INVESTIGATING THE EFFECTS OF ONLINE PUBLIC COMMITMENT IN INFLUENCING CHANGES IN ENERGY BALANCE-RELATED BEHAVIOURS: AN EXPLORATORY SEQUENTIAL MIXED METHODS APPROACH

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Declaration

I declare that this research is developed by me for the purpose of the PhD programme in Liverpool John Moores University and no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Abstract

Background and Aims: The prevention of overweight and obesity is one of today's major public health challenges (Van Stralen et al., 2011). Tackling this issue requires individuals to form a behavioural intention (BI) to engage in physical activity and/or diet, commonly referred to as 'energy balance-related behaviours' (EBRBs) (Looney & Raynor, 2013; Wadden et al., 2012, 2020). Behavioural intentions are not only crucial for securing long-term goals (Baumeister & Bargh, 2014; Kuhl & Quirin, 2011), but are also seen as a key ingredient in various health and psychological behaviour models (Abraham & Sheeran, 2000; Armitage & Conner, 2004; Feil et al., 2023). Despite the utility of these models, the data suggests that many are not able to transform their BI into actual actions – now termed the intention-behaviour gap (Amireault et al., 2008; Faries, 2016; Feil et al., 2023). Numerous authors have suggested ways to deal with this gap.

One particularly important area of focus is a technique known as online public commitment (OPC), in which an individual is asked to make a commitment to perform a particular behaviour or achieve a particular outcome using computer mediated communication (CMC). The principle of OPC derives from commitment research which suggest that a key factor that determines the magnitude of commitment is the publicness with which the individual declares his/her commitment to a position (Cialdini et al., 1978, 1995; Kiesler, 1971). Computer mediated communication allows individuals ease of access, continuous availability, and anonymity (Bradford et al., 2017; Kozinets et al., 2010). Further, as individuals increasingly adopt CMC to conduct numerous aspects of their lives, they are likely to make public commitments to support goal pursuits in conjunction with or lieu of face-to-face alternatives. Thus, computer mediated communication environment has been shown to be an appropriate context in which making a public commitment towards EBRBs will result in behaviour change (Consolvo et al., 2006; Munson et al., 2015),

however, there is lack of conceptual clarity which has impeded progress in OPC intervention research.

The main aim of this thesis was to gain a comprehensive understanding of OPC, in terms of its conceptual elements, the psychological mechanisms underlying its effect on behaviour change and the necessary conditions for making an effective and efficacious OPC.

Methods: To meet the research objectives, this thesis used an exploratory sequential mixed methods design, consisting of three phases of investigation. The first phase was a qualitative study, involving the use of semi-structured interviews to explore the opinions, perceptions and beliefs of those with previous experiences of making an OPC towards EBRBs. The second phase was a quantitative study which employed a randomised controlled trial to investigate the effects of OPC in influencing changes in PA-related goal attainment, level of PA, mental well-being and relative autonomy. The third and final phase was a follow-up qualitative study in which 15 participants of those who took part in the second study were purposively selected, in order to understand the factors that determine the efficacy of an OPC intervention targeting EBRBs. The findings from the three phases of investigation were integrated using the triangulation protocol to create cross-cutting meta-inferences.

Findings: Overall, the findings indicate that OPC is a multidimensional construct consisting of various dimensions that have not been acknowledged in existing literature. The findings show that the reasons why people adhere to their OPCs – although is traditionally based on extrinsic or controlling forces – can be integrated into one's self-concept. Online public commitment, when used as a behaviour change technique, is a promising technique for addressing the intention-behaviour gap, which occurs when individuals fail to translate their intentions to engage in EBRBs into action. The importance of social support was also highlighted in the relationship between OPC and behaviour change. Social support from weak-ties support network can influence motivation towards gaol attainment. Recommendations are made to

enhance the delivery of internet-delivered lifestyle modification programmes. Practitioners (e.g., dieticians, weight loss support groups and fitness coaches) who are concerned with creating a negative energy balance as a way of addressing the overweight and obesity problem are urged to incorporate OPC within their programmes to influence behaviour change.

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Definition of Key Terms

Key concepts and terms (including their respective acronyms) used throughout this study are listed and defined as below:

Behaviour change technique taxonomy (BCTT): a taxonomy of 93 distinct BCT's with labels, definitions and examples, which specifies the potentially active content of behaviour change interventions.

Behaviour change wheel (BCW): A framework for describing, designing and evaluating behaviour change strategies

Behavioural Intention (BI): Refers to an individual's subjective probability that he or she will perform a desired behaviour.

Behaviour change technique (BCT): a systematic procedure designed to modify behaviour, often used in interventions aiming to change specific behaviours, by targeting the underlying determinants of behaviour.

Behaviour change intervention (BCI): Coordinated sets of activities designed to change specified behaviour patterns.

COM-B: The *COM-B model* is a behaviour change framework that proposes three necessary components (i.e., Capability, Opportunity and Motivation) for any behaviour.

Computer-mediated communication (CMC): Conversational interaction mediated through computers or mobile devices.

Energy balance-related behaviours (EBRBs): These are behaviours that may influence the human body's energy balance and include dietary, sedentary, and physical activity behaviour (Kremers et al., 2005). A distinction is made between EBRBs, which aim to address the energy balance, and physical activity, which, in addition to addressing the energy balance, can also promote

overall health and wellbeing. Individuals can also engage in physical activity because it is inherently enjoyable and satisfying.

Health Action Process Approach (HAPA): A psychological theory of health behaviour change that distinguishes between motivational and volitional phases in the behaviour change process, focusing on how individuals initiate and maintain healthy behaviours.

Health Belief Model (HBM): A psychological framework used to understand and predict health behaviours, focusing on how individuals perceive health threats and decide to act based on their beliefs about susceptibility, severity, benefits, barriers, and self-efficacy.

Internet-delivered interventions (IDIs): Behaviour change programs that are delivered to participants over the internet.

Information and Communications Technology (ICT): is a broader term for Information Technology (IT), which refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, video-conferencing, social networking, and other media applications and services enabling users to access, retrieve, store, transmit, and manipulate information in a digital form.

Lifestyle modification programmes (LMPs): Refers to any intervention that creates a framework for encouraging desired behaviours and discouraging unwanted behaviour.

Organismic Integration Theory (OIT): A mini-theory of self-determination theory which explores how individuals internalize and integrate extrinsic motivations, focusing on the process of transforming externally regulated behaviours into self-determined actions

Online public commitment (OPC): The act of making a public commitment using computer mediated communication.

Public commitment (PC): The act of making a commitment to perform a particular behaviour, or achieve a particular outcome in the presence of others.

Physical activity (PA): Refers to any bodily movement produced by skeletal muscles and which requires energy expenditure" (WHO, 2010).

Protection Motivation Theory (PMT): A theory which explains how individuals are motivated to protect themselves against threats by adopting recommended actions, focusing on both threat and coping appraisals.

Self-determination theory (SDT): A theory of human motivation which posits that fostering autonomous forms of motivation for behaviour through environmental supports that foster autonomous reasons will lead to effective self-regulation (Lloyd & Little, 2010).

The Basic Psychological Needs Theory (BPNT): A core concept of self-determination theory which proposes that humans have three innate, universal, and essential needs—autonomy, competence, and relatedness—that are crucial for psychological health and well-being.

Theoretical Domains Framework: An integrative framework which can facilitate comprehensive assessment of behavioural determinants in qualitative studies.

Theory of Reasoned Action (TRA): A motivation theory which posits that a person's behaviour is determined by their intention to perform that behaviour, which in turn is influenced by their attitude towards the behaviour and subjective norms.

Theory of Planned Behaviour (TPB): A key theory of motivation which proposes that human behaviour is guided by intentions, which are influenced by

attitudes towards the behaviour, subjective norms (social pressure), and perceived behavioural control (self-efficacy).

User-generated content (UGC): Refers to any online content—text, videos, images, reviews, etc.—created by people rather than brands.

Quality of life (QoL): This refers to a state of complete physical, mental, and social well-being, and not merely the absence of disease (Davis & Davies, 2007)

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Chapter 1: Introduction and Background

1.1 Introduction

The problem of excess weight gain and obesity is a serious public health challenge, both internationally and within the UK (Flint & Oliver, 2019). Being overweight or obese is associated with an increased risk of several common diseases including diabetes, cardiovascular disease and some cancers (Csige et al., 2018). Obesity is often understood to be the result of the chronic imbalance between energy intake and energy consumption which can lead to an increased adipose tissue and alterations in metabolic pathways (Ataey et al., 2020; Romieu et al., 2017; Zhang et al., 2022). Since weight gain is a result of a positive energy balance (i.e., when energy intake exceeds energy expenditure), these behavioural actions (e.g., physical activity, diet, and sedentary lifestyle) – referred to as 'energy balance-related behaviours' (EBRBs) – have become of great interest because of their direct relation to overweight/obesity and their influencing factors in those who intend to change their behaviour.

Although EBRBs refer to behavioural actions responsible for weight gain, these behavioural actions are often confused with one another. Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that results in energy expenditure (Siscovick et al., 2013). Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. On the other hand, physical fitness is one's ability to execute daily activities with optimal performance, endurance, and strength with the management of disease, fatigue, and stress and reduced sedentary behaviour Kljajević et al. (2022). When an individual does not meet recommended guidelines for PA (i.e. at least 150 minutes of moderate-intensity or 75 minutes of vigorous intensity per week, or a combination of both), this is called physical inactivity, which is terminologically different from sedentary behaviour (i.e., any

waking behaviour characterised by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture (Tremblay et al., 2017)). Physical activity can also be distinguished from EBRBs. In the context of EBRBs, PA is commonly regarded as a behavioural action that may positively or negatively influence the energy balance (Hill et al, 2013; Verhavert et al., 2020; Hall et al., 2022; Van Stralen et al., 2011), however, PA can also exist outside the context of EBRBs whereby individual can improve their physical activity for the sake of it (e.g., because it is inherently enjoyable and satisfying), or to improve their quality of life (QoL; Marquez et al., 2020; Marconsin et al., 2022).

This research focusses mainly on PA due to its important role in addressing overweight and obesity. For example, adhering to the recommended levels of PA has been shown to influence weight loss and weight loss maintenance (Garvey et al., 2022; Jeffery et al., 2003; Lagerros & Rössner, 2013; Oh et al., 2021; Smith & Liu, 2020; Swift et al., 2014, 2018). Indeed, weight loss of 5-10% is sufficient to provide a clinically significant health benefit in terms of risk factors for cardiovascular disease and diabetes (Butryn et al., 2021; Dashti et al., 2014; Larsen et al., 2023).

Although individuals may develop an intention to change their EBRBs, the data suggest that many will not follow through with their intention. This discrepancy has been labelled the "intention–behaviour gap"(Marteau et al., 2012; Papies et al., 2022; Sheeran & Webb, 2016) and means that forming good intentions is not enough to change behaviour (Papies et al., 2022). Although behavioural economic theory suggest that people tend to behave in ways that maximise their economic return and well-being, the performance of EBRBs usually requires individuals to consistently perform behaviours where the immediate costs to the individual are high (e.g., denying their desire for highly palatable foods, physical exertion). Often the effort to realise the physical, mental and psychological benefits of EBRBs (Burns et al., 2012; Cawley & Price, 2013) occur at some unknown time in the future, which may lead to these benefits being undervalued during an individual's decision-making process, thus

resulting in difficulty in adhering to EBRBs. Although the composition of lifestyle modification programmes (LMPs) to help maintain a negative energy balance are highly varied, they mainly aim to use behavioural support to encourage participants to change their EBRBs. Indeed, the modification of EBRBs are the cornerstone of most LMPs (Ananthapavan et al., 2018a). Numerous behavioural support models and strategies, such as detailed action planning (Maltagliati et al., 2023; van Bree et al., 2016), perceived self-efficacy (Williams & French, 2011; Yu et al., 2022), and personality (MacCann et al., 2015) amongst others, have been developed to deal with the intention-behaviour gap. Behavioural intentions (BIs) are seen as a key ingredient in many of these models (Sniehotta et al., 2005), because of the key role they play in an individual self-regulation mechanism. Indeed, the concept of BI has thus proved invaluable for researchers concerned with behaviour change (Sheeran & Webb, 2016).

In an attempt to enrich LMPs, an increasing number of studies have incorporated a technique called public commitment (PC) to influence positive behaviour change. In this technique, an individual is asked to make a commitment to fulfil his/her BIs in the presence of others (de Leon & Fuqua, 1995; Dellande & Nyer, 2007; Lokhorst et al., 2013; Nyer & Dellande, 2010). Broadly speaking, commitment refers to a promise, agreement or pledge do something for oneself or others in the future. Commitment is generally thought to be a powerful motivating factor that produces determination and effort in the direction of behaviour change or action. In many domains of life, individuals create ad hoc arrangements that enable them to formalise and facilitate their goals or intentions, which can be construed as commitments. For example: cutting up one's credit card, brushing one's teeth earlier in the evening to avoid late night snacking, not storing alcohol in the house, not taking a wallet when heading out to avoid spending money (Bryan et al., 2010). Although less theoretically contrived and more inductively driven, these examples have confirmed the same logic that has driven standard procedures for the operationalisation of commitment

The study of commitment has played an important role in understanding human behaviours in several different contexts. For example, in relationships individuals make use of commitment to demonstrate the seriousness of their relationships, thus, binding each other to action. Hence, relationship researchers have long considered commitment as an important variable in sustaining long-term relationship, such as marriages (Agnew et al., 1998; Arriaga & Agnew, 2001; Dean & Spanier, 1974; Hinchliff & Gott, 2004; Levinger, 1965; Nock, 1995; Reis & Sprecher, 2013; Stanley et al., 2010; Stanley & Markman, 1992).

Studies of commitment have also received extensive empirical and qualitative attention in organisational behaviour research (Al-Jabari 2019; Chen & Francesco, 2000; Lok & Crawford, 2004; Miller & Lee, 2001; Rashid et al., 2003; Singh et al., 2008). In this area, researchers have sought to understand the relationships that employees have with organisations, which has serious implications for the decisions to continue or discontinue their involvement in the organisation. In the area of corporate social responsibility (CSR), commitments play a central role in holding organisations accountable to stakeholders and the public in areas such as environment, the economy, human rights, and philanthropic responsibilities (Aguinis, 2010; Carroll, 1999; European Commission, 2011; Macassa et al., 2021; McWilliams & Siegel, 2001; Peloza, 2009; Shamir, 2005; Tomaselli et al., 2018; Velte, 2022).

As seen from the examples above, the commitment construct is conceptualised differently depending on the context in which it is studied, thereby underscoring the need for conceptual clarity. The relative ambiguity of the commitment term, masks significant differences in how commitment has been conceived by theorists over the years (Reis & Sprecher, 2013). Despite the differing conceptualisations of commitment, the general consensus is that an individual's commitment to engage in a specified behaviour conveys his/her attitudinal position towards the behaviour, hence, the principle of commitment could be said to derive from attitude concept. An attitude is an "individual's disposition to react with a certain degree of favourableness or

unfavourableness to an object, behaviour, person, institution, or event – or to any other discernible aspect of the individual's world" (Ajzen, 1993: p.41). With this mind, some theorists view commitment in psychological terms, as the verbal and non-verbal expressions of feelings or emotions associated with an attitude object. This view forms the theoretical basis of relationship commitment (Agnew et al., 2008; Johnson et al., 1999; Le & Agnew, 2003; Levinger, 1965, 1979, 1980; Rusbult et al., 2012; Tran et al., 2019) and organisational commitment constructs (Al-Jabari, 2019; Chen & Francesco, 2000; Lok & Crawford, 2004; Miller & Lee, 2001; Rashid et al., 2003; Singh et al., 2008). Other theorists view commitment in behavioural terms, that is, responses of a conative and overt nature (e.g., past behaviours, behavioural inclinations, intentions or plans) involving the attitude object, for instance, an individual might write a blog in support of a community project. Behavioural community psychologists have tended to focus on this type of commitment to promote resource conservation behaviours (Bachman & Katzev, 1982; Katzev & Pardini, 1987; Wang & Katzev, 1990).

The focus of this thesis is not on the commitments that individuals make to themselves privately, or commitments to others to perform mutually beneficial behaviours, but on the commitment they make to perform a certain behaviour for themselves and in the presence of others. The visibility of the commitment increases accountability. When commitments are made in front of others, there is a heightened sense of obligation to follow through to maintain one's reputation and cognitive balance (Deutsch & Gerard, 1955; Nyer & Dellande, 2010). The power of PC lies in its ability to leverage social and psychological mechanisms to influence behaviour. Strong theoretical and empirical evidence supports the notion that individuals who make a PC to a BI exhibit greater effort and persistence (Cialdini et al., 1978; Kiesler, 1971; Ronay et al., 2017) due to several psychological mechanisms that are enacted. Although the concept of PC has been shown to influence positive behaviours in a wide range of contexts, much of the underlying constructs are based on the physical presence of others as witnesses.

Public commitments have been used effectively to promote pro-environmental behaviours. For instance, community pledges to reduce energy consumption or increase recycling rates leverage social norms and accountability to foster sustainable practices (Abrahamse et al., 2005; Shippee, 1980; Shippee & Gregory, 1982). In health promotion, asking people to publicise their commitments have shown positive results increasing adherence to EBRBs (Coupe et al., 2019; Nyer & Dellande, 2010).

As individuals employ the internet and digital technologies in their daily lives, they are likely to interact with others in an online environment in ways traditionally associated with geographically proximate settings to attain various goals (Bradford et al., 2017). Indeed, within these online environments individuals are more likely to achieve success with their BIs when they make a PC to achieving them, a concept known as online public commitment (OPC). The internet is awash with behaviours analogous to making an OPC towards EBRBs, from the individual who uploads his workout video on social media, to another who writes a blog about her weight loss journey, it is evident that these tools are increasingly been employed to publicise a BI to others. Indeed, these online environments may make salient a form of social accountability which motivates behaviours that facilitate adherence to the OPC.

Whilst the psychological mechanisms underlying face-to-face (FtF) PC effect are well understood, little is known of the possible psychological mechanisms that guide individuals to adhere to their OPC. Whilst commitments are made online, adherence behaviours resulting in desired outcomes occur offline. It will be too simplistic to assume that the psychological factors which mediate the relationship between FtF PC and behaviour change will be equally manifested via the context of computer mediated communication (CMC), where the ubiquitous nature of the internet presents abundant opportunities for individuals to manage aspects of the self to portray a particular image or achieve a particular goal. This impression management strategy has been termed "online self-presentation", and there is an abundance of research demonstrating that interactants in online environment have greater control over self-

presentational behaviour which will allow them to manage their online interactions more strategically (Ellison et al., 2006; Fullwood et al., 2020). In this aspect, it remains unclear how individuals manage their online presentation of self in order to accomplish the goal prescribed by their online PC. It is also unclear whether CMC provides opportunities for making an effective OPC due to characteristics such as anonymity, access to diverse viewpoints, ease of access, privacy etc, or whether these same characteristics may impede it.

There is also the issue of the long-term maintenance of EBRBs. Substantial behaviour change is possible across a range of LMPs, but durable change is much more challenging due to the complex set of interactions between agentic, behavioural and environmental factors (Hall & Kahan, 2018; Loveman et al., 2011; Varkevisser et al., 2019). The word 'substantial' refers to changes in behaviour that are large enough to have an impact on EBRB outcome, and durable refers to changes that will last for the long term, without the need for reminders or further interventions (Cialdini, 2001). Durable behaviour change is essential to addressing many societal and health-related challenges (Green & Vergragt, 2002; Jack et al., 2010; Kelly & Barker, 2016; MacPherson et al., 2021), and the maintenance of durable behaviour changes requires LMP designers to balance the dual demands of efficacy and effectiveness (Mejía, 2021; Michie et al., 2014). This is important given that many abandon their EBRBs following the intervention period (McGuire et al., 1999).

To understand the ability of OPC to influence durable behaviour changes will start by distinguishing between "hard" and "soft" commitments. Hard commitments (e.g., financial incentives, contingency contracts) refer to strategies that call for real or economic penalties for failure, or rewards for success. On the other hand, soft commitments have primarily psychological consequences. Thus, breaking an OPC, in this case, may lead to reputational damage and social disapproval. Although, there has been an increasing attention in the use of hard commitments to positively influence health-related behaviour changes (Harkins et al., 2017; Marteau et al., 2009;

Mitchell & Faulkner, 2012; Ries, 2012; Volpp et al., 2008), their long-term effects have been questioned, particularly when the incentives are removed (Jeffery, 2012; Paloyo et al., 2014; Wall et al., 2006). Aside from the costs of providing incentives, hard commitments are also subject to ethical concerns by the public (Giles et al., 2015).

The focus of this thesis shall be on soft commitment strategies, because they are more acceptable for low socio-economic populations, hence, a more economically prudent approach to health and weight-related behaviour change (Coupe et al., 2019). Soft commitments strategies are brief, simple to incorporate, cost effective and may be easy to understand for those with low health literacy (Coupe et al., 2019). Unlike hard commitments, soft commitments strategies have had somewhat greater success in facilitating durable behaviour changes, even after individuals have fulfilled their initial pledge. Most of these claims have been tested in the context of pro-environmental behaviours (Katzev & Pardini, 1987), however, no experimental studies exist to examine the relative impact of OPC on EBRBs during a specified follow-up period. As soft commitments strategies require individuals to publicise their PCs online, it could be argued that they are an unsuitable approach to those who are digitally excluded. However, as the number of internet users has been increasing at an annual rate of 3.4%, the digital divide is becoming less of a concern (Petrosyan, 2024).

Although there is merit in incorporating OPC strategies within internet-delivered interventions (IDIs) that aim to modify EBRBs – especially due to the high rates of internet access, increased self-disclosure and significant growth of IDIs in recent years – such interventions often encounter attrition problems. In fact, high attrition is one of the most important methodological challenges faced by IDIs that aim to modify EBRBs (Richardson et al., 2010a; Wurst et al., 2020). Attrition can introduce bias if the characteristics of people lost to follow-up differ between the randomised groups (Dumville et al., 2006a). Also, research on interventions that target EBRBs, whether online or FtF, have been focused on bounded present-tense, and discreetly measurable

behaviour change problems, evaluated in the short term. Online public commitment research will benefit from design and behavioural science insights to deliver interventions that shape behaviour beyond the period of the intervention. Yet both design and behavioural science research focused on durable behavioural change is limited (Kwasnicka et al., 2016; Schmidt & Stenger, 2024). Currently, there is a gap in the knowledge about the factors that determine the efficacy of IDIs that target EBRBs. An understanding of these factors can help to strengthen the internal and external validity of IDIs and increase the rate of their long-term success.

Another problem is due to the lack of conceptualisation of the OPC term. While the definition of its predecessor, PC, is much clearer and in line with commitment theory and research (Abrahamse et al., 2005; Cialdini et al., 1978; Cialdini & Trost, 1998; Kiesler, 1971), OPC, is currently undefined. As a consequence of this lack of clarity in its definition, it remains unclear who the acting subjects are (i.e., whether are they individuals or group of individuals), what is the mode of communication (i.e., one-to-one, one-to-may, or many-to-many), the nature of the behavioural intention (i.e., a specified behaviour or specified outcome), the contingencies arranged for the behaviour (i.e., financial or psychological), or the nature of CMC through which the OPC is transmitted to an audience (e.g., synchronous or asynchronous). Such limitations undermine efforts to operationalise OPC as part of a LMP to influence EBRBs. Public commitment research may provide a good starting point for conceptualisation, even though its distinct dimensions are not often advocated as being interrelated. A rigorous and encompassing conceptualisation should identify the concept within the complexity of the online environment, as defined by the dynamic relationships between its underlying dimensions, rather than as a disparate collection of circumstantial variables.

There have been few studies that have explicitly addressed the relationship between OPC and behaviour changes in the context of EBRBs. Most of these have been experimental, with mixed results, due to several methodological challenges. Even

fewer research studies have used an exploratory approach to gain an understanding of the experiences, opinions and attitudes of those who have made OPC towards their EBRBs, before attempting to operationalise this concept. Driven by this poor understanding of OPC, the fundamental purpose of this thesis is to use an exploratory sequential mixed methods approach to provide a comprehensive understanding of the OPC phenomenon, in terms of whether it is more effective than keeping a private commitment, and if so, "why" and "how" it is effective.

1.1.2 Behaviour Change Theories

The existing literature on PC is generally highly positive about commitment making (Lokhorst et al., 2013; De Young, 1993; Nyer & Dellande, 2010; Gopinath & Nyer, 2009). Indeed, the renewed interest in commitment making especially in the context of CMC, would seem to suggest that OPC is a promising technique to promote behaviour change in a wide range of behavioural contexts (Bradford et al., 2017; Munson et al., 2015; Newman et al., 2011; Consolvo et al., 2006). Thus, it is necessary to understand OPC through the lens of behaviour change discussion and behavioural science. To replicate and implement behaviour change interventions in practice, there is need for an agreed terminology to report their content. A shared terminology for specifying behaviour change interventions allows the more efficient accumulation of knowledge and investigations of generalisation across behaviours, populations, and settings (Marques et al., 2024).

The primary goal of behaviour change is to establish new behaviours and patterns of interactions that will replace the old ones, thereby preventing maladaptive patterns from reappearing and allowing long-term, adaptive change in the individual (Waldron et al., 2013). A behaviour change intervention (BCI) is a coordinated set of activities designed to influence or change specified behaviour patterns (Mitchie et al., 2021). In general, these behaviour patterns are measured in terms of the prevalence or incidence of particular behaviours in specified populations. Behaviour change techniques (BCT) refers to the smallest parts of the content of behaviour change

intervention that are observable, replicable and on their own have the potential to bring about change. Behaviour change interventions has also been defined as a systematic procedure included as a potentially active component of an intervention designed to change behaviour (Marques et al., 2023).

Given the increasing recognition that behaviour change interventions should draw on theories of behaviour and behaviour change in the development, behaviour change theories or models (e.g., theory of planned behaviour, health belief model, self-determination theory) provide theoretical frameworks for understanding and influencing behaviour and behaviour change.

Notably, the UK Medical Research Council's guidelines for developing and evaluating complex interventions suggest that a key early task is to develop a theoretical understanding of the likely process of change by drawing on existing evidence and theory (Skivington, 2021). However, the guidance does not specify how to select and apply theory (Mitchie et al, 2005). Mitchie and Prestwich (2010) further argue that even when interventions are said to be guided by theory, in practice they are often not or are only minimally. Thus, in order to improve intervention design, there is need for a systematic method that incorporates an understanding of the nature of the behaviour to be changed, and an appropriate system for characterising interventions and their components that can make use of this understanding (Mitchie et al., 2011).

1.1.2.1 Positioning within a theoretical framework

Despite the exponential growth of internet-delivered interventions (IDIs) to promote EBRBs, experimental studies of OPC lack embedded evidence-based behaviour change theories. Thus, there is need for OPC interventions to be underpinned by evidence and theory to increase effectiveness. Existing OPC interventions have utilised BCTs such as social support, commitment, goal setting

(Munson et al. 2015; Consolvo et al., 2006), however, their behaviour change theories are rarely documented.

Many theories and models of behaviour change exists to guide researchers on which constructs can be utilised to elicit and maintain behaviour change, and the theories may differ in appropriateness depending on the behaviour in question. A framework which can help in understanding OPC, not only from a conceptualisation standpoint, but from an operationalisation standpoint is the behaviour change wheel (BCW; Michie et al., 2011), which is a useful method for characterising BCIs and linking them to an analysis of the targeted behaviour. The BCW has three layers: sources of the behaviour, intervention functions and policy categories; reviewed below.

Sources of the behaviour

COM-B forms the centre of the BCW and consists of *capability*, *opportunity* and *motivation*, the three elements that influence behaviour. The COM-B also works in conjunction with the Theoretical Domain Framework (TDF; Atkins et al., 2017) to identify 14 types of individual barriers and facilitators people might encounter, under each COM-B element. The TDF is a theoretical framework rather than a theory; it does not propose testable relationships between elements but provides a theoretical lens through which to view the cognitive, affective, social and environmental influences on behaviour (Atkins et al., 2017).

Capability is defined as the individual's psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. The TDF factors within this element include knowledge, skills, memory, attention and decision processes, and behaviour regulation (habits). Motivation is defined as the brain processes that energize and direct behaviour, not just goals and conscious decision-making. Motivation includes habitual processes, emotional responding, as well as analytical decision-making. The TDF factors that fall this

element include beliefs about capabilities, social/professional/role/identity, beliefs about consequences, emotions, goals, intentions, reinforcing behaviour and optimism/pessimism. Finally, opportunity is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it (Michie et al., 2011). The TDF factors that fall this element include environmental context/resources and social influences.

These three elements interact and influence each other to alter behaviour. Interventions must target one or more of these elements (COM) to deliver and maintain effective behaviour change. An OPC intervention could target the opportunity element by encouraging an individual to publicise their intentions to others, especially those who are highly susceptible to behavioural consistency or normative influence. Also, this same individual, if he or she has access to the internet and a smartphone, can be encouraged to join an online support community to receive social support.

In terms of the capability element, the individual – although highly motivated to increase his or her level of PA – may have difficulties in identifying suitable and specific goals. Thus, an OPC intervention can be designed to incorporate a collaborative goal setting interview, to will help the individual to identify potential areas for improvement and eliciting specific goals from each of these areas.

Finally, supposing the individual expects that his or her behaviour should reflect his or her true motivation, internal self or self-concept, the OPC intervention can address the motivation element by encouraging the individual to come to these decisions by themselves rather than being coerced. For example, the individual could be asked to identify personally meaningful goal(s) and then phrase his or her goal in the first person and positively. The intervention can also be designed to address the motivation element by targeting individuals who have a strong intention to engage in EBRBs, whether this a specific behaviour or a behavioural outcome.

Intervention Functions

The middle circle of the BCW captures nine types of interventions that can support the required behaviour change. The nine intervention functions consist of education, persuasion, incentivisation, coercion, training, enablement, modelling, environmental restructuring, and restriction. Broadly speaking, OPC can be said to function as a persuasion. Persuasion can be defined as a change in a receiver's preferred action resulting from the exposure to a sender's argument (Penczynski, 2016), or the conscious effort to influence the thoughts or actions of a receiver (Cameron, 2009). Cialdini (1984) proposed that persuasion can be initiated via various pathways (e.g., reciprocity, scarcity, authority, liking, social proof), however, for an OPC intervention, persuasion works by enacting people's in-born desire to behave in a manner that matches their past decisions or behaviours. This persuasion process is also known as behavioural consistency and is also rooted in Festinger's (1957) theory of cognitive dissonance. Hence, if an individual publicises his/her behavioural intention or commitment to engage in EBRBs, it may serve to increase his/her motivation to stay on the course and avoid eliciting disapproval from the self and others. Pallak and Cummings (1976) find public commitment to be a motivator for individuals to remain compliant to specific behaviours which enable goal attainment. Similarly, Ronay et al. (2016) and others (e.g., Parrot et al., 1998; Nyer & Dellande, 2010) have also found the PC effect to be moderated by a desire to attain peer approval by achieving the goals to which individuals has publicly committed.

The nine intervention functions have been linked to a taxonomy of 93 replicable BCTs (Michie et al., 2013) – the active ingredients of behaviour change. Although there exists a plethora of frameworks for classifying BCTs (e.g., Avery et al., 2012; Dombrowski et al., 2012; Rodrigues et al., 2013; Mitchie et al., 2011; Presseau et al., 2015; Pezzolato et al., 2023), the Behaviour Change Techniques Taxonomy v1 (BCTTv1) is one of the most widely used classification of BCTs across a variety of behaviours (Michie et al. 2013), because also provides a shared, standardised

terminology to be used for describing or specifying the active ingredients of BCIs. In the domain of PA, Mitchie et al (2011) provided a taxonomy of BCTs used in interventions.

Table 1 identifies all of the BCTs that are relevant to this thesis, including their overarching theoretical frameworks. Some of these BCTs, such as OPC and social support were intended as active components of the intervention (see chapter 5) because participants were randomised to either receive the intervention or not. Whilst others, such as goal setting and feedback were not intended to be an active component of the intervention because they were administered to all participants, hence, no 'true' control group. It is important at the outset of this research to briefly discuss some of the most relevant theoretical frameworks that underly OPC and other BCTs used in the intervention (chapter 5). In terms of its operationalisation, an OPC intervention consist of various BCTs designed to modify or influencing an outcome behaviour (as shown in Table 1). The outcome behaviour, in the case of the present research, are EBRBs, in particular PA behaviour (discussed further in section 2.2.1).

Goal Setting technique

Goal setting is a relevant BCT associated with the OPC intervention, although not intended as an active component in of the OPC intervention in this thesis (see chapter 5). The purpose of goal setting, for an OPC intervention, is to provide a structured format for eliciting individual goals and a standardised method of rating goal attainment. Goal attainment, in this sense, can be defined as the extent to which an individual's goals are achieved during the course of the intervention. Goal setting is a type of enablement, as per Michie et al.'s (2013) intervention function. This is because individuals who are not able to translate their intentions into actions, usually have self-regulation or behaviour regulation challenges that impact on the possibility of engaging in meaningful activities. They may also have difficulties in identifying specific and measurable goals that make it easier to evaluate goal attainment. Thus, it

is essential to establish which difficulties or areas for improvement are most relevant to the individual and therefore likely to develop into suitable goals. It is important that goals are formulated in such a way that a single attainment rating score will provide meaningful and accurate information about current attainment in relation to the goal, both when setting the goal and when evaluating progress at a later stage. From BCT taxonomy perspective, a distinction has been made between goal setting behaviour and goal setting outcome, however research suggest that combining both BCTs can produce optimal performance (Filby et al., 1999).

Online Public Commitment technique

The OPC technique fits under the commitment BCT (Michie et al., 2013) which they describe as asking the person to affirm or reaffirm statements indicating commitment to change the behaviour. Identifying goals is not sufficient for goal attainment because without the individual being committed to the goals, goal attainment may not be possible. Goal setting research has consistently demonstrated that goal-performance relationship is strongest when people are committed to their goals (Locke & Latham, 1993, 2002; Seijts & Latham, 2000; Klein at el., 2020). Unfortunately, as explained earlier, there is a discrepancy between intentions and actual behaviour. According to the COM-B and TDF in this scenario, motivation is essential for behaviour change to occur, however, the individual's subjective probability of performing the behaviour (i.e., intentions) is low. For individual who are highly motivated but lack the necessary skills to identify specific goals, this can, according to COM-B, present an opportunity for behaviour change to occur.

Thus, it is important to translate attitudes into actions, which in the case of an OPC technique can involve encouraging the individuals to commit to their goals by phrasing the goals in the first person, and based on the outcome they want to achieve, and finally asking them to publicise their commitment to others via CMC. When OPC is combined with goal setting, there are several behaviour change theories which help

to explain the relationship between intentions and goal attainment/behaviour change, including: theory of reasoned action/planned behaviour (reviewed in 2.6.1), achievement goal theory (reviewed in 2.6.2), and health action process approach (reviewed in section 2.6.3).

Social Support technique

Social support is another BCT relevant with an OPC intervention. As an intervention function, a social support BCT is a type of enablement. Enablement involves providing or improving psychological, social or physical resources or treatments to support enactment of a behaviour. From a COM-B and TDF perspective, the provision of social support presents an opportunity to influence an individual who is susceptible to social influence, and has access to peer networks. The provision of social support can also enhance motivation by addressing an individual's belief about his/her capabilities. The relationship between social support and self-efficacy has been demonstrated in the literature (Yiming et al., 2023; Li & Găman, 2021; Hossain et al., 2024; Karimy et al., 2018; Ekpezu et al., 2023).

Various dimensions of social support have been identified (e.g., emotional, informational and instrumental), and according to Michie et al's (2013) BCT taxonomy, each of these dimensions represent different types of BCTs that provide enablement. Emotional support is the provision of empathy, encouragement, trust and caring. Information support is the provision of beneficial guidance, information and/or advice. Instrumental support involves providing practical support such as actions of service, direct interventions, monetary aid, all of which are tangible. Overall, an individual's perception about the availability of support appears to be the most potent social support variable with respect to health behaviours. According to Lox et al. (2006: p.106) social support represents "the most important type of social influence in exercise and other physical activity settings".

Self-determination theory (SDT; Deci & Ryan, 2000) provides a useful framework for understanding the relationship between social support and behaviour change. Self-determination theory is an organismic-dialectical theory that provides an account of the global motivational forces underlying volitional behaviour. Self-determination theory comprises six mini-theories (Cognitive Evaluation Theory (CET); Organismic Integration Theory (OIT); Causality Orientations Theory (COT); Goal Contents Theory (GCT); Basic Psychological Needs Theory (BPNT) and Relationships Motivation Theory (RMT)), each of which was developed to explain a set of motivationally based phenomena that emerged from laboratory and field research. Each, therefore, addresses one facet of motivation or personality functioning. Two of these mini-theories (Basic Psychological Need Theory and organismic integration theory) are relevant in understanding the importance of social support and other BCTs within an OPC intervention, are discussed below. Table 1 also explains the justification of the BCTs used in this research, particularly in the context of SDT concepts.

The Basic Psychological Needs Theory (BPNT) proposes that individuals have an innate tendency towards psychological growth and the mastery of challenges through the satisfaction of three fundamental needs - autonomy, competence, and relatedness (McLachlan et al., 2011). The *need for autonomy* reflects a desire to engage in activities of one's choosing and to be perceived as the origin of one's own behaviour (deCharms, 1968; Deci & Ryan, 1985). For example, an individual who makes an OPC is autonomous when he/she is able to identify personally meaningful goals. The *need for competence* refers to the experience of behaviour as effectively enacted. For example, an individual who makes an OPC towards engaging in EBRBs feels competent when he/she feels able to meet the challenges of engaging in the target behaviours. Finally, the *need for relatedness* involves feeling close to, and valued by others (Ryan & Deci, 2000). An individual can satisfy this psychological need by making an OPC in a

supportive environment where he/she can feel connected to other people in a meaningful way. The BPNT is discussed further in 2.6.4.1.

Organismic integration theory (OIT) addresses the topic of extrinsic motivation and explains how extrinsic motivation, or behaviours aimed at external outcomes, can become internalized and integrated into a person's sense of self, leading to more autonomous and sustainable motivation (McLaclan et al., 2011). Central to the OIT is the distinction between *intrinsic* and *extrinsic* motivation. Intrinsic motivation refers to engaging in behaviour for motives that emanate from the self, such as for the enjoyment, satisfaction, and fulfilment that behavioural engagement provides (Slemp et al., 2021), while extrinsic motivation refers behaviours performed to obtain some outcome separable from the activity itself (Ryan & Deci, 2000). This distinction is important for an OPC intervention because the psychological mechanisms underlying the effect of PC have been usually attributed to extrinsic forces, such as the anticipated personal and social disapproval and penalties (Parrott et al., 1998), or the need to appear consistent in the eyes of others (Gopinath & Nyer, 2009).

However, the OIT further proposes that different types of extrinsic motivation lie on a continuum from lower self-determination (i.e., controlled motivation) to higher self-determination (i.e., autonomous motivation), and reflect the extent to which extrinsic motives can be assimilated with the self, such that it is consistent with one's values and goals (Deci & Ryan, 2000). A fuller discussion of OIT is provided in section 2.6.4.2. In addition to specifying different types of extrinsic motivation that may guide behaviour, the OIT also details specific conditions that are responsible for more or less self-determined motivation. Specifically, the satisfaction of an individual's need for autonomy, competence, and relatedness (discussed previously) will result in diverse cognitive, affective, and behavioural consequences (Edmunds et al., 2006).

Policy Categories

The outer layer of the BCW identifies seven policy categories that can support the delivery of the intervention functions. These categories consist of guidelines, environmental/social planning, communication/marketing, legislation, service provision, regulation, and fiscal measures. Policy and government influences often affect individuals' behaviours and can therefore be used to enable behaviour change interventions. While these policy categories are perhaps designed with national policy in mind, they can be of significant use in supporting behaviour change at a micro-level.

Many evidence-based policy recommendations fail to deliver on their policy objectives because the wrong approach has been adopted to delivering intervention types. For example, an OPC technique is more effect when it is accompanied with a sense of choice and volition, it may be counter-productive to use legislation which may likely thwart people's autonomy and produce suboptimal performance. The BCW provides policy makers with a menu of options to consider when designing the implementation strategy. The use of communications and marketing is more appropriate when an OPC intervention functions as a persuasion. Mass media campaigns, digital marketing campaigns and correspondence are relevant when there is need to educate people about what to do or why change is important, or to persuade them of its importance and to trigger action. On the other hand, a social support technique, which functions as an enablement, will be better served by service provision. The provision of emotional, informational and instrumental support is most relevant when the task is to improve people's ability to change their behaviour.

Table 1:
Combined link between BCTs, COM-B model, TDF domains, intervention functions, and policy categories in this research, including the rationales

Behaviour change technique used in this research study	Definition as per Mitchie's BCTTv1	Intervention Functions (IF)/COM-B/Policy Categories (PC)/TDF	Some of the underlying Behaviour Change Theories/Models	Rationale for use in intervention	Rationale for use based on self-determination theory concepts.
1.1 Goal setting (behaviour)	The person is encouraged to make a behavioural resolution (e.g. take more exercise next week). This is directed towards encouraging people to decide to change or maintain change.	(IF) Enablement (COM-B) Motivation (TDF) Goals (TDF) Optimism (PC) Service provision	• Achievement Goal Theory (AGT) • Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) • Theory of Planned Behaviour (TPB; Ajzen, 1985, 1987, 1991) • Goal setting theory (Locke & Latham, 1990, 2013)	• There was a need to have a structured format for eliciting individual goals and a standardised method of rating goal attainment. • It was important for individuals to provide a quantitative information about how motivated they are to achieve the behaviour change. This helps in identifying individuals who are ready to engage in the target behaviour, and reduce the risk of attrition.	• Helping individuals to identify personally meaningful goals, that are not coerced, will satisfy their need for **autonomy.**
1.3 Goal setting (outcome)	The person is encouraged to set a general goal that can be achieved by behavioural means but is not defined in terms of behaviour (e.g. to reduce blood pressure or lose/maintain weight), as opposed to a goal based on				

	changing behaviour as such. The goal may be an expected consequence of one or more behaviours, but is not a behaviour per se. This technique may co-occur with technique 5 if goals for both behaviour and other outcomes are set.				
1.9 Online public commitment	Ask the person to affirm or reaffirm statements indicating commitment to change the behaviour.	(IF) Persuasion (COM-B) Opportunity (TDF) Resources (TDF) Optimism (PC) Communication/marketing (IF) Enablement (COM-B) Motivation (TDF) Goals (PC) Service provision	• Persuasion (consistency) (Cialdini • Health Action Process Approach (HAPA) • Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) • Theory of Planned Behaviour (TPB; Ajzen, 1985, 1987, 1991)	• Without committing to identified goals, goal setting will not have any motivating effect (Locke et al., 1988; Klei et al., 1989). • There is need to assess the effectiveness of a manipulation on the individuals, to check whether the manipulation has successfully influenced the desired change in the experimental conditions.	• Encouraging individuals to phrase their goal in the first person (e.g., "I will exercise three days a week"), positively, and based on a meaningful goal that he/she wants to achieve, will enhance the experience of the OPC as volitional and reflectively self-endorsed. Doing this will satisfy the need for **autonomy**.

			• Cognitive dissonance (Festinger, 1957) • Self-perception theory (Bem, 193) • Social penetration theory (Altman & Taylor, 1973)		
3.1 Social support	Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues,' buddies' or staff) or non-contingent praise or reward for performance of the behaviour. It includes encouragement and counselling, but only when it is directed at the behaviour.	(IF) Enablement (COM-B) Opportunity (TDF) Social influences (PC) Service provision	• Basic Psychological Needs Theory (BPNT; Deci & Ryan, 200) • Social impact theory (SIT; Latane, 1981)	• It was important to tease out a causal link between OPC and behaviour change.	• Provision of social support can promote the number of opportunities for feeling involved with and close to other people, thereby enhancing their sense of **relatedness**. • Encouragement and praise from others can provide information to individuals about their performance. This may satisfy the need for **competence**.

3.3 Social support (emotional)	Advise on, arrange, or provide emotional social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behaviour.				
1.4 Action planning	Involves detailed planning of what the person will do including, as a minimum, when, in which situation and/or where to act. 'When' may describe frequency (such as how many times a day/week or duration (e.g. for how long). The exact content of action plans may or may not be described, in this case code as this technique if it is stated that the behaviour is planned contingent to a specific situation or set of situations	(IF) Environment Restructuring (COM-B) Capability (TDF) Knowledge (PC) Guidelines	Implementation intentions (Golwitzer, 1999)	• As part of the goal setting interviews, it is important to identify – not only a performance goal (i.e.., goals that specify the end products of performance, but are usually expressed in terms of personal achievement) – but the *process goals* (i.e., goals focus on improving strategy, form and other aspects needed to perform a skill more successfully) that will enable individuals to achieve their performance goal.	• Action planning can enable individuals to achieve skills mastery, which will help in satisfying the need for **competence**.

	even if exact details are not present.			• While the majority of individuals may easily identify suitable goals, for some others it may be more challenging. It is important to understand possible reasons for difficulties in identifying goals in order to manage the process of setting goals sensitively. A structured and standard process was needed for eliciting goals for easier goal attainment rating.	

1.2 Significance of the Study

The current thesis hopes to provide both a theoretical and practical contribution to the literature. Theoretically, only a handful of studies exists whereby the concept of OPC have been explicitly investigated in the context of EBRBs (Munson et al., 2015). Most studies of OPC have been experimental with mixed results. Further, for most studies the OPC concept has been investigated implicitly, that is, the concept of OPC was not explicitly defined or directly measured in any way (Cavallo et al., 2012; Consolvo et al., 2006). No study has attempted to qualitatively explore the experiences, beliefs and attitudes of those who have made an OPC towards EBRBs. As such, missing from current research is the causal explanation of the OPC effect, and an understanding of the necessary conditions for making an effective OPC. This research is one of the first pioneer study employing a mixed methods design "for the broad purpose of breadth and depth of understanding and corroboration" (Johnson & Onwuegbuzie, 2007: p.123) of the OPC concept.

The need for this study is shown by the continuing difficulties individuals have in adopting and maintaining EBRBs (Grossi et al., 2006; Moroshko et al., 2011; Ponzo et al., 2021). Despite strong intentions, these individuals often refrain from acting on intended behaviours due to a deficiency in self-regulatory processes. Given the rise to a growing number of research studies into the intention-behaviour gap (Feil et al., 2023; Sheeran, 2002; Sheeran & Webb, 2016). In terms of EBRBs, this means that, although intention is the proximal antecedent of physical activity (PA), many individuals fail to meet PA recommendations. Recent report suggests that 80% of adolescents and 27% of adults do not meet World Health Organisation's (WHO) recommended levels of physical activity (Mitchell et al., 2022). Bridging the intention-behaviour gap can go a long way in addressing the challenges of overweight and obesity.

There has been increasing interest in the use of OPC as a self-regulatory technique to influence EBRBs due to its reliance on psychological consequences,

instead of on real economic penalties for failure or rewards for success. In addition to being more acceptable, OPC may be a more economically prudent approach to EBRBs and health behaviour change. Computer mediated communication seems to be a useful context for studying the effect of making a PC due to its profound impact on everyday life. As of 2023, the estimated number of internet users worldwide was 5.4 billion (Petrosyan, 2024); most of the UK's population, about 98%, have access to the internet; 56.2 million are active social media users, which translates to a social media penetration rate of 82.8% of the population of the UK. According to Salancik (1977: p.6), "one of the simplest ways to commit yourself to a course of action is to go around telling all your friends that you are definitely going to do something".

The proliferation of the internet means that an individual now has access to countless number of individuals to which he/she can publicise a commitment to. An increasing number of interventions aimed at changing individuals' EBRBs now incorporate CMC whereby individuals have access to others who are not physically co-present. Thus, practically, the results from the current research can offer a set of recommendations for designing effective internet-delivered LMPs for the prevention of overweight, obesity and diabetes. An increasing number of LMPs, such as the NHS Diabetes Prevention Programme (NHS DPP), have incorporated an online component where participants have access to online peer support groups and the ability to set and monitor goals digitally. The inclusion of an OPC component in these programmes can serve to increase their effectiveness by leveraging on participants' preference for consistency between attitudes and behaviour. The findings of this study can also be applied in real world settings. Commercial governmental and programmes which offer various approaches to weight loss (e.g., WeightWatchers®, Slimming World®, Noom® etc), physical activity (e.g., Couch to 5K) and even public health and social marketing campaigns (e.g., Stoptober, Change4Life, Smokefree, Think!), can benefit from incorporating OPC within their programmes to influence behaviour change.

1.3 Research Aim and Research Questions

The overall aim of this thesis was to provide a comprehensive and conceptual understanding of OPC as a multidimensional construct from a pragmatic worldview. A secondary aim of this thesis was to understand the efficacious factors related to an OPC intervention which aim to promote EBRBs. As the current thesis follows an exploratory sequential mixed methods design, three main phases are included (each with its own research questions).

The first phase of the research would be a qualitative study which was aimed at exploring the common themes in the reported experiences of participants who have previously made an OPC. The research questions were:

1. How is OPC conceptualised by those making OPCs towards EBRBs?
2. What are the psychological mechanisms underlying the effect of OPC on behaviour change?
3. What are the necessary conditions for making an effective OPC in the context of EBRBs?

The themes that were identified from the first qualitative phase are then used to direct the research questions and data collection used in the second, quantitative phase. The aim of this study was to investigate the effect of an OPC intervention delivered via Facebook in promoting increases in PA, goal attainment, mental wellbeing and relative autonomy. It was hypothesised that:

> (H1) participants assigned to the intervention conditions will report significantly greater increases in scores for goal attainment, PA, mental wellbeing and relative autonomy than the control condition at all follow-up time-points (i.e., T1, T2 & T3),
>
> (H2) but the condition B will have the greater increase in scores than the other two conditions.

The last phase of the research would be a qualitative study which aimed to follow-up participants 12 weeks after they took part in the OPC intervention to explore quantitative findings that need additional explanation. The specific research question was:

1. What are the perceived factors that lead to success for those who have successfully changed their PA behaviour after making an OPC?

1.4 Motivation and Rationale for the Study

At the outset, it is important for me to acknowledge the rooting of this thesis that is based on my long-standing BI to become more physically active. For the past 15 years, I have struggled to translate my intention to become physically active into actual action. The notion that PA is one way to enhance quality of life and well-being (Marquez et al., 2020) formed an important justification for my BI. Although I was able to – on numerous occasions – achieve this goal in the short-term, the maintenance of these behaviours has constantly been extremely challenging, especially due to the obesogenic environment I have been surrounded by. Obesogenic environment refers to the availability of high energy dense, palatable, and inexpensive food (Ard, 2007).

My inability to sustain positive behaviours was consistent with the overwhelming number of studies that are less than optimistic about long-term behaviour changes in the area of weight maintenance (Machado et al., 2022; Nordmo et al., 2020). As with many individuals who have difficulties aligning their actions with previous intentions, I was also a "victim" of the behaviour-intention gap. Although perceived self-efficacy and detailed action planning are commonly mentioned mechanisms that mediate between intentions and adherence behaviour (Sniehotta et al., 2005), I had no difficulties in these areas. My main challenge was forming the self-regulatory strategies to maintain my behaviours over time.

In my self-regulatory attempts, I publicised my BI to my family and friends (i.e., strong-tie support network) because I anticipated that the social sanctions that

may follow if I reneged on my BI would hold me socially accountable. Likewise, I also expected that the social approval, in the form of praises and encouragement, would also keep me motivated. In reality, although the impact of public and direct surveillance was effective in the short-term, over time, and especially when these external forces were removed or exhausted, my efforts also declined.

A crucial moment in my behaviour change journey occurred when I decided to join a Facebook group for those seeking to address their weight-related issues. The group provided me with the much need emotional, informational and instrumental support that I needed. More importantly, it was interesting to observe that members of the group were making a commitment to the group and to themselves to change their weight-related behaviours and also describe their plan to attain it. I also tried it and found it empowering and motivating.

Another thing I found interesting was that I publicised my BI to individuals who were not physically co-present and more importantly with whom I shared a "low emotional intensity, and limited intimacy" with (Sandstrom & Dunn, 2014: p.910). This has been termed "weak-tie support network" in the literature, and the relational and efficacious differences between weak and strong tie support networks has been well-documented (Moreton et al., 2023; Wright & Miller, 2010). Making a PC to weak-ties was more effective in terms of long-term goal attainment than the successes I had with strong-ties.

I opted for weak-tie over strong tie support network due to several reasons that are also consistent with the literature. Firstly, I perceived the emotional, informational and instrumental support from weak ties would be more objective and less emotional than the same from strong-ties (Wright et al., 2010). Second, weight-related concerns were often difficult topics for me to discuss with my strong-ties support network. Hence, there was a desire to avoid feeling ridiculed or patronised, which I felt was more likely to occur within a strong-tie network (Wright et al., 2010). Third, given that I spend most of my daily activities on the internet, computer-mediated support groups

would be a particularly useful source for connecting me to weak-ties (Walther & Boyd, 2002; Wright et al., 2010). Lastly, whilst my strong ties consisted of a small handful of people (Roberts et al., 2009; Small, 2013), making a PC using computer-mediated communication meant that I had access to at least several hundred people, with diverse viewpoints and information (Wright & Miller, 2010; Wright & Rains, 2013). Interacting with a more diverse network of people also increased the number of social comparisons I was able to make concerning my goal attainment vis-à-vis others (Adelman et al., 1987).

Granted, the several dimensions of weak-ties support network that may be advantageous for making a PC via CMC, and also the increased employment of it in lieu of face-to-face settings to make a PC, it was concerning for me that there was a lack of research in this area. Additionally, I observed that there has been a growing interest in the use of IDIs to change behaviour due to their large-scale availability, ease of use and economic prudency. Whilst IDIs seemed to offer a promising opportunity to improve health outcomes, such as depression (Hegerl & Oehler, 2020; Pang et al., 2021), I was disappointed to find that the area of PA goal pursuits lacked adequate theoretical and empirical attention. It was during this time that I came across journal article entitled "Weight Loss Through Virtual Support Communities: A Role for Identity-based Motivation in Public Commitment" by Bradford et al. (2017). It was one of the first articles I had read in relation to the concept of OPC.

Through their netnographic approach, Bradford and her colleagues found that by sharing success and setbacks in online support groups, participants were achieving better results. According to Tonya Williams Bradford, "When people seeking to lose weight join a virtual support community and share their plans online to attain their goals, they invite members to join them by offering encouragement in both words and actions. This exchange of online support facilitates adherence to the offline goal of losing weight. Public accountability is key". Insights from their research demonstrated to me that there was merit in deepening our understanding of the online public

commitment, especially in the area of energy balance related behaviours (EBRBs) which are regarded as particularly important with respect to weight status.

In summary, my motivation is to contribute to developing knowledge in the area of commitment and self-regulation research. This is potential solution for the intention-behaviour gap problem that currently exist when individuals are unable to convert their EBRB intentions into action.

1.5 Organisation of the Thesis

In *chapter 2* a narrative review of the literature is provided, focusing on the various topic areas, theories, themes, strands, etc., that contribute to a more comprehensive understanding of OPC. The chapter begins by reviewing the problem of overweight and obesity, lifestyle modification approaches to dealing with overweight and obesity, and the role of energy balance-related behaviours within a lifestyle modification approach. The concepts of PC and OPC are also discussed including their antecedents and underlying psychological mechanisms. It concludes with a review of two min-theories of self-determination theory, that may be crucial for understanding the psychological mechanism underlying the effect of OPC.

Chapter 3 focusses on the overarching methodology of this thesis, namely the three-phase research design characterising the entire project. It begins by providing a rationale for the use of mixed methods approach and the exploratory sequential design. Then, it describes the philosophical foundations underlying the research design (i.e., pragmatism), and provides a justification for its use in this thesis, based on the ontological, epistemological and ontological perspectives.

Chapters 4, 5 and 6 report the three research studies in turn; each chapter includes an introduction, methods, results/findings and a discussion relating to the findings of the study. *Chapter 7* synthesises the findings from the three studies to determine where the results converge, diverge, and/or complement each other. The synthesis is carried out in the context of the wider literature.

Chapter 8 begins with an evaluation of the overall strengths and limitations of the thesis, then considers the theoretical practical implications of the findings for EBRB behaviour change theory, before making recommendations for future research to advance the concept of OPC. Chapters 4, 5 and 6 are preceded with a study map recapping the aims and research questions.

1.6 Ethical Approval

Ethical approval for this PhD was received as follows:

	Research Ethics Committee	**Reference number**
Study 1	Liverpool John Moores University Research Ethics Committee	19/SPS/041
Studies 2 and 3	Liverpool John Moores University Research Ethics Committee	22/SPS/001

1.7 PhD Timeline and COVID-19 Impact Statement

Table 2 below shows a timeline of the research activities that were undertaken in this PhD journey. There were some difficulties experienced in collecting data for the study 1 as a result of the COVID-19 pandemic. Given the aim of gathering rich data that offer deep insights into participants' attitudes, behaviours and experiences, the initial plan was to conduct face-to-face interviews with participants. However, due to the restrictions put in place by the first national lockdown, the majority of the interviews were conducted via telephone and Microsoft Teams. Fortunately, due to the sensitive nature of some of the topics explored, the use of telephone interviews was valuable, and provided many benefits including decreased cost and travel, and the ability to reach geographically dispersed participants which would not have been feasible without telephone interviewing. The impact of COVID-19 did not have any impact whatsoever on studies 2 and 3.

Table 2:

Gantt Chart showing timeline of PhD (quarterly)

	2019				2020				2021				2022				2023				2024			
Research activities	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D
Literature review																								
Study 1 Data Collection																								
Study 1 Data Analysis																								
Study 2 Data Collection																								
Study 2 Data Analysis																								
Study 3 Data Collection																								
Study 3 Data Analysis																								
Synthesis of Findings																								
Write-Up																								

Chapter 2: Review of the literature

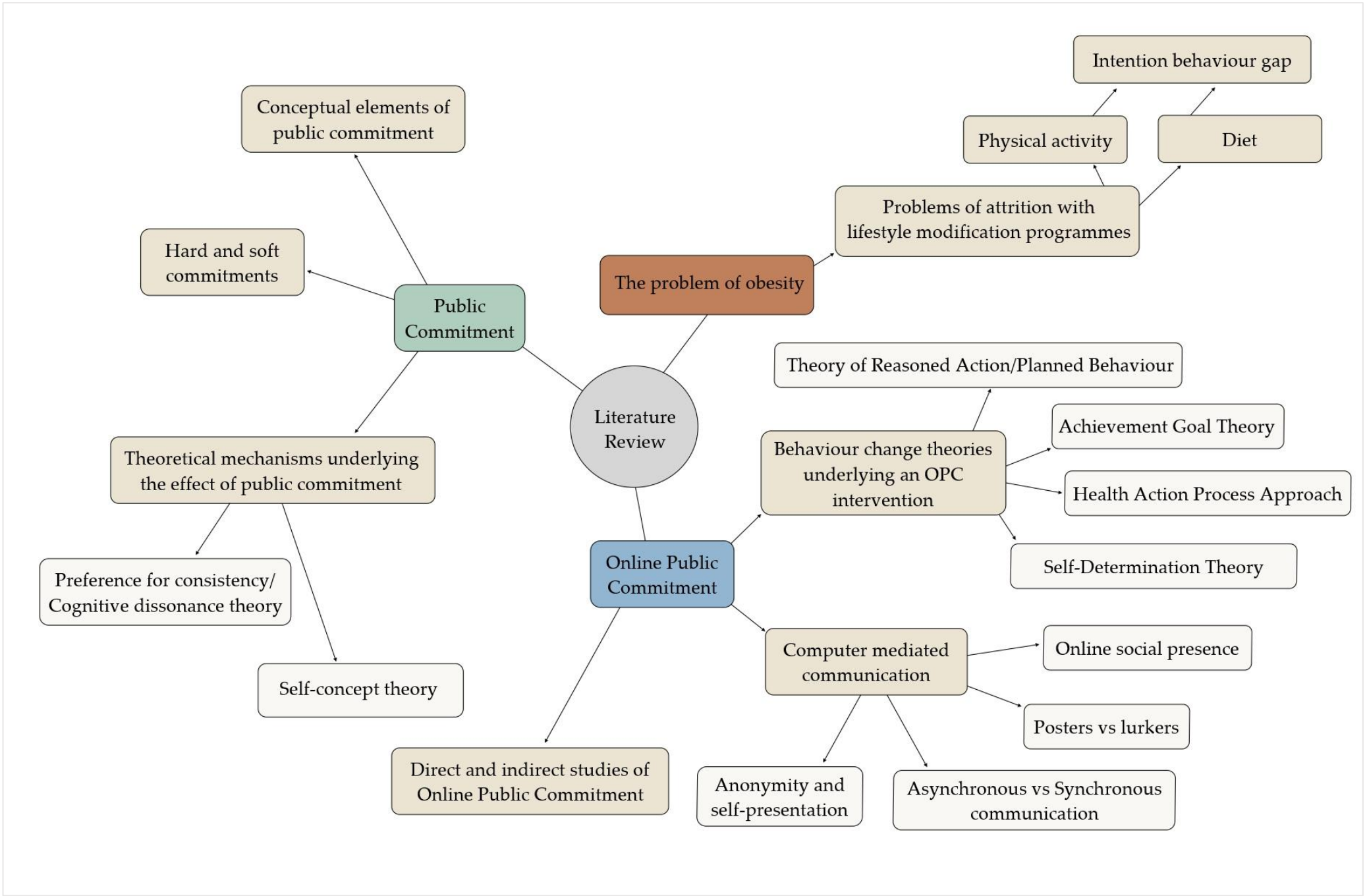
2.1 Introduction

This chapter provides the main theoretical underpinning for this thesis by conducting a narrative review of the relevant literature on online public commitment (OPC) and its predecessor, public commitment (PC). Online public commitment is a complex multidimensional issue, and the associated literature is vast, encompassing social psychology, sports science, environment and behaviour, consumer behaviour, behavioural economics, and computer mediated communication (CMC). To include everything is beyond the scope of this thesis, therefore this chapter focuses on salient and critical aspects of the most current knowledge regarding OPC and PC, which includes substantive findings, as well as conceptual, theoretical and methodological contributions to the topic.

This chapter starts by setting the scene with overweight and obesity being an increasing public health challenge, and problems of attrition with lifestyle modification programmes (LMPs) that address overweight and obesity, before outlining key theoretical concepts and antecedents, which serves as a background for discussing and understanding OPC. Section 2.2 provides an overview of the prevalence and consequences of overweight and obesity, and reviews lifestyle interventions programmes that specifically target energy balance-related behaviours (EBRBs). Section 2.3 discusses the intention-behaviour gap as one of the reasons why problems of attrition persist. Section 2.4 describes the concept of PC, its conceptual elements and antecedents, and makes a distinction between hard and soft commitments, followed by the psychological mechanisms that underpin the effect of PC on behaviour change. Section 2.5 introduces the concept of OPC, by first outlining CMC and using this as a basis for reviewing the antecedents and consequences of OPC, and ends by reviewing empirical studies that directly and indirectly address OPC. Section 2.6 provides a discussion of the relevant behaviour change theories that

underlie an OPC intervention. A diagrammatic representation of the literature review is shown in Figure 1, below.

Figure 1:
A diagrammatic representation of the literature review



2.2 The Problem of Overweight/Obesity and Lifestyle Modification Programmes

The World Health Organisation (WHO) defines obesity as a state of imbalance between calories ingested versus calories expended which would lead to excessive or abnormal accumulation of body fat and presents a risk to health (WHO, 2016). For adults, a body mass index (BMI) of 25 kg/m^2 or greater is generally considered overweight, while a BMI of 30 kg/m^2 or greater is considered obese. The prevalence of overweight and obesity has become a serious and increasing public health challenge in the United Kingdom and across the world. Obesity is associated with numerous metabolic disorders (e.g., type 2 diabetes, hypertension, hyperlipidaemia), cardiovascular diseases, several types of cancers and increased risk of morbidity and mortality (Bogers et al., 2007; LeBlanc et al., 2018).

Although the exact cause of overweight and obesity remains largely unknown, there is consensus that changes in lifestyle behaviour are driving the overweight and obesity epidemic (Al-Hazzaa et al., 2012; Gómez-Martnez et al., 2012; Hill et al., 2003; Kerkadi et al., 2019; Lobato et al., 2009; Shestakova et al., 2020; Skelton et al., 2011) rather than changes in biologic or genetic factors. The widespread increase in the prevalence of overweight and obesity has resulted in an obesity epidemic in the UK, and globally. In 2022 to 2023, 64.0% of adults aged 18 years and over in England were estimated to be overweight or living with obesity. (House of Commons, 2023). This is similar to 2021 to 2022 (63.8%) but there has been an upward trend since 2015 to 2016 (61.2%). In 2022 to 2023 26.2% of adults were estimated to be living with obesity. This is similar to 2021 to 2022 (25.9%) but, as with the prevalence of overweight (including obesity), there has been an upward trend since 2015 to 2016 (22.6%) (House of Commons, 2023).

With the recognition that overweight and obesity is a complex, multifactorial disease, the difference between energy intake and energy expenditure, frequently

referred to as energy balance, has become of great interest because of its direct relation to long-term gain or loss of adipose tissue and alterations in metabolic pathways (Romieu et al., 2017b). Although the supply of dietary energy is needed for the body to stay alive and maintain essential body processes (e.g., respiration, blood circulation, digestion), when energy intake exceeds expenditure, a positive energy balance is created which leads to storage of excess energy as fat, leading to weight gain, and eventually to the development of overweight and obesity. (Chooi et al., 2019; Hill et al., 2013).

Given that lifestyle factors are the major contributors to the development of overweight and obesity, lifestyle modification programmes (LMPs) are regarded as the cornerstone of overweight and obesity management due to their low cost and minimal risk complications (Cifuentes et al., 2023; Jensen et al., 2014). The goal of LMPs is to target modifiable energy intake and energy expenditure behaviours, that is, physical activity (PA) and dietary behaviours, also referred to as energy balance related behaviours (EBRBs) (De Craemer et al., 2015; Kremers et al., 2005; Van Stralen et al., 2011; Verhavert et al., 2020; Webb & Wadden, 2017). Such interventions include programmes based on a variety of approaches including provision of health education, and cognitive behavioural strategies (e.g., goal setting, self-monitoring, stimulus control, social support, problem-solving, cognitive restructuring, relapse prevention). In the broadest sense, PA and diet are the two main EBRBs, however, both of these are complex behavioural categories that involve a variety of actions. A distinction is made here between EBRBs, within an energy balance approach, and PA, which can be undertaken solely to improve mental wellbeing (Lahert et al., 2019; Eric et al., 2020; Ramírez-vélez et al., 2021; Ahmad et al., 2015), or simply because it is inherently enjoyable and satisfying (Neace et al., 2022; Turner & Reed, 2022; Ryan et al., 1997).

Lifestyle modification programmes can be delivered in individual or group settings across a range of modalities including face to face, telephone or via web-based

methods. There is strong evidence which suggests that among general population samples, LMPs are an effective means of achieving significant improvements in anthropometric measures including reductions in body weight, BMI and waist circumference (Galani & Schneider, 2007), as well as improvements to PA (Jones et al., 2021), and improvement in the consumption of fruit and vegetable (Rees et al., 2013). Lifestyle intervention programmes have also been associated with improved psychological outcomes (Lidin et al., 2018; Marcos-Delgado et al., 2021; Neale et al., 2023), as well as positive health outcomes such as reduced risk of cardiovascular disease (Ma et al., 2017), type 2 diabetes and metabolic syndrome (Brown et al., 2009), including all-cause mortality (Kritchevsky et al., 2015).

2.2.1 Physical Activity (PA)

Physical activity (PA) is defined as "any bodily movement produced by skeletal muscles which requires energy expenditure" (WHO, 2010: p.14). A large variety of behaviours contribute to PA, such as transport-related behaviour, work-related activities, leisure time activities and sports participation. The guidelines, in accordance with WHO protocol, recommend that adults should undertake at least 150 minutes of moderate-intensity activity a week or 75 minutes of vigorous-intensity activity a week, or some equivalent combination of moderate-intensity and vigorous-intensity aerobic physical activity, per week (Bull et al., 2020).

The UK's Chief Medical Officer (CMO) (Davies et al., 2019) updated guidelines for PA recommends that adults should incorporate resistance training into their PA routine at least twice a week to maintain or improve muscle strength. This can be achieved through various activities like using bodyweight, free weights, resistance machines, or elastic bands, as well as activities of daily living. Additionally, the CMOs also recommend that adults aim for at least 150 minutes of moderate intensity activity or 75 minutes of vigorous intensity activity per week, to improve health. Even with lower volumes, intensities and frequencies of PA, health benefits may also be derived, particularly for individual with low levels of physical fitness and for disabled adults.

Further new evidence suggests that short duration, very vigorous exercise (at or close to all-out or maximal effort) at lower volumes than 75 minutes per week may bring equivalent health benefits to those derived from adherence to the previous guidelines, in a more time-efficient manner. The guidelines also emphasize the importance of minimising time spent sitting or being sedentary.

Aside from the health benefits of PA, NICE (2013) guidelines suggest that adults who live with overweight or obesity and have lost weight may need 60-90 minutes of activity a day to avoid regaining weight. Indeed, the relationship between meeting the recommended levels of PA and weight maintenance has been demonstrated in wide-ranging studies (Butryn et al., 2021; Camps et al., 2013; Catenacci & Wyatt, 2007; Dashti et al., 2014; Larsen et al., 2023; Oppert et al., 2023; Ramage et al., 2014; Swift et al., 2014, 2018).

Engaging in some sort of PA is associated with positive outcomes in physical, mental, financial and social well-being, commonly referred to as improved quality of life (QoL; Karimi & Brazier, 2016; Reiner et al., 2013; Sosnowski et al., 2017). The critical role of PA in tackling obesity has been found in a vast number of studies, where it has been shown to improve cardiovascular health (Chudyk & Petrella, 2011; Kim et al., 2021; Mora et al., 2007; Pattyn et al., 2013), reduce blood pressure (Aguilar-Cordero et al., 2020; Battista et al., 2021; Xu et al., 2020), lipids (Gawlik et al., 2018; Tirandi et al., 2022; Zhang et al., 2019), visceral fat (Ando et al., 2020; Ko et al., 2022; Saelens et al., 2011), as well as attenuate obesity-related mortality (Gaesser & Angadi, 2021; Headid & Park, 2021; Kim et al., 2021).

Yet, other studies comparing the general effectiveness of changes in PA for the prevention of overweight and obesity in adults and children have reported inconsistent associations (Basterfield et al., 2012; Bowen et al., 2015; Bradbury et al., 2017; Crandall et al., 2012; Du et al., 2013; Hjorth et al., 2014; Hrabosky et al., 2007; Jakicic et al., 2018; Jones et al., 2015; Kaczynski & Henderson, 2007; Kettaneh et al., 2005; Roberts et al., 2014; St-Onge & Gallagher, 2010; Van Cauwenberg et al., 2011;

Vancampfort et al., 2014, 2015; Xu & Wang, 2015), despite their interrelationship making intuitive sense. The inconsistent results stem from several limitations such as, relatively small sample sizes (Basterfield et al., 2012; Kettaneh et al., 2005), primary focus on total physical indices (Hrabosky et al., 2007), a single baseline measurement of PA (Jakicic et al., 2018), and an inability to account for the multitude of environmental exposures occurring simultaneously (Hrabosky et al., 2007; Kaczynski & Henderson, 2007; Roberts et al., 2014).

2.2.2 Diet

Diet refers to an increased energy intake, in particular, (i) consumption of energy-dense micronutrient-poor foods (Fogelholm et al., 2012; Livingstone et al., 2022; Lopez-Cepero et al., 2019), (ii) consumption of palatable, low-cost, easily available food (Abdullah et al., 2017; Jaworowska et al., 2013; Jia et al., 2021), consumption of sugary foods and drinks (Afeiche et al., 2018; Han & Powell, 2013; Malik et al., 2013; Wang et al., 2013), (iii) consumption of red and processed meat (Rouhani et al., 2014), and (iv) large portion sizes (Livingstone & Pourshahidi, 2014; Steenhuis & Poelman, 2017). All of which have been linked with risk of weight gain and obesity.

It is argued that the extent to which these foods are obesogenic may be due to their composition rather than their energy density (Romieu et al., 2017b). With this in mind, studies have found that higher consumption low energy density foods (e.g., pulses, non-starchy vegetables, and fruits), as well as high energy density foods (e.g., nuts, olive oil, avocados) have been associated with a lower risk of overweight and obesity and weight gain (Fogelholm et al., 2012). Hence, the content of fibre, high water content, satiating effect of fat, and low glycaemic index in many of these foods may play an important role. In recent times, nutrition research has shifted attention away from single nutrients and foods because these foods or nutrients are not eaten in isolation and people do not easily understand messages regarding these single

components. Hence, the effects of combination of nutrients/foods in dietary patterns has received greater attention (Jacobs & Steffen, 2003; Jacobs & Tapsell, 2013).

The effectiveness of various dietary patterns, such as low fat (Chawla et al., 2020; Fernandez et al., 2022), low carbohydrate (Chawla et al., 2020; Foster et al., 2003; Hall & Chung, 2018; Hu et al., 2012), intermittent energy restriction (Beaulieu et al., 2020; Jane et al., 2015; Jebeile et al., 2019), ketogenic diet (Choi et al., 2020; Crosby et al., 2021; Kumar et al., 2021; Murphy & Jenkins, 2019), plant-based diet (Eichelmann et al., 2016; Turner-McGrievy et al., 2017; Zamani et al., 2020) and Mediterranean diet (MediDiet) (Estruch & Ros, 2020; Georgoulis et al., 2021; Limongelli et al., 2021; Rosi et al., 2020), have been tested and reviewed to determine its effects on weight-loss and obesity. The findings from two recent meta-analyses examining the efficacy of some of popular dietary patterns have shown mixed effects and, if effective, they have generally resulted in only small changes in target behaviours (Dinu et al., 2020; Ge et al., 2020).

2.3 Intention-Behaviour Gap and Problems of Attrition

Despite the long-standing and general public knowledge of the benefits of PA, unfortunately, 1 in 4 adults fail to engage in its recommended levels (Rhodes et al., 2022a). Although it is suggested that most people have an impressive capacity for self-regulation, unfortunately failures are common. Additionally, an individual will lose control of his or her behaviour in a wide variety of circumstances (Baumeister & Heatherton, 1996). Self-regulation is defined as the capacity of an individual to exert control over their self (Van Damme et al., 2009), or the process by which an individual regulates him/herself to achieve specific goals (Shapiro & Schwartz, 2000). The concept of self-regulation has also been expanded to include conscious and nonconscious regulation (Schwartz, 1979, 1995, 2004), even mindfulness (Kabat-zinn, 1982; Kabat-Zinn et al., 1992; Kabat-Zinn & Chapman-Waldrop, 1988).

People who are able to exert great self-regulation over a particular behaviour or action are more likely to be successful in bringing about long-term desirable outcomes (Baumeister & Heatherton, 1996). On the other hand, lapses in self-regulation can result in an inability to adhere to behaviours and actions. As such, self-regulation failure is related to common human foibles such as excessive person debt, excessive risk-taking in games of chance, substance misuse, unplanned pregnancy and sexually transmitted disease, and crime (Dishman, 1994; Jeffery, 2012; Muraven & Baumeister, 2000). This is inconsistent with behavioural economics theory which posits that humans tend to behave in ways that maximise their economic return and well-being.

Theories of self-regulation typically include behavioural intention (BI; reviewed further in section 2.4.1.1) as an antecedent (Shapiro & Schwartz, 2000), however, whether or not an individual's BIs are translated into action is currently regarded as a focal challenge for research. Research demonstrates that an individual's BI to be physically active is a proximal determinant of subsequent PA behaviour (Chatzisarantis et al., 2019; Rhodes & Quinlan, 2015). Physical activity is a prime example where individuals are required to consistently perform behaviours where the immediate costs to the individual are high (e.g., physical exertion) in an effort to realise its benefits at some unknown time in the future (Ananthapavan et al., 2018; Baumeister, 2010). In other words, due to lapses in self-regulation the best BIs to change PA behaviour often fail to translate into desired behaviours. Hence, it is unsurprising that despite the strong predictive value of BIs in PA domains (McEachan et al., 2011), tests of its absolute predictive utility show discordance with behaviour (Rhodes & Dickau, 2012). This discrepancy has been labelled the "intention–behaviour gap", reflecting the black-box nature of the underlying psychological process that leads from intention to action (Sniehotta et al., 2005).

Although LMPs which incorporate EBRBs are efficacious in the management of overweight and obesity, they often report poor attendance and high attrition rates

which hinder the treatment effectiveness and health outcomes (Burgess, Hassmén, & Pumpa, 2017). Clearly, this would appear the most important area to understand the severity of the intention-behaviour gap (Foster et al., 2005). For LMPs to be successful, it is crucial that individuals adhere as best they can to the recommendations provided.

Attrition is defined as failing to return, refusing to return, or being expelled from a treatment intervention (Pirotta et al., 2019). It has also been defined as the extent to which a participant's behaviour corresponds with agreed recommendations (WHO, 2003). The literature on attrition for LMPs is heterogeneous, affecting between 10% to 80% of participants (Bennett & Jones, 1986; Castellani et al., 2003; Huisman et al., 2010; Inelmen et al., 2005; Miller & Brennan, 2015; Moroshko et al., 2011; Stunkard, 1978; Zuckoff, 2012). High attrition rates in lifestyle interventions are not only problematic in the area of treatment effectiveness and health outcomes, but also on the economic costs impacting the intervention and the participant (Castro Lopes et al., 2017; Tremmel et al., 2017). In a meta-analysis of 45 RCTs of LMPs involving adults with overweight and obesity, it was found that 28.4% of participants dropped out of the intervention prior to the maintenance phase (Dombrowski et al., 2014). Another meta-analysis of 80 studies found a mean attrition rate of 31% (Franz et al., 2007).

Individuals who prematurely terminate lifestyle modification programme do not only fail to attain the required skills and strategies to effectively overcome barriers to lifestyle change, but feelings of frustration, discouragement, and learned helplessness have been associated with non-adherence (Nobles et al., 2018). This shortcoming also affects long-term weight maintenance, which in turn reduces QoL (Karimi & Brazier, 2016; Reiner et al., 2013; Sosnowski et al., 2017), promotes loss of income due to absenteeism (De Panfilis et al., 2008; Greenberg et al., 2009; Han & Lean, 2016), and increases risk of obesity-related diseases (Finley et al., 2007; Honas et al., 2003).

The predictors of attrition and non-adherence have been extensively studied, and the most frequently reported reasons relate to: individual characteristics (e.g.,

higher BMI, non-obesity related health problems, low socioeconomic status), weight loss-related aspects (e.g., unsuccessful weight-loss, body shape concern), psychological factors (e.g., high level of stress, depression, perceived sense of abandonment), and practical barriers (e.g., time and family commitments). All of these characteristics have the potential to disrupt intervention engagement (Altamura et al., 2018; Batterham et al., 2016; Benediktsdottir et al., 2016; Elfhag & Rössner, 2010; Goode et al., 2016; Messier et al., 2010; Michelini et al., 2014; Moroshko et al., 2011; Perna et al., 2018; Sawamoto et al., 2016; Teixeira et al., 2004).

Even when participants remain engaged for the full duration of the intervention, durable or long-term behaviour change remains a critical challenge (Page et al., 2021). For example, in the area of weight-loss outcomes, most studies have shown that weight regain is common after the conclusion of a 6 or 12-month LMP (Anderson et al., 2001; Appel et al., 2011; Barte et al., 2010; Blomain et al., 2013; El Ansari & Elhag, 2021; Machado et al., 2022b; Wu et al., 2009). Indeed, most participants typically regain one third of their lost weight during follow-up. Participants, on average, return to their baseline weight within 4–5 years (Wadden et al., 1989). As observed in the Diabetes Prevention Program (DPP) (Knowler et al., 2002), ten years after intervention ended, lifestyle-treated participants had nearly returned to their baseline weight (with no significant differences in weight loss among study groups). This is due to the previously mentioned self-regulatory failures that is underlined by difficulties in transcending overwhelming immediate temptations or indulges, negative moods and resources depletion. Indeed, these minor lapses in self-control can snowball into self-regulatory collapse (Heatherton & Wagner, 2011).

Lifestyle modification programme designers also find it difficult to create interventions that are both contextually relevant and produce substantial behaviour changes, as well as explicable and predictable, typically via the integration of design and behavioural science guidance (Heatherton & Wagner, 2011). There are difficulties in conducting rigorous longitudinal studies and then diminishing impact of

interventions over time (Heatherton & Wagner, 2011; Hedin et al., 2019; Kwasnicka et al., 2016). In addition, there is a disconnect between the techniques used in the interventions and the contextual realties faced by LMP designers, being abstracted from the context of application as well as the embodiment of the interventions themselves (Schmidt & Stenger, 2024).

According to Cash et al. (2023), these inadequacies have the potential to derail long-term LMP design efforts by simultaneously over-emphasising short-term, strategies and de-emphasising the complexities of contextual intervention embodiment. A lack of evidence on the long-term efficacy of LMPs that target modifying EBRBs may compromise policy-making guidance. The need for guidance is especially important as several countries endeavour to introduce long-term programmes to address overweight and obesity. For example, the National Health Service (NHS) in the UK published its long-term plan (LTP) which marks a turning point in how healthcare is provided across the UK. A key part of the LTP is to expand the National Diabetes Prevention Programme (NDPP) to identify and help more people who are at risk of developing diabetes, keeping them in better health for longer.

As demonstrated by the above discussion, a better understanding of the strategies to improve adherence to EBRBs is vital to the development of successful LMPs. Furthermore, relatively few studies have analysed why, or by which processes, interventions are effective for some individuals and not for others. The most effective strategies for modifying EBRBs are those which focus on initiating self-regulatory efforts in order to achieve personal goals. Inauen et al. (2014) stated that the true manifestation of a decision lies in the implementation of a commitment to act and maintain such action. Decision derives from an intention/perception, followed by plans on when, where, and how the intended behaviours should be implemented. Therefore, utilizing a theoretical rationale derived from social psychological research on commitment processes, many scholars have theorised that if people could publicly

commit to fulfilling their BIs, they would adhere to the commitment, thus, producing long-term behaviour change.

2.4 Public Commitment

Public commitment, which is the public declaration of a BI to others, is said to increase the likelihood of complying to a course of action. There is an overabundance of research which suggest making a commitment known to others typically makes them more effective than keeping them private. Early PC researchers (e.g., Cialdini et al., 1978; Kiesler, 1971; Kiesler et al., 1974; Kiesler & Corbin, 1965) have long argued that a key factor that determines the magnitude of commitment is the publicness with which the individual declares his or her commitment to a position. Similarly, Staats et al. (2004) also states that whenever people make their BIs public, the behavioural impact of these BIs is enhanced. Salancik (1977: p.6-7) also puts it succinctly in stating that "one of the simplest ways to commit yourself to a course of action is to go around telling all your friends that you are definitely going to do something".

The effect of public commitment in modifying behaviour has been extensively and historically tested in the environmental literature. Early research of public commitment has been shown to enhance bus ridership (Bachman & Katzev, 1982); recycling (Burn & Oskamp, 1986; Katzev & Pardini, 1987; McCaul & Kopp, 1982; Wang & Katzev, 1990); and residential energy consumption (Pallak & Cummings, 1976). A superficial review of these studies would suggest that, although PC interventions are predicted to produce substantial and durable change, the results have been mixed. Some studies have shown it to be successful in the short-term, while others have demonstrated long term effects. Indeed, others have shown no significant differences when compared to control conditions. Outside of environmental literature, PC has also proven effective in enhancing savings balances when connected to loan repayments (Atkinson et al., 2013). There is a paucity of literature pertaining to the use of PC in influencing EBRBs where these behaviours have either been the desired

outcome in and of themselves, or where these behaviours were instrumental in addressing obesity or overweight.

Given the previously discussed problem of poor adherence to LMPs for obesity (Burgess, Hassmén, Welvaert, et al., 2017; Looney & Raynor, 2013; Stinson et al., 2020), the lack of research into the role of PC in influencing EBRBs is concerning. This is especially important because people who successfully achieve their weight loss goal will eventually regain it after the intervention ends (Anderson et al., 2001; van Baak & Mariman, 2019). Yet, PC interventions have shown promising results for maintaining behaviour, even after individuals have fulfilled their initial promise (Katzev & Pardini, 1987; Kerr et al., 1997; Kerr & Kaufman-Gilliland, 1994). Though these studies, in some ways, demonstrate the effect of PC on behaviour change, more contemporary research is needed to support this claim. Nyer and Dellande's (2010) work is perhaps the most recent study that has investigated the role of PC in influencing goal attainment and motivation in a weight-loss setting. Participants took part in a 16-week weight-loss program at a weight-loss/fitness centre and set specific weight-loss goals at various intervals of the LMP. It was found that participants in the intervention group who had their names and weight-loss goals publicly displayed in a fitness centre achieved significantly greater weight loss than participants who kept theirs private. It was also found that participants whose weight-loss goals were publicised exhibited greater motivation which partly mediated the effect of public commitment on their weight loss goals.

2.4.1 Conceptual Elements of Public Commitment

Despite the plethora of research on what many regard as a promising intervention technique to influence durable behaviour change (Abrahamse et al., 2005; de Young, 1993; Dwyer et al., 1993; Katzev & Wang, 1994), there is a lack of clarity on what a PC is. Although the concept of PC has been conceptualised in various ways, it is clear from the literature that four conceptual elements are being posited by the PC literature, as summarised in Table 3. The first descriptive element is *BI*, referenced in

previous research as "commitment" and the very same concept as it is applied to attitudinal adherence as "consistency". The second element is *publicness*, which refers to the degree to which one's commitment will be observed by others and the number of others who might see or learn about it (Leary & Kowalski, 1990). The third element is *acting subjects*, that is who undertakes the process of initiating his/her own behaviour change and makes this intention public to others. The fourth element described the *addressed audience*, that is, to whom the PC or specified activities are aimed at. The first three of these elements are reviewed below.

Table 3:
Conceptual elements of public commitment in the literature

Conceptual elements of public commitment and types	References
Behavioural intention	
Specified behaviour	de Leon and Fuqua (1995); Lokhorst et al. (2010, 2013)
Course of action	Nyer and Dellande (2010)
Intentions	Gollwitzer et al. (2009a)
Implied act	Dellande & Nyer (2007)
Implied decision	Dellande and Nyer (2007)
A position	Ahluwalia et al. (2001); Bradford et al. (2017)
A target response	Shippee and Gregory (1982)
Pledge	Coupe et al. (2019); Wang and Katzev (1990)
Promise	Lokhorst et al. (2013)
To do something	Lokhorst et al. (2013)

Behavioural goal	Debar et al. (2011)
Attitudinal position	Gopinath and Nyer (2009); Kiesler (1971)
Goals	Munson et al. (2015)
Mode of Publicness	
Written form	Wang and Katzev (1990)
Verbal form	de Leon and Fuqua (1995)
Declaration	Bradford et al. (2017)
Acting subjects	
Individuals	Lokhorst et al. (2013); Nyer and Dellande (2010)
Large group of individuals	Wang & Katzev (1990)
Addressed audience	
Other people	Ahluwalia et al. (2001); Lokhorst et al. (2013)

2.4.1.1 Behavioural Intention

Most conceptualisations of PC regard it as being a BI, whether this relates to the achievement of a particular outcome (e.g., "I intend to lose 5kg in 12 weeks"), otherwise described as goals (Debar et al., 2011), or where the specified behaviour is a desired outcome in and of itself (e.g., "I intend to spend 30 minutes per day doing exercise") (Lokhorst et al., 2010a). Others also construe the PC in more general terms (e.g., attitudinal position, promise, pledge) thus allowing substitution of means of

attainment (Ahluwalia et al., 2001). Behavioural intentions refer to an individual's perceived readiness or likelihood to engage in a desired behaviour and is regarded as the most immediate and key determinant of an individual's behaviour (Fishbein & Ajzen, 1975b; Lindgren et al., 2021). Behavioural intentions also convey the amount of determination, effort and persistence individuals plan to use towards the performance of a behaviour and which activates the motivational factors that directs the execution of the behaviour in the same direction (Fishbein & Ajzen, 1975b).

Clearly, the BI construct encompasses both the direction (e.g., "I will do X") and the intensity (e.g., how much time and effort the individual will commit to achieving X) of an intention or decision. Sheeran and his associates have identified other factors of BI, including: accessibility, certainty and temporal stability (see Cooke & Sheeran, 2013; Sheeran & Abraham, 2003; Sheeran & Webb, 2016). According to Bagozzi et al. (1992) when the motivational factors of a BI are activated, it will function as part of a self-fulfilling process and drive individuals into a "must do" or "will do" status. Hence, the stronger the intention to perform a behaviour, the higher the probability of enacting that behaviour (Doll & Ajzen, 1992). From a different perspective, BIs could also be regarded as the cognitive instructions people give to themselves to perform a particular behaviour or to achieve a certain goal (Triandis, 1980). These cognitive instructions function as a powerful self-regulatory strategy of the "when, where and how of goal-directed responses", additionally it also creates a cognitive connection between a desired future situation and the intended goal-directed response (Brandstätter et al., 2001, p. 947).

Thus, it could be seen that BIs are the culmination of the decision-making process, signalling the end of deliberation and capturing the motivational factors that will be expended during the performance of the behaviour (Ajzen, 1991a; Gollwitzer, 2012). Given that these cognitive reactions reflect favourable or unfavourable evaluations of the target behaviour, it would be logical to assume that a BI lends itself to research on the concept of attitude (Ajzen & Fishbein, 1975; Bem, 1972; Oskamp &

Schultz, 2004; Ostrom, 1969). Attitude research holds promise in understanding PC from a BI perspective. For instance, many have argued that attitude is a hypothetical construct, which cannot be measured directly but must be inferred from measurable reaction to the attitude object. This is consistent with existing measurements of PC which have used manipulation design of either a categorical or a continuous flexibility type. Thus, an individual who makes a public commitment could be located on an evaluative continuum vis-à-vis the target behaviour.

However, the attitudinal expression of a BI lends itself more to the behavioural component of attitude, rather than the cognitive and affective components (see Table 4). This aligns with two of Cialdini's (2001) critical features of PC that would increase long-term behavioural follow-through, that is, (1) the commitment should be active rather than passive, and (2) the commitment should be effortful or difficult. This suggests that for public commitment to be effective, an individual's BI should be demonstrated overtly and outwardly. For example, in some studies, participants expressed their BI explicitly in a written format (Gollwitzer et al., 2009b), or via a verbal pledge (Debar et al., 2011). Yet, in another study, the PC is implied, which again, is consistent with attitude research (Debar et al., 2011).

Table 4:
Responses used to infer attitudes (Ajzen, 1988)

Response mode	Response category		
	Cognition	Affective	Conation
Verbal	Expressions of beliefs	Expressions of feelings	Expressions of intentions
Non-verbal	Perceptual reactions	Physiological reactions	Motor responses

2.4.1.2 Publicness

Publicness is another important dimension of the PC construct, which suggests that a PC can only be effective if it is witnessed by others. The impact of public surveillance will serve to ignite the psychological mechanisms through which individuals are driven to enact behaviours that move them towards goal attainment. Publicness traditionally indicates the degree to which a commitment is made public, hence, in some studies the manipulation design intends a degree of publicness (Ahluwalia et al., 2001; Halverson & Pallak, 1978). However, most commitment studies have strayed from this defining measure by assigning participants to conditions in which their commitment is either public or private (Baca-Motes et al., 2013; Debar et al., 2011; Gopinath & Nyer, 2009b; McCaul et al., 1987; Pallak & Cummings, 1976).

The general idea behind public commitment is to introduce direct social pressure to influence adherence and behaviour change. Operationally, this would involve asking participants to make a commitment to engage in a particular behaviour either in a written or verbal form, and in the presence of other people (see Nyer & Dellande, 2010). In other words, this is an attempt to enact the psychological mechanisms that mediate the effect of the PC on behaviour change. Such mechanisms can either: (1) heighten individuals' concern for their social or public image (Kulendran et al., 2016; Shippee & Gregory, 1982; Wang & Katzev, 1990); (2) enable them to conform to normative influence to gain or avoid social consequences (Abrahamse et al., 2005; Bryan et al., 2010; Parrott et al., 1998); (3) enable them to derive psychological utility from being consistent (Lerner & Tetlock, 1999); or (4) change their self-concept to be in line with the new behaviour (Burger & Caldwell, 2003; Cialdini, 2007; Gollwitzer et al., 2009). All of which have been suggested in the literature to mediate the relationship between PC and behaviour change (discussed further in section 2.4.3). When a PC is operationalised in this manner, it is thought to be more

effective than commitments made in private (Cialdini, 2010; Cialdini & Trost, 1998; Debar et al., 2011; Hollenbeck et al., 1989).

The notion that intentions stated publicly are relatively stable and are more likely to result in congruent behaviours, is strongly supported in the behavioural commitment literature (Ahluwalia et al., 2001; de Leon & Fuqua, 1995; Hollenbeck et al., 1989; Kiesler, 1971; Pallak et al., 1980; Pallak & Cummings, 1976; Staats et al., 2004). Individuals whose commitments are made in public tend to exert greater effort and persistence to reach their goals (McCaul et al., 1987); are more resistant to persuasion (Cialdini et al., 1978; Cialdini & Trost, 1998; Debar et al., 2011; Eagly & Chaiken, 1995; Gopinath & Nyer, 2009); strengthened the confidence they have in their attitudes (Pauling & Lana, 1969); and demonstrate greater progress towards goal attainment (Hayes et al., 1985).

2.4.1.3 Acting subjects

Although a large majority of descriptions of PC have focused exclusively on the individual as the acting subject, few studies have also extended the use of this concept to group settings (e.g., Wang & Katzev, 1990). The descriptive element of acting subject speaks directly to the notion of perceived locus of causality (PLOC; deCharms, 1968). In the context of PC, PLOC refers to the tendency of individuals to be motivated to feel like they are at the origin of their PC. In this light, a PC could be said to belong on a dimension of attribution, with internal PLOC (I-PLOC) on one end, and external PLOC (E-PLOC) on the other. People are said to have an I-PLOC if they believe in their capability to exert control over events that affect their lives. They believe that outcomes of events in their lives are guided by their own behaviours, efforts and decision making. On the other hand, individuals with E-PLOC see themselves as a "pawn" to luck, fate and other heterogenous forces.

The differences between these interpersonal attributions of causality and knowledge of the causes of an individual's own behaviour, is central to most theories

of motivation. Making this distinction in the case of PC is crucial for several reasons. First, theoretical studies that have used self-concept theory to explain the relationship between PC and long-term behaviour change have largely relied on the notion of I-PLOC. For example, Lokhorst et al. (2013) argues that if people willingly choose to perform a behaviour, they believe that they must have wanted to. They must believe in the cause or expect to derive enjoyment from the behaviour. When they perceive their behaviours as voluntary and not externally enforced, they assume that they have come to these decisions themselves and that their behaviours reflect their true motivations, internal self or self-concept. Lokhorst et al. (2013) suggest that it is this change in self-concept, or a change in some aspect of the self that sets the stage for subsequent consistent behaviour. Unfortunately, experimental studies of PC that have applied self-concept and Bem's (1972) self-perception theories to investigate the effect of PC on durable behaviour changes (e.g., Gollwitzer et al., 2009b), have done so without specifically addressing the role of I-PLOC.

Second, experimental studies of PC often face a methodological challenge when the critical differences between I-PLOC and E-PLOC are not acknowledged. In most studies of PC, participants are instructed to make a specific PC with little degree of freedom (Baca-Motes et al., 2013; de Leon & Fuqua, 1995; Wang & Katzev, 1990), which has the potential to reduce participants' basic psychological need for autonomy, competence and volition (Ryan & Deci, 2006; Sansone & Tang, 2021). Only one known PC study gave participants the flexibility to demonstrate their PC from a larger number of options (Debar et al., 2011). If participants have an E-PLOC when making a PC, this may raise the question of whether the PC produced public conformity coupled with private acceptance (Kelman, 1958), or a state of "forced-compliance" (Wixon & Laird, 1976). There is strong evidence to support this claim emanating from the adherence versus compliance debate (Chakrabarti, 2014; Mir, 2023). In the context of LMPs, adherence could be defined as the extent to which a person's behaviour (e.g.,

following a diet, taking part in PA, and/or executing lifestyle changes) corresponds with agreed recommendations.

Adherence is also a positive proactive behaviour, where the participant takes responsibility for their own well-being. Compliance, on the other hand, is a passive behaviour in which a participant is following a list of instructions provided by the researcher unquestioningly. Similarly, an overwhelming number of studies have shown that extrinsic motivators may diminish intrinsic motivation (Vallerand, 2004). This, perhaps, is the reason why experimental studies of PC have provided weak support for self-perception theory as a mediator of the PC effect. There were too few "degrees of freedom" in the performance of the act, which is inconsistent with one of the conditions suggested to intensifying the magnitude of PC.

Bem (1972) argues that for self-perception to operate, participants must have an "illusion of freedom", that is they must fail to apprehend the forces which induced them to comply. According to him if participants accurately discriminated the variables controlling their behaviour, then none of the predicted self-attributions would have occurred. Bem's (1972) explanation for this is that external sources of stimuli can exercise control over an individual's attributions of his/her transitory states or attitudes. Since self-perception theory has been suggested as a key psychological mechanism mediating the effect of PC on durable behaviour changes, it is important that the source of cues for the self-attributions is the individual's overt behaviour, rather than external factors of the situation. Thus, the following research question is raised:

1. What role does PLOC play in the relationship between PC and goal attainment?

2.4.2 Types of Commitments

It is necessary to distinguish between two types of commitments, that is, hard commitments and soft commitments. Hard commitments place explicit restrictions on

future behaviour by either financially rewarding positive behaviour change or imposing hefty fees if behaviour change is not achieved. Soft commitments have primarily psychological consequences (i.e., social approval and disapproval) mediated by the commitment individual's social environment. Although this thesis shall focus on soft commitments, because it is more economically prudent approach to addressing EBRBs (Blaga et al., 2018), both types are discussed below.

2.4.2.1 Hard commitments

Hard commitment interventions, such as monetary contingency contracts and lottery incentives, have proven to have positive short-term effects (Bryan et al., 2010). In monetary contingency contracts, also known as deposit contracts, participants are usually required to deposit money, which can only be refunded upon reaching the goal (Sykes-Muskett et al., 2015b). In lottery incentives, participants are given the opportunity to win money if they accomplish their goals to which they have committed to (John et al., 2012). These interventions typically utilise financial incentives as a way of positively influencing decision making and promoting positive behaviour change (Burns et al., 2012; Jeffery, 2012). By consistently and immediately rewarding behaviours, it is thought that Jeffery and colleagues have done the only three studies known by this author that have examined the effectiveness of different financial incentive structures in maintaining weight losses. They first examined whether or not a different temporal distribution of financial incentives could better sustain weight loss efforts during the treatment period itself. The underlying rationale was that the effort required to lose weight is often initially motivated by intrinsic factors—the novelty of the experience, therapist encouragement, the positive feedback of weight decrease, improvements in mobility, reduced health risk indicators like blood pressure, and positive social feedback. With time, however, the power of these "natural rewards" declines, and the benefits of further weight losses and effort are no longer as salient or motivating. This phenomenon has been described as habituation. Following this line of reasoning, it is plausible that financial incentives for weight loss

might be more effective if focused primarily within the time period when most people find it most difficult to sustain weight loss, that is, after they have lost some of their desired weight (Jeffery, 2012).

Hard commitment interventions have been shown to be effective in promoting positive lifestyle changes, such as smoking cessation (Giné et al., 2010; Halpern et al., 2015), and PA (Prestwich et al., 2012; Royer et al., 2015). In terms of weight management behaviours, numerous intervention studies have used hard commitments in the form of financial incentives as a cost-effective method to promote EBRBS, although the results have been inconsistent (e.g., Abrahms & Allen, 1974; Ferster et al., 1996; Harris & Bruner, 1971; Jeffery et al., 1978, 1983; Stuart, 1967). In some of these studies, participants wishing to lose weight were required to sign a financial incentive contract committing themselves to pay a certain amount of money for each pound they wished to lose. In others, participants deposited money with a therapist who returns the money according to participants' adherence to their weight loss goals. The results of most of these studies showed that the rate of weight loss was greater in the first six months of the treatment and slowed down after six months. Although some participants were able to reach their personal weight loss goals, however, after the financial incentives were removed almost all participants regained most their initial weight loss.

In recent years, several systematic reviews assessing the effectiveness of financial incentives in enhancing weight loss via EBRBs have found generally promising but mixed results (Burns et al., 2012; Mitchell et al., 2017; Paloyo et al., 2014; Paul-Ebhohimhen & Avenell, 2008; Promberger & Marteau, 2013; Rice, 2013; Ries, 2012; Sykes-Muskett et al., 2015b; Volpp et al., 2008; Wall et al., 2006). Various factors such as, small sample sizes, the quality of weight loss instruction provided, the variability in the size of financial incentive, and contextual factors have usually been cited for these inconsistencies (Jeffery, 2012). Despite the inconsistent results, the key findings of these studies indicate that negative reinforcements (i.e., ones which punish

participants if stated goals are not met) are more effective than positive reinforcements (i.e., ones which reward participants for attaining their goals) (Burns et al., 2012; Jeffery, 2012). Another key finding is that financial incentives are more effective for influencing short-term weight loss via EBRBs, however once the financial incentives are removed the EBRBs also ceases (Burns et al., 2012; Jeffery, 2012; Mitchell et al., 2017; Paloyo et al., 2014).

Despite over 60 years of research investigating the effects of financial incentives on EBRBs, the long-term effects remain unclear (Mitchell & Faulkner, 2012; Volpp et al., 2008). Furthermore, the use of contingency contracts requires individuals to self-fund deposits, which may not only have financial costs that limit their applicability (de Leon & Fuqua, 1995), but may only be suitable for high socio-economic populations and not financially sustainable or ethical for low socio-economic populations (Coupe et al., 2019).

2.4.2.2 Soft Commitments

Although soft commitments have been described in a variety of ways, they can be grouped into two perspectives. Firstly, Anderberg et al. (2018a), Himmler et al. (2019) and Rachlin (2016) explain soft commitment as the mental or cognitive consequences which occur when an individual is involved in a pattern of behaviour, that is difficult to interrupt (i.e., because the person would pay a price or risk some reward not to have it interrupted), yet the individual is able to accept the cost and break the pattern at any point. To illustrate their supposition, consider an athlete doing a 5-kilometre run. Long duration activities, such as this, attain their value by their pattern. Even though the pattern is interruptible, any form of interruption degrades the value of the whole run. Hence, the closer the athlete gets to the finish line, the more committed he or she is in finishing it and the more interruption becomes unpleasant. Although the athlete is said to have made a soft commitment to finish the run, he or she can forgo the reward (i.e., sense of achievement) and retire from the race.

For Anderberg et al. (2018a), Himmler et al. (2019) and Rachlin (2016), this is soft commitment because there is a way out, and non-adherence does not carry any consequences (aside from forgoing some non-financial reward). For Bernheim & Rangel (2004) the avoidance of certain environmental factors that are complimentary to specific temptation goods constitutes a soft commitment. Similarly, Bénabou and Tirole (2004) and Bisin and Hyndman (2020) illustrates soft commitments as when an individual self-imposes penalties to ensure that he or she chooses a long-term gain over a short-term benefit.

Although these examples of commitments could be regarded as "soft" due to their flexibility, however, in any of these examples, an individual could set unenforced rules for him or herself that could also constitute a hard commitment. For example, in Anderberg et al.'s (2018a) study, although commitment adherence (i.e., early submission of assignment) or non-adherence did not give students any grade advantage or disadvantage, however, due to the offer of a £5 lottery ticket, the commitment they offer could also be described as "hard". These studies give evidence for the success of a commitment intervention in changing behaviour, but does not explain the actual psychological or emotional decision-making process itself.

In terms of the cognitive consequences, it has been suggested that soft commitment works by imposing cognitive costs that make it difficult for the individual to deny or reverse the initial behaviour. Several studies purporting to utilise soft commitment have offered individuals a cognitive means of committing themselves to a promise action without any emotional penalties (e.g., shame, guilt) for failing to fulfil it. An example of this can be found in Atkinson et al.'s (2013) study. Soft commitment, in their study, took the form of a commitment-type savings account that was offered to participants at the time of loan disbursement. Although it was found that soft commitment resulted in an increase in final balances relative to no commitment and was particularly effective for impatient individuals, no specific emotional consequences (i.e., disappointment with oneself for failing to adhere) were

reported by participants due to non-adherence. Rather, the soft commitment consequence was based more on provoking mental accounting and reinforcing the salience of savings (Karlan et al., 2016).

Other soft commitment studies examining the relationship between human action and consequences have also failed to report on the emotional consequences, experienced by participants (e.g., Dupas & Robinson, 2013; Karlan & Linden, 2021). This leaves a critical gap in understanding whether concepts such as mental accounting would allow for soft commitment. Several theories have been used to explain the effects of soft commitments on behaviour via mental accounting, such as theory of internal commitments (Bénabou & Tirole, 2004) and cue-based theory (Bernheim & Rangel, 2004). Although there has been much discussion of these theories, there is dearth of research that formalise these intuitions and their behavioural implications for soft commitments. Without accounting for the emotional consequences, it could be argued that operationalising soft commitment in this manner is no more than an exercise in planning with reminders.

For the purpose of this thesis, it is the second perspective of soft commitment, driven by social psychological research, that shall be accepted and employed. In this perspective, soft commitments typically take the form of a non-binding agreement, pledge or promise, in which an individual declares that he or she will agree or commit to carrying out an activity (Himmler et al., 2019). Hence, unlike hard commitments, there are no economic or material penalties for failing to adhere to one's soft commitment. Instead, there is the assumption that these self-imposed commitments set in motion an automatic system of psychological decision making and action, so that people automatically, and often subconsciously, feel the need to act on their commitments due to the psychological consequences mediated the committed individual's social environment (Kulendran et al., 2016). This perspective focusses on the emotional consequences initiated by soft commitments (Abrahamse et al., 2005; Cialdini, 2001; Lerner & Tetlock, 1999; Munson et al., 2015; Nyer & Dellande, 2010;

Pallak & Cummings, 1976; Parrott et al., 1998; Shippee & Gregory, 1982), where punishment comes from negative psychological states (e.g., shame, loss of self-esteem or guilt), and reinforcement comes from positive psychological states (e.g., pride, high self-esteem or recognition).

The avoidance or receptivity of these psychological consequences guide people to adhere to their commitments. Soft commitments are challenging to operate due to the inherent trade-offs. On one hand, the psychological consequences have to be weak enough such that individuals are not frightened off from making a commitment, such methodological challenge was identified in Munson et al.'s (2015) study. On the other hand, it has to be strong enough to influence behaviours congruent with one's commitment.

Two areas that soft commitments have shown promising results are in education and personal finance. In education, it is commonly found that procrastination can cause students to fall behind, and hence can have a negative impact on academic success (Steel, 2007). Soft commitments have been successfully employed to help students who tend to procrastinate due to self-control problems, by drawing out a promise from students to submit their assignment on or before the deadline (Anderberg et al., 2018a; Ariely & Wertenbroch, 2002; Himmler et al., 2019), although the results were inconsistent. Notably, 73% of students who committed to an early deadline subsequently failed to adhere to it (Anderberg et al., 2018a). Given the importance of education and the prevalence of procrastination among student, one would expect a wealth of literature addressing soft commitment in this domain. Unfortunately, the literature is scarce, and most studies purporting to employ soft commitments have contained elements of hard commitments (Anderberg et al., 2018b; Ariely & Wertenbroch, 2002).

Despite the effectiveness of soft commitments in the areas of environment, education and personal finance, there is little research of its use in influencing EBRBs. The sparse studies in this area have either implemented hard commitments

(Augurzky et al., 2015; John et al., 2012; Marteau et al., 2009; McGill et al., 2018; Royer et al., 2015), combined both soft and hard commitment approaches (Harkins et al., 2017), or combined hard commitment with another non-related intervention (Luley et al., 2010; Shaw et al., 2017). This is concerning given that weight regain, for example, is a common problem for participants who have achieved initial weight loss in a LMP (Kraschnewski et al., 2010), and also because hard commitments are only effective as long as participants are receiving the intervention (Paloyo et al., 2014). Hence, there is need to explore interventions that focus primarily within the time period that most people find it difficult to maintain EBRBs. Thus, the following question can be raised:

2. What is the effect of making a PC on durable goal attainment?

2.4.3 Theoretical Mechanisms Underpinning the Effect of Public Commitment on Behaviour Change

Lokhorst et al. (2013) have written extensively about how PC can lead to durable behaviour change. Durable, in the sense that the changes will last for the long-term, without the need for reminders or further interventions. However, the literature demonstrates that PC has had mixed results, sometimes being successful in the short-term, and other times having a more sustained effect over a longer period. Indeed, some studies have found that PC is no different from other interventions or even control conditions. This suggest that making a PC not only activates particular psychological processes that influence behaviour change, but depending on which of these psychological processes underlies the behaviour change, one would make different predictions about the manifestations and consequences of the new behaviours: about the durability and about the number of different attitudinal or behavioural areas that will be affected by them.

Attitude research may be valuable in providing an understanding of the nature and depth of changes that are brought about by making a PC. In particular, Kelman's (1958) theoretical framework which analyses the different process of attitude change

resulting from social influence. Kelman (1958) posits that changes in attitudes and actions produced by social influence may occur at different levels, and these differences in the nature and level of changes that take place correspond to the differences in the psychological process whereby the individual accepts influence (or "conforms"). In other words, even though the resulting overt PC adherence behaviours may appear the same, the underlying psychological processes in which individual engages when he adopts induced behaviour may be different. The three different processes of influence can be distinguished: *compliance*, *identification* and *internalisation*.

In the context of PC, *compliance* occurs when an individual accepts to adhere to a PC because he/she hopes to gain a favourable reaction from the addressed audience. Individuals who demonstrate compliance are driven to adhere to their PC, not because they believe in the cause or expect to enjoy the behaviour, but because they expect to obtain social approval or avoid social disapproval. In *identification*, individuals believe in the cause of adhering to their PC because they want to have a satisfying relationship with the addressed audience. Thus, the satisfaction derived from identification is due to the act of conforming. *Internalisation* can be said to occur when individuals adhere to their PC to achieve fully internalised instrumental outcomes. These outcomes are integrated into the repertoires of behaviours that satisfy psychological needs.

In other words, PC adherence occurs because there is congruence between the adherence behaviours and the individual's value system. Thus, the satisfaction derived from internalization is due to the content of the adherence behaviours. Kelman's (1958) three processes represent three qualitatively different ways of accepting the social influence that is enacted by making a PC. These processes will provide a basis for the possible psychological mechanisms that have been suggested to underlie the PC effect. These psychological mechanisms that are said to be responsible for the effect of PC are discussed below.

2.4.3.1 Normative Influence

Poor EBRBs tend to cluster within social networks, which are systems of personal relationships and social interactions (Conklin et al., 2014; McNeill et al., 2006; Ståhl et al., 2001; Trapp et al., 2015). This suggests influences in the social environment may play an important role in the development and maintenance of these behaviours. A popular explanation through which the environment affects PC adherence behaviours is normative influence (Lokhorst et al., 2013). Normative influence refers to "the rules and standards that are understood by members of a group, and that guide and/or constrain social behaviour without the force of laws" (Cialdini & Trost, 1998: p.152). Significant sources of normative influence are found in an individual's social environment through exposure to interpersonal and social cues, including those from a network of strong-ties (e.g., family, close friends), distal members (e.g., neighbours, colleagues), and weak-ties (e.g., strangers). Norms can be divided into injunctive norms (what society says one should do) and descriptive norms (what people actually do). A substantial body of literature and several social and behavioural theories, such as theories of planned behaviour (Ajzen, 2011), normative conduct (Cialdini et al., 1990; Lapinski & Rimal, 2005) and normative social behaviour (Rimal & Real, 2005), have all explored the impact of social norms on thoughts and behaviours. Indeed, there is wealth of studies that have demonstrated the impact of normative influence on the adoption of EBRBs (Ball et al., 2010; Kim et al., 2019; Wally & Cameron, 2017).

In the context of PC, normative influence differs from conformity, which is behaviour intended to match that of the majority. Instead, it is argued that an individual who makes a PC is said to be socially accountable to the addressed audience, due to the possible social sanctions that would follow for breaking it (Abrahamse et al., 2005; Kulendran et al., 2016; Lokhorst et al., 2013; Nyer & Dellande, 2010; Parrott et al., 1998), which is consistent with Kelman's (1958) notion of compliance. In other words, it is an attempt to gain a social reward or avoid a punishment (Cialdini et al., 1991; Deutsch & Gerard, 1955; Reno et al., 1993; Rivis &

Sheeran, 2003). It is commonly assumed that PC serves to increase one's motivation (Lokhorst et al., 2010a; Shippee & Gregory, 1982) to fulfil their commitment and avoid eliciting disapproval from self or others (Bradford et al., 2017; Dellande & Nyer, 2007a). An extensive example of normative influence (e.g., ridicule, criticism) is provided by Cialdini (2001) concerning individuals whose behavioural consistency is due to the fear of others' scorn. This approach emphasises the importance of other people's opinion in support of goal attainment or PC adherence behaviours (Lokhorst et al., 2013). Thus, the satisfaction derived from compliance is due to the influence of accepting social accountability and conforming with the norms of the addressed audience.

Although the impact of normative influence on PC seems plausible, studies of PC have merely alluded to normative influence without giving details of the psychological process, including how social norms evolve, what aspect of rational function is connected with the adherence of a PC, and what are the roles of specific sources of information about social norms within social groups. Moreover, it is not unusual for individuals to receive mixed normative messages from different sources concerning a particular behaviour (Mead et al., 2014).

2.4.3.2 Preference for Consistency and Cognitive Dissonance

An alternative explanation for the role of normative influence on PC adherence behaviours is based on the notion of preference of consistency, which is mainly based on cognitive dissonance theory (Festinger, 1957) and behavioural consistency (Cialdini et al., 1995; Cialdini & Trost, 1998; Festinger, 1957; Kiesler, 1971b; Pallak & Cummings, 1976). Festinger's (1957) cognitive dissonance theory began by postulating that pairs of cognitions (i.e., elements of knowledge) can be relevant or irrelevant to one another. Cognition refers to the mechanisms by which people acquire, store and act on information from the environment (Shettleworth, 2009). Two pairs of cognitions can be relevant or irrelevant to one another. If two cognitions are relevant and

consistent with one another, there is consonance. However, if they are irrelevant or inconsistent with one another it means there is cognitive inconsistency.

The existence of cognitive inconsistency leads to a psychological discomfort (i.e., cognitive dissonance) which the individual is motivated to reduce, thereby restoring cognitive balance. The greater the magnitude of dissonance, the greater is the pressure to reduce dissonance in the direction of PC adherence (Harmon-Jones & Mills, 2019). Festinger (1957) identified four critical strategies that can lead to dissonance reduction and restore cognitive balance, which are: (1) add new consonant cognitions so that the overall inconsistency decreases, (2) remove one of the dissonance cognitions, (3) reducing the importance of dissonant cognitions, for example, trivializing the dissonant cognition, or trivializing the importance of the attitude, or (4) increasing the importance of consonant cognitions.

Aside from cognitive dissonance, other theories such as impression-management theory (Tedeschi et al., 1971) and balance theory (Heider, 1946, 1958), view the desire for consistency as a powerful motivator that drives human action. Cognitive based explanations for consistency have been leveraged in a variety of ways to influence behaviours, such as in the foot-in-the-door technique (Cialdini & Goldstein, 2004), low-ball technique (Guéguen & Pascual, 2014), binding communication (Michelik et al., 2012), and the four walls approaches (Guéguen et al., 2013). The success of these approaches is demonstrative of the notion that consistency pressures make people susceptible to performing behaviours consistent with their PC. Although development of consistency specific theories has informed the psychological theory of motivation and compliance by introducing the evolving cognitive balance that an individual is driven to maintain, many have argued that individuals differ in their willingness to conform to the expectations of others regarding attitudinal and behavioural decisions (Batra et al., 2001; Martin et al., 2008; Orth & Kahle, 2008; Wooten & Reed, 2004).

Public commitment researchers, like many social behavioural psychologists, have long understood that an individual's preference for consistency, and to be viewed as a committed person, mediates the protection, alteration and malleability of attitudes. As such, whenever people make their intentions public, they are more likely fulfil their intentions due to the psychological need to appear consistent in the eyes of others and to exhibit stability in the preferences and/or in their expressions of preferences (Cialdini et al., 1995; Salancik, 1977; Tesser, 2000). Direct evidence for PC leading to a preference for consistency comes from research showing that people who favour consistency are more likely to conform to the principles of PC, whereas people who favour inconsistency and spontaneity are less likely to confirm PC hypotheses, especially when their initial PC are made salient (Burger & Guadagno, 2003; Cialdini et al., 1995).

The PC literature also points to dissonance reduction strategies which are suggested to underpin an individual's attempt to follow through with his/her PC. It is commonly argued that the act of making a PC leads individuals into a state of defence motivation whereby they become more resistant to counter-attitudinal attacks (Ahluwalia et al., 2001; Eagly & Chaiken, 1995; Gopinath & Nyer, 2009). Many mechanisms have been suggested to explain the role played by PC in influencing resistance to attitude change and promoting behaviour congruent with one's PC. Defence motivation is one such mechanism, which involves the selective cognitive processing of information that is consistent with the attitudinal position prescribed by the individual's PC (Gopinath & Nyer, 2009; Kunda, 1990; Pomerantz et al., 1995). Defence motivation also accounts for changes in negative, irrational thoughts that are involved in the maintenance of depression and related disorders (Cash, 2012). These defence motivation processes diminish the negative effects of that information in that they act as a moderating influence on resistance to attitude change.

An alternate explanation by Holt (1970) and Pauling and Lana (1969) suggests making a PC strengthened the confidence that individuals had in their attitudes, and

this increased confidence could strengthen their attitudes. The self-affirmation viewpoint (Aronson et al., 2019; Steele & Liu, 1983) suggests that dissonance reduction functions as a way of restoring one's self- image, which is consistent with how Shippee and Gregory (1982) harnessed PC in their study to heighten participant's concern with their social or public image. Operationally, participants would recognise that if they did not follow through with their PC, the outcome would be the loss of a positive civic image, social esteem, and/or community standing. From a dissonance reduction standpoint, it could be inferred that one of the reasons people adhere to their PC when confronted by counter-attitudinal information involves the need to maintain cognitive balance via the use of dissonance reduction strategies. Although there is not much precedence for this assumption in the context of PC literature.

2.4.3.3 Self-Concept and Self-Perception Theory

The effect of PC on subsequent behaviour has also been explained using the principle of self-concept, which derives from Bem's (1972) work on self-perception theory. This idea is based on attribution theory (Fiske & Taylor, 1991; Heider, 1958), which is concerned with how people arrive at casual explanations of certain behaviours, by attributing it to the situational and dispositional constraints imposed on these behaviours. Conventionally, it is believed that personalities and attitudes drive individuals' actions and behaviours, however, this does not apply to the theory of self-perception. Bem (1972: p.2) argues that "individuals come to know their own actions and behaviours partially by inferring them from observations of their own overt behaviour and/or circumstances in which this behaviour occurs". The theory argues that people may sometimes not have special knowledge about their internal states or emotional responses. In this case, they can come to infer underlying characteristics about themselves from their own behaviours in a similar fashion to that by which they infer the attitudes of others (Petty, 2012).

The self-perception theory is considered to be among the most influential theories that explain how self-knowledge is gained (Mohebi & Bailey, 2020). Bem

(1972) argues that so far as the individual's internal cues are weak, ambiguous or uninterpretable, the individual is functioning in the same position as an outside observer of his overt behaviour, and must depend on those same external cues to make subjective inferences of his/her own inner states. Thus, self-perception theory is grounded on the assertion that the overt behaviour of an individual is a route to find and interpret the feelings or inner states of that person. An example of this assertion is that an individual who observes that he/she prefers eating healthy foods over junk foods may infer that he/she is a heathy eater. Applying this assertion to PC: an individual who makes a PC to exercise five days a week may infer from this overt behaviour that he is a physically active individual Indeed, it is this psychological mechanism that will motivate him/her to follow through with the promised activities.

Lokhorst et al. (2013) notes that such a process does not imply an evaluative inference based on mindless compliance to whatever PC was initially made, but rather a change in how people infer their attitudes and who they are, on the basis of what they have committed to. For this to happen, the individual needs to freely choose to perform the behaviour, and they must believe in the cause or expect to enjoy the behaviour. Lokhorst et al. (2013) and Nyer and Dellande (2010) argue that if people voluntarily choose to perform a behaviour, they conclude that they have come to the decision by themselves and that this behaviour reflects their true motivations, beliefs or self-concept. This view is consistent with Kelman's (1958) notion of *internalisation* which occurs when behaviours are integrated into one's values and belief system. In essence, the individual brings his/her self-concept to be in line with the new behaviour.

Social psychologists have highlighted the important role that self-concept plays in self-perception (Bong & Skaalvik, 2003). Self-concept refers to how people think about, perceive and view themselves. Various types of self-concept have been identified, some of which relate to certain personality aspects (physical, social emotional, ethnic and racial, socioeconomic, sexual, religious), while others relate to

academic achievement (Sarsani, 2007; Bong & Skaalvik, 2003; Easterbrook et al., 2020; Fernández-Bustos et al., 2019; Hosseini et al., 2021; Savary & Dhar, 2020). Compressing these various self-concepts into three distinct but related dimensions, Rogers (1983) found that self-concept consists of *actual self* (is the way in which an individual sees him or herself now), *ideal self* (is the way in which an individual would like to see him or herself) and *self-esteem* (how much worth and value ascribes to his or herself).

The importance of self-concept stems from its notable contribution to personality formation. It is generally agreed that an adjustment in self-concept or adjustment in the salience of some aspect of the self should cause the individuals to follow-through with the promised behaviour (Rhodewalt & Agustsdottir, 1986). Hence, PC researchers have advocated a connection between self-concept change and attitude change. This does not mean that attitude change occurs easily. Afterall, strong evidence shows that self-concepts resist change and maintain stability (Marececk & Metee, 1972; McFarlin & Blascovich, 1981; Swann, 1983, 1987; Swann & Ely, 1984; Swann & Hill, 1982; Swann & Predmore, 1985; Swann & Read, 1981). Likewise, a voluminous amount of research also shows that attitude change is difficult and most people are highly resistant to persuasion (Banas & Richards, 2017; Bohner & Dickel, 2011; Briñol et al., 2015; Petty et al., 1997).

Insights from cognitive dissonance research also confirm that individuals will counterargue against attitude-challenging information in order to maintain their consistency between attitude and behaviour (Cialdini & Trost, 1998). Although, occasionally people do change, the interest of commitment research goes beyond whether some measurable change in attitude has occurred, but in knowing the nature and depth of the attitude change so as to make meaningful predictions about how it will be reflected in subsequent actions and reactions to events (Kelman, 1958). From the perspective of PC, it is crucial to know whether the attitude change has occurred on a superficial (i.e., public but not private acceptance), hence, disappears after a short

lapse of time, or, is the attitude change due to the new behaviour being consistent with one's values, beliefs and self-concept?

Evidence that making a PC leads to a change in self-concept is limited to a number of studies which have linked Kelman's (1958) concept of internalisation with self-concept change (Burger & Caldwell, 2003; Burger & Guadagno, 2003; Fazio et al., 1981; Jones et al., 1981). For example, Burger and Caldwell (2003) induced PC in their study and then collected personality related measures. It was found that, compared with a control condition, those who made a PC (i.e., signed a petition and wrote a brief essay), described themselves as (a) more compassionate, (b) more willing to provide support for the homeless, and shortly thereafter, (c) were more likely to comply with a request to volunteer for a food drive. Mediation analysis demonstrated that the change in self-concept mediated the relationship between PC and subsequent adherence behaviours. The importance of maintaining consistency between attitudes and behaviour is also underscored by these studies, which shows that individuals who are induced to make initially counter-attitudinal and overt behaviour come to maintain those positions, especially when their overt behaviours are made public (Baumeister & Tice, 1984; Carlsmith et al., 1966; Helmreich & Collins, 1968; Paulhus, 1982).

A related approach to understanding how individuals fulfil their PC – due to it being congruent with their value system – is provided Kerr et al. (1997) and Schwartz and Howard's (1984) research on internalised norms. This is particularly important because social pressure is a type of extrinsic motivation, and long-term behaviour change, they claim, is more likely to occur if the influence is intrinsically driven. Internalised norms could be described as the process that transforms the motivations of agents for complying with social norms from those of external reward or punishment to that of following norms as an end in themselves. This simply suggests that when people make a PC, a need for action can be activated by their moral

values, which produces feelings of moral obligation to adhere to or refrain from the PC.

Feelings of moral obligation are personal, internalised norms, which bears a resemblance with Kelman's (1958) notion of internalisation because the moral obligation has been adopted in a manner that is integrated with the individual's existing values. Thus, the satisfaction derived from this internalisation is due to adhering to the PC. Kerr et al. (1997) tested this explanation against the social norm theory. In two experiments, Kerr et al. (1997) demonstrated that even when the addressed audience did not know whether participants actually adhere to their PC, they still kept the promises they made to them. Kerr et al. (1997) and other similar studies (e.g., Kerr & Kaufman-Gilliland, 1994) concluded that their studies offered support for the personal norm explanation. Thus, the following research question can be raised:

3. What is the effect of making a PC on goal attainment, when the impact of public accountability is removed?

Most explanations of the effect of PC on behaviour mainly have an extrinsic focus, however, it is the theory of self-concept that holds more promise in explaining its effects on durable or long-term behaviour change. Although historically it was postulated that extrinsic motivation such as social accountability could undermine internal motivation, the studies already reviewed demonstrates that this is not always the case in relation to EBRBs or weight-related outcomes.

From a review of the various psychological mechanisms that are said to underlie the effect of PC, it would seem that it is not enough to know that there has been some measurable change in attitude as a result PC; usually it will also be important to know what kind of change has been induced by the social pressure or social accountability. Is it a superficial change, whereby the individual accepts the social pressure in spite of not agreeing with it (i.e., public conformity without private

acceptance)? Or is it a more lasting change in attitude and belief, which manifests itself durable behaviour changes due to the PC being integrated into the committed individual's value system (i.e., public conformity coupled with private acceptance)?

Although the framework acknowledges the importance of social contexts and the different processes of attitude change resulting from social pressure, little is known about the nature of these social environments, especially whether these contextual constraints can be restrictive or enabling, and its impact on psychological well-being. It has been argued that social environments that allow the satisfaction of three basic human needs for autonomy, competence and relatedness are thought to promote optimal outcomes in terms of both personal development and the quality of the experiences within a specific social situation (Ryan & Deci, 2017). The importance of social context has been noted in the literature surrounding psychological well-being (Lloyd & Little, 2010).

Another limitation of Kelman's (1958) framework in explaining the effect of PC, is that the three processes of influence are treated as distinct dimensions based on how the individual accepts influence. However, given that social influence is commonly regarded as an external contingency on behaviour, the framework fails to explain the development and dynamics of extrinsic motivation. Specifically, little is known about the degree to which individuals who make a PC experience autonomy while engaging in extrinsically motivated behaviours. One theoretical approach to human motivation that is receiving increasing attention in the PA domain is self-determination theory (SDT; Ryan & Deci, 2000, 2017). The importance of SDT in understanding the adoption and maintenance of health behaviours is strongly supported (Kwasnicka et al., 2016). Indeed, SDT may provide a more useful framework for understanding necessary mechanisms that underpin changes in long term behaviour in the context of PC.

2.5 Online Public Commitment

While PC presumes the physical presence of an addressed audience as witness, it is important to understand how PC manifests within the context of computer mediated communication (CMC) where individuals are not physically co-present. This is important because as individuals employ CMC in numerous aspects of their lives, they are likely to interact with others in ways traditionally associated with geographical proximate communities to make their PC. Computer mediated communication has been defined as "the practice of using networked computers and alphabetic text to transmit messages between people or groups of people across space and time" (Jacobs, 2014; p.470). With the mounting impact of various forms of synchronous and asynchronous CMCs, (e.g., virtual communities (VCs), online support groups, social networking sites (SNSs), blogs, etc), it is likely that individuals participate in these online environments to make PCs to support their goal pursuits in conjunction with or in lieu of in-person groups (Bradford et al., 2017).

In synchronous CMC, interaction takes place in real time, while in asynchronous CMC interactants are not necessarily online simultaneously (reviewed further in section 2.5.1.1). To this end, an online public commitment (OPC) could be defined as the use of CMC to publicise a PC towards a BI (i.e., to engage in a particular behaviour or achieve a particular outcome) to others. The computer network acts as a communication medium in a similar fashion that the newspaper advertisement (Shippee & Gregory, 1982), commitment form (Wang & Katzev, 1990), and index card (Nyer & Dellande, 2010) each served as a medium to communicate in-person PC. From the individuals who joins an online support group to share the triumphs and tribulations of their weight loss journey, to others who posts videos of their exercises on social media websites, all of these could be described as making an OPC in support of their EBRBs.

Whilst prior research finds evidence for a relationship between in-person PC and compliant behaviours (Ahluwalia et al., 2001; Cialdini & Trost, 1998; Debar et al.,

2011; Gollwitzer et al., 2009a; Hollenbeck et al., 1989; Nyer & Dellande, 2010; Wang & Katzev, 1990), little research has been carried out on the OPC phenomenon, especially where commitments are made online but compliant behaviours resulting in goal attainment occur offline. There is merit in also exploring the mechanisms enabling OPC for goal attainment in the absence of the physical presence of others. Given the wide array of different platforms via which an OPC can be made, including their functionalities and affordances, studying the effects of OPC on adherence behaviours can be challenging, as these are unlikely to be linear and consistent across platforms.

In addition, existing theories around CMC do not tend to make explicit reference to the source or origin of behaviour (Kaye et al., 2022). This is an obvious omission in understanding the origin of an OPC, which makes it difficult to understand whether (1) the OPC itself natively and exclusively takes place online for acting subject and addressed audience (i.e., online exclusive behaviour, e.g., via a keypad/keyboard to compose a social media post), (2) takes place offline for the acting subject and/or addressed user but are facilitated by CMC (i.e., online mediated-behaviour, e.g., "real world behaviour" displayed via video conferencing), or (3) takes place offline but is concurrently or subsequently recorded online (i.e., online-recorded behaviour, e.g., Strava, fitness app metrics, accelerometery) (Kaye et al., 2022).

The source of behaviour (i.e., whether it originates online or offline) explicitly underpins these three types of behaviours and is a critical factor in understanding the psychological and social effects associated with CMC, ranging from motivation to behavioural outcomes (Kaye et al., 2022). Online public commitment can be aligned with text-based forms of CMC (e.g., via a keyboard to write a social media post) as equally as does with newer modes of CMC that allow the exchange of not only textual but also audio, visual, and/or graphical information. Online public commitment is by no means limited to one particular CMC mode. On the contrary, given the sheer diversity of different OPC behaviours which may be represented with CMC, an assumption is made that current CMC theory may not fully capture some distinctions

in the proposed effects which are said to derive from CMC. What the above discussion means is that OPC itself may not always be represented equivalently to the communicated message, therefore, distinguishing types of online behaviour for the benefit of OPC is paramount.

2.5.1 Computer-Mediated Communication

Computer-mediated communication (CMC) is defined as "the process by which people create, exchange, and perceive information using networked telecommunications systems that facilitate encoding, transmitting, and decoding messages" (Zeinali Nejad et al., 2021: p.95). This definition emphasises the role of interactivity between users through technologically mediated channels of communication. Computer mediated communication can take place over local area networks (LANs) or over the Internet. The rapid growth of information and communications technology (ICT) in the last 50 years or so has pervaded many aspects of human communication and interaction (Blake, 2017; Jelfs & Richardson, 2013; McGlinn & Parrish, 2002; Pennington & Rogerson-Revell, 2019; Zeinali Nejad et al., 2021). Whilst CMC is not specific to the internet, the development of internet-enabled digital technologies and Web 2.0 has resulted in CMC becoming a major area of inquiry when understanding human communication and its intersection with technology (Kaye et al., 2022). Although Web 2.0 is a term that is somewhat contested, it usually refers to the second generation of the internet that offer a two-way communication in the form of user-generated content (UGC) (Newman et al., 2016), as opposed to Web 1.0 which represented the early stage of the internet that were characterised by one-way communication (e.g., static web pages). Within Web 2.0, both electronic health (eHealth) and mobile health (mHealth) are becoming prominent components in the domain of health and weight-related behaviours (Kampmeijer, 2016). eHealth refers to the use of information and communication technologies (ICT) to improve healthcare delivery, whilst mHealth is the use of mobile wireless technologies to support the achievement of health (or weight) objectives. The

effectiveness of both eHealth and mHealth have been demonstrated to improve PA and diet (Duncan et al., 2018; Fenton et al., 2021; Scarry et al., 2022; Gilson 2017; Arora et al., 2024; Klein et al., 2017; Murawski et al., 2018; Deiner et al., 2022).

According to Walther (2007) the most interesting aspect of the advent of CMC is how it reveals basic elements of interpersonal communication, which forms the basis of the development of relationships relying on typed messages as the primary mechanism of expression. Early definitions CMC, such as the one provided by Zeinali Nejad et al. (2021) above, have focussed largely on the delivery mechanisms, derived from communication theory and the importance of the interaction of people that the technologies and processes mediate. Early research on CMC have primarily focused on online support groups that were formed via "older" mediums of CMC such online bulletin boards, and Usenet newsgroups, and are characterised by text-based, asynchronous and anonymous communications (Herring, 2002; van Dijck, 2013). However, as technologies change, newer modes of CMC evolve. Sometimes newer audio-visual possibilities diverge from purely text-based, while in other aspects a convergence occurs, where text-, voice- and/or video interactions are amalgamated within a web-browser or app environment (e.g., Zoom or Microsoft Teams).

Aside from synchronicity/temporality of CMC, the role of other technological features of CMC, such as modality (Zhou & Zhang, 2007), persistence/visibility of communication (Treem et al., 2020; Walther et al., 2018), media richness (Daft & Lengel, 1984), media naturalness (Kock, 2012) and orthography (Aldunate & González-Ibáñez, 2017; Niezabitowska et al., 2019) have also been discussed in terms of their impact upon user perceptions and behaviour. Indeed, many of these features have underpinned a substantial proportion of cyberpsychology research and maintained their significance as a stable part of CMC enquiry to the present day (Petrocchi et al., 2020).

In more recent definitions, the social aspects of the communication, rather than the hardware or software, have been emphasised. For example, Jones (2012) defined

CMC as thus: "CMC, of course, is not just a tool; it is at once technology, medium, and engine of social relations. The focus of this definition is beyond the structures social relations, and considers the space within which the relations occur and the tool that individuals use to enter that space". Such a definition demonstrates the move away from the technological focus of CMC definitions. Research supporting these types of conceptualisation have largely focussed on how CMC alters the processes and outcomes of social interaction and group processes, addressing issues such as how the characteristics of groups (e.g., size, history) and tasks (e.g., idea generation, decision making) affect the performance of groups (Calefato & Lanubile, 2010); how the level of intimacy and social presence varies between various types of CMC mediums; and how people present and construe self-identity to facilitate desired relationships (Walther & Boyd, 2002). As such, core theories that guided earlier conceptualisation of CMC highlight the lack of socio-contextual information as the defining characteristics of CMC working to its disadvantage (Lee & Oh, 2015). Several aspects of CMC have been discussed in the literature, which may be useful in providing in better understanding OPC.

2.5.1.1 Asynchronous vs Synchronous Communications

One of the main distinctions that has been made in CMC has been between synchronous and asynchronous communications. Several studies, mostly within educational context, have reported notable key differences between asynchronous and synchronous CMC. In synchronous CMC, interactions take place in real time (e.g., text-based online chat, audio and video conferencing), which limit the use of outside resources. Whereas in asynchronous CMC, interactions occur in delayed time where participants are not necessarily online simultaneously (e.g., email, discussion forums, bulletin boards, online groups). This gives users more time for thinking and planning and uses eternal resources. Others have suggested that asynchronous CMC, which is typically text-based CMC is "lean" media, is more suitable for basic, straightforward tasks such as scheduling, while "rich" media such as synchronous and face-to-face

communication is better suited for complex tasks that require intensive interactions and deliberations (Xie, 2008a). Most of the distinctions between synchronous and asynchronous which may serve different functions have been studied within the educational literature (Abuseileek & Qatawneh, 2013; Zeinali Nejad et al., 2021b). Unfortunately, in the area of OPC related behaviour changes, there has been virtually no research. Hence, little is known about the advantages (or disadvantages) of both synchronous and asynchronous CMC in promoting communication, interaction and socialisation for those who choose to publicise their PC using the internet. Thus, the following research question is raised:

4. How does the differences between synchronous and asynchronous CMC impact on the effect of OPC on goal attainment?

2.5.1.2 Lurkers vs Posters

In terms of online behaviours, researchers mainly differentiate between two types of behaviours within virtual communities (VCs): lurkers and posters (Lai & Chen, 2014; Mousavi & Roper, 2023; Neelen & Fetter, 2010; Nguyen et al., 2020). As with any community, members do not participate at the same level. Though some members who make an OPC are active and contribute their social capital, other individuals who make their OPCs may seek personal gain without contribution. These differences have been investigated mostly in terms of knowledge sharing (Lai & Chen, 2014). Lai and Chen (2014) views 'posters' as those who contribute an above-average number of postings to a group and regularly visit a website, or members who have posted at least one message in a community forum in the past three months.

In contrast, lurkers have been defined as members of a VC who either seldomly contribute online content (Ganley et al., 2012; Lai & Chen, 2014), or never post at all (Neelen & Fetter, 2010). Posters, on the other hand, are those members who regularly post and contribute online content (Ridings et al., 2006). In fact, it has been speculated that lurking makes up between 50 to 90% of online behaviours within VCs (Ridings et

al., 2006; Walker et al., 2010). The commonly mentioned "90-9-1" principle states that within VCs and other collaborative websites, 90% of the members only consume content but do not actively contribute or participate, 9% edit the content, and 1% actively create new content (Carron-Arthur et al., 2014; Jakob Nielsen, 2006; Nielson, 2006; Van Mierlo, 2014).

Although many researchers have regarded lurking as a negative behaviour (Audy Martínek et al., 2023; Farhat et al., 2023; Hong et al., 2023),— indeed such behaviours has been regarded as problematic and undesirable (Edelmann, 2013; Leban et al., 2020) — there is a general consensus that lurking is an integral part of any VC (Audy Martínek et al., 2023; Hong et al., 2023). This suggests that, although the majority of content in a VC is created by the minority of users, lurking is also an active, participative and valuable form of online behaviour (Edelmann, 2013). Some have even argued that information overload would occur if all members of a VC were actively engaged and contributed their social capital. A balance between both types of behaviours must exist for VCs to survive and even flourish (Ridings et al., 2006).

Surprisingly, there has been little research on lurkers. Most of the research on online behaviours has focused on posting behaviour, whilst neglecting the members who make up a large proportion of many VCs. Put differently, the perceived power of VCs is built on a minority view (i.e., only active members) and so on an unrepresentative sample of VC members (Mousavi & Roper, 2023). Admittedly, since lurkers do not post and there is limited research on the motives behind this type of online behaviour, it has become increasingly difficult to gather information about them in the persistent conversation. It is important to understand how lurkers might differ from their posting counterparts, aside from the basic notion that one group posts, while the other does not. More importantly, since OPC, by definition, is aligned with posting behaviour – because posting frequency seems to be the key factor in the determination of online behaviour – understanding and catering to the needs of lurkers is an increasingly important area of inquiry. Furthermore, understanding the

factors that drive online participation may help to explain the reasons for lurking and develop strategies to motivate OPC behaviour (Sun et al., 2014).

Two streams of research have emerged from the study of lurking behaviour, both of which have implications for OPC research. One stream concerns the motivation for joining a VC, and the other concerns the reasons for lurking behaviour. In terms of the former, it has been found that lurkers and posters do not differ in their motivations for joining a VC (Nonnecke et al., 2004; Sun et al., 2014), but found that they act in different ways to fulfil their goals. Demographically, lurkers and posters have been found to be similar (Preece et al., 2004). Virtual communities are unique in that most of the content is member-generated, as opposed to that provided by the site provider. This member-generated content is a source of content attractiveness that draws more members to the community, creating a loop, since more members generate more content, which in turn draws more members (Ridings et al., 2006). In view of this, knowledge and information have been commonly mentioned as valuable currency or social resources in a VC (Mousavi & Roper, 2023; Nguyen et al., 2020).

The information flow in VCs is both ways, that is, people visit to provide information in addition to receiving it. In terms of OPC, it has been found that individuals who make an OPC within VCs, not only enact a form of social accountability, but it also allows VC members to exchange social support in the form of emotional, information, and instrumental support that may not be possible within FtF settings (Bradford et al., 2017; Consolvo et al., 2006; Johnson & Lowe, 2022; Munson et al., 2015). For example, Munson et al. (2015) found that making a PA-related OPC were effective at eliciting social support with very few negative replies from commenters. Participants who made an OPC either received positive feedback and support and then became more open to or appreciative of the intervention, or received no feedback and became apathetic about the public posts.

The importance of receiving social support is also concurred by Consolvo et al. (2006) who found that participants who made an OPC enjoyed receiving recognition

and encouragement from other participants, and often the social support came from just knowing how participants were doing. This suggests that making an OPC may be an important part of receiving social support which may also serve to increase one's motivation to stay on course and avoid eliciting disapproval from self or others. Thus, the following research questions remain unanswered, especially in the context of experimental research:

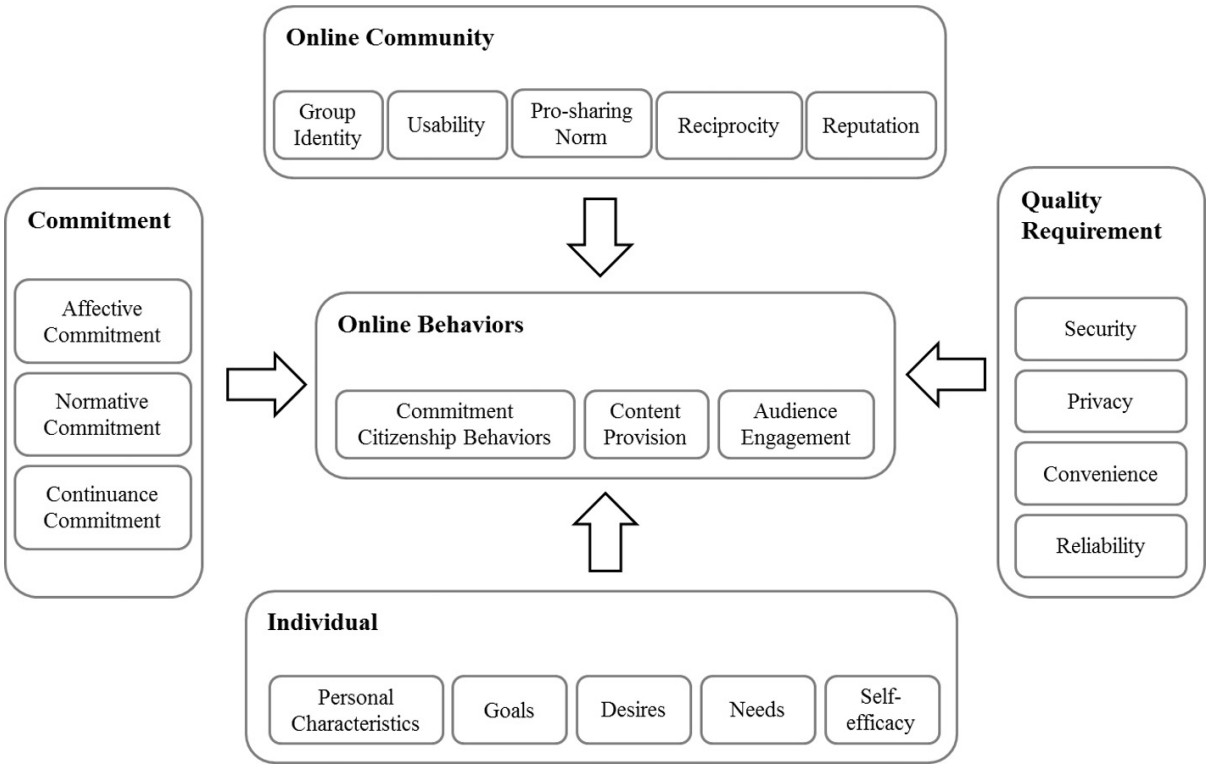
5. What impact does level of online engagement have on the relationship between OPC and goal attainment?
6. What role does social support play in the relationship between OPC and goal attainment?

Unfortunately, there is lack of research on the reasons why those who intend to make a PC choose to do so within the context of CMC, even less research has focused on the differences between lurkers and posters in terms of their motivations for making an OPC.

In terms of the reasons for lurking behaviour, research demonstrates that significant differences exist between lurkers and posters. According to Nonnecke et al. (2004), posters are more motivated by extroverted activities (e.g., entertain others, build professional networks, and offer expertise). Whereas several other studies have found an intrinsic factor was the dominant reason for lurking (Preece et al., 2004; Walker et al., 2010). Although "too often, reading is assumed not to have any intrinsic value by comparison with contribution" (Thorpe et al., 2007: p.355). Lurking gives individuals the opportunity to access information without having to publicly participate of leave visible traces (Edelmann, 2013). Similarly, Preece et al. (2004) found that lurkers lurk because: they feel they are being helpful by not posting, they cannot make the software work correctly in order to post, or the community is a poor fit for them. Nonnecke et al. (2004) also identified and outlined 20 reasons why lurkers do not post, the top four reasons were: just reading/browsing (54%), still learning about the group (30%), shy about posting (28%) and nothing to offer (23%).

As evident from the above discussion, the research on the reasons why 'lurkers' lurk and 'posters' post is disjointed at best, therefore, based on the findings of the literature, Sun et al. (2014) proposed an integrated model of motivational factors of online behaviour, as shown in Figure 2. In this model, the online behaviours were classified into three categories: *community citizenship behaviours* (or the development and spread of community norms); *content provision* (or the contribution of valuable resources); and *audience engagement* (or the consumption of resources). Content provision speaks to the notion of OPC itself, and community citizenship behaviours relate to the supposition that OPC may be escalated due to confidence when there is public accountability (Bradford et al., 2017; Lokhorst et al., 2013; Ronay et al., 2017). According to many researchers, such as Bateman et al., (2006) and Kaye et al. (2022), these three voluntary behaviours are believed to be important for the viability of VCs.

Figure 2:
The integrated model of motivational factors of online behaviours (Sun et al., 2014)



According to Sun et al. (2014), these motivational factors could be categorised into: *online community*, *individual*, *commitment*, *quality requirement* factors. From the

perspective of OPC research, a few of these factors are consistent with the conceptualisation of PC and/or OPC while the others may contribute to a better understanding of how to improve OPC behaviour. Goals are an important underlying motivator for joining a VC, and different goals lead to different online behaviours. It is argued that when a member enters a VC with the goal of having a conversation, he/she is likely to be a poster. If a member only wants to learn about the group or just browse, he/she is more likely to be a lurker. Hence, an individual experiences a desire to change his/her EBRB behaviour, then makes an OPC to validate the plans that were developed from the desire, and subsequently decides to become a poster or lurker does so because he/she believes this behaviour is the best way to chieve his/her overall goals. This view is consistent with Bishop's (2007) 3-level conceptual framework that describes online actions.

Others have disagreed with the notion that desires drive online behaviours, for them the motivation for online behaviour is to satisfy the needs of users, including social needs, self-expression needs (Han et al., 2007), information needs (Han et al., 2012; Schneider et al., 2013), need for popularity (Utz et al., 2012), and need to achieve (Tedjamulia et al., 2005). This need perspective has been mostly applied to understand online behaviours in the context of health, however, the literature on EBRB and OPC is non-existent. Despite the vast research on the factors that drive online behaviours, it is unfortunate that none of this research efforts have been targeted towards understanding OPC behaviour. This is especially concerning because research has demonstrated that individuals are increasing adopting CMC to publicise their PCs (Bradford et al., 2017).

Many types of CMCs including VCs, SNSs, blogs and podcasting allows individuals ease of access, continuous availability and anonymity. With many people now using CMCs to make their OPCs, the research on VCs has been gathering momentum across many disciplines (Agostini & Mechant, 2019; Ayachi & Jallouli, 2022; Balasubramanian & Mahajan, 2001; Chiu et al., 2006; de Valck et al., 2009;

Dholakia et al., 2004; Lizzo & Liechty, 2022; Ridings et al., 2002; Rodríguez-López, 2021; Wang et al., 2022; Zhao & Shi, 2022). For example, VCs provide a virtual gathering of individuals with a communal consciousness, shared traditions, and common rituals (Johnson & Lowe, 2022), indeed through these VCs individuals find one another and provide social support as they influence decision making, promote relationships and enable democratised participation (Bradford et al., 2017). Further, membership norms are constructed and negotiated, resulting in a balance of individual and collective responsibilities (Cranwell & Seymour-Smith, 2012; Seraj, 2012).

Virtual communities also support the attainment of personal goals (Thomas et al., 2013), develop mastery and overcome social stigma (Seraj, 2012). Relationships within VCs begin with similar interests and are nurtured through sharing experiences, passing advice, recognizing successes, and providing motivation (Bradford et al., 2017). Although no research exists that explores the motivational differences between lurkers and posters that make an OPC, these insights have a lot to offer to OPC research, in terms of understanding the factors that drive OPC behaviour.

2.5.1.3 Online Social Presence

Social presence theory is one of the earliest theories in CMC, which explains the kind of interactions during a socio-collaborative activities. Although social presence is traditionally rooted in non-medicated communication, especially in social psychological theories of interpersonal communication and symbolic interactionism (Biocca et al., 2001, 2003; Sallnäs, 2005; Tu, 2000), in recent times, the concept of social presence has been widely discussed in the context of CMC. Given that PC and OPC is predicated on the presence of other people, social presence can be considered an integral part of the relationship between commitments that are made online and complaint behaviours resulting from desired outcomes that occur offline.

Moreover, Allport (1985) contended that social psychology was not just concerned with the effect of the "real presence" of others on behaviour but also with the effects of their "imagined or implied presence". Classic research on the normative influence of "reference groups" also demonstrated that individuals can be influenced by social groups or categories that might not necessarily be present in situ and to which they might not even belong (Bearden & Etzel, 1982; French & Raven, 1968; Hyman, 1942). In the context of CMC, social presence can thus be defined as the degree to which one perceives the presence of participants in an online interaction, and the consequent appreciation of an interpersonal relationship (Calefato & Lanubile, 2010).

Social presence has also been defined as the degree of feeling perception, and reaction of being connected to another member on CMC (Tu, 2000). Intimacy and immediacy are two close related concepts that have been associated with social presence. Based on the work of Argyle and Dean (1965), intimacy refers to the feeling of connectedness that communicators feel during an interaction. It is suggested that intimacy is a joint function of eye contact, physical proximity, intimacy of topics, and smiling; these components develop an equilibrium for intimacy. According to Argyle and Dean (1965), if any component of intimacy is changed, one or more other components will make compensatory changes to maintain the status of equilibrium. Immediacy refers to the psychological distance between communicators, or as Cui et al. (2013) defined it: the communication behaviours that enhance closeness to nonverbal interaction. It is suggested that nonverbal cues such as facial expression, eye contact and other expressions of body language could lead to more intense and immediate interaction.

In applying the concept of social presence to CMC, Short et al. (1976) proposed that different types of communication media varied in their ability to convey the psychological perception that other people are physically present, due to the different ability of media to transmit the verbal and nonverbal cues that convey socio-emotional

information (e.g., eye contact, facial expressions, physical distance, voice intonation etc.,). Admittedly, Short et al.'s (1976) theory was applied to earlier forms of CMC (e.g., email), which were predominantly asynchronous and text-based. These offered a limited amount of verbal and nonverbal information, hence were limited in their ability to promote social presence (Hiltz et al., 1978).

However, recent technological advancements have introduced newer modes of CMC, described specifically as "multimodal CMC" (Xie, 2008) whereby users may utilise, and more importantly, combine various modes (e.g., text, images, voice, video, emoticons) to convey a message. These newer modes of CMC that are increasingly challenging earlier CMC theories (Boyd & Ellison, 2007; Ellison et al., 2007; Hu et al., 2004; Kim et al., 2007; Lange, 2007; Stefanone & Jang, 2007; Valkenburg & Peter, 2007) can be observed in a wide variety of synchronous communication platforms such as voice chat, videoconferencing, virtual reality (VR), YouTube, podcast and instant messaging (IM). Compared with earlier forms of CMC that were generally anonymous, asynchronous, publicly accessible, group-based, and newer modes of CMC are more likely to be identifiable, private, dyadic, and ephemeral (evidence of interaction vanishes by default unless users choose to save) (Xie, 2008). Asynchronous CMCs, such as text-based communications, are leaner and more efficient for task-oriented communication (Huang & Hsiao, 2012; Kahai & Cooper, 2003; Lim, 2017; Zeinali Nejad et al., 2021).

Social presence theory has mostly been applied in the context of online group learning research (Akcaoglu & Lee, 2016; Andel et al., 2020; Guo et al., 2022; He, 2022; Jaradat & Ajlouni, 2020; Kreijns et al., 2003; Miao & Ma, 2022; Weinel et al., 2011), especially during the COVID-19 pandemic (Baber, 2022; Bao, 2020; Iyer et al., 2020; Munir et al., 2021; Ritonga et al., 2022; Sobaih et al., 2020; Stankovska et al., 2021; Toquero, 2020; Wut & Xu, 2021). Unfortunately, in the area of EBRB and OPC the research is non-existent. Despite this, the knowledge created in this area can also serve to bolster a better understanding of OPC.

The different features of different modes of CMC might have different effects on online interactions and relationship development and thus there is merit in examining these features in the context of OPC for several reasons. First, based on media richness theory (Daft & Lengel, 1984; D'ambra et al., 1998; Dennis & Kinney, 1998; Kahai & Cooper, 2003), it is commonly suggested that multimodal communication promotes greater social presence and are more efficient for relational communication, than asynchronous or less rich formats. If different media vary in their ability to reproduce "rich" social information, it means that some media will be more effective than others in support of OPC goal attainment. Rich media theory would also suggest that FtF communication would allow excessive social information, which is consistent with the notion that FtF support groups allow direct confrontation and therefore, individuals are held to a higher degree of accountability (Bradford et al., 2017). On one hand, this can equally be advantageous because individuals can be flexible in terms of when and to what degree of their OPC they choose to share which effectively lessens their accountability. On the other hand, given the assumption that lack of nonverbal cues would make CMC adequate for exchanging information of an impersonal or task-based nature, this may seem inadequate for OPC which is usually of a personal and emotional nature.

Second, the above viewpoint is predicated on the questionable assumption that human beings are incapable of adjusting to their environment (Sumner & Ramirez, 2017). Thus, in contrast to the medium-centric views which have posited that certain affordances of a medium can increase or decrease social presence when all other factors are equal (Moreno & Mayer, 2004; Zhan & Mei, 2013), the social information theory (SIPT; Walther, 1992) argues that individuals are capable of adapting to different communication media. Walther (1992) offered a testable set of theoretical mechanisms regarding how and why individuals are able to engage in personal communication in so-called lean online environments.

One of Walther's (1992) arguments was that communication environments that offer fewer verbal and/or nonverbal cues (e.g., text-based CMC) can produce equal levels social presence as FtF communication, as long as users find ways to use any accessible cues in an advantageous manner. In the context of OPC, this may possibly mean that an individual that uses text-based channels to publicise an OPC will find ways to mitigate the structural limitations of this channel to send messages that convey the desired level of both informational and emotional content. Clearly, determining how to develop an individual's social presence within his/her CMC environment could be key to promoting more engaging and supportive experience, in which the individual becomes more motivated to engage in the behaviours prescribed by his/her OPC.

However, one area that may pose a problem in applying social presence theory to OPC is that social presence theory commonly assumes that the behaviour underpinning the communicated message will be an equivalent level of richness and naturalness. While this may often be the case in most behaviours, OPC, on the other hand, is different, in that the behaviours may be entirely natural (e.g., engaging in PA) but the OPC itself which encapsulates the behaviour may relatively low in richness (e.g., metrics, graphics). As such it is crucial to distinguish between the behaviour itself and what is communicate about the behaviour via the OPC. These are conceptual distinctions not currently specified in existing theoretical models of CMC.

2.5.1.4 Anonymity and Self-Presentation

Given that the effect of PC on behaviour change depends on the physical presence of others (Bradford et al., 2017), and that the psychological mechanisms underlying this effect is mostly based on normative influence (discussed previously in section 2.5.4), it is worth reviewing whether the anonymity that CMC provides can strengthen or weaken the interpersonal bonds that transmit normative influence. Anonymity is central to most explanations of online behaviour, especially in the context of both pro- and anti-normative CMC behaviour. Anonymity refers to a state

where a person is not identifiable (Qian & Scott, 2007). Although this definition suggests a dichotomous conceptualisation of the term, it is commonly argued that different types of CMC can afford anonymity in different ways and to different degrees (Eklund et al., 2022; Macaulay et al., 2022; Zhao et al., 2022).

Distinctions have been made between personal anonymity (i.e., the degree to which users are personally identifiable online), and social anonymity (i.e., the degree to which users' social identities are identifiable) (Jaidka et al., 2022). Even between visual anonymity (Scott, 2004; i.e., the extent to which people can see and/or hear the communicator) and discursive anonymity (Suler, 2004; i.e., when a message cannot be linked to a specific source). Given that the attributes of CMC provide more opportunities for anonymity, research is needed into the process of normative influence when individuals publicise their PCs online.

Although group theories, in general, do not explicitly rule out the possibility of normative influence when the interactants are unknown to each other or do not physically interact, many of these theories make the assumption that normative influence will increase as function of the intensity of social contact. For example, Deutsch and Gerard's (1955) theory of normative influence argues that a group's normative influence depends on social pressure from others and that this pressure can best be exercised when group members are identifiable, under public surveillance, and therefore socially accountable to the group for their responses. Other theories which have extended the theory of normative influence, such social impact theory (Latané, 1981a), media richness theory (Trevino et al., 2014), the reduced social cues model (Sproull & Kiesler, 1986), and the previously discussed social presence theory (Short et al., 1976b), have all converged on the supposition that identifiability, as opposed to anonymity, would be expected to enhance immediacy and social presence and thus facilitate normative influence. In other words, the anonymity of group members or interactants might be expected, either implicitly or explicitly, to weaken normative influence by and within the group (Postmes et al., 2001). Hence, the

potential normative influence that mediates the relationship between OPC and behaviour change would be weaker than in a FtF setting, such as in-person PC.

A consideration of other social psychology theories within the context of CMC and online behaviour research suggests that anonymity might not necessarily undermine normative influence. For example, the social identity model of deindividuation effects (SIDE; Reicher et al., 1995) suggests that when social identity is salient – that is, when people define themselves as group members rather than as individuals – the anonymity of the members would decrease attention regarding interpersonal differences and enhance the salience of the group and social identity. Following self-categorization theory, this should then lead to enhanced normative influence in line with group norms (Hornsey, 2008; León, 2023; Postmes et al., 2001; Trepte & Loy, 2017).

Similarly, various authors have theorised that deindividuation, i.e., the psychological state of decreased self-evaluation and disinhibited behaviour in crowd situations (Coppolino Perfumi et al., 2019; Crossey et al., 2021; Johnson & Downing, 1979; Postmes & Spears, 1998; Vilanova et al., 2017), may diminish the effects of normative influence. In a state of deindividuation people show more extreme and anti-normative behaviour (i.e., behaviour deviating from norms) after being submerged in a crowd (Festinger et al., 1952; Sassenberg & Boos, 2003). Although individuals who make their OPCs within VCs commonly do so amongst a gathering of individuals who share common concerns that facilitate goal attainment (Bradford et al., 2017), paradoxically, this same environment provides an opportunity in which the individual– submerged or anonymous–suffers from a loss of self-awareness, and undertakes behaviours that may even be detrimental to the OPC.

The basis of this discussion rests on the notion that individuals who make an OPC have opportunities to represent themselves within CMC differently than how they appear offline (Papacharissi, 2002; Schau & Gilly, 2003), which potentially leads to tension between the OPC and offline goal attainment. The sense of "publicness"

(i.e., being observed to an audience) is a key construct in PC and OPC concepts, and unsurprisingly has been extensively invoked in the literature on social psychology phenomena.

Early theorists and researchers in the study of the self, have examined how the observed presence of an audience could cause an individual to alter his/her attention the self (i.e., public self-consciousness; Fenigstein et al., 1975, or public self-awareness; Orive, 1984). A commonly accepted view of identity presumes that there are multiple aspects of the self which are expressed or made salient in different contexts (Ellison et al., 2006). Higgins (1987) identified three domains of the self: the *ideal self*, the *actual self*, and the *ought self*. The ideal self is part of the self that is highly prized and consists of an individual's desires, hopes and wishes. The actual self is a cognitive structure that contains all attributes that the individual believes that are self-descriptive. The ought self is the self-state representation of the attributes that the individual believes he/she should possess.

Discrepancies between an individual's actual and ideal self predisposes the individual to dejection-related emotions (Ellison et al., 2006). However, when there is a consistency between an individual's ideal and actual self, self-actualisation occurs and the person is progressing toward realisation of their full potential (Higgins, 1987). Although most people hold generally stable positive self-views, the introduction of a "publicness" element may accentuate the need for people to pursue their feelings of psychological coherence and continuity with respect to one's evaluation of the self – known as preference for consistency (Cantarero et al., 2017; Cialdini et al., 1995; Gopinath & Nyer, 2009; Maksim & Śpiewak, 2023) – by seeking to think, behave and be perceived by others to act in congruence with a promised action. In this sense, recent empirical studies have shown the multifaceted effect of publicness online, for example, suggesting that people tend to strategically manage their self-presentation behaviour more on SNSs under the surveillance of their peer audience (Marder et al.,

2016), or Facebook users' tendency to constrain their self-presentation behaviour due to the perception of the imaginary audience (Ranzini & Hoek, 2017).

According to Bradford et al. (2017), within VCs individuals may wish to tactically manage their online presentation of self in order to accomplish their OPC, and their data reflects accounts of success and failures. Success outcomes enact congratulatory responses and also serve to provide encouragement to others. Acknowledgement of failures can be construed as an act or moral redemption (Moisio & Beruchashvili, 2010; Nyer & Dellande, 2010), which allows opportunities for support, give permission for self-forgiveness, as well enact a figurative restart to the process (Bradford et al., 2017).

The hyperpersonal model of CMC (Walther, 1996) is one of such theories that the notion of online impression management. The model describes the way that CMC's technical capacities work in concert with users' impression development intentions in order to enhance their relational outcomes: As receivers, CMC users may develop idealized perceptions of individuals with whom they communicate online (Bargh et al., 2002; Burgoon et al., 2002; Ramirez & Zhang, 2007; Walther et al., 2005). As senders, CMC users selectively self-present, revealing attitudes and aspects of the self in a controlled and socially desirable fashion (Walther, 2007). Walther (1996: p.17) defined hyperpersonal communication as: "CMC that is more socially desirable than we tend to experience in parallel FtF interaction".

The hyperpersonal model of CMC specifies several concurrent dynamics in sender, receiver, channel, and feedback systems that are affected by CMC attributes, which promote the development and potential exaggeration of impressions and relationships online (Walther, 2007). Thus, online self-disclosure is not always open and honest but may involve a deliberate attempt for individuals consciously and intentionally reveal positive rather than negative aspects of self in order to be perceived as attractive and rewarding (Kim & Dindia, 2011). In this perspective, the hyperpersonal model of CMC has received support in variety of settings, involving

both dyads and groups, in romantic, organisational, educational and group/leadership settings (Antheunis et al., 2020; Halversen et al., 2022; Hian et al., 2004; Pang et al., 2018; Sheng & Kairam, 2020; Zhao & Kun Yan, 2022). Outside of relationship development sphere, the selective self-presentation capacities and affordances of CMC has been studied in the context of various psychosocial outcomes including: self-esteem (Britt, 2015; Gonzales, 2014), however no research has explored these same affordances in the context of the relationship between OPC and EBRB goal attainment.

There has been much empirical support for hyperpersonal model of CMC, especially by earlier CMC research involving text-based communication. However, given that OPC is not limited to text-based communication, there is lack of research examining the hyperpersonal model where OPC is mediated by multimodal CMC. Especially where older modes of CMC are generally regarded as anonymous and asynchronous, and newer modes are more likely to be identifiable, and synchronous (Xie, 2008b). These different features of different modes of CMC might have different effects on OPC behaviour and thus should be examined thoroughly.

Also, OPC is distinctive from other forms of online behaviour/interaction, in the sense that commitments are made online, yet, complaint behaviours resulting in desired outcomes typically occur offline. Given that modality switching from online to offline interaction is less salient for some OPC interactants, the greater control over self-presentational behaviour in CMC allows individuals to exaggerate their complaint behaviours more strategically to others online, in order to construct inflated positive impressions. Theoretical and empirical evidence for this assumption can be found in studies where public awareness, self-verification motives, audience feedback and other factors have been demonstrated to influence online impression formation (Carr & Foreman, 2016; Gonzales & Hancock, 2008). For example, recent studies have shown that people tend to engage in selective self-presentation more on SNSs under

the surveillance of peer audience or the perception of the imaginary audience (Marder et al., 2016; Ranzini & Hoek, 2017).

Similarly, given that the communication of OPC is experienced in tandem with feedback in the form of enacted social support, studies involving the hyperpersonal model suggests that online processes intensify feedback effects, as online individuals can selectively self-present traits that may be idealized by an audience, influencing subsequent behaviours and attitudes to exaggerate perceived characteristics (Carr & Foreman, 2016).

2.5.2 Direct and Indirect Studies of Online Public Commitment

Despite the countless online exchanges analogous to OPC that occur online, there are relatively few studies that have addressed this phenomenon. Even fewer studies have addressed OPC in the context of EBRBs. There is an overabundance of research that use internet-delivered interventions (IDIs) to promote EBRBs (Allam et al., 2021; Alley et al., 2019; Alley et al., 2018, 2022; Bossen et al., 2013; Duan et al., 2022; Duan et al., 2017; Hartson et al., 2022; Howell et al., 2018; Huang et al., 2019; Irvine et al., 2013; Liu et al., 2019; Mailey et al., 2016; Massoudi et al., 2010; Muellmann et al., 2019; Murray et al., 2022; Robinson et al., 2021; Vandelanotte et al., 2022; Wijsman et al., 2013). A superficial examination of these studies show that not only do IDIs hold much promise for EBRB-related behaviour change in patients with overweight and obesity, but it can also reduce some health risks associated with the disease, including hypertension (Allam et al., 2021; Vandelanotte et al., 2022), and depression (Murray et al., 2022).

Cialdini (2001) identified four critical factors that would enhance the durability of behavioural follow-through, which can also be applied to the operationalisation of OPC. First, the commitment should be active rather than passive; second, the commitment should be publicised; third, the commitment should be effortful or

difficult; and fourth, commitment should be perceived by the individual to be voluntary or internally motivated. Few studies have come close to operationalising the OPC concept in line with Cialdini's (2001) recommendations. In some studies, participants were promoted to make a commitment towards their BIs, however these commitments were not made public to others (e.g., Balk-Møller et al., 2017). In other studies, OPC was inadvertently and indirectly assessed. For example, Cavallo et al.'s (2012) study, participants were also prompted to make a commitment and share their commitment, progress and setbacks on Facebook. By recording Facebook participants' Facebook interactions manually during the intervention, (e.g., comments, discussion board posts, posting of pictures and videos), the researchers were indirectly measuring OPC, however, this was not a stated research aim. Unfortunately, none of these studies can be regarded as addressing the concept of OPC in the real sense of the word.

Munson et al. (2015) and Consolvo et al. (2006) are perhaps the only two studies that have accurately operationalised the OPC construct in manner that is consistent with some of Cialdini's (2001) recommendations. Munson et al. (2015) tested the effects of including public commitment in a pedometer-based walking program amongst 220 participants with overweight and obesity. Participants were given Fitbit pedometers that automatically upload step counts over the Internet. Participants were encouraged to make a commitment each week, quantified as the number of days they intended on meeting or exceeding their daily step target. Participants in the treatment groups had their commitments posted to at least 20 Facebook friends and emailed to three contacts – this being the OPC. Although it was found that OPC catalysed social support (i.e., emotional, informational and instrumental support) from others, the net impact of OPC on completing commitments and PA was inconclusive. In fact, participants made fewer commitments when those commitments were made public, because the prospect of accountability creates a selection effect that decreases the probability of making commitments.

In Consolvo et al.'s (2006) study, participants were encouraged to commit to a daily step count goals using a mobile fitness/journal app. The app enabled participants in the intervention group to voluntarily share their step count and an optional comment to any/all of their group members (i.e., the OPC), whilst participants in the control group kept their step count goal private. It was found that participants in the OPC group were significantly more likely to meet their step count goals ($t = 2.60$, $p < .05$). Qualitative data from the same showed that the social accountability that accompanied participants' OPC and progress toward their goal motivated them to fulfil their goal, do better than their group member, or not have the lowest step count. It was also found that social support linked to favourable outcomes. The issue of anonymity was a concern in the study. By ensuing that participant communications did not include personally identifying information (unless the participant explicitly included such information in a custom message), researchers fail to consider that this lack of identifiability may have likely drove down the potency of social influence.

Similarly, by allowing participants to control when and what they updated, researchers were not certain whether the uploaded counts were participants' actual daily counts. Combining this self-disclosure issue with that of anonymity, it could be argued that participants constructed a predominantly positive impression online by capitalising on these capabilities. As seen above, research to date has been largely experimental with equivocal results. A number of flaws in the operationalisation of the OPC construct could be the cause of these inconsistencies.

Firstly, studies purporting to measure OPC, unfortunately, construe CMC as a mere conduit through which a commitment is made public and fail to understand that traditional views of in-person public commitment apply differently in an online setting. Given that CMC comprises a wide array of platform, each with their own functionalities and affordances, studying such social effects can be rather challenging, as they are unlikely to be linear and consistent across platforms (Kaye et al., 2022). Given that theories around CMC do not tend to make explicit reference to the source

or origin of the behaviour, it remains unclear whether the act of making an OPC actually takes place online (e.g., posting a commitment to start a new diet on Facebook) or is mediated by internet-enabled devices/platforms (e.g., "real world behaviour" displayed via video conferencing).

Secondly, in Munson et al. (2015) and Consolvo et al.'s (2006) study, the OPC was operationalised by directly assigning participants to conditions in which publicness is either present or absent. This manipulation design results in a categorical construct and fails to address any specified degree of publicness that is traditionally prescribed by in-person public commitment research (Ahluwalia et al., 2001; Gonzales & Hancock, 2008; Hollenbeck et al., 1989; Holt, 1970; Kiesler, 1971). The notions of *publicness* and *audience effects* are both embedded into CMC theory. From the perspective of OPC, *publicness*, or referred to as *audience size* in some literature (Emington, 2012), refers to the degree to which an individual's OPC will be observed by others and the number of people who might know about it (Leary & Kowalski, 1990). *Audience effects* refer to how the individual then changes his/her behaviour as a result of being observed (Hamilton & Lind, 2016). Hence, both concepts align with self-presentation theory (Goffman, 1959; Schlenker, 1985; Snyder, 1974), whereby the effect of an audience underpins one's impression management strategies.

Clearly, CMC channels differ in terms of publicness and directedness. The disclosure of an OPC could be targeted towards a specific observer (i.e., one-to-one, e.g., private messaging), or multiple observers (i.e., one-to-many, e.g., posting on one's Facebook timeline). Online public commitment may also be described as 'many-to-many', for instance, in the case of an online support group or online community with a shared goal. All of these forms of OPC differ in their degree of publicness and directedness. Most direct and indirect studies of OPC have typically used one channel as a representative environment to give participants the impression they were committing in web 2.0 environments (Consolvo et al., 2006; Munson et al., 2015). Given these realities, the question of how various CMC channels could moderate the

effect of OPC still remains unanswered. Indeed, it is necessary to also understand how different technological features influence perceptions of social presence to inform the design of an effective IDI.

Thirdly, the issue of perception seems to play a critical role in most previously discussed constructs underlying CMC behaviours. For example, many have argued that the actual effects of CMC attributes (i.e., reduced nonverbal cues and controllability) that are responsible for increased self-disclosure, would depend on individuals' perceptions of the relevance of these attributes (Schouten et al., 2007). Indeed, individuals differ greatly in their perceptions of the relevance of CMC attributes (Valkenburg et al., 2006). This underscores the need to understand the subjective experiences, opinions and perceptions of those who have made an OPC. Existing qualitative research has provided limited knowledge. Some studies focussed primarily on gathering and analysing archived data (e.g., Bradford et al., 2017), however, the online world is not static but keeps metamorphosising. Besides, Bradford et al.'s (2017) study, like most netnographic approaches, focusses on a specific online community, which brings into question the extent to which such findings can be generalised to other synchronous and asynchronous CMC environments.

2.6 Behaviour Change Theories Underlying an OPC Intervention

Given the impact of a range of health behaviours on health outcomes, a number of theories have been developed to explain and predict the motivations underlying such behaviours, including health belief model (HBM; Becker, 1997; Janz & Becker, 1984; Khodaveisi et al., 2021; Wu et al., 2020; for a recent review see Anuar et al., 2020); protection motivation theory (PMT; Maddux et al., 1983; Plotnikoff & Trinh, 2010; Seow et al., 2022; for a recent review see Marikyan & Papagiannidis, 2023); social cognitive theory (SCT; Bandura, 1982, 1999, 2010; Schunk et al., 2020; for a recent

review see Stacey et al., 2015); self-determination theory (reviewed in section 2.6.4); theory of reasoned action/planned behaviour (reviewed in section 2.6.1). These models contain a number of common determinants including intentions, self-efficacy, outcome expectancies, perceived susceptibility and perceived severity (Conner & Paul, 2017).

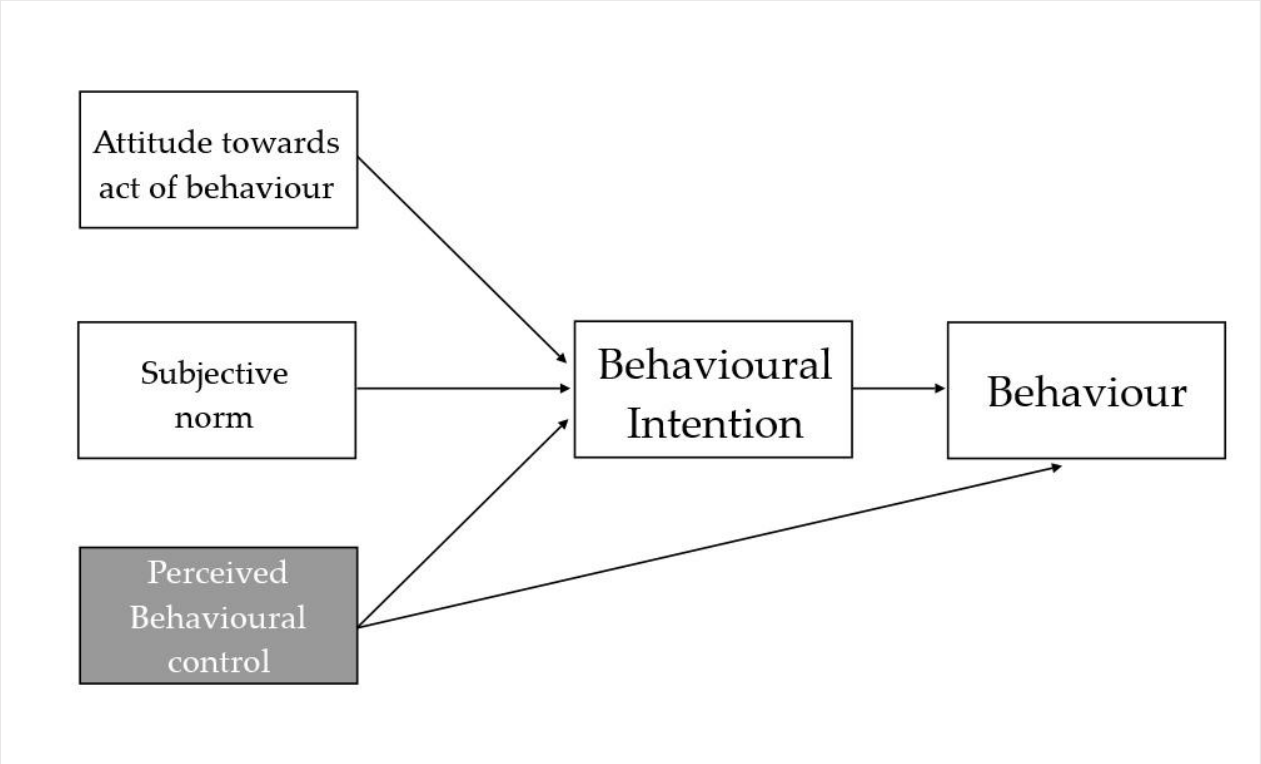
2.6.1 Theory of Reasoned Action/Planned Behaviour

An individual's PC/OPC to engage in a specified behaviour represents the subjective probability that he/she will engage in the behaviour, or the individual's readiness to perform the promised behaviour. Thus, a PC/OPC could be described as a behavioural intention (BI), which captures one's level of motivation to perform the behaviour. Much experimental and observational evidence generated over several decades suggests that BIs are malleable and that changes in the strength of intention often are followed by changes in behaviour (Ajzen, 1991; Sheeran, 2002; Conner & Norman, 2006). The theory of reasoned action (TRA; Ajzen & Fishbein, 1980) and the theory of planned action (TPB) distinguishes between different types of beliefs that affect an individual's BI to perform a specific behaviour. Studies find that BI explains more variance in behaviour than attitudes, norms, self-efficacy, perceptions of risk and severity (Fishbein & Ajzen, 2011; Armitage & Conner, 2001; Sheppard et al., 1988).

The TRA model proposes that a person's behaviour is determined by the BI to perform the behaviour, and this BI, in turn, is a function of their attitude towards the behaviour (i.e., the individual's positive or negative evaluation of the particular behaviour), and subjective norms (i.e., the individual's perception of the social expectations to adopt the behaviour). However, the TRA makes the assumption that behaviours are always under total volitional control. Therefore, to account for behaviours that were not necessarily under volitional control, perceived behavioural control (PBC) was added to the TPB model. Perceived behavioural control is similar to the concept of self-efficacy and depends on the individual's perception of the ease or difficulty of performing the particular behaviour (Ajzen, 1987). The more

favourable an individual's attitude is toward behaviour and subjective norms, and the greater the perceived behavioural control, the stronger that individual's BI will be to perform the behaviour in question. A visual representation of TRA and TPB is shown in Figure 3 below.

Figure 3:
A visual overview of the Theory of Reasoned Action/Planned Behaviour



The TPB provides a useful framework for designing behaviour change interventions to influence the engagement of EBRBs. The predictive utility of TPB in the context of PA has been demonstrated in a number of studies (Ahmad et al., 2014; Feng et al., 2023; Lu, 2022; Zhang et al., 2022; Rhodes et al., 2004; De Bruijn et al., 2012; Yang et al., 2022; Conner et al., 2010; Park et al., 2017). In the area of diet, the TPB has also been useful in predicting the willingness to adopt healthier food (Sogari et al., 2023; Bélanger et al., 2023; Haubenstricker et al., 2023; Ploll & Tobias, 2020; Biasini et al., 2023; Jenkins & McKenzie, 2011), such as plant-based diet (Wang & Scrimgeour, 2021), Mediterranean diet (Caso et al., 2024; Scannell et al., 2020) and fruit and

vegetable consumption (Blanchard et al., 2009; Cannova et al., 2020; Canova & Manganelli, 2016, Kothe & Mullan, 2015).

Behaviour change interventions that apply the TPB to influence PA behaviour have typically attempted to do by manipulating any of the three beliefs. Because attitudes, subjective norms, and perceived behavioural control are assumed to be based on corresponding sets of beliefs, behaviour change interventions must try to change the beliefs that, according to the theory, ultimately guide performance of the behaviour. For example, in Feng et al. (2023), investigated whether variations between individualism and collectivism will have an influence on the TPB relationship. They found that collectivism – which is related to TPB's notion of subjective norms – predicted exercise behaviour. Zhe (2023) also utilised the TPB in designing a behaviour change intervention which focussed on how social media attention influences a positive attitude toward home-based exercise, which in turn, can increase the intention to engage in this behaviour.

Given that OPC behaviour is conceptually similar to the BI construct within the framework of TRA and TPB, it would be axiomatic that such frameworks should be embedded within OPC interventions. Unfortunately, current reporting of OPC interventions in published evaluations falls short of the detail required for reliably identifying the effective ingredients that aim to influence BI. In some cases, reporting mentions how the degree of publicness of the commitment was manipulated, without actually specifying how this technique contributes to any of the beliefs in the TPB model that bridge the gap between BI and behaviour change (e.g., Munson et al., 2015). In other cases, reporting of intervention content is often missing or imprecise (Consolvo et al., 2006). In conclusion, although BI is considered to be the most proximal mediator of behaviour since it is the construct most likely to predict voluntary behaviour, there is lack of information of which techniques contribute to the success of OPC interventions. Linking behaviour change techniques to theories which predict behaviour change allows intervention effectiveness to be optimised by

providing knowledge about how techniques may be effectively combined together and how intervention effects are likely to generalise across situations.

2.6.2 Achievement Goal Theory

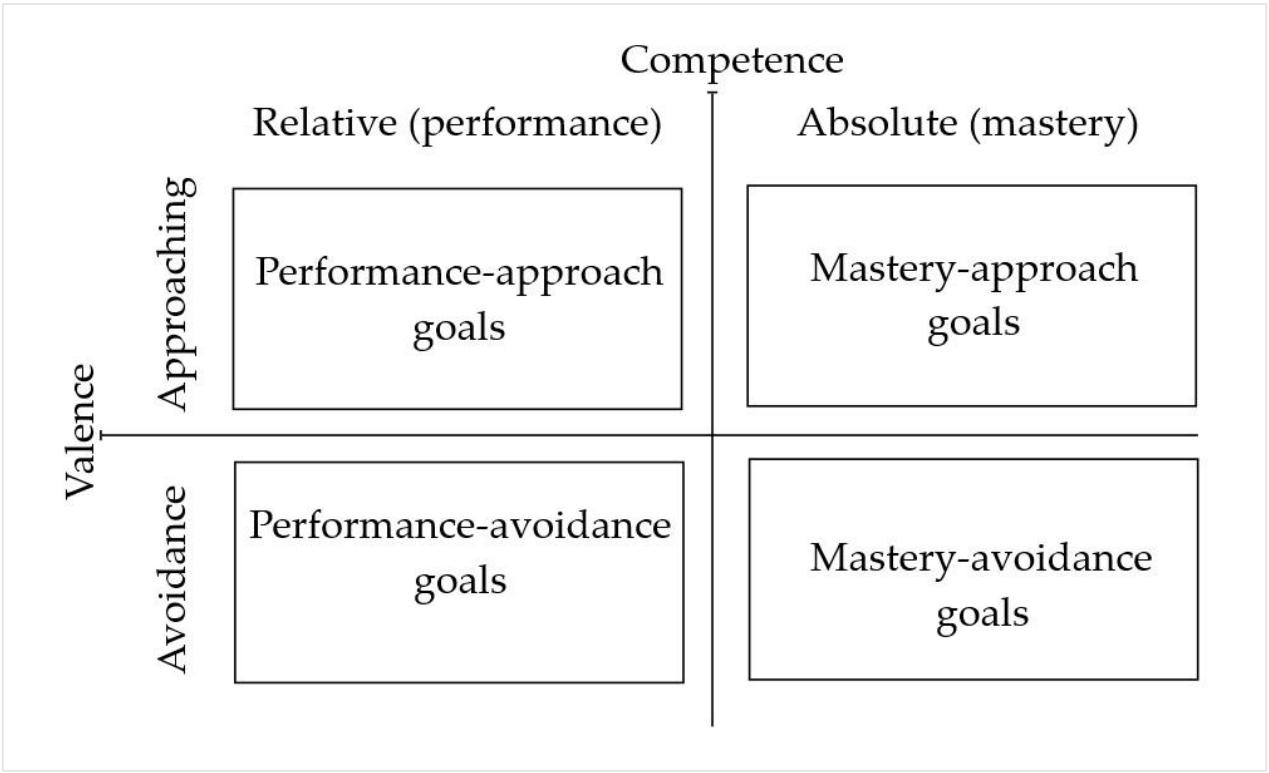
Achievement Goal Theory (AGT; Senko et al., 2011; Nicholls, 1984; Ames et al., 1988) is regarded as one of the most prolific approaches to the empirical study of students' motivation. During the 1990s and 2000s, the AGT became a predominant theoretical framework, due to its emphasis on how individuals approach achievement situations, and the internal and external factors affecting students' motivational frameworks (Urdan & Schoenfelder, 2006; Hinzman, 2010; Bardach et al., 2020). Outside of educational context, the AGT has also been used to explore goal-oriented behaviours within sports and exercise (Gaunreau & Braaten, 2016; Sun & Ji, 2022; Standage et al., 2003; Fernández-Espínola, et al., 2022).

The features of competence and valence have been highlighted as significant in distinguishing achievement goals (Elliot & McGregor, 2001; Hao et al., 2017). *Competence or task-oriented goals* are those aimed at developing one's competence and sense of mastery. Competence is viewed as the ability to do something effectively, sufficiently, or successfully (Chazan et al., 2022). Again, within the sports and excise literature, these goals bear a similarity with process goals, which are those which specify behaviours in which the performer will engage during performance (e.g., to perform exercises with proper form) (Kingston & Hardy 1997).

On the other hand, *ego involvement goals* are aimed at being better than peers (Ames & Archer, 1988). Ego oriented individual define their competence in terms of interpersonal and normative comparisons. Within the realm of sports and exercise, these types of goals could be referred to as outcome goals, defined by Kingston and Hardy (1997) as those which focus on the outcomes of particular events and are usually based on social comparison (e.g., to lift a heavier weight or perform more repetitions than others).

Valence differentiates achievement goals from the aspect of approach and avoidance. Individuals with approach goals engage in specific behaviours that aim to achieve positive results, whereas individuals with avoidance-goals usually try too avoid negative results (Cury et al., 2006; Huet et al., 2011). The features of competence and valence classify achievement goals into four categories: mastery-approach, performance-approach, mastery-avoidance and performance-avoidance goals (see Figure 4). This classification is also referred as 2 x 2 achievement goal framework (Elliot & McGregor, 2001; Huet et al., 2011).

Figure 4:
2 x 2 Achievement goal framework (adapted from Hao et al. (2016)



There is strong evidence to show that high levels of task orientation are associated with a wide range of positive cognitive, affective, and behavioural outcomes at an individual level (Chacón-Cuberos et al., 2018; Taghavi et al., 2011; Usán et al., 2019). Conversely, ego involvement goals are associated with neutral or less optimal outcomes, particularly when perceptions of competence are low or not accompanied by task-based goals (Harwood & Thrower, 2020).

Unfortunately, a limitation with the distinction between personal competence and ego-involvement is that it lacked depth to the intrinsic motivational aspect (Senko et al., 2011). Therefore, a second distinction was added to provide a more nuanced understanding of the valence of competence. In other words, a distinction was made between approach and avoidance as either working to approach success or striving to avoid failure. Approach motivation is defined as behaviour directed toward a positive or desirable outcome; whereas avoidance motivation is defined as behaviour directed away from a negative outcome (Elliot, 2006). Approach/avoidance distinctions permeate various aspects of psychology including coping literature (e.g., Wodzinski et al., 2018; Nicholls et al., 2014; Theodosiou et al., 2018) and competence development (e.g., Maree, 2021; Pittman et al., 2011) and have made a similarly important contribution to AGT.

Despite the application AGT to a variety of contexts, including, education (Struck et al., 2024; Chazan et al., 2022; Liu et al., 2017; Urhahne & Wijnia, 2023), and sport (Carr, 2009; Knoblochova et al., 2021; Sit & Lindner, 2005; Cervelló et al., 2007; Sun & Ji, 2022; Gaundreau & Braaten, 2016), it has not yet been referenced in relation to commitment making. Commitment making has similarities with educational attainment in that both are achievements settings, and can involve mental and physical action directed toward some specified behaviour or outcome. The application of AGT in explaining commitment making behaviour to understand how individuals construct their meaning of success and thus of the goals they strive to achieve.

2.6.3 Health Action Process Approach

Health behaviours, sometimes called health-related behaviours, are actions taken by an individual to maintain, restoring and improving health (Sort & Mollborn, 2015). Hence, when an individual makes an OPC towards engaging in EBRBs to improve his or her health, the EBRBs can be regarded as health behaviours. The health action process approach (HAPA; Zhang et al., 2019) is particularly useful in explaining health behaviour engagement within the context of PC and OPC. The HAPA

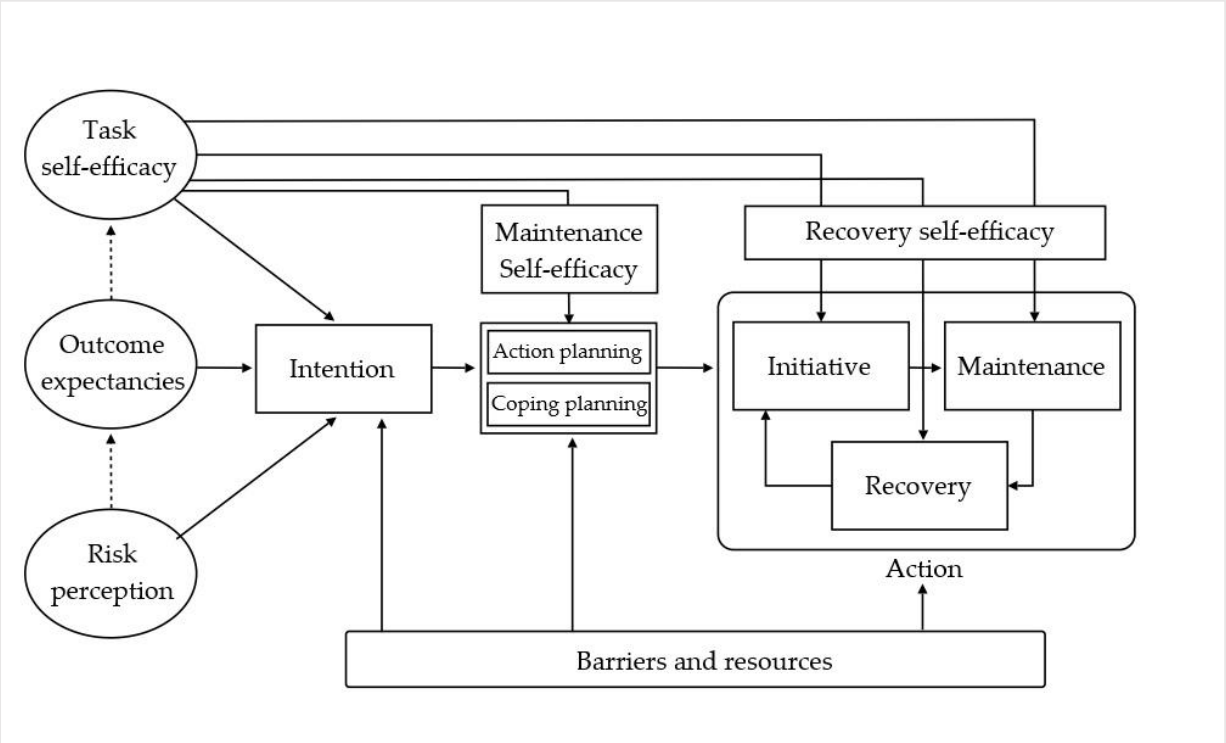
addresses the intention behaviour gap by proposing that engaging in health behaviours consists of two phases before a behaviour occurs: the motivation phase, followed by the volition phase.

In the motivational phase, the behaviour intention is determined by risk perception, outcome expectancy, and action self-efficacy (Tang et al., 2021). Risk awareness refers to the perceived health threat or concern that is needed to mobilize action. Task self-efficacy is the degree to which a person believes he or she is able to complete a particular behaviour (Bandura, 1997). Outcome expectancies refer to whether an individual believes the behaviour will bring about the desired change (Reesor et al., 2017). If the evaluation of the outcome of the behaviour is positive, an individual is more likely to form an intention to engage in this behaviour (MacPhail et al., 2014).

Despite good intentions, research has shown that many people do not always translate their intentions into action (i.e., the behaviour intention gap; reviewed earlier in section 2.3). Bridging this gap requires self-regulation activities to stay on the path to behaviour change. Once an action has been initiated, it has to be controlled by cognitions in order to be maintained. The goal-oriented behaviours have to be protected from being interrupted and abandoned prematurely due to incompatible competing intentions which may become dominant while a behaviour is being performed. Therefore, the volition phase within HAPA requires self-regulation activities such as action control, (i.e., self-monitoring activities to increase focus), maintenance (coping) self-efficacy, and recovery self-efficacy.

As can be seen in Figure 5 (below), the HAPA model incorporates 10 constructs (action control; action planning; coping planning; goal setting; intention; maintenance self-efficacy; outcome expectancy; risk perception; recovery self-efficacy; and task self-efficacy) and provides a basis for understanding how to target interventions most effectively based on stage-specific developmental needs (Schwarzer et al., 2011).

Figure 5:
The Health Action Process Approach model



Similar to how the HAPA specifies motivational and volitional determinants of health behaviour, there is also a need to distinguish between two self-regulatory processes when making a PC/ OPC. In the motivation phase, the individual who intends to make an OPC will typically be required to form an intention that speficies when, where, and how to act on a given goal. This phase can also be described as goal setting, after all, the field of social and personality psychology as well as the field of human cognitive neuroscience both define goals as mental representations of desired end states (Braver et al., 2014). Humans regulate their behaviour by setting goals and then acting toward them. However, at this stage of the process, the PC/OPC represents a mindset, or attitude building toward action.

In the volition phase, the individual takes the necessary steps to publicise his/her intention, commitment or goals to others. By making a PC/OPC to engage in a specified behaviour, the individual binds him/herself to the position implied by this act or decision. According to the HAPA, the initiation of the PC/OPC requires action control which is designed to increase focus on the behaviour to avoid distraction,

temptation and negative emotion. To persist and sustain the OPC, coping planning must be undertaken to establish behavioural strategies to anticipate barriers and situations that may arise during the action phase. For example, the individual who makes an OPC via a Whatsapp status may change the setting so that only those on his/her contact list can be able to view the status.

As seen from the above illustration, HAPA can help to understand that the process of transforming a PC/OPC into a firm commitment to act, often involves deliberation and decision-making.

2.6.4 Self-Determination Theory

Self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000, 2017) is a macro-theory of motivation, that takes into consideration factors that hinder or facilitate an individual's basic psychological needs (BPNs) for autonomy, competence and relatedness. In SDT, an individual's goals, or reasons for behaviour is divided into extrinsic and intrinsic motivation. Intrinsic motivation refers to the pursuit of behaviours that are inherently enjoyable, interesting, fun, challenging or intrinsically captivating (Fischer et al., 2019). The performance of these behaviours fulfils BPNs, resulting in higher levels of psychological functioning and well-being. Extrinsic motivation, on the other hand, refers to behaviours that are carried out to attain outcomes unrelated to the activity itself, not because they are inherently enjoyable or satisfying. The performance of these behaviours is associated with less self-determined regulation due to inhibiting an individual's ability to satisfy BPNs (Vansteenkiste et al., 2020).

Self-determination theory, with its focus on the motivation underlying human behaviour, is particularly relevant in the context of OPC. This is because within the context of EBRBs, research has consistently demonstrated that the endorsement of extrinsic goals, such as appearance reasons, are associated with less self-determined regulation resulting in negative outcomes. Whilst, intrinsic goals, such as health, are

associated with more self-determined regulation that promotes optimal outcomes in terms of both personal development and the quality of the experiences (Aleksovska-Velickovska et al., 2019; Cheung et al., 2021; Coumans et al., 2022; Demetriou & Bachner, 2019; Edmunds et al., 2006; Fraguela-Vale et al., 2020; Ingledew & Markland, 2008; Matsumoto & Takenaka, 2022; Nogg et al., 2021; Teixeira et al., 2012).

Self-determination theory is not an axiomatic system, logically derived from a few basic principles. Instead, it is best understood as an overarching theoretical framework that comprises six mini-theories (i.e., Cognitive-Evaluation Theory, Organismic Integration Theory, Causality Orientations Theory, Basic Psychological Needs Theory, Goal Contents Theory, and Relationship Motivation Theory) each addressing different problems of motivation theory (Ryan & Deci, 2017). While these mini-theories all adhere to the same fundamental ideas, the BPN Theory (BPNT) and Organismic Integration Theory (OIT) will be the main focus of this chapter because they offer a theoretical framework for understanding OPC behaviour and identifies the diverse array of psychological reasons underlying OPC adherence behaviours, and the various levels that attitude change may occur as suggested by Kelman (1958).

2.6.4.1 Basic Psychological Needs Theory

Central to the SDT is the Basic Psychological Needs Theory (BPNT) which is concerned with the satisfaction of three basic psychological needs of competence (i.e., a sense of confidence), relatedness (i.e., a sense of connectedness with others), and autonomy (i.e., the need to experience oneself as the initiator and regulator of one's behaviour). Social environments that allow satisfaction of these needs are argued to foster the most volitional and high-quality forms of motivation and engagement for activities, including enhanced performance, persistence, and creativity (Ryan & Deci, 2000). The theory suggests that the quality of individuals' motivation varies from autonomous (self-determined) or controlling, which affects the extent to which individuals will engage in, and persist with behaviours (Hagger et al., 2014).

Behaviours and actions that are autonomous (i.e., intrinsic motivation) emanate from the self and are initiated with a sense of violation. Individuals in this instance feel a sense of choice, enjoyment, personal endorsement, interest and satisfaction, and are more likely to persist in the behaviour without any external reinforcement and contingency (Ryan & Deci, 2000). In contrast, when behaviour is controlled (i.e., extrinsic motivation) it is regulated by external contingencies, such as to gain rewards or perceived approval from others or to avoid punishment or feelings of guilt. In this instance, feelings of joy, enthusiasm, and interest that once accompanied the behaviour are frequently replaced by experiences of anxiety, boredom, or alienation (Ryan & Deci, 2000; Oman & McAuley, 1993).

Furthermore, individuals are only likely to persist with the behaviour as long as the external contingencies are present. Individuals who experience controlled-motivated are therefore less likely to be self-regulated. The behaviour is not perceived as supporting individuals' psychological well-being and is instead likely to be viewed as inhibiting individuals' assimilative and growth-oriented processes.

Overwhelming research, some of which has been summarised in meta-analyses (Ng et al., 2012; Slemp et al., 2018; Van den Broeck et al., 2016; Vasquez et al., 2016; Yu et al., 2018), has shown that the satisfaction of BPN will indeed result in diverse cognitive, affective, and behavioural consequences (e.g., interest, development, performance, creativity, psychological well-being; Ryan & Deci, 2000) across cultures, with strong consequences for basic motivation science (Ryan & Deci, 2017). With respect to EBRBs, BPNT has been particularly useful in explaining the extent to which the fulfilment of psychological needs is associated with PA engagement (Dunton et al., 2023; Li et al., 2021). However, no known study has examined the relationship between PA engagement and OPC, and the mechanisms underlying this association using BPNT.

Studies of OPC and PC frequently point to the satisfaction of BPN, as a necessary condition for optimal OPC adherence whereby committed individuals are

more persistent and determined to reach goal attainment. For example, in terms of relatedness, a study demonstrated that individuals who strongly identified with a relevant group engendered the descriptive and injunctive norms which influenced adherence behaviours (Terry et al., 1999; see also Werner, 2003). Similarly, other studies have evidenced that members within virtual support communities (VCSs) are united by pursuit of a focal goal and engender belonging (Bradford et al., 2017; De Almeida et al., 2014); have a communal consciousness, shared traditions and common rituals (Johnson & Lowe, 2022); and, interact with one another and develop relationships (Kozinets et al., 2010; Labrecque et al., 2013). All of which have been shown to motivate behaviours that facilitate adherence to the commitment.

In terms of competence, studies have found that virtual communities (VCs) provide members with vast resources for learning (Kozinets et al., 2010), and community members can share common concerns and facilitate problem solving (Mathwick et al., 2008). Indeed, the relationships formed within these VCSs are nurtured through sharing experiences, passing advice, recognising success and providing motivation (Bradford et al., 2017). In two other OPC studies, receiving encouragement and support was found to promote greater interest and enjoyment of the activity, an effect accounted for by the satisfaction of both the need for relatedness and competence (Consolvo et al., 2006; Munson et al., 2015).

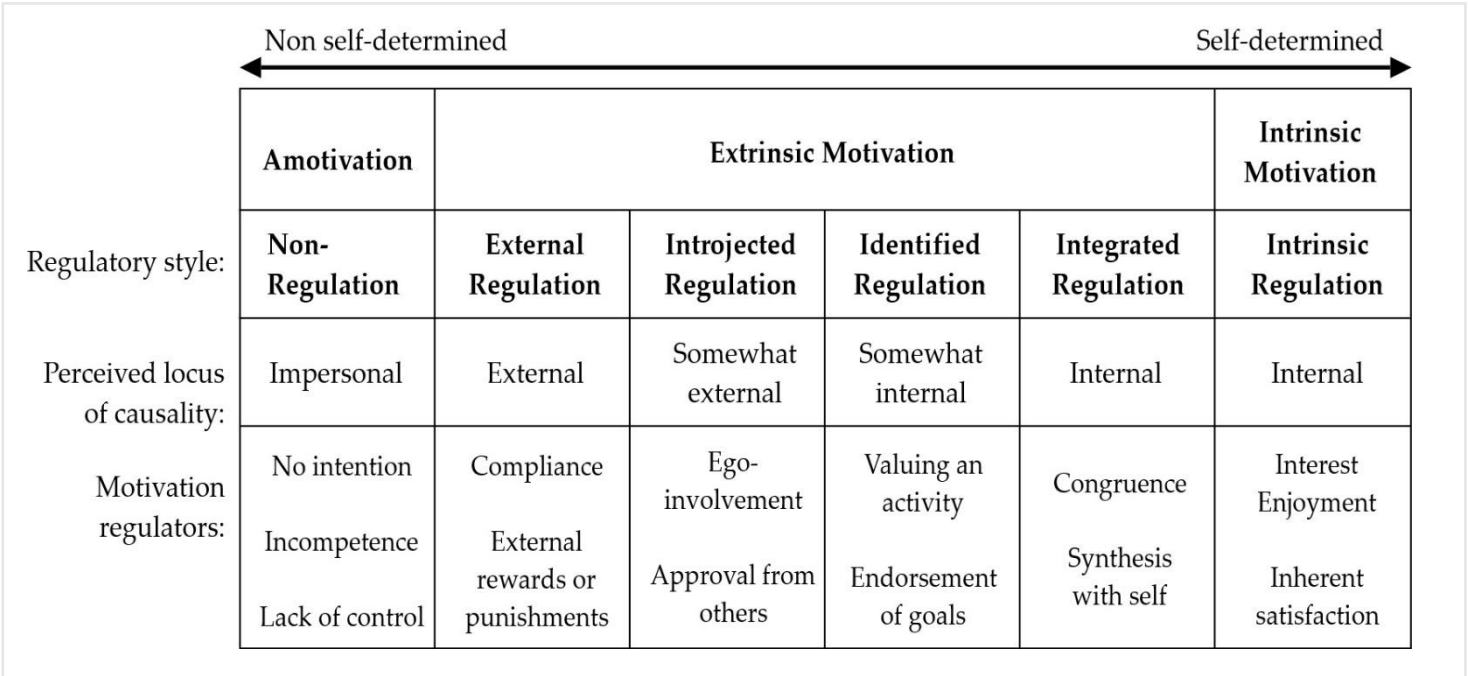
2.6.4.2 Organismic Integration Theory

Previously it was mentioned that extrinsic motivation refers to doing an activity for instrumental reasons, or to obtain some outcome separable from the activity itself. Self-determination theory research suggests that it is possible to distinguish between various types of extrinsic motivation in terms of their varying levels of self-determination, that is, how much the motivation stems from the self (Ryan & Deci, 2006). The reasons underlying adherence behaviour are fundamental in that they do not lead to the same quality of outcomes. Indeed, from the perspective of OPC, these different types of extrinsic motivation can account for a diverse array of

reasons why people adhere to their OPC. It is quite surprising to note that most of the theories (reviewed earlier in section 2.4.3) underlying the effect of public commitment have an extrinsic focus, but do not provide a framework for the classification of different types of extrinsic motivation.

In line with this rationale, Organismic integration theory (OIT) is introduced as an alternative way of understanding individuals' motivation in the context of OPC. Organismic integration theory is a motivation paradigm that provides a framework to understand why individuals engage in certain behaviours and categorises their regulatory styles into different forms of motivation, consisting of external, introjected, identified, and integrated regulations. In other words, OIT describes the processes, gradations, and effects of integration of initially extrinsic goals and values into the self (Gilal et al., 2022). Figure 3 below illustrates the motivation continuum, specifically showing types of motivation with their regulatory styles, loci of causality (source of motivations) and corresponding processes.

Figure 6:
Self-determination motivation continuum



External regulation is the least self-determined and autonomous form of extrinsic motivation and can be defined as adhering to an OPC due to external reinforcements such as gaining a reward or avoiding a punishment. Such behaviours are poorly maintained once the controlling contingencies have been removed (Niemiec & Ryan, 2009). The next type of motivation is introjected motivation, where the motivation for adhering to the OPC has been partially, but not fully internalized. In this instance, OPC adherence occurs due to the satisfaction of internal contingencies, such as to avoid shame or to feel worthy. For example, an individual who makes an OPC to exercise more might fulfil this promise to avoid the guilt he/she will experience for failing to adhere. Although guilt and shame are often regarded as potentially motivating positive forces, in the direction of goal attainment (Hoffman, 1982), SDT suggests that introjected motivation based on externally referenced contingency may be detrimental to individuals' general well-being (Verstuyf et al., 2012). External and introjected regulation are perceived as emanating from outside the self, and thus have an external locus of causality (E-PLOC; deCharms, 1968). Accordingly, these forms of motivation are experienced as relatively heteronomous, the difference being the level at which they are self-determined.

Both external and (especially) introjected regulations are akin to a commonly cited psychological mechanism underlying PC, where it is suggested that an individual adheres to a public commitment because of the anticipated social disapproval or penalties for failure to follow through with the promised activities (Coupe et al., 2019; Dolan et al., 2012; Lokhorst et al., 2013; Nyer & Dellande, 2010; Parrott et al., 1998). Similarly, it is suggested that individuals who make a PC or OPC are driven to act on their commitment to avoid reputational damage (see Bryan et al., 2010; Dolan et al., 2012; Kulendran et al., 2016; Munson et al., 2015). Clearly, this adherence behaviour is not autonomous, but driven by external contingencies, because it is performed to obtain some outcome separable from the activity itself. Qualitive data from an OPC study (Munson et al., 2015) confirms this, where

participants described how the threat of posting their failures drove them to work harder. One participant mentioned that: "I felt obligated to work harder, so I didn't let anyone down"(p.5). In terms of external regulation, it is worth mentioning that OIT does not explicitly state whether the contingencies are economic or psychological, therefore hard commitments that have real economic consequences (e.g., contingency contracts) could also fall under this category. Hence, it would be plausible to assume that introjected regulation, with its foundation in avoiding guilt and shame, is more reflective of the psychological mechanism underlying public commitment, which is enacted to satisfy these internal contingencies.

Not all extrinsic motivations are controlled. Identified regulation, for example, represent a more autonomous form of behavioural regulation, an individual might adhere to the OPC, not because it is inherently interesting or satisfying (i.e., intrinsic motivation), but rather because it is self-endorsed and of personal value. Examples include exercising because one values its outcomes and desires to maintain good health (Ryan et al., 2009). The most autonomous type of extrinsic motivation is integrated regulation, whereby an individual might adhere to an OPC because doing so is congruent with other aspects of the self. For example, an individual might make an OPC to start a vegan diet because doing so enables her to exclude all forms of animal exploitation and cruelty, which is consistent with her abiding values. In this instance, OPC adherence occurs because it is part of who the person is.

However, both forms of regulation require individuals to have formed a coherent identity (Deci et al., 1996), such that they can identify with the importance of a behaviour and reciprocally assimilate that identification with other aspects of their life (Guay, 2022). Both identified and integrated regulation are perceived as emanating from the self, with varying degree of autonomy or of an internal perceived locus of causality (deCharms, 1968). Accordingly, those forms of behavioural regulation are experienced as relatively autonomous because they are congruent with other values and needs.

Integrated regulation shares some similarities with the type of motivation proposed by Nyer and Dellande (2010) and Parrott et al. (1998) in that individuals who make a public commitment to an action may perceive it as a signal of their strong personal commitment, their internal self and true motivation to engage in the promised action (see section 2.4.5.3). According to Lokhorst et al. (2013), when individuals commit and follow through on a behaviour, they bring their self-concept in line with the behaviour. Lokhorst et al. (2013: p.21) further states that if individuals freely choose to perform a behaviour, and when their behaviours are perceived as voluntary, and not coerced they will conclude that enacting this behaviour is a personal choice. These descriptions suggest that the behaviour, although motivated extrinsically, has been internalised (or "taken in") and is now experienced as autonomous or subjectively located closer to the self (Ryan et al., 1985).

A significant body of literature has been published on OIT, all of which have applied the OIT to explain motivation in various settings, such as purchase decisions (Channa et al., 2022; Gilal et al., 2022), education (Emmett, 2013; van Egmond et al., 2020), PA (Brunet et al., 2012; Mack et al., 2015; Wasserkampf & Kleinert, 2015). Despite a promising beginning and the strong theoretical and empirical foundations of OIT, there are no known study of OIT in the context of PC or OPC. This constitutes a gap because OIT may possibly explain the motivational processes neglected by existing theories in the commitment literature. For example, it is commonly suggested that controlled forms of motivation can only sustain short-term behaviour change, but sustaining long-term behaviour change is more challenging (Deci & Ryan, 2000; Gillison et al., 2019; Ng et al., 2012; Ryan & Deci, 2006, 2017). Indeed, controlled motivation could undermine intrinsic motivation (Reeve, 2023; Riley, 2016; Ryan, 1982).

A meta-analysis conducted by Lokhorst et al. (2013) found that PC based on extrinsic motivation yielded long-term behaviour change in a few studies, relative to control conditions. The long-term effect of extrinsically-based PC was also found in

other studies (Craighead & Blum, 1989; Kegler et al., 2016; Kulendran et al., 2016; Ureda, 1980). Based on OIT, a possible explanation for this could be to the experience of perceived causality with regard to participants' behaviour. In this regard it could be argued that the satisfaction of internal contingencies, a formerly controlled motivation, has been adopted by participants as their own in such a way that it is now experienced as autonomous. This shows that OIT may be more suited to explain the various motivations underlying OPC and public commitment adherence than traditional theories. Arguably, many of the motivational processes that have been suggested to underly the effect of public commitment and OPC are incorporated within OIT itself.

2.7 Conclusion

The aim of this chapter is to provide a narrative overview of the literature surrounding PC and OPC which spans various disciplines. The existing literature in the domain of environmental psychology, personal finance, customer compliance, and organisational behaviour is generally positive about commitment making. The divergent conceptualisations of OPC, even PC, used across these various disciplines make comparisons problematic. Of course, it is perhaps not realistic or desirable to have one singular definition of OPC, but it may be useful to understand and capture the different underlying dimensions of OPC as a multidimensional construct. Doing this will provide a clarity of definition of OPC which can help to establish a strong evidence base to facilitate the operationalisation of the OPC concept. Where no consensus is evident for definitions, especially for OPC, future research aimed at examining and redressing this would although not necessarily be conclusive, be valuable.

Generally, it is understood that making a commitment towards a behavioural goal binds the individual to the position implied by his/her act or intention (Kiesler, 1971). Furthermore, the more publicly one states their attitude, the more one is committed and locked into that position (Cialdini & Trost, 1998; Gopinath & Nyer,

2009; Hollenbeck et al., 1989; Kulendran et al., 2016; Nyer & Gopinath, 2005). If, according to Kiesler (1971), a key factor that determines the magnitude of the commitment is the publicness with which the individual declares his/her commitment to a position, then CMC provides a number of unique and optimal conditions under which to study PC and EBRB outcomes, specifically. Given the prevalence and popularity of various types of CMC (e.g., social networking sites, blogs, virtual communities etc.), and increased employment of these platforms in lieu of in-person support groups, it is likely that individuals within these platforms make PCs to support goal pursuits in conjunction with or in lieu of in-person groups (Bradford et al., 2017). Subsequently, there is a gap in knowledge on how publicising a commitment can manifest in an online setting, where, unlike in FtF settings, other individuals are not physically co-present. Various CMC theories such as hyperpersonal model (Walther, 1996, 2007), and disinhibition theory (Hollenbaugh & Everett, 2013; Lapidot-Lefler & Barak, 2015), would suggest that CMC's technical capacities work in tandem with individuals' impression development intentions. Also, research shows that differences in online behaviours exists between posters and lurkers (Bartikowski & Walsh, 2014; Nonnecke et al., 2004; Walker et al., 2010). However, there is little research of how these affordances and functionalities of CMC impact on the effect of OPC.

The results of the few studies of OPC would seem to suggest that it is promising technique to promote behaviour change for both short- and long-term LMPs, especially for pr-environmental behaviours (Lokhorst et al., 2013; Shippee, 1980), however, despite this success, little attention has been paid to the use of OPC as a mechanism to enhance EBRBs. This constitutes a gap in the knowledge because the performance of EBRBs is one of the areas that suffers most from the intention-behaviour gap (Feil et al., 2023; Rhodes et al., 2022b). Additionally, although LMPs that promote EBRBs have been shown to be effective in tackling the problem of obesity and overweight, these interventions often encounter with the attrition problem and

long-term success is modest. This underscores the critical need to understand, not only the psychological mechanisms that underlie the effect of OPC, but to also understand which of them is most effective in producing durable behaviour changes. More specifically, it is important to understand the underlying psychological mechanisms that guide the OPC effect because one cannot assume that the psychological mechanisms that guide in-person public commitment operates in a similar fashion online.

Theories such as Bem's (1972) self-concept theory and normative approach (Abrahamse et al., 2005) seems to yield the most robust findings in terms of durable behaviour changes, however, such theories do not account for the process of internalisation through which extrinsically motivated behaviours become self-endorsed and intrinsically motivated. Traditional theories do not provide a framework for the classification of different types of extrinsic motivation. Theories of internalisation typically suggest that self-perceptions of the "causes" of (i.e., reasons for) behaviour are differentiated along a continuum of autonomy that contains identifiable gradations (Ryan & Connell, 1989). There is a gap in the knowledge with respect to understanding the role an individual's motivational autonomy plays in producing durable behaviour changes.

Another gap in the knowledge is that there is lack of understanding of the role that social support plays in the relationship between OPC and goal attainment. It is well known that virtual communities, for example, provide a gathering of individuals with a communal consciousness, shared traditions and common rituals, and through these communities, individuals find one another and exchange informational, emotional and appraisals (Bradford et al., 2012, 2017). Similarly, interaction with other people has been shown to increase adherence to PA goals (Richardson et al., 2010b). The positive role of social support has been qualitatively acknowledged in a few studies of OPC (e.g., Munson et al., 2015), however, less is known about how these

types of exchanges facilitates compliant behaviours to attain desired outcomes, especially in an experimental setting.

Chapter 3: Methodology

3.1 Overview

This chapter presents the research methodology that was used address the research questions described in *chapter 1 (section 1.3)*. Research methodology is a collective term for the systematic process of conducting research. This includes providing a rationale for the research, how the research problem has been identified, what data have been collected and what particular method has been adopted to answer the research questions (Patel & Patel, 2019). Hence, methodology is a fundamental aspect of research, which delineates how research should be designed and executed. An important methodological choice a researcher must make is whether to adopt a qualitative (open-ended data) methodology, quantitative (closed-ended data) methodology, or one that draws on the strengths of both methodologies. Given that the literature review (chapter 2) highlights the importance of gaining a comprehensive understanding of OPC as a multidimensional construct, this study was a mixed methods research. Mixed methods research (MMR) can be defined as "research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both quantitative and qualitative approaches" (Tashakkori & Creswell, 2007: p.4).

Mixed methods research has been established as a third methodological movement in the evolution of research methodology, and has witnessed a rapid rise in popularity in the last 20 years. This movement has been accompanied by a struggle to find an appropriate paradigm to provide a legitimation for the use of MMR comparable to the paradigms that have been widely accepted as justifying the use of quantitative and qualitative methods separately (Hall, 2013). It has been well documented that what distinguishes MMR from other approaches is the mixture of different seemingly incompatible paradigms that underlie qualitative and quantitative research methods (Ghiara, 2020; Guba & Lincoln, 1994; Johnson, 2012;

Tashakkori & Teddlie, 2015; Uprichard & Dawney, 2019). To deal with this struggle some researchers have advocated the idea of paradigm pluralism or multiple paradigms for MMR (Tashakkori & Teddlie, 2015a), which is the approach adopted in this thesis. To illustrate, the central aim of study 1 and 3 (chapter 4 and 6) was to understand the experiences, beliefs and attitudes of those who have made an OPC towards EBRBs. Thus, the studies were conceived originally within an interpretivist paradigm, which is consistent with the use of semi-structured interviews to collect qualitative data on both studies.

An interpretivist paradigm is based on the assumption that social reality is not singular or objective, but is rather shaped by human experiences and social contexts (ontology) and is therefore best studied within its socio-historic context by reconciling the subjective interpretations of the social actors themselves (epistemology). However, in order to test and confirm the quantitative findings from study 2 in a more representative sample, a positivist paradigm was adopted based on the ontological belief that reality is measurable and encompasses only what one can directly observe (Lincoln & Guba, 1985; Teddlie & Tashakkori, 2009). There is not scope in this thesis to fully discuss the differences between the various philosophical paradigms, nor the claims concerning their incommensurability (see Guba & Lincoln, 1994). Moreover, this study advocates that a single paradigm can indeed provide justification for MMR. In this respect, this study adopts pragmatism as its philosophical foundations based on the premise that research can steer clear of metaphysical debates about the nature of truth and reality and focus instead on 'practical understandings' of concrete, real-world issues (Patton, 2015). A rationale for this decision is provided in section 3.3.

Aside from integrating qualitative and quantitative data within a study, Creswell and Plano-Clark (2011) identifies four major types of MMR in terms of their designs: *triangulation*, *embedded*, *explanatory* and *exploratory* designs. The purpose of *triangulation* is "to obtain different but complementary data on the same topic" (Morse, 1991: p.122).

Triangulation design is used when a researcher wants to directly compare and contrast quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data. This design and its underlying purpose of converging different methods typically enables the researcher to implement the quantitative and qualitative methods during the same timeframe and with equal weight.

In an *embedded* design, one data set provides a supportive, secondary role in a study based primarily on the other data type (Creswell & Plano-Clark, 2011). An embedded design is appropriate for when different research questions need to be answered, that each need different types of data. For example, a researcher could embed qualitative data within a quantitative methodology, as might be done in an experimental design, or quantitative data could be embedded within a qualitative methodology, as could be done in a phenomenology design (Creswell & Plano-Clark, 2011).

The *explanatory* sequential design is two-phase mixed methods design whereby qualitative data helps explain or build upon initial quantitative results. Because this design begins quantitatively, investigators typically place greater emphasis on the quantitative methods than the qualitative methods. This design is useful when developing and testing a new instrument, or when a researcher wants to form groups based on quantitative results and follow up with the groups through subsequent qualitative research.

The final type of MMR is the *exploratory* sequential design (ESD), where a first phase of qualitative data collection and analysis is followed by the collection of quantitative data to test or generalize the initial qualitative results. The above set of MMR designs assumed only one qualitative and one qualitative component, however, as noted by Schoonenboom and Johnson (2017), this simplistic assumption can be relaxed in practice to allow more complex designs. Thus, this thesis adopted a three-phase ESD, where the first phase would be exploratory with the collection of

qualitative data, and then builds to a second, quantitative phase, and the third phase would be explanatory with the collection and analysis of qualitative data to explain the quantitative results (QUAL → QUANT → QUAL). Because this design begins and ends qualitatively, there is a greater emphasis on the qualitative methods than the qualitative methods. The three phases represent three distinct studies that were conducted in this thesis, and the terms "phases" and "studies" are used interchangeably in this thesis.

3.2 Exploratory Sequential Mixed Methods Design

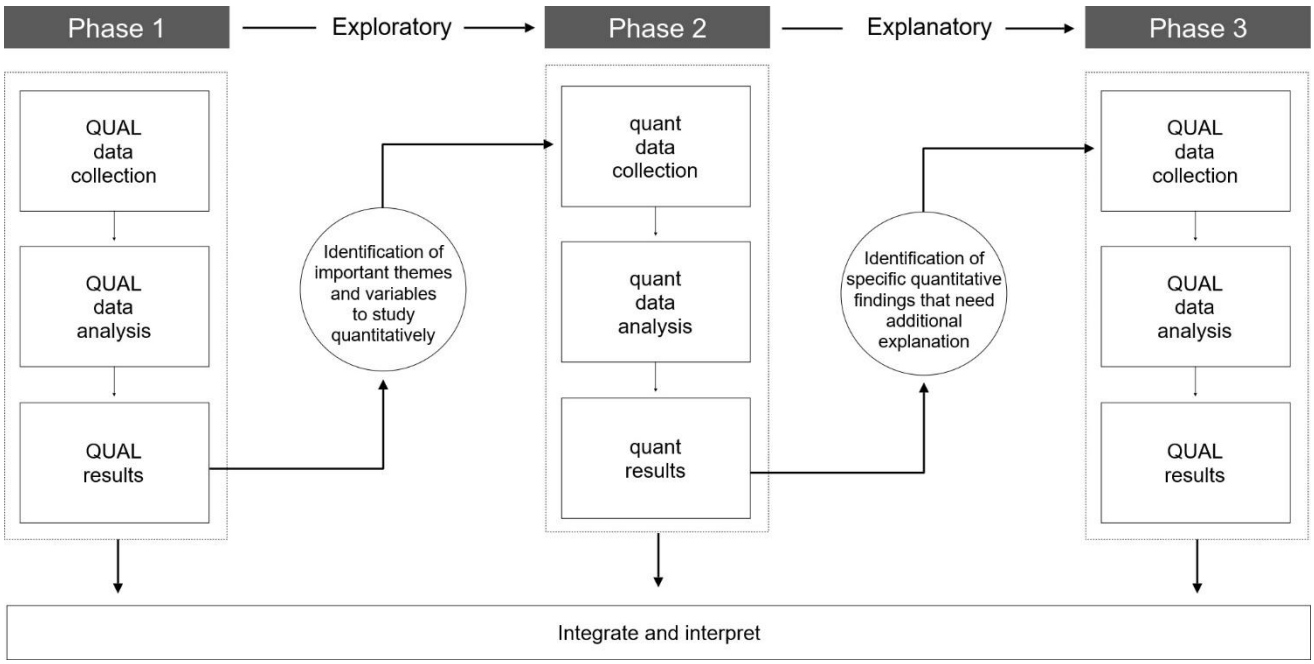
Figure 7 provides a diagrammatic representation of the research design for this thesis. In the first phase (or study 1) the purpose was to seek an in-depth understanding of the OPC phenomenon by exploring the direct experiences, beliefs opinions and attitudes of participants, as meaning-making agents in their everyday lives. As such semi-structured interviews was used to collect data, as it provides a 'deeper' understanding of social phenomena than would be obtained from purely quantitative methods (Mashuri et al., 2022). The use of semi-structured is also particularly appropriate for exploring sensitive topics, where participants may not want to talk about such issues in a group setting (Gill et al., 2008). The rationale for this phase is based on the premise that exploration is needed to identify important variables to study quantitatively. Thus, this phase will produce specific themes or relationships, which will then direct the research questions or hypothesis that are subsequently tested in the second phase.

By employing a randomised controlled trial (RCT), the purpose of the second phase (or study 2) was to test the efficacy of an OPC intervention in influencing physical activity (PA)-related behavioural changes. The RCTs are regarded as the most scientifically rigorous method of hypothesis testing available, and the gold standard for evaluating the effectiveness of interventions (Ahuja, 2019). This phase is followed by the subsequent collection and analysis of qualitative data. The third, qualitative phase (study 3) of the thesis is designed so that it follows from (or connects

to) the results of the second quantitative phase. The rationale for the third phase is that qualitative data helps explain or build upon initial quantitative results. Thus, it was important to identify specific quantitative findings that need additional explanation. Specifically, the aim was to understand the factors determining the success of an OPC intervention by collecting qualitative data from participants who can best help explain these findings. The research aims and hypothesis for the three studies is provided in Table 6.

An important procedural consideration for choosing MMR is how the quantitative and qualitative methods will be integrated, because without explicitly integrating the data derived from each is simply a collection of multiple methods (Creswell & Plano-Clark, 2011). In this thesis, although integration occurs through *building* (i.e., when results from one data collection procedure *informs the data collection approach* of the other procedure; the latter building on the former), integration mainly occurs at the interpretation and reporting level (see *chapter 7*).

Figure 7:
Research design for entire study



3.2.1 Rationale for the Exploratory Sequential Mixed Methods Design

According to Creswell and Plano-Clark (2011), a key factor that researchers should consider when choosing a mixed methods design is the research problem that they want to study. Specifically, the design should match the research problem. The lack of research into OPC consequently means that OPC is a research problem that has not been clearly defined. Hence, this situation lends itself to an exploratory approach, where the aim is to gain a better understanding of the OPC phenomenon and uses this research as a medium to define parameters of the OPC concept, or extend and develop a general idea into a more specific research problem.

The justification for adopting an ESD in the MMR literature have typically been because measures or instruments are not available, there is no guiding framework or theory, or the variables are unknown. The ESD has been used in numerous studies to inform the development and administration of new survey instruments so that the quantitative results can verify, confirm, or generalize the initial exploratory, qualitative results to a larger population (Durham et al., 2011; Hidalgo et al., 2020; Morgan, 1998; Myers & Oetzel, 2003; Panda et al., 2015; Plano Clark & Ivankova, 2018; Shorten & Smith, 2017; Soyuçok & Balantekin, 2022). However, in this thesis the ESD helps in terms of intervention development, that is, the themes and sub-themes helps to develop hypothesis which can be tested in an intervention. Although few articles have used the ESD for intervention development, Munce et al. (2021), Nastasi et al. (2007) and Panda et al. (2015) have all demonstrated how an ESD can be used for complex intervention development by presenting and integrating both qualitative and quantitative findings.

According to Skivington et al. (2021), aside from complexities arising from context and overlapping research perspectives, interventions can also become complex in line with increasing the number of intervention components and the

interactions, range of behaviours, expertise and skills required by the researcher, number and variability of outcomes and number of groups that are targeted by the intervention. Given the characteristics of study 2 which make it to be inherently complex, the ESD design also helps in conducting a process evaluation to provide valuable insights into the fidelity and quality of implementation and to identify contextual factors associated with variation in outcomes. This is in line with a key recommendation of the UK Medical Research Council's guidance on developing and evaluating complex interventions, which states clearly that: "implementation questions should be considered alongside evaluation questions from the outset" (Skivington et al., 2021: p.51).

The first qualitative phase was suitable for exploring the main aspects of an under-researched problem. The use of semi-structured interviews is a suitable data-collecting approach that is optimum for understanding the complexity and depth of a research problem (Gogo & Musonda, 2022). Using the insights gained from the interview-based qualitative methodology, the researcher can develop a research hypothesis and research questions that will be investigated in the second phase. From the perspective of this thesis, the preliminary insights that the qualitative methodology offered was essential to establishing the probable active components of the intervention so that it could be delivered effectively, for example, during the randomised controlled trial (RCT) in the second phase (Munce et al., 2021). As discussed above, the third phase (study 3) is strategically positioned, not only in providing insights about whether an intervention works in the sense of addressing the research questions/hypotheses. But, broader range of questions (e.g., what other impact has the intervention had, theorising how it works, taking account of how it interacts with the context in which it is implemented and how the intervention can work in a real-world setting) can also be explored by employing a qualitative methodology.

Although the sequential and three-phase approach of the ESD requires considerable time to implement, given that only one type of data can be collected at a time, it does make the design straightforward to describe implement and report. Another rationale for utilising the ESD is due to its flexible and adaptable nature, which allows a researcher to explore a wide range of ideas and perspectives without being constrained by specific research questions or hypotheses. The researcher can adjust his/her methods and approach as more insights and understanding of a research problem is gained.

3.2.2 Rationale for Mixed Methods Design

An MMR approach was chosen because it was theorised to produce a more comprehensive understanding of the OPC phenomenon being studied, by combing statistical techniques (quantitative data) with experiences, beliefs, attitudes and opinions of those who have made an OPC (qualitative data). Indeed, this collective strength provides a better understanding of the research problem than either method alone, while compensating at the same time for the weaknesses of each method (Johnson & Onwuegbuzie, 2013). An MMR can integrate and synergize multiple data sources which can assist to study complex problems (Poth & Munce, 2020). Both types of research methods are valid, and certain research topics are better suited to one research method or the other.

Given that OPC has been under-investigated in the literature, there is merit in combining quantitative and qualitative data in a research study to enable the researcher to view the OPC phenomenon from different perspectives and research lenses and to develop an in-depth and comprehensive understanding of the OPC phenomenon. An important aim of this thesis was to develop a detailed view of the meaning of OPC from the standpoint of those who have had first-hand experience and then generalize the findings to a population. The qualitative data obtained from semi-structured interviews (study 1) can provide depth in the research inquiry as the researcher can gain a deeper insight into the OPC phenomenon from participants'

opinions, beliefs and experiences. Then, based on the qualitative findings, the researcher can conduct a quantitative study to understand the causal or correlational relationship between variables through testing hypotheses.

Qualitative and quantitative methods have different philosophical assumptions about the beliefs about the nature of reality and humanity, the theory of knowledge that informs the research, and how that knowledge may be gained. Indeed, many have argued that the philosophical assumptions underlying quantitative and qualitive research methods are incompatible and that any reconciliation would destroy the philosophical foundations of each (Guba, 1987; Guba & Lincoln, 1994). Thus, by adopting MMR a researcher can overcome the epistemological and ontological differences between quantitative and qualitative paradigms, and, instead, focus on interrogating the value and meaning of research data through examination of its practical consequences (Morgan, 2014).

3.2.2.1 Rigour

An MMR approach helps to obtain more rigorous conclusions by employing two methods in such a way that the strengths of the qualitative methods offset the weaknesses of the quantitative methods and vice versa (Dawadi et al., 2021; Plano Clark & Ivankova, 2018). According to Morrow (2005), criteria for assessing the methodological rigour of research are closely related to the paradigmatic foundations of the particular discipline in which an investigation is conducted. In quantitative research, the criteria for rigour include: credibility, dependability, transferability and confirmability (Lincoln & Guba, 1985), which match the criteria for assessing rigour in quantitative research, that is, internal validity, reliability, external validity and objectively, respectively. Table 5, below, illustrates which tactics were applied in this thesis to achieve each of these criteria. Detailed information is provided in each of the study chapters.

Although researchers within the field of social psychology have used a variety of methods to answer their research questions, early studies of PC, mostly within the area of pro-environmental behaviours, have been dominated by scientifically based experimental research that lend themselves to more positivist standards of rigour (Couch et al., 2005; de Leon & Fuqua, 1995; Hamad et al., 1977; Jacobs & Bailey, 1982; Kohlenberg et al., 1976; Shippee & Gregory, 1982; Winett et al., 1978).

In the sparse number of quantitative studies where OPC have been used to address EBRBs, several techniques to enhance rigour are made implicit, such as, experimental manipulation, randomisation, blinding participants to the hypothesis being tested (Consolvo et al., 2006; Munson et al., 2015; Nyer & Dellande, 2010). Mixed methods research of OPC have also implicitly referred to several tactics demonstrating rigour in the quantitative methods. However, in the qualitative component, no reference is made to which criteria of rigour or trustworthiness their techniques were addressing (Consolvo et al., 2006; Munson et al., 2015). What these studies demonstrate is that methodological rigour is assessed in different ways.

Table 5:

Quality criteria in qualitative and quantitative research, adapted from Frambach et al. (2013)

Category	Qualitative criteria	Approaches used in this thesis to enhance quality in qualitative research (Study1 and 3)	Quantitative criteria	Approaches used in this thesis to enhance quality in quantitative research (Study 2)
Validity of setting the research frameworks (Validity)	Credibility	• Prolonged engagement with data • Familiarisation of data • Documenting theoretical and reflective thoughts • Diagramming to make sense of theme connections • Establishing investigator's authority • Supervisor debriefing	Internal validity	• Measures to avoid loss of participants or provide information on non-responses • The use of control groups • Standardize treatment conditions • Internal reliability testing (Cronbach's alpha) of a set of scale or test items • Experimental manipulation, and manipulation testing

		• Development of interview protocol and pilot testing of interview protocol • Logical and systematic method of analysing data, including, generation of codes, combining codes into themes, reviewing themes and subthemes • Themes and subthemes vetted by supervisory team to determine significance of themes • Storing of raw data in well-organized archives		• Taking account of confounding variables • Describe details of the research context and intervention • The use of incomplete disclosure
Range and applicability of findings (Applicability of evidence)	Transferability	• Purposive sampling • Data triangulation • Thick descriptions	External validity	• Use of random sampling • The use of inclusion and exclusion criteria

		• Sampling strategies		• Field experimentation (Facebook) • Psychological realism
Stability of the phenomena and methods (Consistency of evidence)	Dependability	• Collect data until no new themes are identified (data saturation) • Implementation of ethics in research design • A detailed track record of the data collection process was developed (audit trail) • Preparation of detailed drafts of the study protocol throughout the study	Reliability	• Study protocol • Test-retest reliability • Estimate the internal consistency across repeated measures

Neutrality of the observations and interventions (Neutrality of evidence)	Conformability	• Discuss the research process and/or findings with supervisors • Transcribe data verbatim • Use of multiple coders (study 1 only)	Objectivity	• Setting clear and specific research questions • Supervisory team review • The use of validated measurements • Communicating with a passive voice

3.3 Pragmatism as a Philosophical Standpoint for this Thesis

A researcher's methodological choices depend on his/her worldviews which comprise the beliefs or philosophical assumptions about: how knowledge is acquired, understood and utilised (epistemological assumptions), the realities that are encountered (ontological assumptions), and the extent and ways in which the researcher's own values influence the research process (axiological assumptions). These philosophical assumptions (or commonly referred to as paradigm), exists in both implicit and explicit forms, and will inevitably shape how research questions are understood, and the manner in which data about phenomenon should be collected, analysed and used. Philosophical assumptions are historically and culturally situated and produced, and as such they are embedded within disciplines, theories, methodologies, and methods (Gannon et al., 2022; Mauthner, 2020).

The rationale for adopting pragmatism in this thesis is based on its ontological, epistemological and axiological elements, all of which can provide a philosophical justification for MMR (Biesta, 2015; Johnson & Onwuegbuzie, 2013; Liu, 2022; Shannon-Baker, 2016). Pragmatism is based on using the philosophical and/or methodological approaches that works best for a particular research problem that is being investigated (Kaushik & Walsh, 2019). Thus, it provides an action-oriented framework in research where the emphasis is on "what works" rather than being built on assumptions about the nature of reality or the nature of the relationship between the known and the knower (Creswell, 2014; Hall, 2013; Shannon-Baker, 2016). Given the lack of research into OPC, the primary objective of this thesis was to provide a comprehensive and conceptual understanding of OPC before attempting to operationalise its variables and investigate its effects on behaviour change. This objective was strongly influenced by a desire to contribute useful and actionable knowledge anchored in participants experience. Thus, this objective was accomplished by engaging with individuals who have made an OPC towards EBRBs

to collect data that is relevant to this research problem, and then generating hypothesis that is then tested under experimental conditions.

3.3.1 Ontological Rationale

Ontologically, this meant accepting both the existence of one reality and that individuals have multiple interpretations of this reality. Thus, a researcher flows from an ontological stance that is located in the middle of the objectivity-subjectivity continuum, and chooses the view that best serves his/her research purposes (Johnson & Christenen, 2012; Morgan, 2007). On one hand, assuming that reality changes periodically, the researcher adopts the assumption that reality is subjective, multiple and socially constructed which aided in the qualitative approach. On the other hand, assuming that reality is stable most of the time, the researcher was able to adopt the one realty view when using the quantitative approach to test the hypotheses.

3.3.2 Epistemological Rationale

Epistemologically, pragmatism acknowledges that knowledge is constructed by interactions between humans and their environments (Denzin, 2012), which implies that although knowledge does exist in the external world, it must be *experienced* by individuals. Herein lies another rationale for adopting pragmatism; the value placed on experiential knowledge. Given the ESD of this thesis, the aim was to seek deeper understanding of the human experience, in relation to OPC. The perspectives, beliefs, opinions and experiences of those who have made an OPC usually inform how OPC is conceptualised, which suggest an inherent alignment with pragmatism's conceptualisation of knowledge (Maarouf, 2019). This inductive-deductive approach is congruent with Dewey's (1989, 2011) conceptualisation of intelligent action. Pragmatism was instrumental in directing the researcher towards making appropriate methodological choices by unpacking different aspects of the research problem at the design stage. For example, pragmatism's inherent focus on experiential knowledge and action helped to identify important variables (in study 1)

which helped to define the research questions for testing in phase 2. Likewise, understanding the experiential knowledge of participants in phase 3 was useful in explaining the specific quantitative findings of phase 2 that needed additional explanations. The need to engage deeply with participants to identify goals for quantitative study (phase 2) was underscored by pragmatism's notion of social reality being mind-dependent and not free from participants' point of views, interests and purposes (Putnam, 1981). By building in scope to explore the diverse experiences of different individuals at different phases of the research process, it was possible to identify more facets of the research problem than if these were solely framed around the theoretical literature.

3.3.3 Axiological Rationale

Although a quantitative approach would make a distinction between *facts*, which is viewed as objective truth, and *values*, which can be inherently misleading and prevents the pursuit of truth. Axiologically, pragmatism argues that it is impossible to be completely free of one's own values, beliefs, ideas and experiences. Thus, a pragmatic researcher should focus on his research objectives and use his values in a way that serve these objectives and enhance the research results. In the words, the degree to which a researcher allows his/her bias to influence the research should be determined by the research requirements. In conducting this thesis, the value of the researcher affected many aspects of the research process. As explained earlier (see section 1.4), the researcher's lived experience and interest in OPC and the se of digital technologies to influence behaviour change influenced the selection of the research topic, and formation of the research questions. Adopting a pragmatist standpoint also guided the researcher's evaluation and understanding of the ethical issues related to the research. For example, it was important for the researcher to protect the rights and welfare of participants that take part in this research. The acknowledgement of this value was especially manifested during the use of incomplete disclosure in phase 2.

On one hand, it was necessary for the researcher to maintain objectivity and dismiss the importance of his values (in respect of protecting participants' rights and welfare). This is because revealing the full purpose and nature of the study may alter the participants' behaviours and responses, thereby making the study impossible to conduct. On the other hand, it was also necessary to acknowledge that the use of incomplete disclosure prevents participants from prospectively providing fully informed consent and that participants have dignity which must be respected, and they have a fundamental human right to make choices which the researcher must respect. Thus, the debriefing process – whereby participants were informed that an incomplete disclosure was used in in the study – is an example of the researcher bringing his values into the research. Indeed, by documenting this in the thesis, the researcher is acknowledging the value-laden nature of the research.

Table 6:
Aims and research questions/hypotheses for all studies conducted

Study and aim	Research questions/hypothesis	
Study 1 **Aim** To explore the common themes in the reported experiences of participants who have previously made an online public commitment.	1. 2. 3.	How is OPC conceptualised by those making OPCs towards EBRBs? What are the psychological mechanisms underlying the effect of OPC on behaviour change? What are the necessary conditions for making an effective OPC in the context of EBRBs?
Study 2 **Aim** The aim of this study to investigate the effect of an online public commitment (OPC) intervention	H1. H2	Participants assigned to the intervention conditions will report significantly greater increases in scores for goal attainment, PA, mental wellbeing and relative autonomy than the control condition at all follow-up time-points (i.e., T1, T2 & T3),

delivered via Facebook in promoting increases in PA, goal attainment, mental wellbeing and relative autonomy.		but the condition B will have the greater increase in scores than the other two conditions.
Study 3 **Aim** To identify quantitative findings that need additional explanation, and to collect qualitative data from participants who can best explain these findings.	1.	What are the perceived factors that lead to success for those who have successfully changed their PA behaviour after making an OPC?

Chapter 4 – Study 1: A qualitative exploration of OPC related to physical activity and diet

4.1 Introduction

It is commonly assumed that whenever people make a public commitment (PC) to engage in a specific behaviour or activity, the behavioural impact of these intentions is enhanced (Gollwitzer et al., 2009a; Staats et al., 2004). There has been considerable interest in PC for quite some time with the earliest work in environmental literature conducted by Burn and Oskamp (1986); Cialdini et al. (1978); Kiesler (1971); Kiesler et al. (1974); Kiesler and Corbin (1965); Kiesler and Sakumura (1966); Pallak and Cummings (1976); Shippee and Gregory (1982). While the concept of PC has been around for some time, it has received more recent attention in behavioural (Cialdini, 2001; Cialdini & Trost, 1998), environmental (Hartini et al., 2017; Lokhorst et al., 2010b, 2013; Werner et al., 1995), education (Gollwitzer et al., 2009a), savings (Ashraf et al., 2006; Burke et al., 2018; Karlan et al., 2007), and consumer behavioural literature (Dellande & Nyer, 2007b; Gopinath & Nyer, 2009). Across these behavioural disciplines, a key conclusion of Kiesler's early work held true; specifically, a key determinant of the commitment magnitude is the publicness with which individuals declare their position message (Kiesler, 1971; see also Nyer & Dellande, 2010; Pallak et al., 1980).

One reason for the popularity of PCs is that they have been shown as an effective and durable behaviour change technique (Lokhorst et al., 2013). Thus, in a sample of participants who made a commitment to perform a specified behaviour, those who's made their commitments publicly were subsequently more likely to perform the behaviour than those who kept their commitment private (Baca-Motes et al., 2013; Gopinath & Nyer, 2009; Knox & Inkster, 1968; Lokhorst et al., 2013; Wang & Katzev, 1990). Given that overweight and obesity prevention requires effective interventions targeting the so-called energy balance-related behaviours (EBRBs; that

is, physical activity and dietary behaviours) (Kremers et al., 2005; Romieu et al., 2017; Van Stralen et al., 2011; Verhavert et al., 2020), it would seem PCs may provide unique and optimal conditions under which to promote EBRBs. A distinction is made here between EBRBs, within an energy balance approach, and PA, which can be undertaken solely to improve mental wellbeing (Lahert et al., 2019; Eric et al., 2020; Ramírez-vélez et al., 2021; Ahmad et al., 2015), or simply because it is inherently enjoyable and satisfying (Neace et al., 2022; Turner & Reed, 2022; Ryan et al., 1997).

By asking individuals to make a PC to engage in behaviours that maintain a negative energy balance (i.e., when energy expenditure exceeds intake), it is assumed that bodyweight will change as a response to changes in energy intake and expenditure. The relationship between energy balance and body weight regulation has been demonstrated in wide number of studies (Basolo et al., 2021; Fonseca et al., 2018; Hall et al., 2012, 2022; Hill et al., 2013b; Müller et al., 2016; Westerterp, 2018). Unfortunately, research assessing the relationship between PC and EBRBs is sparse.

Several psychological mechanisms have been suggested to explain the role played by PC in influencing resistance to attitude change and promoting behaviour(s) congruent with one's PCs. Mainly, it is argued that people have a strong desire to appear consistent and rational in the eyes of others, which evokes a willingness to conform to normative influence to engage in the behaviour in question (Cialdini et al., 1995; Dellande & Nyer, 2007b; Wang & Katzev, 1990). Others have also argued that making a PC commits the individual to a certain self-view with which the person then acts consistently (Burger & Guadagno, 2003; Gollwitzer et al., 2009a).

Traditionally, the effect of PC has mostly been demonstrated in an in-person context (Burn & Oskamp, 1986; de Leon & Fuqua, 1995; Dellande & Nyer, 2007b; Nyer & Dellande, 2010; Shippee & Gregory, 1982). While evidence demonstrates the declining usage of in-person community, online collaborative communities continue to grow (Löwgren & Reimer, 2013). Increasing prevalence and utilisation of computer-mediated communication (CMC) are attributed to changes in society including family

structure, ease of access, anonymity, and the knowledge that the internet has become a widely useful resource for obtaining social support (Walther & Boyd, 2002), particularly in the context of health (Wright & Bell, 2003).

Accordingly, as individuals increasingly conduct numerous aspects of their lives using CMC, it is likely that they make use of CMC to make a PC to support their goal pursuits (Bradford et al., 2017). In other words, these individuals are said to be making an online public commitment (OPC). For the purpose of this study, an OPC occurs when an individual uses CMC to publicly commit to a certain position. Social networks, online videos, and instant messaging services equip users with several features to communicate and disclose OPC, for instance by sharing text-based message, photos, videos or status updates with friends or the public.

It is, however, a mistake – and rather a common one – to view OPC as a unitary phenomenon. Even the simplest OPC (and even PC) manipulation necessarily implicates several empirical distinguishable sub-manipulations, each of which has received empirical attention on their own right. These include (a) *a behavioural intention* (making a commitment is commonly seen as a behavioural intention; see Ahluwalia et al., 2001; de Leon & Fuqua, 1995; Gollwitzer et al., 2009a; Gopinath & Nyer, 2009), and which many regard as the most proximal determinant of behaviour (Ajzen & Fishbein, 1975; Amireault et al., 2008; Fishbein & Ajzen, 1975; Rhodes et al., 2022b); (b) *publicness* (the more publicly one states their attitude, the more one is committed and locked into that position; see Cialdini & Trost, 1998; Emington, 2012; Hollenbeck et al., 1989; Pallak et al., 1980); (c) *CMC context* (CMC environment has been shown to be an appropriate context in which PC will result in attitude change; see Bradford et al., 2017; Cavallo et al., 2012; Consolvo et al., 2006; Munson et al., 2015); (d) *susceptibility to normative influence* (the greater the need to appear consistent in the eyes of others, the greater the need to follow through with the promised actions; see Cialdini et al., 1995; Gopinath & Nyer, 2009; Parrott et al., 1998; Wooten & Reed, 2004); and (e) *degree of volition in the performance of the act* (those who make PC must believe that their

behaviours reflect their true motivations, and internal self; see Burger & Caldwell, 2003b; Burger & Guadagno, 2003; Cialdini et al., 1995).

There is an abundance of research suggesting that an increasing number of people are sharing content online that promote their EBRBs (Al Ali et al., 2021; Carpenter & Amaravadi, 2019; Johnston & Davis, 2019; Kashian & Liu, 2020; Singh & Sharma, 2022; Toh & Lee, 2022). This research, however, has been hampered by a lack of conceptual clarity, and work in this area would benefit from studies that clearly define and conceptualise the underlying constructs that are most important for making an effective OPC.

Research has also been limited by a lack of understanding of the possible psychological mechanisms underlying the OPC effect. One cannot assume that the psychological mechanisms underlying the effect of PC will operate in a similar fashion for OPC. Several theories that have been applied to CMC contexts would suggest that these potential differences should not be ignored. For example, the Social Identification-Deindividuation (SIDE; Reicher et al., 1995) posits that people lose their sense of socialised individual identity and resort to unsocialized and anti-social behaviour. Similarly, people are concerned with the way others perceive them, motivating actors to manage their behaviour in order to present favourable and appropriate images to others (Schlenker, 1985; Snyder, 1974). Others have argued that relative anonymity of CMC are said to weaken the interpersonal bonds that transmit social influence (Coppolino Perfumi et al., 2019; Crossey et al., 2021). All of these theories converge on the idea that CMC users take advantage of the interface and channel characteristics that CMC offers in a dynamic fashion in order to enhance their relational outcomes(Walther, 2007). This presents a challenge for OPC intervention design.

Given that OPC, unlike PC, is an under-researched area with many questions still unanswered, further analysis of the OPC concept is needed in order to provide the foundation for more conclusive evidence. The few studies that have come closest

to providing a conceptual understanding of OPC and its underlying dimensions have done so using secondary or archival data. For example, Bradford et al (2017) employed archival netnography of online weight loss support communities where individuals blog about their weight loss journey. While online communication can be a good source of data to form an understanding of a cultural phenomenon, the most prominent disadvantage of this approach is the lack of control over the sampling structure of the study population as well as the absence of any research structure or strategy for collection of data. Moreover, this passive analysis of archived data has been criticised by Cherif and Miled (2013) and Costello et al. (2017) who both argued that such an approach threatens the premise upon which netnographic methodology retains its qualitative rigor.

Consequently, a very limited number of qualitative studies have examined the OPC concept using primary qualitative data, especially from the perspective or lived experience of individuals who have first-hand or direct experiences of making an OPC. Table 7 below shows an overview of the sub-topics and associated studies reviewed in this section, including their research design, target population and location.

Table 7:
Overview of the reviewed sources (Study 1)

Topic	Sub-topic	Author (date)	Research design	Target population, and location (if known)	Findings
Behaviour intention (BI)	Does BI predict PA behaviour?	Feil et al. (2023)	Systematic review	Studies with an assessment of physical activity intention and the employment of the intention-behaviour relationship into profile quadrants	Intention is a necessary, yet insufficient antecedent of physical activity for many. Successful translation of a positive intention into behaviour is nearly at chance.
		Schwarzer et al. (2007)	Longitudinal study	Undergraduate students, Germany	Self-efficacy and planning seemed to be functional as proximal predictors of health behaviours. When predicting health behaviours, these two self-regulatory variables should be used in addition to the behavioural intention.
		Rebar et al. (2016)	One-week prospective study	Undergraduate students	Intention-enhancing interventions may effectively promote vigorous physical activity, but other motivational processes may be more appropriate to target in interventions of walking and moderate physical activity.

		McEachan et al. (2011)	Meta-analysis	Studies investigating efficacy of the Theory of Planned Behaviour (TPB) dependent on behaviour and methodological moderators	Intentions explain 33% of variability in future physical activity behaviour.
Public commitment vs private commitment	Comparing the efficacy of public commitment vs private commitment	Nyer and Dellande (2010)	Experimental (Randomised controlled trial)	Women, between 20 and 45, India	Public commitment was shown to be a significant motivator in ensuring long-term compliance behaviour. Participants who made a long-term public commitment to a weight-loss goal were found to have achieved greater results compared to participants who made a short-term public commitment and compared to those who made no commitment at all.
		Shippee and Gregory (1982)	Experimental (Randomised controlled trial)	Commercial-industrial firms, USA	Mild commitment intervention led to greater levels of behaviour change than did strong commitment intervention. However, the strong commitment condition exhibited significantly greater levels of behaviour change than was exhibited by control condition.

de Leon and Fuqua (1995)	Experimental (Randomised controlled trial)	Graduate students, married students and their families, USA	An intervention combining public commitment and mass media group feedback can significantly increase recycling behaviour.
Dellande and Nyer (2007)	Experimental (Randomised controlled trial)	Undergraduate students, USA	Participants who made a public commitment to conserve paper by reading lectures online were found to have done so compared to subjects who made a less public commitment, and compared to those who made no commitment at all.
Gollwitzer et al. (2009)	Quantitative survey	Undergraduate students, Germany	When other people take notice of one's identity-relevant behavioural intentions, one's performance of the intended behaviours is compromised. This effect occurs whether the intentions are internally or externally endorsed.
Lokhorst et al. (2010)	Experimental (Randomised controlled trial)	Dutch farmers, Netherlands	Results show that the combination of tailored information and the making of public commitments was especially effective in eliciting

					behaviour change: participants showed a stronger desire to engage in conservation, increased their area of nonsubsidized natural habitat, and reported spending more time on non-subsidized conservation.
		Debar et al. (2011)	Experimental (Randomised controlled trial)	Secondary school students	Participants who made a public commitment to conserve paper by reading lectures online were found to have done so compared to subjects who made a less public commitment, and compared to those who made no commitment at all.
The psychological mechanisms mediating the effect of public commitment	Group norms	Terry et al. (1999)	Prospective design,	Community residents, aged 17-59, Australia	Results showed that group norms influenced behaviour primarily for people who strongly identified with the relevant group.
		Nyer and Dellande (2010)	Experimental (Randomised controlled trial)	Women, between 20 and 45, India	• The influence of others serves to enhance the salience of the target's norms. This in turn leads the target to a sense of responsibility toward normative or desirable behaviours.

				• Weight-loss motivation partly mediated the effect of public commitment on weight loss. Short- and long-term public commitment resulted in increased weight-loss motivation, which in turn resulted in increased levels of weight loss. • The personality trait susceptibility to normative influence (SNI) was found to be a moderator of the effect of public commitment on weight loss. Participants high in SNI were more likely to be affected by public commitment compared to those lower in SNI.
Cognitive elaboration process	Petty and Cacioppo (1986)	Descriptive research	-	Public commitment can set in motion a process whereby the individual elaborates on the possible reasons to engage in the behaviour and strategies to accurately perform the behaviour, resulting in a

				strong positive attitude towards the behaviour.
Anticipated personal and social approval/disapproval	Parrott et al. (1998)	Prospective study	Farmers	People who make a public commitment act on their commitment due to anticipated personal and social disapproval and penalties for failure to follow through with the promised activities.
Susceptibility to normative influence	Dellande and Nyer (2007)	Experimental (Randomised controlled trial)	Undergraduate students, USA	• The personality trait susceptibility to normative influence (SNI) to be a determinant of how effective public commitment would be in gaining compliance. Subjects high in SNI were more likely to be affected by public commitment, compared to those lower in SNI. • The act of making a public commitment to a goal caused subjects to assess the goal as being more important.

Preference for consistency	Gopinath and Nyer (2009)	Experimental (Randomised controlled trial)	Undergraduate students, USA	• The effect of public commitment is mediated by preference for consistency (PFC), such that individuals with high PFC were more resistant to counter-attitudinal persuasion as compared to those with a low PFC. • The proximity of the source group relative to the proximity of the group to whom the public commitment is made had a significant influence on attitudinal changes. • Individuals who publicly stated their position on an issue experience increased confidence in their attitudes, and evaluated the issue as being more important as compared to individuals who did not publicly state their position. • The increases in attitude certainty and issue

				importance increased resistance to persuasion.
Preference for consistency	Gopinath and Nyer (2009)	Experimental (Randomised controlled trial)	Undergraduate students, USA	• The effect of public commitment is mediated by preference for consistency (PFC), such that individuals with high PFC were more resistant to counter-attitudinal persuasion as compared to those with a low PFC. • The proximity of the source group relative to the proximity of the group to whom the public commitment is made had a significant influence on attitudinal changes. • Individuals who publicly stated their position on an issue experience increased confidence in their attitudes, and evaluated the issue as being more important as compared to individuals who did not publicly state their position.

				• The increases in attitude certainty and issue importance increased resistance to persuasion.
Changes in self-concept/labelling	Burger and Caldwell (2003)	Experimental (Randomised controlled trial)	Undergraduate students	Changes in self-concept underlie a successful foot-in-the-door manipulation and support the self-perception explanation for the foot-in-the-door effect.
	Pallak and Cummings (1976)	Experimental (Randomised controlled trial)	Homeowners, USA	Results showed a strong effect of commitment when they labelled participants as "public-spirited, fuel-conserving citizens," a possible strategy for enhancing the shift in self-concept needed for behaviour change.
Self-perception	Burger (1999)	Experimental (Randomised controlled trial)	Undergraduate students	• Self-perception processes contribute to the effectiveness of the Foot in the Door (FITD) procedure. • The FITD effect is enhanced to the extent that both a general and a

					specific change in attitude occurs.
	Internalised personal norms	Kerr et al. (1997)	Experimental (Randomised controlled trial)	Undergraduate students	Participants enter into commitments to follow some relatively cooperative strategy and that the commitment norms that binds the group members to honour such agreements is predominantly an internalised, personal norm.
		Matthies et al. (2006)	Randomised controlled trial,	German citizens with good car access and living in areas with a convenient supply of public transportation, Germany	The effect of commitment on behaviour was successful primarily for those with a preexisting norm. These norms were activated by administering weekly questionnaires containing a question about participants' personal norm toward the target behaviour.
The psychological mechanisms mediating the effect of online public commitment	Identity-based motivation	Munson et al. (2015)	Experimental (Internet-delivered randomised controlled trial)	Undergraduate students, USA	Social accountability prevents participants from setting commitments that are too easy.
		Bradford et al. (2017)	Netnography	Members of online weight loss support communities	• The study found that social identity is made salient upon entering into these virtual support

communities (VSCs) given that members are united by pursuit of a focal goal, and engender belonging through blogs that provide commentary illuminating progress, failures, or detours.

- Individuals also inhabit various roles within these communities acting as both contributors documenting and sharing their journey as well as observers and commentators of others' experiences.

- The beneficiary focus is likely fluid, as individuals move between a focus on benefits for themselves and benefits for the community. The breadth of sharing relative to the focal goal is the degree to which individuals engage with the community primarily for the goal enjoining the community (i.e., narrow) or to

		commune on issues beyond the focal goal (i.e., broad).

4.1.1 Study Aim and Research Questions

The aim of the current study/phase was to qualitatively explore participants' experiences, perceptions and attitudes of OPC in the context of EBRBs, in order to gain a more comprehensive understanding of OPC and its conceptual components.

4.1.2 Research Questions

This study seeks to answer the research questions below.

1. How is OPC conceptualised by those making OPCs towards EBRBs?
2. What are the psychological mechanisms underlying the effect of OPC on behaviour change?
3. What are the necessary conditions for making an effective OPC in the context of EBRBs?

4.2 Methods

4.2.1 Study Design

Given the limited research to date on individuals' experiences of making an OPC in the context of EBRBs, a qualitative and exploratory methodology was selected as the most appropriate approach to address the research questions. Qualitative research is well-suited for studying under-researched topics and can generate themes and patterns that explains 'how' and 'why' a particular phenomenon operates (Green & Thorogood, 2004). Admittedly, a qualitative approach is not intended to provide final and conclusive answers to the overall research problem, rather, to understand the nature of a phenomenon under investigation. This information is important in order to identify important variables, specific categories or relationships These insights are then used to direct the research questions and data collection used in the second, quantitative phase.

The use of semi-structured interviews was considered an appropriate method of data collection for gaining insights into participants' experiences of making an OPC

and the meanings attached to these experiences. Alongside being an effective data collection tool, semi-structured interviews combine the freedom and flexibility of an unstructured interview with the rigor and comparability of a structured interview (DeJonckheere & Vaughn, 2019). Adopting such an approach allows a researcher to change his/her direction as a result of revelation of new data and new insights (Dearnley, 2005).

The study was underpinned by an interpretivist worldview. Interpretivism posits the existence of a subjective reality, and any accounts of this reality are constructed through the lens of the environment and experience of the constructor (Kenny et al., 2024; Vincent & O'Mahoney, 2018). From an interpretivist standpoint, utilising semi-structured interviews allowed for subjective meaning to be explored with each participant while acknowledging the role of context in shaping knowledge and meaning (Gelo et al., 2009; Lyons, 2011). Due to the sensitive nature of weight-related topics, it was also considered that participants may be willing to share more personal experiences via this format than in a group setting (Ní Néill et al., 2023). Ethical approval was granted for this study by Liverpool John Moores University (LJMU) Research Ethics Committee (Reference number: 19/SPS/041).

4.2.2 Methodological Rigour

This section describes the specific criteria used to assess the rigour or trustworthiness of this study. Research is considered rigorous or trustworthy when members of the research community are confident in the study's methods, data and analytics process. Trustworthiness in research can be achieved by ensuring the credibility, transferability, dependability, and conformability of the study's findings (Lincoln & Guba, 1985; Nowell et al., 2017). These stringent criteria for assessing qualitative research are the parallel terminologies for assessing rigour (i.e., reliability, validity, objectivity and generalisability) in quantitative research. Table 8 below shows the steps that were taken in this study to achieve methodological rigour, in the context of "the Four-Dimensions Criteria" (Lincoln & Guba, 1985).

Table 8:
Strategies adopted to achieve rigour/trustworthiness (Study 1)

Rigour Criteria	Purpose	Original Strategies	Strategies applied in this study to achieve rigour
Credibility	To establish confidence that the results (from the perspective of the participants) are true, credible and believable (Nowell et al., 2017).	• Interviewing process and techniques	• Interview schedule tested using 1-2 pilot interviews.
		• Prolonged engagement with data	• Interviewer spent 5-10 minutes in each interview to build rapport with participants.
		• Establishing investigator's authority	• Investigator familiarised himself with knowledge and research/analytical skills to perform his role.
		• Supervisor debriefing	• Investigator had regular debriefing sessions with supervisory team.
Dependability	To ensure that the research process is logical, traceable and clearly documented (Tobin & Begley, 2004).	• Establishing an audit trail	• A detailed track record of the data collection process was developed.
		• Feedback from supervisors	• Investigator obtained feedback frequently throughout the data collection and analysis process.

		• Practice reflexibility	• Investigator reflected on how his beliefs and experiences might influence the research process.
		• Data saturation	• The collection and analysis of data continued until no new themes were identified.
Confirmability	To strengthen the confidence that the results would be confirmed or corroborated by other researchers (Forero et al., 2018).	• Triangulation	• Multiple coders (i.e., investigators) were used to analyse and interpret the data.
		• Ethical consideration	• Investigator ensured that care was taken to protect the confidentiality of participants and shield them from harm relating to issues of respect and dignity.
		• Quotes	• Investigator made use of direct quotes from participants to demonstrate that the themes are generated form the data.
		• Supervisory team debriefing	• Investigator frequently reported back to the supervisory team for them to check how inferences, interpretations and conclusions have been reached.

Transferability	To ensure that the study's findings have meanings to others in similar situations and settings (Shenton, 2004).	• Thick descriptions	• Rich and detailed descriptions of the research process and participants was provided facilitating the assessment of its relevance and applicability to other contexts.
		• Data triangulation	• Investigator deployed multiple data collection tools (i.e., face-to-face and telephone interviews) to enhance transferability.
		• Purposive sampling	• Investigators ensured that data was collected from those who have firsthand experience of the phenomenon.
		• Sampling strategies	• Investigator described the sampling methods used and the criteria for participant selection to help determine whether the findings might be applicable or transferable to similar populations or settings outside the study context.

4.2.3 Participants and Recruitment

Inclusion criteria in this study were (1) being over 18 years of age, and, (2) have previously publicised a commitment to engage in EBRBs, using any type of CMC (e.g., social networking websites, blog, online support groups, online forums etc). Recruitment took place between July and August 2019. Participants were recruited via email invitations (Appendix 4A) to staff and students of LJMU. Social media adverts on Facebook were also used to recruit potential participants (Appendix 4B). A consent form (Appendix 4C) and participant information sheet (Appendix 4D) were forwarded to potential participants, providing further details about the purpose and nature of the study. Because the aim was gaining a rich and varied insight, convenience sampling was used to ensure that the study included participants with a mix of genders, age, ethnic backgrounds and whose OPCs were publicised in a diverse range of CMCs.

Fifteen participants (10 females, 5 males) took part in the interviews. Participants were aged between 24 and 51 years and used a wide range of CMCs to publicise their OPCs. Nine participants used online support groups on Facebook to share their OPC; two used an online support group (websites); two used their own pre-existing online social networks (Facebook and Twitter); one used a fitness tracking app; and one used a blog. Table 9 below summarises key demographic information for all participants, as well as key information about their OPCs.

Table 9:
Participant background information (Study 1)

Demographic information			OPC information			
Pseudonym	Sex	Age	BI	Type of BI	CMC used	OPC composition
Angela	Female	24	To exercise regularly	Specific behaviour	Facebook closed group	Text-based

Hannah	Female	26	To compete in "Couch to 5K"	Desired outcome (Outcome-based)	Online support group	Text and image-based
Becky	Female	28	Be able to get from couch to running a marathon	Desired outcome (Outcome-based)	Pre-exiting social network	Text and image-based
Juliet	Female	47	To lose 5 stones	Desired outcome (Outcome-based)	Facebook closed group	Text and image-based
Monica	Female	43	To lose 10kg by 90-days by sticking to a healthy diet and keeping fit	Specific behaviour + desired outcome	Facebook closed group	Text and image-based
Andrew	Male	48	Generally, to lose weight and live a healthier lifestyle	Desired outcome (Outcome based)	Facebook closed group	Text and image-based
Paul	Male	31	Generally, to lose weight and achieve mental health after a traumatic life event	Desired outcome (Outcome-based)	Facebook closed group	Text-based
Sarah	Female	40	To start and stick to a ketogenic diet, to lose weight	Specific behaviour + desired outcome	Facebook closed group	Text-based
Justin	Male	38	To lose weight and become healthier by starting a vegetarian diet	Specific behaviour + desired outcome	Facebook closed group	Text and image-based
Eve	Female	51	Train for and be able to run half-marathon	Specific behaviour	Blog	Text-based

				+ desired outcome		
Katherine	Female	37	Train for the London Marathon and finish in less than 3 hours	Specific behaviour + desired outcome	Facebook closed group	Text and image-based
Patience	Female	35	To compete for Iron Man, and finish in the top 50	Desired outcome (Outcome-based)	Pre-exiting social network	Text and video-based
Jeb	Male	36	Work out 3 days a week to gain muscles	Specific behaviour + desired outcome	Facebook closed group	Text and image-based
Hazel	Female	38	To train regularly for upcoming triathlon	Specific behaviour	Online support group	Text and image-based

4.2.4 Semi-Structured Interviews

Semi-structured interviews were guided by an interview schedule that was developed for this study (Appendix 4E), and on the basis of pertinent questions arising from a review of the literature and in discussion between the research team. The interview schedule consisted of seven open-ended questions supplemented by follow-up and probing questions, which were grouped to elicit understanding of the three research questions described above. The interview schedule included questions about participants' experiences and descriptions of OPC, the possible psychological processes underlying the effect of OPC on behaviour change, and the factors which determined the effectiveness of their OPC.

Semi-structured interviews followed the steps proposed by DeJonckheere and Vaughn (2019). Firstly, to build trust and rapport with participants, participants were provided with a brief explanation of the research study, including the format, agenda

and approximate duration of the interview, and discussing ethical considerations. Secondly, the interview began with an easy, context-setting question before moving to more in-depth and sensitive questions. A friendly, non-judgemental attitude and a conversational tone were adopted to encourage participants to share as much information as possible, unselfconsciously, whilst also acknowledging the sensitive nature of the conversation. The final stage comprised of BO bringing the interview to a conclusion, asking participants if they had any questions or concerns, and reflecting on both the content and process of the interview.

Interviews took place either by telephone or face-to-face (FtF) depending on the participant's preference and availability. Three participants chose to be interviewed at their workplace, and 12 were conducted via telephone. All the interviews audio-recorded with a digital voice recorder and transcribed verbatim. Interviews took place between August and September of 2019, and lasted between 45 to 60 minutes. Written consent was obtained from all study participants before the interview commenced. In addition, verbal consent was given at the beginning of each interview, which was recorded separately from the main interview. It was decided a priori that recruitment should cease when data saturation was reached, that is, when no new themes were observed in the interviews (Bowen, 2008; Fusch & Ness, 2015). Further insights into the decision to halt data collection is provided in the next section.

In addition to the audio-recordings, demographic information, such as age and sex, was collected from participants after the interviews. All identifiable data was removed, and pseudonyms were given to all participants to protect their identity. No participants dropped out of the study. No rewards or incentives were offered in exchange for taking part in the study.

4.2.5 Data Analysis

Interviews were audio-recorded with permission, anonymised, and manually transcribed verbatim by the first author. Data were subject to both inductive and deductive thematic analysis, applying the six steps outlined by (Braun & Clarke, 2006).

Thematic analysis was chosen because it offers a non-linear approach to analysing data, thereby allowing themes to be generated and evolve organically. Given the exploratory nature of this study, and the importance of remaining open to new ideas and themes that are identified from the data, this was a suitable analytical approach. Codebook approaches, such as framework analysis (Ritchie & Lewis, 2003) or template (King & Brooks), are more prescriptive and demand consistency with an established analytical framework.

In the first of the six steps, the first author familiarised himself with the collected data and to check for accuracy, through repeated listening of the recordings and reading of the transcripts. Given that the first author also transcribed the data, the process of transcription also familiarised the first author with the data. The purpose of this step was to engage as much as possible with the data, in order to form ideas about prevalent topics discussed by the participants.

In the second step, the transcripts were coded by the first author using ATLAS.ti (version 9.0.16), to reduce lots of data into chunks of meaning. Operationally, this involved assigning codes to (long or short) phrases and words that captures the data's core message, or significance. Each segment of data was coded that were relevant to or captured something interesting about each research question. Appendix 4F shows how the coding process helped to convert raw data into insightful, manageable units. The initial codes represented the first author's interpretation of patterns of meaning across the dataset. The primary supervisor, PW, coded a subsample of transcripts.

Although it is not the expectation that the codes or themes interpreted by one researcher may be reproduced by another (Byrne, 2021), the use of multiple coders was to sense-check ideas, rather than attempting to achieve consensus of meaning. This helped to encourage alternative viewpoints and reduce the risk of insights being missed (Smith & McGannon, 2018). Yet, in other studies, the use of researcher triangulation has been shown to enhance the reliability and validity of their findings (Kljajević et al., 2022; Jonsen & Jehn, 2009; Church et al., 2019; O'Connor & Joffe, 2020),

whilst others have found it beneficial in assessing the transparency of the coding process (MacPhail et al., 2016; Vaismoradi et al., 2016; Hruschka., 2004).

Once the transcripts were coded, the next step involved categorising codes together that have similar meanings or have relationship with one another. After the codes were clustered together, the first author labelled the clusters based on the meaning or relationships shared among the codes. The prevalence of a theme was not necessarily dependent on quantifiable measures, but rather on whether the theme provides some insights into addressing the overarching research question. For example, the researcher approached research question 2 based on his prior research and knowledge about the levels of attitude change and the different forms of extrinsic motivation. Adopting this deductive approach ensured that the themes were derived from prior research. An inductive approach was implemented or research question 1 and 3, which involved approaching the data without any preconceived categories or theories. For example, for research question 1, it was important to identify any emerging patterns, themes and abstract concepts that help to break down OPC into its constituent parts.

The identified themes (i.e., initial candidate themes) were characterised by their significance, in other words what is shared and unites the observations in the theme is the topic. As Braun & Clarke (2006) explain, there is no hard-and-fast answer to the question of what proportion of your data set needs to display evidence of the theme for it to be considered a theme. What is important is that the researcher is consistent in how he/she does this within any particular analysis (Braun and Clarke, 2006).

The fourth step involved reviewing, modifying and developing the initial candidate themes that we generated in the third step. The data associated with each of them was considered whether the data really did support it, and if themes overlapped, would it be better to separate them. Inconsistencies were identified, discussed and resolved by the whole research team before arrival at final set of themes and sub-themes. For example, it was felt that one of the initial candidate themes (*social support*) were represented by codes which convey both the actual, specific support

received, and the subjective belief about the availability of support from others. This resulted in the *social support* theme being split to two new themes (i.e., *enacted social support* and *perceived social support*). However, it was also decided that the new perceived social support theme should be removed because the data did not sufficiently support this theme. Another initial candidate theme (*sense of achievement*) was also removed for the same reason. Also, one of the initial candidate themes (*displeasing self to please others*) was removed because it was agreed that the data did not function well as meaningful interpretations of the data. It was felt that this theme did not enrich understanding of the research questions because it deviated significantly from the typical patterns of themes identified during the analysis. According to Byrne (2021), a researcher must be able and willing to let got of codes or prospective themes that may not fit within the overall analysis.

After this step, the generated themes and sub-themes were reviewed against the transcripts to ensure that all relevant data were coded and coherently represented the data. Once finalised, themes were defined and further refined to represent "the essence of what each theme is about" (Braun & Clarke, 2006). In addition to identifying the 'story' that each theme told, the inductively derived themes were categorised in relation to the three research questions (RQs), namely: how is OPC conceptualised by those making OPC towards EBRBs? (RQ1); what are the possible psychological mechanisms underlying the effect of OPC on behaviour change? (RQ2); and, what are perceived to be necessary conditions for OPCs to be effective in the context of EBRBs (RQ3). The categories were reviewed to ascertain that they were categorised in such a way that they were internally as homogenous as possible, and externally as heterogenous as possible (Krippendorff, 2022).

Since the emergence of "saturation" as a criterion for determining when to stop the concurrent collection and analysis of data, its conceptualisation and operationalisation has continued to evolve as a measure of trustworthiness and rigor across various qualitative research traditions and fields (Peters, 2023). However, the concept of data saturation or "information redundancy" has become a matter of

increasing debate (see Braun and Clarke, 2019; Fusch & Ness, 2015; Mason, 2010; Saunders et al., 2017), and there is greater need for researchers to be cognisant of the complexities behind claiming saturation (Smith & McGannon, 2018). For example, Levitt et al. (2018) developed reporting standards for qualitative research, identifying the need to document the saturation practices used in qualitative research and addressing methodological integrity using fidelity and utility.

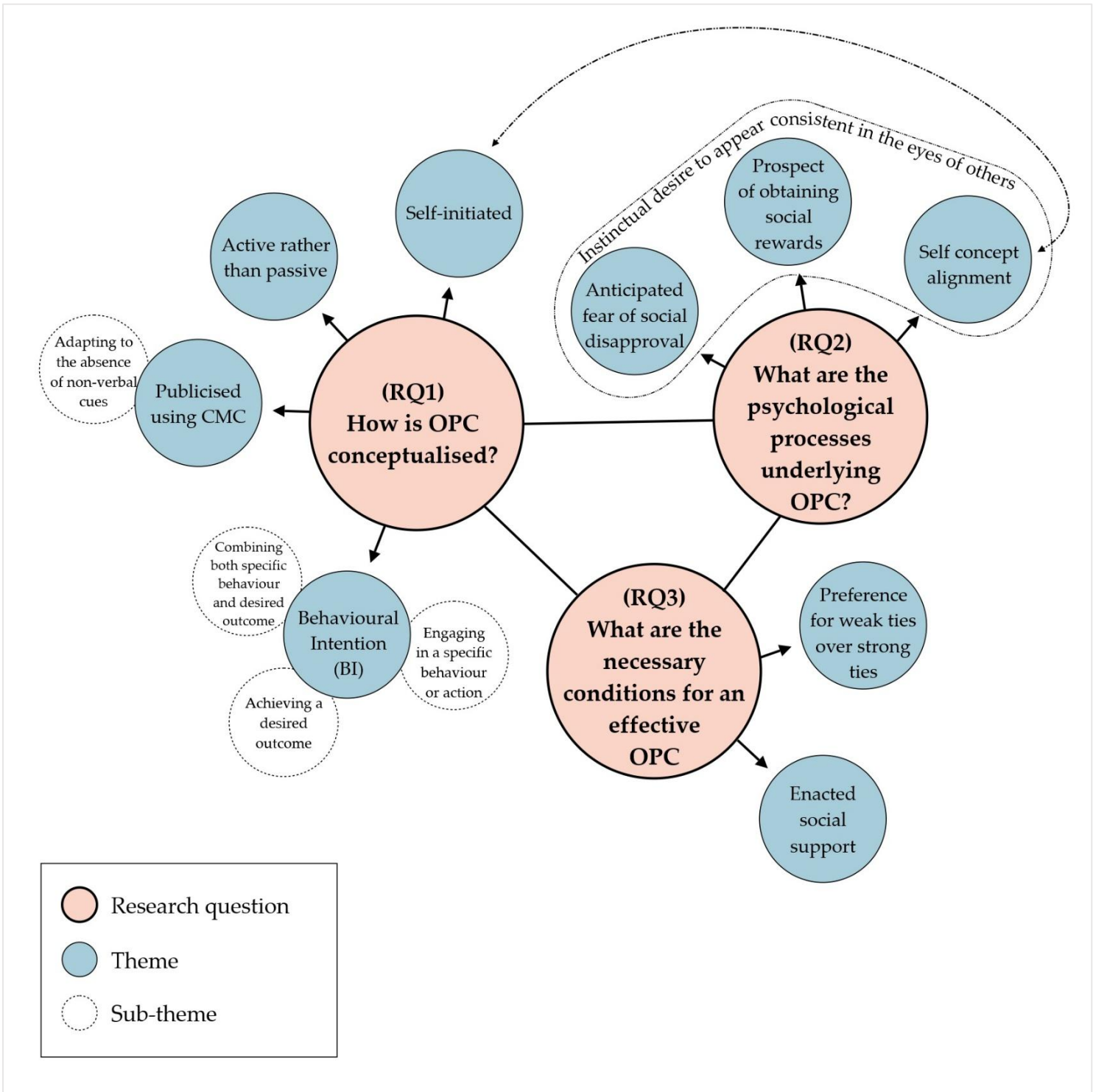
In this study, data collection and analysis stopped when the researcher reached sufficient depth of understanding to build a theory about the data, an approach that has been termed *theoretical sufficiency* (Dey, 1999). At the point when data collection and analysis stopped, it was felt that there was sufficient data collected to identify important variables to study quantitatively. The decision to halt data collection was a subjective one, based on the researcher's impressions of the data during and after data collection. Similar approaches to data saturation have been adopted by Underhill et al. (2015), Marshall et al. (2012) and Saunders et al (2018).

4.3 Results

Thematic analysis revealed an array of *themes* (a pattern that captures something significant or interesting about the data and research questions) and *sub-themes* (these shares the same central organising concept as the theme, but focuses on one notable specific content) which were viewed to be central to the experiences of all the participants (see Figure 8 below). Under RQ1, four themes and four contributory sub-themes were identified from the data representing how OPC is conceptualised by those making OPC towards EBRBs. Under RQ2, three themes were identified which represented the underlying psychological mechanisms responsible for the effect of OPC. Themes under RQ3 represented the necessary conditions for effective OPC, of which one theme and two subthemes were generated. Themes and subthemes are outlined with supporting verbatim quotes followed by the participants pseudonym. Various terminologies (e.g., "a majority of participants" , "most participants", "many participants", "a significant number of participants", "a prominent theme") have been

used interchangeably in this section as conventions for representing prevalence in the thematic analysis. Whilst not a core focus of thematic analysis – after all this is a qualitative analysis (Braun and Clarke, 2006) – the number of participants who articulated the theme/sub-theme across the entire dataset has been highlighted to provide context and to support the interpretations of the researcher.

Figure 8:
Diagrammatic representation of all themes and subthemes (Study 1)



4.3.1 Themes and subthemes for RQ1

Four themes were generated that conceptualised what an OPC was for participants in the study, these were: (1) 'A behavioural intention' (with contributory subthemes including (i) 'Engaging in a specific behaviour', (ii) 'Achieving a desired outcome', and (iii) 'Behaviour and outcome related'), (2) 'Publicised using CMC' (with contributory subtheme (i) 'subjective awareness of others'), (3) 'Self-initiated'; and (4) 'Active rather than passive'. In no particular order, the themes and sub-themes are described below.

4.3.1.1: Theme 1: A behavioural intention

A prominent theme within all participants' descriptions of OPC was of them being self-instructions, that capture an underlying personal motivation or commitment to act in the direction of behaviour change, otherwise described as a behavioural intention (BI). In this sense, two types of BIs were described by participants, achieving a desired outcome (n = 7), and performing a specific behaviour (n = 7). Of the BIs focused on achieving a desired outcome, two were more specific than others (i.e., Patience and Adam). For example, Patience's BI was to compete in the Iron man competition and finish in the top 50 positions. Adam's BI was to complete the "Couch to 5K" in 30 minutes. Adam's description of his OPC would suggest that the outcome of this type of OPCs is not seemingly dependent on factors outside of his control, such as the performance of others. However, for most participants, their BIs were described in more general, thus allowing substitution for means of attainment. Participants expressed that BIs based on personal standard of performance are usually more flexible and controllable, than where the BI was based on achieving a result that was contingent on the performance of others.

Two participants described their BIs in terms of performing or engaging in a specific behaviour, in which the specified behaviour was the desired outcome in and of itself. These participants placed a greater emphasis on the strategies and

incremental behaviours that will increase their chances of achieving the overarching desired outcome, than on the desired outcome itself. For example, Angela's OPC was to exercise 3 days a week at her local gym. Although losing weight was her overarching goal, her behavioural intention was more focussed on the procedural actions that she believes will be necessary for losing weight. Also, Eve's performance goal was to be able to run a half marathon, however, her specific process goal was train regular at certain times and days of the week.

Six participants described their OPC by incorporating both the desired outcome they hoped to achieve and also the specific process which will enable them to attain their BI. For example, Monica's OPC stated that she wanted to "finish the London Marathon in less than 3 hours", however, she also recognised the importance of describing the activities that will enable her to achieve this time within her BI. Accordingly, she talked about the frequency and volume of training that she needed to do, and the number of calories and water she needed to consume on a daily basis in preparation for the race.

4.3.1.2: Theme 2: OPC is publicised to others using computer mediated communication

A majority of participants (13 out of 15) expressed an acknowledgement for the increasing role that CMC plays in human communication and interaction. Equally, participants acknowledged that self-disclosure is increasingly taking place on the internet.

> … I mean the internet is here to stay… everybody is using it [the internet] to connect with others, to communicate, to interact, to build relationships. It's a big part of my life. (Andrew)

> I use the internet for almost everything. Maybe it's my age or something, but I cannot imagine my life without it. Things like dating, banking, gambling,

> gaming, education and so on. The internet is full of many types of things to do. (Paul)

Patience talks about how an increasing number of people are disclosing personal information about themselves using CMC.

> I guess it's now a thing where you look on your timeline on Facebook or Instagram, and nobody has a secret anymore, nothing is private. Whether it's the food they eat, or the vacation they go, or even the person they are dating. Everything is fair game… No shame. (Katherine)

As well as acknowledging that CMC provides large amounts of social behaviour and self-disclosures, participants also recognise that using CMC to publicise one's goal or intention is commonplace.

> Its surreal actually. The way people are sharing personal information about themselves, even if it's to do with goals, I have never seen anything like it. It's like once upon a time, this is information that you would tell your closest friends, but now it's all happening on the 'tinternet'… it's the place to go if you want to like maybe declare your goals, I guess. (Sarah)

All the participants seem to conceptualise an OPC as a behavioural intention which is made public (or at least has the potential to be publicised to others) using CMC.

> It's not public if no one knows about it… If you intend to do something, I guess you become publicly committed to it when you have sort of made a promise in the presence of others, even though it's to your online friends I feel the effect is the same. (Hannah)

> I would describe it as announcing your goals using the medium of the internet, whether it's writing a blog, or posting it on your Facebook page, or anything else… its gotta go through the internet. (Angela)

Like Hannah and Angela, other participants also recognised the importance of CMC as a conduit through which a commitment is made public to others. The ways that participants communicated their OPC included a variety of mainly asynchronous activities, such as online discussion forums, social networking sites, and blogging, as shown table 6 (above). In terms of the composition of their OPC, nine participants described their OPC as being text and image-based; four participants used a text-based OPC; and one participant's OPC was text and video based. Most participants (9 out of 15) said that they publicised their OPC within a Facebook online support group. All participants expressed a perceived awareness of the presence of others who witnessed their OPC. Andrew characterised the presence of others as friends and family who are "waiting on the finish line":

> It's like I have said to all my friends and family that I'm going to run 5K and they are all waiting in the finish line and I know I have got to get there otherwise I will look stupid if I don't turn up at the finish line. (Andrew)

Participants also highlighted some of the benefits of CMC, as opposed to face-to-face settings. For example, Becky explains that using CMC would increase the publicness of her OPC.

> Wow… you can reach a lot more people on social media. I mean like myself, I've got over 500 friends on my Facebook and I also use Twitter. So when I did post about my Couch to 5K at the time, I knew a lot of people would know about it. (Becky)

Although most participants (13 out of 15) recognised the potency of CMC for promoting an OPC, they equally expressed a belief that CMC lacks the richness of normal face-to-face interaction due to absence of non-verbal cues (e.g., eye contact gaze, vocal intonation, and gestures). Some mentioned that the absence of non-verbal cues can weaken the interpersonal bonds that transmit social influence.

> I think accountability is less on the internet. You may say you will do something, but you are sat behind a screen. It can be unnatural. But it may also depend on the channel that you use. (Andrew)

However, most participants (10 out of 15) felt that it is possible to adapt to the absence of these social cues. More specifically, it is possible exploit the technological aspects of CMC in order to enhance the messages they construct.

> I feel like the internet allows you to control every aspect of your… post or intention, before you send it. Unlike in a physical group where when you say it, it's out there, you can't take it back. But with the internet, you can create and edit your message however you want it to appear… only when you feel it's perfect you can then send it. (Monica)

> For me, I use a lot of emojis. It may seem like its impersonal, but I think emojis can speak a thousand words. Like especially when you get a reaction to a post, sometimes people don't have to write something lengthy. A thumbs up alone can make your day. (Hannah)

> They can't hear me shouting but I can use all caps to write my message. (Becky)

4.3.1.3: Theme 3: OPC is active rather than passive

Generally, participants regarded themselves as community members who actively contribute content, their OPC being the content. Although many participants understood that lurking is an essential behaviour in any online community, they equally acknowledge that for online communities to thrive, members should be actively engaged. Many took the view that lurkers, whom Katherine described as "free-riders", drained the community of its social capital. By publicising their OPC and sharing constant updates, participants felt that they actively participated in the creation and report of information in their respective online communities. For example, Katherine said:

> I didn't see myself as a free-rider. By sharing my commitment and what I wanted to achieve with others in the group, I felt that I am not only taking but also giving back. (Katherine)

For some participants (six out of 15), their contribution and participation did not end immediately after publicising their initial OPC, but they felt a moral obligation to inform the community at multiple times throughout their OPC journey. This necessity to provide regular updates about the OPC journey was articulated by Hannah:

> I felt that I owed it them [online community members] to let them know how I was getting on. To keep them posted about my progress, whether good or bad, I felt that they needed to know to encourage me. (Hannah)

For many participants (11 out of 15), the moral obligation to contribute their OPCs was induced by the norms that was established by their group for acceptable behaviour. These norms were expectations of the group members that were both informal and formal. For Juliet, her group norm was conscious and formal:

> Before I joined my Facebook group, I remember I was posed with some questions about do's and don'ts of the group. I remember one of the do's was to participate and… share accomplishments and milestones. It was sort of an encouragement. (Juliet)

For Angela, the norms, rules and expectations associated with her group membership was more informal:

> It's hard to sit back and be passive when you can see most people are posting their stuff, and getting good feedback like "Well done". And, you know they are benefiting from being more engaged. I think, even though I wanted to be passive, I felt I also needed to be active and post my updates. I felt a sense of belonging the more I took part in the group. (Angela)

4.3.1.4: Theme 4: OPC is self-initiated

Most participants (nine out of 15) highlighted a distinction between the decision to publicise the OPC and the subsequent OPC-adherence behaviours. Whilst participants acknowledged that the reasons or rationale for adhering to an OPC could be extrinsically motivated (e.g., to obtain social rewards or avoid social sanctions), all participants were consistent in the view that the initiation of the OPC itself should not be externally endorsed. Hence, participants described their OPC as one which emanates from oneself rather than from forces external to themselves. Participants' felt that the decision to make an OPC should be associated with feelings of internal control and independence. Participants were so grounded in the notion that an OPC should be volitionally made, that many of them even questioned whether an OPC that is influenced by outside sources was an OPC at all. Katherine describes her OPC as one which should ideally be internally driven:

> I would say it's gotta come… you've got to want it for yourself not for other people. Even though you are doing that public bit, it might be for support and things like that… you still got to want to do it for yourself. (Katherine)

4.3.2 Themes and Subthemes for RQ2

Most of the participants' narratives suggested that the psychological processes underlying their OPC adherence behaviours were extrinsically motivated, that is, driven by the prospect of obtaining social approval or avoiding social disapproval. Although, for some participants it appeared that the act of making an OPC resulted in a self-concept alignment, whereby the act of making an OPC commits them to a certain self-view, with which they then act consistently. Four themes were generated under this research question, i.e., (1) 'Anticipated fear of social disapproval', (2) 'Prospect of obtaining social rewards', (3) 'Self-concept alignment', and (4) 'Adapting to the absence of non-verbal cues'. The first three of these themes were transcended by the notion of (5) 'Instinctual desire to appear consistent in the eyes of other'.

4.3.2.1: Theme 1: Anticipated fear of social disapproval

Seven participants described the social disapproval and penalties they anticipated and even 'feared' if they failed to follow through with their commitment. It was apparent from the interviews that the fear of embarrassment or 'letting people down' was in itself a positive motivating factor driving OPC adherence. As one participant stated, "people are actually watching and it's gonna be pretty embarrassing if I don't do this" (Andrew). Likewise, Becky reflected on her OPC and acknowledged the impact of public surveillance and its associated social disapproval that was worth avoiding for her:

> I was like a bit embarrassed, because I told the world that I was going to do this event and then I never actually did it, so yeah, and that wasn't a particularly good feeling. (Becky).

Becky also described the 'rollercoaster of emotions', such as anxiety, frustration and nervousness, which she experienced in tandem with her anticipated fear of social disapproval. For Becky, the experience of these emotions was unpleasant, however, she insisted that it was a positive motivating factor which may possibly influence her future OPC adherence behaviours.

4.3.2.2: Theme 2: Prospect of obtaining social rewards

Six participants expressed how the anticipation for social rewards contributed to their motivation to adhere to their OPC. They expressed an expectation for receiving social support (e.g., praises, encouragement, empathy, advice and suggestions) which they perceived would come from acting on their commitment. For example, Patience, who posted her OPC on Twitter said:

> I posted it… because I knew that a lot of other people would be also doing it, so it was kind of like a support mechanism, so other people could, you know, could say I am doing it too, and then I know that I will probably be receiving a lot of encouragement from people on Twitter. (Patience)

Paul also anticipated that making an OPC would catalyse social support, especially from like-minded people:

> I guess you know you are going to kind of get support and because you know that… because they are in that group and they are going through something similar, they are more likely to understand. (Paul)

Other participants, whose narratives suggested that they were less confident in enacting behaviours toward their OPC, perceived that the acceptance of these social rewards was a precursor for self-forgiveness. For example, Andrew said:

> If I am being honest, I am probably posting on social media saying "look I have done an ultra-marathon, but I haven't done the time that I wanted" and then I get the nice responses to make me feel better. (Andrew)

The prospect of obtaining social rewards, whether participants felt confidence in achieving their OPC or not, was predicated on social accountability. Hence, by making an OPC, participants felt that the social rewards they expected to receive from the addressed audience was a way of holding them socially accountable in terms of adhering to their OPC.

4.3.2.3: Theme 3: Self-concept alignment

For some participants (four out of 15), their OPC adherence was not based on obtaining rewards or avoiding social sanctions, but on the protection of their ego and reputation which would likely be damaged if the commitment was not met. To this end, their defence mechanism was to bring their self-concept, cognition, values and attitudes to be in line with the new behaviour. Sarah portrays a good example this theme. She mentioned that:

> I do think that from an egotistical perspective just putting it online and just telling people that I have signed up for Iron Man. If you asked me why I was doing it, I would say that it was partly from an ego perspective to say that I am

> doing an Iron Man and it is important for me to tell the world that this is what I am good at this is what I chose to do and I know I will achieve it. (Sarah)

Although she freely admits that the making of her OPC was egotistically driven, however, her narratives reveal that she believed in the cause or at least expected to enjoy the behaviour, and that her OPC reflects her true motivations. For Katherine, the act of making an OPC was perceived not only as a signal of her true motivation, but also of her self-view with which she followed through with the OPC.

> …even if I wasn't giving up, it's really reinforced that this particular programme will get me to my goals. My goals will be that I consider myself as a runner who goes for a run for half an hour, three times a week, comes back feeling sort of invigorated and healthier. And, actually, has some exercise integrated into their lives rather just sitting their car or office all day. (Katherine)

These participants' interviews illustrated an instinctual need for consistency between OPC and subsequent actions, which was achieved through a desire to appear consistent to others.

4.3.2.4: Transcending theme: Instinctual desire to appear consistent in the eyes of others

When participants publicised an OPC towards a target behaviour, the prospect of social rewards and the fear of social disapproval contributed to their motivation to follow through with the promised behaviour. Similarly, by making an OPC other participants had assimilated their self-concept to be in line with the new behaviour which also contributed to their own motivation to adhere to their OPC. Transcending these themes was the instinctual desire for consistency, which participants believed contributed to their motivation to act on their commitment. In particular, participants illustrated a desire for consistency which meant they derived psychological utility from maintaining a balance between their commitments and subsequent behaviours.

Participants conveyed a strong sense of concern for the opinions and expectations of other people within their online environment. They highlighted the importance of adhering to their OPC because doing so was socially rewarding or the social consequences (e.g., ridicule, embarrassment) of not doing so was worth avoiding. As Paul said:

> I think once I realised that people were noticing that if I didn't go out for a couple of weekends on a row or that I had a couple of bad weeks in a row that's when I started realising that there is no excuses here people are actually watching and it's gonna be pretty embarrassing if I don't do this. (Paul)

Like Paul, several other participants also felt that their OPC adherence was predicated on the need to identify with others via social accountability. Participants indicated that the addressed audience provided social accountability via text-based feedback.

4.3.3 Themes and subthemes for RQ3

4.3.3.1: Theme 1: Preference for weak-tie over strong tie support networks

A significant number of participants (12 out of 15) talked about a preference for making their OPC within weak-tie support network, instead of the strong-tie network of family and friends on their pre-existing online social network. Weak-ties are characterised by infrequent interactions with acquaintances or strangers who are not interpersonally close, such as members of online support groups facing similar challenges. Aside from one participant (i.e., Becky), all participants publicised their OPC to individuals who were not interpersonally close to them (i.e., weak-ties support network) but with whom they share similar goals.

Though making an OPC was perceived as a way of obtaining social rewards (e.g., praises, encouragement, advice), participants believed that receiving these social rewards was more effective from weak-tie than from strong-tie networks. Participants

perceived that weak-ties are "more understanding" and "less judgemental" than strong-ties. Participants felt that support from family and friends may be neither desirable nor useful because of the deep affinity of the relationship which renders the support to be less objective and more emotional than weak-tie support. According to Paul "to some extent I expect that your friends don't really care whether you accomplish the thing or not".

Such a perception influenced their motivation for the type of CMC on which to publicise their OPC. Some participants talked about their preference for weak-ties because of the like-minded nature of these CMC support groups. For example, Paul mentioned that:

> I think because it was a members-only group, most people were all very much of the same sort of mind. I think that's why I chose to do it more in that than just on my ordinary Facebook. (Paul)

Sarah also shares the same opinion as Paul:

> … everybody is there for the same reason, they want to get fit, they want to get healthy, they want to lose weight… nobody is going to be negative towards them, because why would you be, because at the end of the day, they are trying to make a difference, and everybody has to start somewhere. (Sarah)

It appears that participants' CMC preference for weak ties facilitated their need for consistency. From this perspective, some participants talked about their avoidance of CMC types that are "unmoderated" and "unrestricted", due to their ability to produce dissonance (i.e., where a discrepancy occurs between OPC and subsequent behaviour). As explained by Paul:

> I mean, you are not exposing yourself in the way that I would have been on Twitter for example. Twitter is especially a sort of mad house. It's so open that you are opening yourself up to trolls or whatever. And, certainly in this

> [Facebook closed group], they just aren't there. It's mainly to do with the culture, and it's moderated. (Paul)

Like Paul, other participants found that making an OPC outside of public weak-tie networks can attract negativity and even invite trolling:

> I would say, my fear of critique or... not bullying but there are always people online who have an opinion so I guess I wouldn't have done it publicly like that because I wouldn't want to be susceptible to people who are cheeky or have an opinion really. (Adam)

4.3.3.2: Theme 2: Enacted social support

An important condition necessary for an effective OPC was the social support enacted by making an OPC. Previously, it was mentioned that the prospect or perception of obtaining this type of social reward formed the psychological process underlying the effect of OPC. However, this theme reflects the *actual* social support that was received after making an OPC. Participants expressed a sense of satisfaction with being socially connected to others when making an OPC.

> It was great to be part of something… part of a group with similar interests and shared goals. I don't think it would have worked for me, if I isolated myself. I guess I am not that type of a person, it's like I need to be connected and feel among something. (Patience)

Within their social environment, participants valued two types of social support, that is, emotional and informational support. Most participants enjoyed receiving praise, encouragement, care and empathy, which enhanced their motivation to stay on course.

> For me it was like a validation that I was on the right track. Maybe a reward sort of thing… for adhering to your commitment. I would get all sorts of

> encouragement like "hey you are doing great" or "keep up the good work". It was really encouraging, especially if you are doing the right thing. (Paul)

For participants, such has Becky, receiving emotional support increased her confidence:

> …and that make me feel really good that other people have got confidence in me, so that kind of boosts my own confidence. (Becky)

For other participants, such as Hazel, without the emotional support she would have given up her goal pursuit.

> I was really lucky, I had a lot of positive praise so for me, that kept me motivated and kept me going and probably at times when I would have wanted to give up, that kind of praise and positive attitude from other people probably kept me on track to be honest. (Hazel)

Similar to Hazel, Hannah also acknowledged that without this type of social reward she may have resisted from sharing further updates about her OPC:

> I suppose, if I didn't have any responses, I won't keep doing it. So, the amount of responses I had encouraged me to post more. (Hannah)

This reliance on the enacted emotional support was also concurred by many others, including Justin.

> The actual support was really good whether it was early in the morning or late at night. And, it's good to read back my comment. Look at my pictures… and, look at other people's comment. (Justin)

Although most expressed receiving social support from members of their online support group who were like-minded, Katherine talked about receiving social support from "experienced people".

> And it was helpful from more experienced people, for me from more experienced people to say "yeah, but you are forgetting that the conditions changed from week to week, and you are changing week to week". So, you know, give yourself a break, not every week is going to be perfect. You are going to have bad weeks; you are going to have great weeks. (Katherine)

Participants also valued receiving informational support in the form of guidance, advice and suggestions. For some participants, such as Andrew, obtaining information support helped with problem solving.

> You really cannot overestimate the value… the experience some of these individuals have. Some of them have been through what I've been through, so they know what works and what doesn't. I mean the advice and recommendations I received was priceless, especially when you have hit a tough spot and need a solution. (Andrew)

4.4 Discussion

Arguably, this was the first study to qualitatively explore the experiences, views and motivations of those who have made an OPC towards EBRBs, the behaviours which are the regarded as particularly important with respect to the management of overweight and obesity (Kremers et al., 2005). Given the lack of a standard definition and clarity regarding the conceptualisation of OPC, the findings represent a preliminary step toward conceptualising OPC as a multidimensional construct, grounded in the themes and topics reflected in the interviews.

The findings suggest that an important dimension of OPC is that it is a BI. This BI-oriented view of OPC is consistent with Bradford et al. (2017) and most conceptualisations of FtF PC, whether the BI is a specific behaviour (de Leon & Fuqua, 1995; Lokhorst et al., 2013), a desired outcome (Coupe et al., 2019), or goal-oriented (Abrahamse et al., 2005; Debar et al., 2011; Nyer & Dellande, 2010). Although BIs in general have consistently been used to predict subsequent behaviour in the context of

EBRBs (Jacobs et al., 2011; Norman et al., 2000; Scannell et al., 2020; Stolte et al., 2017; Sur et al., 2022; Wong & Mullan, 2009), for many, however, such intentions never result in actual behaviour change or may do so only in the short term (Ogden et al., 2007). Hence, more empirical research is needed to investigate whether BIs in the form of an OPC can be used to predict long-term behaviour changes for EBRBs.

The findings suggest that the theory of planned behaviour (TPB; Ajzen, 1991b, 2002) and self-determination theory (SDT: Deci & Ryan, 1985, 2012) offer complementary explanations for OPC as a BI and its effect on behaviour change. The TPB assumes that BIs are influenced by three factors: attitudes towards the behaviour, subjective norms, and perceived behavioural control. All three of these factors were reflected in the themes that directly influence intentions to engage in a given behaviour. First, existing studies have shown that people's attitude towards a given behaviour is influenced by their perception and awareness of the problem (Kuklinski et al., 2000; Slovic et al., 1982), and motivation to engage in the activity (Teixeira et al., 2012). In a similar vein, Howe and Krosnick (2017) describes attitudes towards behaviour as the degree to which an individual considers an attitude to be personally important. Indeed, they argue that people are likely to commit themselves publicly to attitudes they consider important (Schuman & Presser, 1981), which, in turn, has the tendency to increase resistance to change (Gopinath & Nyer, 2009; Halverson & Pallak, 1978; Holt, 1970). It has also been argued that attitude is a hypothetical construct which is not accessible to direct observation, but must be inferred from measurable reactions to the attitude object. Thus, when participants made an OPC it could be said to be consistent with their disposition to react with a certain degree of favourableness to the attitude object. More specifically, it could be said an OPC are attitude-relevant responses of a conative nature (Ajzen, 1993).

Subjective norms, another factor of the TPB underlying a BI, is also consistent with the themes reflected in this study. Subjective norms refer to an individual's perception of the social expectations to adopt a particular behaviour (Barbera & Ajzen,

2020; Peters & Templin, 2010). The generated themes demonstrates that OPC can only be effective if it based on the desire to conform to the expectations of a reference group. The literature on group norms is vast, however, all arrive at the supposition that groups can also influence members indirectly through the power of social norms that describe and prescribe appropriate behaviour for group members in that context (Hogg, 2001).

Although it is commonly accepted that people who conform to normative influence, do so in order to obtain social approval or avoid disapproval from others – without any underlying cognitive change – (Sowden et al., 2018), more research is needed to understand the nature of change brought about by the individual who makes an OPC. This is important given that the notion of acceptance (that is, when the social influence causes the individual to internalise the belief or attitude expressed by the group such that it becomes their own), rather than compliance, is more crucial for enacting durable behaviour changes.

Additionally, while this subjective norms-behaviour relationship may be easier to predict in a FtF setting where group members are identifiable, and sometime known to each other, this relationship may be more difficult to predict within the context of CMC. This is because group theories, such as social impact theory (Latané, 1981b), suggest that the amount of influence exerted by a source group is a function of the strength, immediacy, and number of other people. Indeed, CMC types differ in their ability to convey the psychological perception that other people are physically present (Calefato & Lanubile, 2010; Malin et al., 2017). Therefore, more research is needed to explore the role played by proximity in influencing behaviour change when an individual makes an OPC. The notion of subjective norm, reflected in this study, would exclude "hard commitments" from being included in the conceptualisation of OPC because these rely on real economic penalties for failure, or rewards for success. The notion that OPC is based on psychological consequences, rather than economic,

is consistent with most FtF PC constructs (Anderberg et al., 2018a; Coupe et al., 2019; de Leon & Fuqua, 1995; Lokhorst et al., 2013; Nyer & Dellande, 2010),

Third, the 'self-initiated' theme speaks directly to TPB's notion of perceived behavioural control (Close et al., 2018; Sogari et al., 2023) and to deCharms' (1968) notion of perceived locus of causality (PLOC) as it describes the tendency of participants to be motivated to feel like they are at the origin of their behaviours. Based on this view, an effective OPC could be regarded as one which gives individuals a more internal PLOC (I-PLOC) for behaviour. This finding is consistent with numerous EBRB studies which found that I-PLOC results in improved self-regulation and longer-term outcomes (Cobb-Clark et al., 2014; Dimmock et al., 2013; Hagger & Armitage, 2004; Hagger et al., 2003). The 'self-initiated' theme is not only valuable in the conceptualisation of OPC, but it may also explain why certain participants developed a personal norm that would support engaging in the behaviour. This view is consistent with Cialdini (2001), and especially Lokhorst et al.'s (2013) who stated that when people view their behaviours as voluntary, they conclude that they have come to the decisions by themselves and so their behaviours is a reflection of their true motivations and self-concept.

Direct evidence for commitment leading to a change in self-concept comes from several studies (Burger & Caldwell, 2003a; Burger & Guadagno, 2003). The findings of the importance of having an I-PLOC for making an effective OPC expands OPC research by prompting researchers to re-think the effect of OPC on behaviour change as being solely extrinsically driven. The findings suggest that extrinsic motivation can also be applied in different life domains to account for diverse array of reasons why people engage in certain behaviours, in line with self-determination research (Deci & Ryan, 1985; Ryan & Deci, 2002).

Whilst TPB explains what influences participants' BI to implement their behaviour, SDT can clarify why participants formed certain intentions. The focus of SDT is on the quality of generalised motivational orientations that affect behaviour in

a specific context. Indeed, it has been proposed that motivational constructs from SDT can act as sources of information in the process of formation of the socio-cognitive (Hagger et al., 2002). In other words, participants' motivational orientations shaped their attitudes, subjective norms and perceived behavioural control.

From the perspective of SDT, when participants highlighted the importance of making a self-initiated OPC, it could be that their need for autonomy was being satisfied, which in turn, led to a favourable attitude toward the behaviour. This explanation is supported by empirical evidence which have demonstrated positive relationship between autonomy and attitudes (Caso et al., 2024; Hollett et al., 2020; Khan et al., 2023; Kothe & Mullan, 2015). Central to SDT is the distinction between autonomous self-determined (i.e., autonomous motivation) and controlled types of motivation.

Self-determined motivation can be supported or thwarted by environmental contingencies. Thus, when participants highlighted the importance of social support, this could be interpreted as their basic psychological need for relatedness (i.e., the feeling of being connected to others; having a sense of belongingness both with other individuals and with one's community (Baumeister & Leary, 1995; Bowlby, 1979, Ryan 1995) was being satisfied. Various dimensions of social support, including emotional support (Maas et al., 2022; Shin & Park, 2022), informational support (Shin & Park, 2022; Li & Xuequn, 2018), and instrumental support (Schoch et al., 2021; Helgeson et al., 2023), have all bee been conceptually and empirically linked with the construct of relatedness.

As found in these studies, and in line with SDT, the satisfaction of need for relatedness energises autonomous motivation, promoting behavioural persistence and well-being (Deci & Ryan, 2000). By this same token, it could also be argued that an OPC that is initiated within a relatedness-thwarting environment (i.e., an environment that does not support the individual's need for relatedness), can lead to a sense of social alienation, exclusion, and loneliness (Vansteenkiste et al., 2020; Cheng

& Lau, 2022). Indeed, such conditions can create a sense of ineffectiveness or even failure and helplessness in regard to an OPC.

The findings of this study reveal a variety of overlaps with exiting literature and traditional conceptualisation of FtF PC, especially the psychological constructs that possibly underlie the commitment effect (Coupe et al., 2019; Lokhorst et al., 2013; Nyer & Dellande, 2010). Even so, several meaningful deviations were also uncovered which contribute to providing a more comprehensive understanding of the OPC concept. Therefore, based on themes reflected in the interviews, a proposed working definition of OPC is:

> A self-initiated commitment or behavioural intention to engage in a specific behaviour and/or to achieve a desired outcome, where the commitment is made public to others using computer-mediated communication, is active, and takes place within a social environment that opens up the possibility of social rewards and sanctions.

This proposed working definition presented above contains several important conceptual observations that have strong empirical support in the behavioural commitment literature. This definition is meant to serve an example of a research-based definition that will hopefully generate valuable discussions among behavioural commitment researchers, especially those interested in operationalising the concept of OPC to promote EBRBs and other behaviours. It is important to point out that, although the role of CMC is captured within this definition as a vehicle for OPC, the sheer diversity of different OPCs which were represented with CMC and key distinctions in audience effects and social presence of these different CMCs did not feature. Despite being an important aspect of the study, the discussion of this issue was not as prevalent in the transcripts as had been anticipated. This is perhaps unsurprising because studying such social effects can be rather challenging, as these are unlikely to be linear and consistent across platforms (Kaye et al., 2022).

The definition does not make explicit reference to the source or origin of the OPC, specifically, whether the act of making an OPC actually takes place online (e.g., using a keyboard/keypad to write a social media post), or is mediated by internet-enabled devices/platforms (e.g., "real-world behaviour captured via a video call) (Kaye et al., 2022). Attention was paid to CMC's functionalities and affordances in the context of OPC initiation, but its impact on offline behaviour remained relatively unexplored by participants, especially where OPC manifests online, but subsequent adherence behaviours occur offline (Bradford et al., 2017). This may reflect a lack of depth in the interview process, although the sensitive discussion of weight-related issues would suggest otherwise.

The notion of social support can shed light on two key areas of OPC. First, the anticipation or perceived social support was found to be one of three psychological mechanisms through which OPC influenced behaviour change. Second, enacted social support was found to be an important condition for OPC to be effective. Perceived social support has been linked to several positive psychological outcomes, such as self-esteem (Chen et al., 2022), social integration (Yuan et al., 2023), and has also been shown to facilitate EBRBs (Laiou et al., 2020; Pieroth et al., 2017; Rieger et al., 2018; Stevens et al., 2020; Yang et al., 2021). Perhaps this may explain why participants felt empowered to make an optimal OPC. Given the important role of social support in these two areas of OPC, unfortunately, the relationship between PC/OPC and social support has rarely been investigated. In fact, a superficial examination of the PC/OPC literature finds that the notion of social support is rarely mentioned, if mentioned at all.

4.4.1 Methodological Considerations

A key strength of this study is the methodological rigour or trustworthiness. According to Morse et al. (2002) without rigor, research is worthless, becomes fiction, and loses its use. However, unlike quantitative research which deals with numbers and statistics, conducting qualitative research with extreme rigour is more difficult

because of the potential of subjectivity when dealing with narratives. Assessing rigour in qualitative research to ensure that findings are trustworthy is not new. Qualitative researchers have used rigour criteria widely (Harley & Cornelissen, 2022; Johnson et al., 2020; Klem et al., 2022; Morse et al., 2002). This study applied Lincoln and Guba's (1985) criteria of credibility, transferability, dependability and confirmability, indeed, various techniques were used across these four criteria to demonstrate the trustworthiness of this study, and the confidence that can be placed on its findings (*see* Table 6; *section* 4.2.2). One of the strategies worth mentioning here is investigator triangulation, which is the use of multiple researchers to complete comparative analyses of individual findings. is the use of multiple coders in data analysis. To achieve investigator triangulation, two investigators coded a sub-section of the same transcripts and compared results on a one-to-one basis. The strength of this strategy rested in the inclusion of multiple perspectives in researcher backgrounds and in the opportunities to discuss coding disagreements and refine the coding system. In sum, all the strategies deployed in the research process were intentionally used to enhance the quality, authenticity, and truthfulness of findings of qualitative research.

The current study is also without limitations. First, the distinction between "soft" and "hard" commitments in not perfectly binary, as some "hard" commitments will have some unavoidable psychological consequences, and most "soft" commitments will also accrue some nonzero economic consequences. Given this conceptual overlap – which was evidenced in studies such as Anderberg et al. (2018), Atkinson et al. (2013) and Karlan and Linden (2021) – it was unsurprising that the OPCs of a couple of participants contained both "soft" and "hard" elements. For example, one participant's OPC was to compete in the Iron Man which she posted on her Facebook page, however, she was also using the event raise money for charity. This conceptual overlap limits the conclusions regarding long term effects of interventions that utilise a "soft" commitment strategy such as PC and OPC.

Second, the impact of anonymity on selective self-presentation strategies (Scott & Fullwood, 2020a; Walther, 2007), antinormative behaviour (Coppolino Perfumi et al., 2019; Postmes & Spears, 1998) and OPC adherence was not examined fully. It is therefore unclear whether the psychological mechanisms underlying the effect of OPC was expected to increase or decrease as a function of the intensity of anonymity. Third, given the wide array of different CMCs with which individuals can enact their OPCs, their functionalities and affordances, as well as the complexities of behaviours derived with them, studying such effects on OPC adherence was not possible as these are unlikely to be linear and consistent across CMC platforms.

4.4.2 Implications of the Research and Conclusion

The existing literature on commitment have generally presented commitment making as one of the most promising techniques to promote behaviour change for both short- and long-term interventions (Coupe et al., 2019; Kiesler, 1971; Lokhorst et al., 2013; Nyer & Dellande, 2010). However, while these studies have attributed the effect of commitment on physical presence of others, the current findings show that commitment can materialise in an online environment where other individuals are not physically co-present. The making of OPC causes individuals to be psychologically accountable to the addressed audience so that they automatically, and often subconsciously, feel the need to act on their OPC. Unlike traditional views which suggest that the effect of OPC on behaviour is mainly extrinsically driven (Coupe et al., 2019; Munson et al., 2015; Nyer & Dellande, 2010), the findings introduce the idea that, even though for an OPC to be effective it must be publicised to others, extrinsically motivated behaviours can also become autonomous. Therefore, there is an important need for further research into this area to investigate the diverse array of reasons why people adhere to their OPC, based on SDT's organismic integration theory.

The current study also provides the first qualitative account of OPC in the context of EBRBs, and contributes theoretically to the literature by proposing a

comprehensive definition based on the themes and topics reflected in this interview. Aside from its theoretical implications, the findings also have important practical implications. They suggest that lifestyle interventions for the promotion of EBRBs that include a OPC technique is worth pursuing as a way to increase long-term change. For participants in this study, their OPC was reciprocated by enacted social support, which had a positive impact on OPC adherence to such an extent it could be theorised that social support moderates the relationship between OPC and behaviour change. Future research may benefit from exploring this variable's role in influencing OPC adherence in the context of EBRBs. Future research should also focus on the effect of anonymity on OPC adherence, specifically, whether the social accountability that comes from making an OPC can best be exercised when group members are identifiable and interact physically. It is hoped that future research will build on this study's exploratory findings to conduct more rigorous tests and investigate the relationship between OPC and behaviour change.

Chapter 5 – Study 2: A randomised control trial (RTC) of the effects of OPC on behaviour change

5.1 Introduction

Are individuals more likely to adhere to their commitment if they tell others about this commitment than if they keep the commitment private? Kiesler (1971) defined commitment as a binding of the individual to the position implied by his or her behaviour intention (BI). Two streams of research have emerged from this supposition, both of which have converged on the same conclusions about commitment based on the original suggestion of Kiesler: a key determinant of the commitment magnitude is the publicness with which the individuals declare their position message (Emington, 2012; Kiesler, 1971; Kiesler & Corbin, 1965; Nyer & Dellande, 2010).

The first stream of research has found that whenever people make a public commitment (PC) to certain behaviour(s) in the physical presence of others, they are more committed and locked into that position that those who keep their commitments private (Gollwitzer et al., 2009a; Staats et al., 2004). Nyer and Dellande (2010) evidenced that making a PC motivates individual to remain compliant to specific behaviours which enable goal attainment. In experimental studies, the level of a PC is typically manipulated by varying the degree to which the participants' commitments are made public or known to others (Ahluwalia et al., 2001; Nyer & Dellande, 2010). According to Pallak et al. (1980), attitudes stated publicly are relatively stable and are more likely to result in consistent behaviours and strengthen consistency to those abstract positions. This operationalisation is consistent with the original assumption of publicness, which is based on the actual audience size and message of an individual. Both of these requirements are available in the social network environment of CMC.

The second stream of research has acknowledged the impact of computer mediated communication (CMC) on numerous aspects of daily lives, and the increased employment of it to make an online public commitment (OPC) to support

goal pursuits (Bradford et al., 2017; Consolvo et al., 2006; Munson et al., 2015; Singh & Sharma, 2022; Toh & Lee, 2022). Instagram alone boasts two billion monthly active users; YouTube has more than 2.70 billion monthly active users; and 1.8 billion people use Facebook groups (Dixon, 2024b). Computer-mediated communication provide unique and optimal opportunities to study the influence of PC on behaviour change. Indeed, CMC environments have also been shown to be an appropriate context in which OPC will result in behaviour change (Bradford et al., 2017; Gonzales & Hancock, 2008).

Public commitment interventions have been shown to influence positive behaviour change in a wide range of disciplines as diverse as environmental literature (Lokhorst et al., 2010b; Shippee, 1980; Shippee & Gregory, 1982), consumer behaviour (Cialdini et al., 1978; Gopinath & Nyer, 2009; Guéguen & Pascual, 2014; Nyer & Gopinath, 2005; Shippee, 1980; Shippee & Gregory, 1982), education (Gollwitzer et al., 2009a), savings (Ashraf et al., 2006; Burke et al., 2018; Karlan et al., 2007) and weight loss (Nyer & Dellande, 2010). However, OPC interventions, on the other hand, have had mixed results. Some studies have demonstrated that OPC works (Consolvo et al., 2006), while others have shown no significant differences between OPC and private commitment (Emington, 2012). Other research has shown that the effects cannot be sustained beyond the intervention period (Balk-Møller et al., 2017), and interestingly, one study showed that making an OPC can be counterproductive, such that participants created fewer commitments when those commitments were made public (Munson et al., 2015).

There is limited research exploring the use of OPC in encouraging behavioural actions such as diet and physical activity, commonly referred to as energy balance-related behaviours (EBRBs). A distinction is made here between EBRBs, within an energy balance approach, and PA, which can be undertaken solely to improve mental wellbeing (Lahert et al., 2019; Eric et al., 2020; Ramírez-vélez et al., 2021; Ahmad et al., 2015), or simply because it is inherently enjoyable and satisfying (Neace et al., 2022; Turner & Reed, 2022; Ryan et al., 1997). Given that the root cause of

overweight/obesity is a disrupted energy balance (Romieu et al., 2017; Van Stralen., 2011), commitment to engage in EBRBs, within a lifestyle modification approach, may be one preventative way of addressing the problem of overweight and obesity, a disease which has become a public health crisis (Meldrum et al., 2017; Roderka et al., 2020; Zoeller, 2008). For example, engaging in the recommended level of PA (i.e., between 150-300 minutes per week of moderate-intensity activity, 75-150 minutes vigorous-intensity activity, or some equivalent combination of moderate-intensity and vigorous-intensity aerobic physical activity, per week) (Bull et al., 2020), can be beneficial to many critical health markers, including increased cardiorespiratory and muscle fitness (Barry et al., 2014), as well as decreased risk of all-cause mortality and cardiovascular disease (Zhang et al., 2020). The UK's Chief Medical Officer (CMO) (Davies et al., 2019) updated guidelines for PA recommends that adults can in fact accumulate these 150 minutes in bouts of any length and/or achieved in one or two sessions per week while still leading to health benefit. Even with lower volumes, intensities and frequencies of PA, health benefits may also be derived, particularly for individual with low levels of physical fitness and for disabled adults. Further new evidence suggests that short duration, very vigorous exercise (at or close to all-out or maximal effort) at lower volumes than 75 minutes per week may bring equivalent health benefits to those derived from adherence to the previous guidelines, in a more time-efficient manner.

Despite well documented evidence advocating the benefits of PA for physical and mental health, and numerous public health campaigns promoting its importance, data from developed countries show that the majority of the adult population is not sufficiently active to derive these benefits (Edmunds et al., 2006). For OPC to reach its full potential, it is crucial to investigate whether it is effective in influencing EBRB outcomes and, if so, the possible factors that moderate this relationship. The OPC literature have pointed to several of these moderators such as knowledge of results (Munson et al., 2015), source proximity/relationship proximity (Emington, 2012), and

audience size (Emington, 2012), but interventions that include the role of social support (SS) seem to yield the most robust findings (Burke & Settles, 2011; Cavallo et al., 2012; Munson et al., 2015).

In study 1 it was found that the theory of planned behaviour (TPB; Ajzen, 1985, 1987, 2011) and self-determination theory (SDT; Deci & Ryan, 2000) provide complementary explanations that underlie motivated behaviour. The theory of planned behaviour proposes that an individual's is more likely to perform a given behaviour if they have a favourable attitude (i.e., perception of consequences of the behaviour) and subjective norm (i.e., perception of other's approval) about the behaviour and have a high degree of perceived behavioural control (i.e., perception of difficulty to perform the behaviour). However, TPB was not sufficient in explaining how and why participants engaged in their target behaviour. Therefore, SDT was useful in this context because it makes a distinction between two types of OPC motivation in terms of whether the OPC is enacted with a sense of choice, personal endorsement and volition (i.e., autonomous motivation), or whether the OPC is subject to pressure and coercion (i.e., controlled motivation). Indeed, this framework helped to explain the link between an autonomously enacted OPC and optimal outcomes. This link is consistent with one of the core tenants of SDT, which is based on the psychological needs of an individual, i.e., autonomy, relatedness, and competence. In study 1, having a supportive network had a positive impact on goal pursuit and OPC adherence behaviours. However, there is lack of experimental studies that investigate the relationship between OPC and PA-related goal attainment, using SS as a moderating variable.

The rapid spread of internet access has provided opportunities for a new wave of SS groups as the shift from face-to-face (FtF) groups have developed into CMC social support groups (Mustafa et al., 2015). Also, a variable that appears to predict whether or not individuals participate in CMC support groups/communities is if they experience limited access to traditional FtF SS resources (Wright, 2016).

Indeed, from the perspective of self-determination theory (SDT; Ryan & Deci, 2000, 2017; Teixeira et al., 2012), receiving SS plays an important role in satisfying the psychological need for relatedness (Maas et al., 2022; Shin & Park, 2022). The relatedness need corresponds to the objective to feel connected to important others and experiencing feelings of warmth and care (Cantarero et al., 2021; Vansteenkiste et al., 2020). The satisfaction of relatedness has also been shown to contribute to mental well-being (Church et al., 2013; Reis et al., 2000), and reduced stress (Quested et al., 2011). Thus, it would be expected that those who make an OPC and receive SS will perform at a more optimum level than who make an OPC without receiving SS.

Traditionally, it has been argued that making a FtF PC contributes to one's motivation to act due to the endorsement of extrinsic goals: individuals who make a commitment to engage in EBRBs, do so to avoid the guilt they will experience if they do not attend a session. The preference for consistency (Cialdini et al., 1995; Gopinath & Nyer, 2009; Nyer & Dellande, 2010) and normative approach (Abrahamse et al., 2005) are two psychological mechanisms in which a PC has been suggested to influence behaviour via extrinsic motivation. According to SDT, extrinsic motivation refers to behaviours performed to obtain some outcome separable from the activity itself (Ryan & Deci, 2000). Such behaviours are poorly maintained once the controlling contingencies have been removed (Niemiec & Ryan, 2009).

The organismic integration theory (OIT; Gilal et al., 2022; Niemiec & Ryan, 2009), with its foundation in distinct types of extrinsic motivation, may be particularly relevant in this context. Ryan and Deci (2006) have suggested that the reasons for engaging in a particular behaviour can be regulated in a variety of ways, varying in levels of self-determination (how much the motivation stems from inside the self). Self-determined regulation is more associated with intrinsic goals, and non-self-determined regulation with extrinsic ones. Research within PA has consistently shown that more self-determined regulation is associated with better performance and wellbeing (Buckworth et al., 2007; Cho et al., 2023; Earl, 2023; Oman & McAuley,

1993; Ryan et al., 1997; Schneider & Kwan, 2013), due to the satisfaction of basic psychological need for autonomy, competence and relatedness. On the other hand, non-self-determined regulation may be detrimental to individuals' wellbeing (Verstuyf et al., 2012). Thus, from the perspective of SDT, it would also be expected that an OPC that is experienced as autonomous will produce greater level of goal attainment and behaviour change than a OPC that is less self-determined. However, previous PC and OPC research has not directly tested this correlation, especially in the context of EBRBs. In addition, there is strong evidence to suggest that autonomy-supportive and relatedness-supportive environments promote mental wellbeing (Peel et al., 2019; García-Castilla et al., 2020; Selvaraj et al., 2022; Khawaja et al., 2017). Thus, the purpose of this study was to test an OPC intervention based on SDT to present the rationale behind SDT's utility in facilitating and explaining PA behaviour change. There is a lack of experimental studies OPC which have drawn on a relevant theocratical frameworks, such as SDT, to understand the factors that promote motivation. The Medical Research Council (MRC) framework for developing and evaluating complex interventions provides a well-established guide for the development of complex interventions (Skivington et al., 2021). According to the guide, a key early task is to develop a theoretical understanding of the likely process of change by drawing on existing evidence and theory. Unfortunately, existing experimental studies of OPC have failed to draw on existing theory to identify what is important, relevant and feasible to inform the intended goals of the intervention and inform the content and delivery of any intervention.

Table 10 (below) shows an overview of the sub-topics and associated studies reviewed in this section, including their research design, target population and location.

Table 10:
Overview of the reviewed sources (Study 2)

Topic	Sub-topic	Author (date)	Research design	Target population, and location (if known)	Findings
Variables/factors that moderate/affect the relationship between public commitment and behaviour change	Attraction	Kiesler & Corbin (1965)	Experimental (Randomised controlled trial)	Undergraduate students, USA	When an individual is committed to continue as a member of a group, there is a nonmonotonic relationship between attraction and conformity.
	Volition	Cialdini et al. (1978)	Experimental (Randomised controlled trial)	Undergraduate students	The effectiveness of the low-ball technique appeared to stem from its relation to the psychological concept of commitment, which was seen to be greatly affected, and perhaps mediated, by a manipulation of Free choice.
		Gollwitzer (1999)	Descriptive study	-	Getting people to specify when, where, and how a desired behaviour will occur, participants get physical and social cures to remind them of their commitment, thereby increasing chances the

					commitment will guide behaviour.
	Feedback/reminders	Lokhorst et al. (2010)	Experimental (Randomised controlled trial)	Dutch farmers, Netherlands	Results show that the combination of tailored information and the making of public commitments was especially effective in eliciting behaviour change: participants showed a stronger desire to engage in conservation, increased their area of nonsubsidized natural habitat, and reported spending more time on non-subsidized conservation.
		de Leon and Fuqua (1995)	Experimental (Randomised controlled trial)	Undergraduate students, USA	Telling people how well they are doing and also reminding them of their commitment serve to make the commitment more salient, which in turn leads to increased likelihood of sustained behaviour change.

	Cobern et al. (1995)	Experimental (Randomised controlled trial)	Homeowners/residents	Persuading others might have helped persuade the self and by doing so increased the salience of the commitment.
	Kiesler and Sakumura (1966)	Experimental (Randomised controlled trial)	Undergraduate students, USA	The greater the inducement offered to participants for performing an act consistent with his beliefs, the less committed he is to that act, and the less the resistance to subsequent counter - communications.
Level of specificity	Gollwitzer et al. (2009)	Experimental (Randomised controlled trial and cohort study)	Undergraduate students, Germany	Results showed a medium to strong effect size for the relationship between specific goal intentions and actually performing the behaviour.
Level of intrinsic motivation	Sansone et al. (1992)	Experimental (Randomised controlled trial)	Undergraduate students	The findings reveal that no matter how determined people were to maintain a new behaviour, if they could not figure out how to make the behaviour interesting, fun, or otherwise meaningful,

					they would stop engaging in the behaviour.
		Brown et al. (2003)	Correlational	Undergraduate students, USA	Students who made a permanent shift to transit were more likely to find ways of increasing their intrinsic motivation by making the trip enjoyable (music), relaxing (private time), or productive (studying, reading).
Variables/factors that moderate/affect the relationship between online public commitment and behaviour change	Social support	Cavallo et al. (2012)	Experimental (Randomised controlled trial)	Undergraduate students, USA	• There were no increases in perceived social support or physical activity over time between groups. • There were no group X time interactions for perceived social support or physical activity. • There were main effects of time for physical activity and esteem and companionship social support, as these variables increased

			over the course of the intervention. • There was no main effect for informational support.
Consolvo et al. (2006)	Experimental (Internet-delivered randomised controlled trial)	Women, aged 28-42	While different classes of influence affected participants, all but one were motivated by social influence. The three classes of influence that had impact were: • Social pressure: because participants were sharing activity level and progress toward their goal with buddies, they felt pressure to make their goal. • Social support: participants enjoyed receiving recognition and encouragement from their buddies.

			• Communication: some of the problems in giving users proper credit for activities became more important when step counts were shared with buddies.
Munson et al. (2015)	Experimental (Internet-delivered randomised controlled trial)	University students, USA	• The primary benefit (if any) of public posts was the emotional, instrumental, and informational support they triggered and that, once posted, accountability or lack thereof was relatively unimportant. • People expected others to judge them on an absolute scale of how much they walked, rather than a relative scale based on the number of days they committed to.

Balk-Møller et al. (2017)	Experimental (Internet-delivered randomised controlled trial)	Employees of nursing homes, Denmark	Receiving social support from known colleagues, both at the workplace and in a Web-based Forum is important.
Burke and Settles (2011)	Netnogtraphy & quantitative survey	Musicians	• Overall, compelling evidence found that participants who took advantage of the social features of this personal goal setting site performed better on their individual goals than those who did not. • Participants who treated the platform as a website rather than a community—those who kept their songs private, and did not interact with other users—did not do as well.
Munson et al. (2015)	Experimental (Internet-delivered randomised controlled trial)	University students, USA	• Participants who customized their audience described choosing to share with close friends who they felt would be

				encouraging, who would not judge. • Participants generally had positive feelings about posting commitments to Facebook. • Participants described feeling more accountable. • Participants noted that their friends were supportive even when they did not achieve their commitment.
Knowledge of results	Munson et al. (2015)	Experimental (Internet-delivered randomised controlled trial)	University students, USA	• Announcement without results led to creation of fewer commitments rather than more; announcement with results led to fewer commitments, as expected • The probability of keeping commitments

					was not lower when commitments were announced without results nor significantly higher when announced with results.
	Source proximity/relational proximity	Emington (2012)	Experimental (Internet-delivered randomised controlled trial)	Undergraduate students, USA	• There were no statistically significant differences between private commitment and public commitment (i.e., online public commitment) conditions. • Instead of increasing commitment, relational proximity had no observable impact on the outcomes.
	Audience size	Emington (2012)	Experimental (Internet-delivered randomised controlled trial)	Undergraduate students, USA	Regardless of audience size, perceptions of publicness are low in this context
The relationship between social	Reducing stress	Cohen and McKay (2020)	Systematic review	Studies which assess support structure	Social support critically reduces or ameliorates the negative experiences of an

support and physical activity				individual's stressful event.
	Thoits (1986)	Systematic review	-	Social support bolsters coping skills and developing solutions, lowering the appraisal of the stressful situation.
	Cohen and McKay (2020)	Systematic review	Studies which assess support structure	Social support reduces or alters the affective, physiological, or maladaptive response to the stressful situation, thereby allowing enhanced coping with stress

5.1.1 Study Aim

The aim of this study was to investigate the effect of an OPC intervention delivered via Facebook in promoting increases in PA, goal attainment, mental wellbeing and relative autonomy. All participants took part in an initial goal setting interview, and were randomly allocated to one of three conditions (i.e., two intervention conditions and a control condition):

Condition A: An intervention group where participants made an OPC to each other.

Condition B: An intervention group where participants made an OPC plus exchanged social support (SS).

Condition C: A control group where participants kept their commitment private.

This randomised-controlled trial (RCT) implemented a 3 × 3 factorial design, using the above conditions as between-subject factor and time as the within-subjects factor (6 weeks follow-up (T1), 12 weeks follow-up (T2), and 24 weeks follow-up (T3)). The study was approved by the Liverpool John Moores University (LJMU) Research Ethics Committee (Ref: 22/SPS/001).

5.1.2 Research Questions

It was hypothesised that:

(H1) participants assigned to the intervention conditions will report significantly greater increases in scores for goal attainment, PA, mental wellbeing and relative autonomy than the control condition at all follow-up time-points (i.e., T1, T2 & T3),

(H2) but the condition B will have the greater increase in scores than the other two conditions.

5.2 Methods

5.2.1 Participants

Criteria for inclusion in this study were: (1) be over 18 years of age, (2) have an existing English-language Facebook account, (3) are willing and open to setting a PA-related goal to help improve their lifestyle, (4) have access to a computer, tablet or smartphone with internet connection, and finally, (5) are willing to join a private Facebook group for a period of 12 weeks. Exclusion criteria were: (1) have a medical reason that prevents you from taking part in any sort of physical activity, and (2) have been diagnosed, are being treated for, and/or are taking medication for psychiatric or psychological disorders (e.g., depression). In terms of the exclusion criteria, medication can have physical (e.g., weight gain, fatigue, difficulty losing weight) and psychological (e.g., negative mood/wellbeing, low motivation, slowed cognitions) side effects on the user. Given that many of these common side effects could impact the variables of interest in the study, it was decided to exclude those on medication from taking part in the research at this stage. Future research may more closely examine these side effects and widen the inclusion criteria.

Due to limited experimental studies of OPC – which would have provided the necessary values to conduct a sample size calculation – it was difficult to determine the minimum number of participants required for adequate power. Moreover, testing the hypothesis and the preliminary data analyses (e.g., manipulation check, baseline differences) required multiple statistical analyses to be conducted, each of which will have different sample size requirements. Indeed, the more the number of statistical analyses, the larger the sample size should be to adjust for multiple testing (Andrede, 2020). For example, using GPower 3.1.9.7, the sample size required to test the differences between three conditions, based on a small-sized effect (Cohen's $f = 0.15$), with an alpha = .05, and power = 0.80, would be 690. The estimated sample size needed for a 3 x 4 factorial design, based on a small-sized effect (Cohen's $f = 0.15$) with an alpha

= .05, and power = 0.80, would be 400. Thus, the researcher would have needed to recruit at least 750 participants in order to achieve more than sufficient power. However, due to resource limitations, time constraints of conducting a rolling recruitment process and the complexity of conducting a multi-phase research, a pragmatic approach to determining sample size was adopted (Nevins et al., 2022; Lewis et al., 2021; Pye et al., 2016). Assuming a dropout rate of 20% across the three time-points, it was proposed that 180 participants will remain at 24-weeks (the primary endpoint), enough to detect even small differences in PA and goal attainment.

Practical significance, distinct from statistical significance and *p* values, refers to determining whether the result of the statistical analysis has real-world relevance or meaningfulness, and is not solely dependent on sample size (Ellis & Steyn, 2003; Alwahaibi et al., 2020; Liu & Weistroffer, 2022; Mohjeri et al., 2020). Although effect sizes are not synonymous with practical significance, it is a basis for evidence of substantive significance, and according to Peeters (2016) researchers should find and report effect sizes whenever possible.

Thus, in total, 172 potential participants were assessed for eligibility, three of which did not meet the exclusion criteria, and 21 failed to take part in baseline assessment/activities. Thus, the final study thus consisted of 156 participants (Male = 63, Female = 92, Other = 1), who were of diverse age groups; 34.6% were between 25-34, 23.7% aged 35-44, 20.5% aged 18-24, 16.7% aged 45-54, 2.6% were aged 55-64, and the remaining 1.9% were aged 65 and above. The majority of the sample were mostly women (59.0%), single (37.2%), in full-time employment (70.5%), and well educated (39.7% bachelor's degree). Table 14, and Figures 9-13 below, shows the demographic characteristics of all participants. The flow of participants is illustrated in Figure 14 (*section* 5.2.4).See section 5.2.6 for a comprehensive discussion of the power analysis.

Figure 9:
Chart of males and female participants

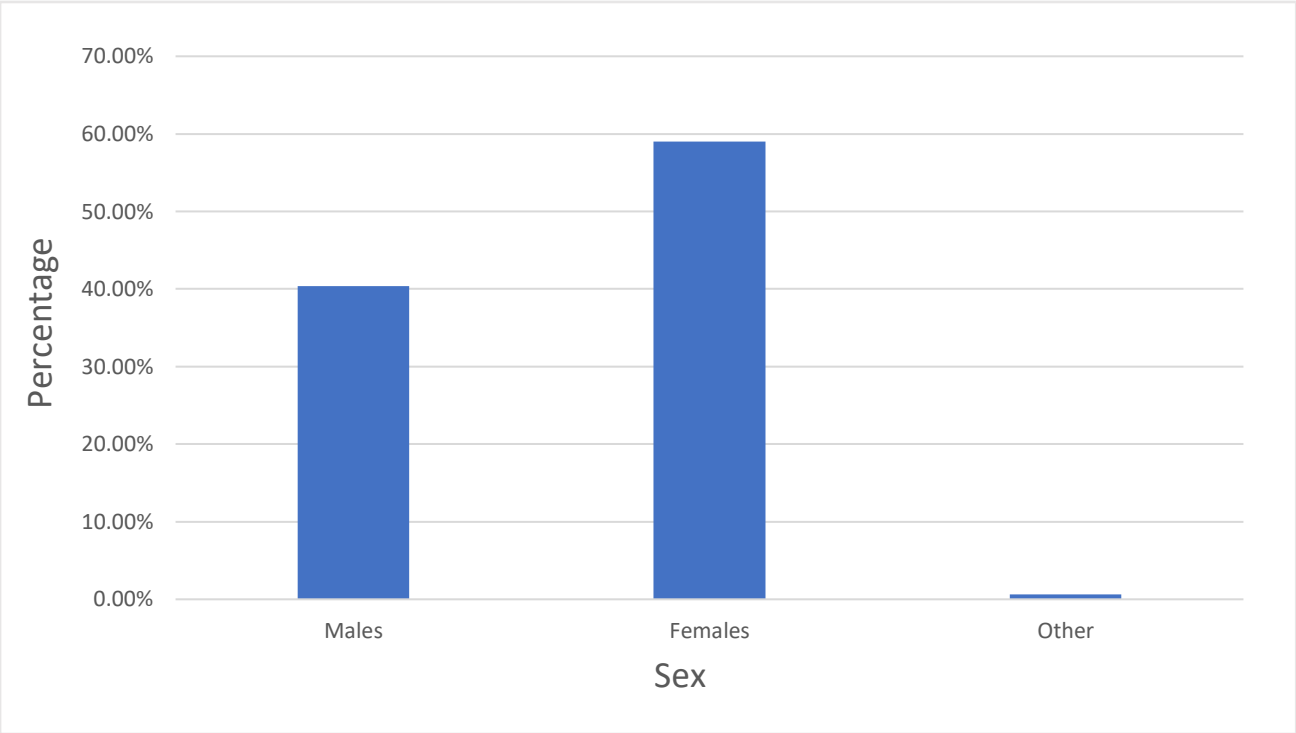


Figure 10:
Chart showing the percentages of the different age groups

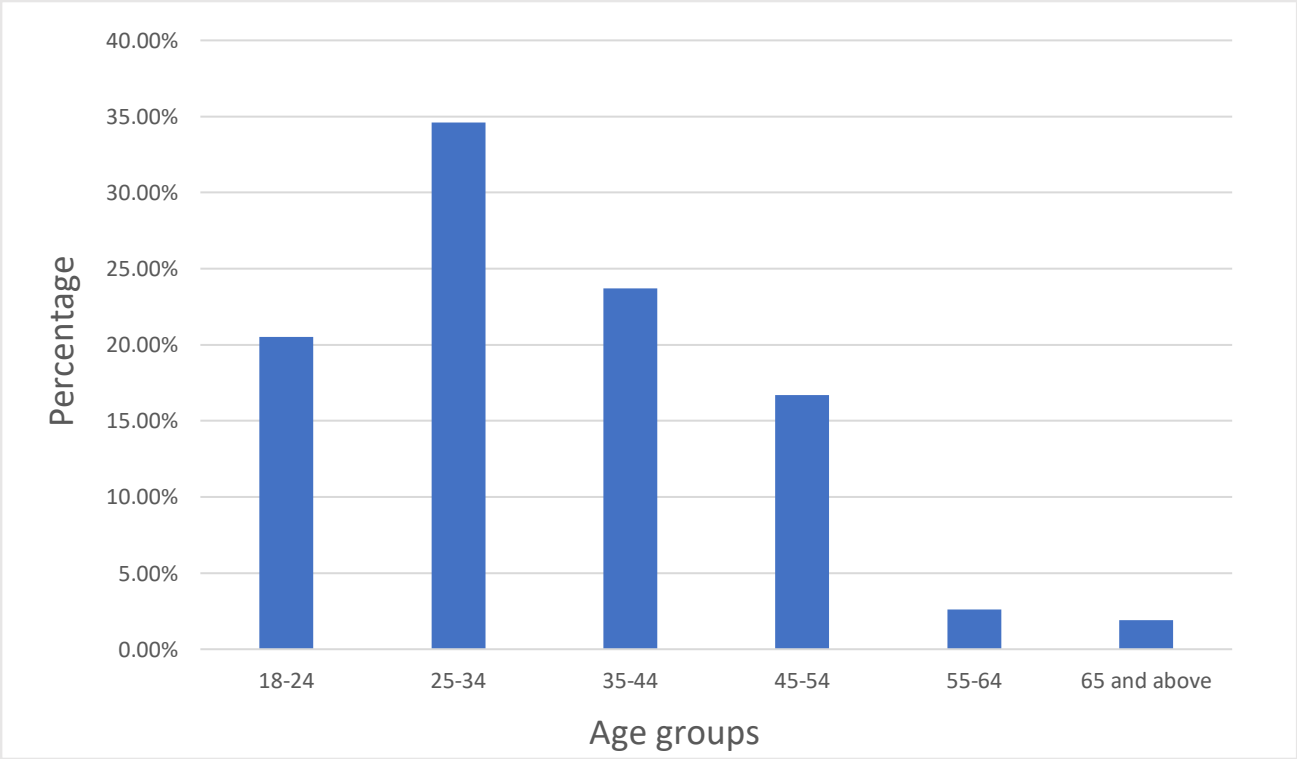


Figure 11:
Chart showing the percentage between relationship status

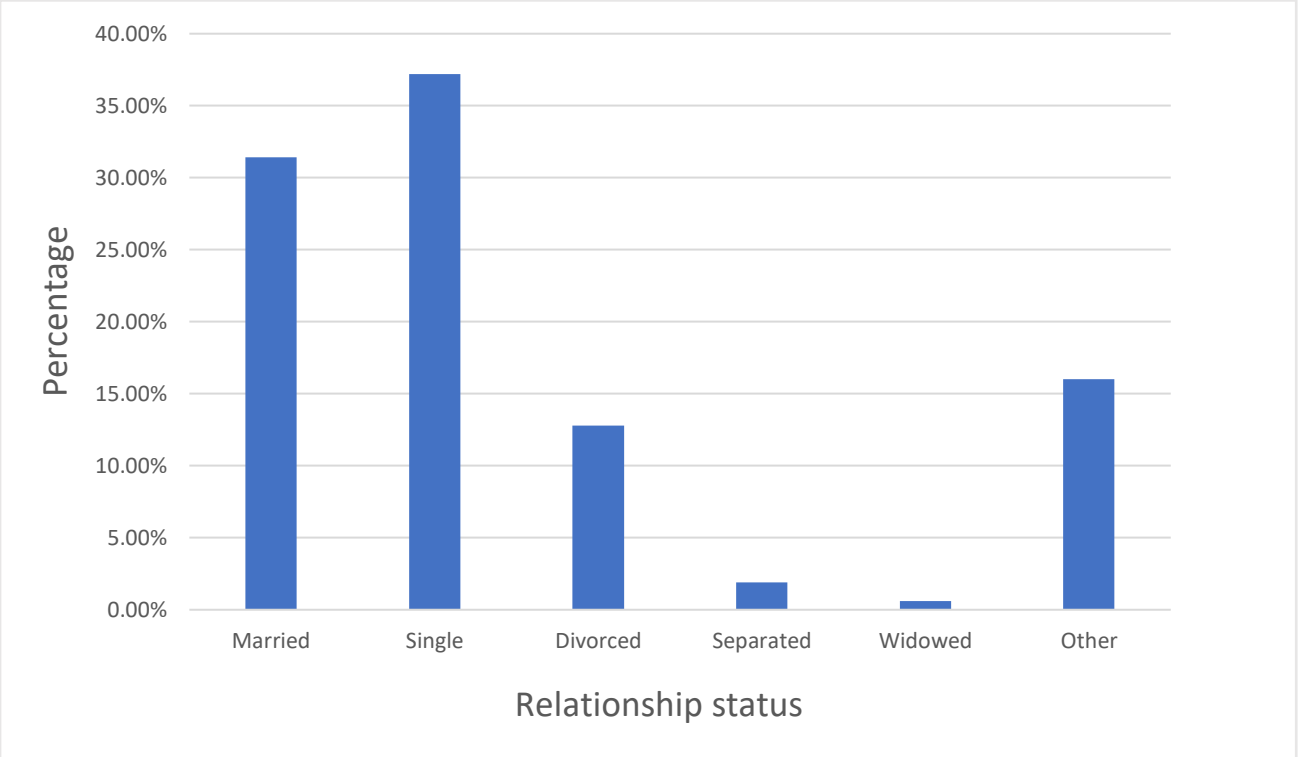


Figure 12:
Chart showing percentage between employment status

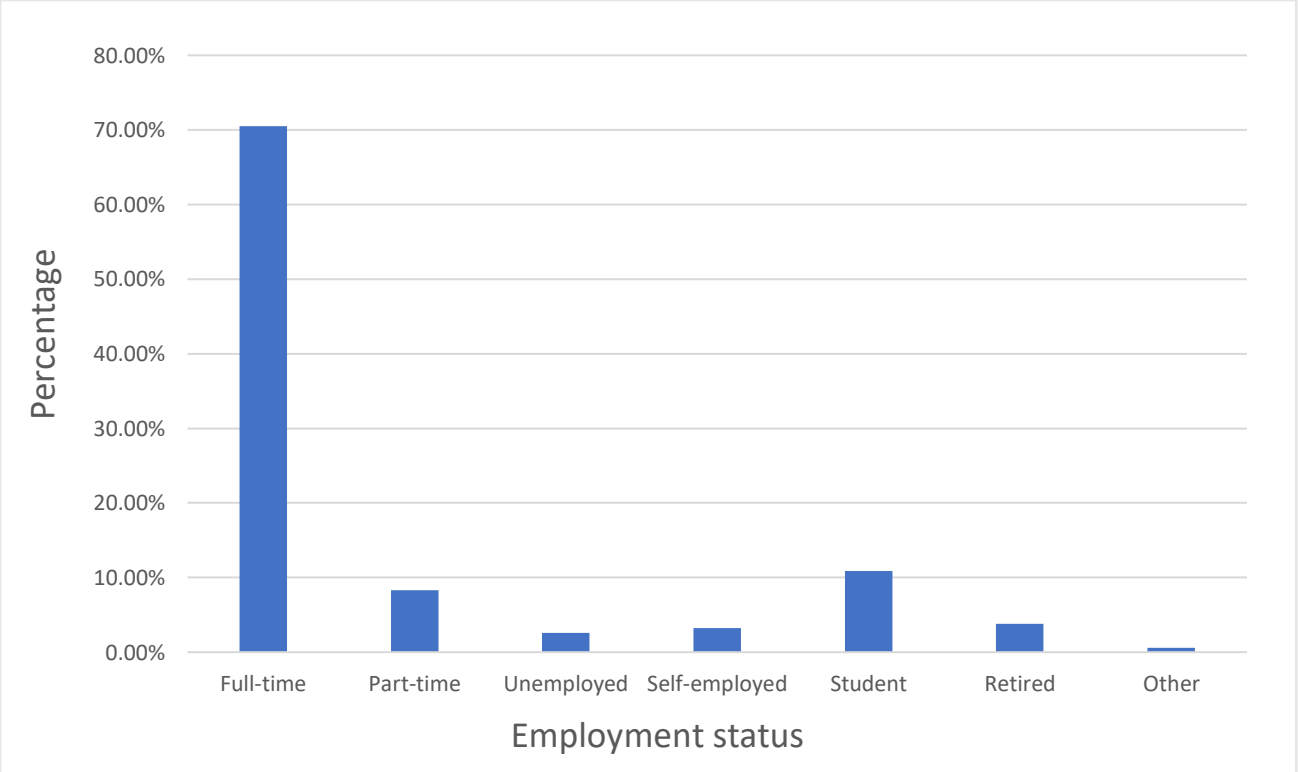
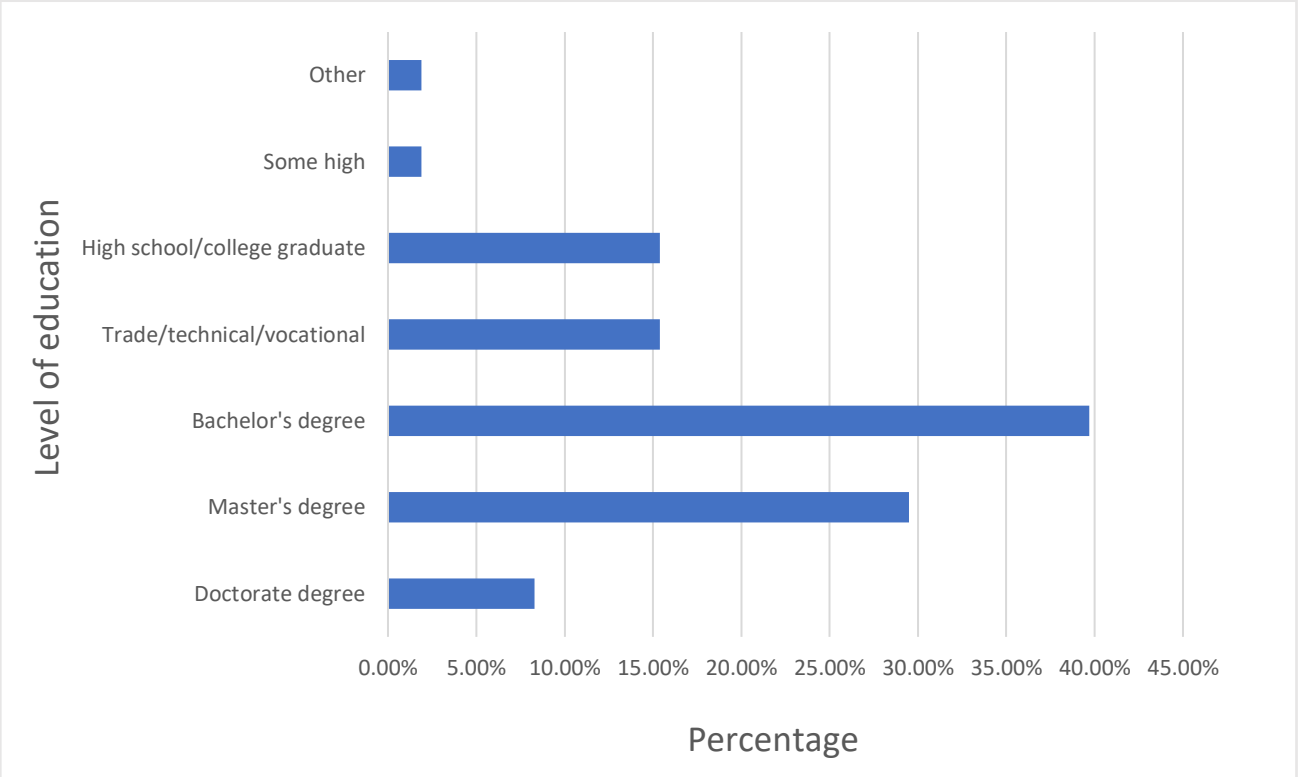


Figure 13:
Chart showing the percentage between levels of education



5.2.2 Conditions

Intervention condition A (OPC only)

Participants randomised to condition A were invited to join Facebook group A (see Appendix 5A) using their existing Facebook account. Prior instructions were given to participants to publicise/share their commitment to others upon joining the Facebook group. By doing so, they had, in effect, made an OPC. Participants were also explicitly instructed not to exchange social support and interact with each other. To this end, after posting their initial OPC, participants were "muted" by the moderator, which meant they could only access the group and read what other participants posted but could not make any comments, interact to posts (e.g., "like" or react), or make further posts.

Intervention condition B (OPC + SS)

Participants randomised to condition B were invited to join Facebook group B (see Appendix 5B). Similar to condition A, prior instructions were given to these

participants to publicise/share their commitment to others upon joining the Facebook group. However, unlike condition A, these participants were explicitly encouraged to interact with each other by exchanging social support. To this end, participants ability to interact with each other was enabled by the moderator, hence, they could make comments, interact to posts and make further posts.

Control Condition C (Private commitment)

Participants randomised to control condition C only took part in the goal setting interviews, and were not required to join a Facebook group to publicise their OPC. Rather, they were encouraged to keep their commitment to themselves for the duration of the intervention, and not reveal it to friends/family in both their online and offline environments.

All participants were encouraged to remain in their allocated condition for 12 weeks. At the end of 12 weeks, participants in both intervention groups could either exit or remain in their Facebook groups for a further 12 weeks. Similarly, participants in the control condition were encouraged keep their commitments private for a further 12 weeks.

The two Facebook groups were created by the principal researcher (BO) who also acted as the moderator. The two Facebook groups were private, which meant that only members could see who was in the group and what they posted. The moderators' role was to monitor discussions in the groups, to ensure that all participants adhered to the group rules. Also, to approve all posts from members, and manage participants' level of interaction with each other (e.g., commenting, reacting, "liking"). The moderator's role did not include direct social support to individual participants. Intervention participant and moderator activities are described in more detail in Table 11 below.

Table 11:
Participant and moderator activities for the intervention conditions (Study 2)

Intervention components	Participant/moderator activities
OPC	Participant activities • Share goal statement/commitment to other members (beginning of the intervention) Moderator activities • Inform participants of their agreed goals and OPC (prior to intervention) • Inform participants to publicise their OPC (prior to intervention) • Remind participants to publicise their OPCs
Facebook group	Participant activities • Connect with other participants to exercise on the Facebook wall and in the Facebook discussion boards dedicated to PA (ongoing) • Share progress and setbacks related to agreed goals and OPC (ongoing) • Exchange emotional, informational, instrumental and appraisals with other participants • Post pictures and videos related to PA Moderator activities • Communicate Facebook group rules (beginning and midpoint of intervention) • Monitor discussions in the groups • Approve/admit new members • Approve posts • Manage participants' level of interaction (at the beginning as needed) • Delete spammy posts and comments • Remove participants who are not following the group rules

5.2.3 Outcome Measures

A series of self-reported outcome measures were assessed at baseline and follow-up time-points, as illustrated in Table 12.

Goal Development

Although not intended as active ingredient of the intervention, goal setting was used as a strategy to identify participants' goals needed for their OPC in this this study, using the Bangor Goal-Setting Interview (BGSI; Clare et al., 2015) as a framework to. The BGSI was developed to identify goals for goal-oriented programs for behaviour change in PA and cognitive activity. The purposes of the goal setting interviews were, firstly, to explore areas where the participant would like to make changes or improvements and then identify behavioural goals that conform to the 'SMART' principle (specific, measurable, achievable, realistic and time-delineated).

Participants were required to identify one performance-related goal (i.e., a standard of performance to be achieved, e.g., "run 5k in 20 minutes") and up to 3 process-related goals (i.e., the specific actions required to achieve the desired performance-related goal, e.g., "train 4 days a week for 30 minutes per session"). Secondly, participants were required to make a commitment to attaining their goals in the form of a goal statement. These goal statements were stated positively, phrased in the first person and based on the outcome the participant wanted to achieve (e.g., "I want to lose 10kg in 10 weeks"). Depending on their allocated condition, participants were required to either make their goal statement public or private. The agreed goals and goal statements were sent by email to the participants as a reminder of what goals they had committed to.

Goal setting is a widely used and accepted strategy for promoting PA (Howlett et al., 2019; McEwan et al., 2016), and dietary behaviours (Olson et al., 2019; Shilts et al., 2004) especially within internet-delivered (ID) interventions (Albers et al., 2023; Baretta et al., 2019). Research also shows that when participants are involved in the

goal setting process in a collaborative sense, such as was the case in this study, it leads to positive outcomes in weight reduction and PA (Schnoll & Zimmerman, 2001). Intervention involving motivational interviewing have resulted in positive outcome in PA (Soderlund, 2018), diet (Befort et al., 2008) and mental well-being (Afriwilda & Mulawarman, 2021). Unfortunately, in this study the role of collaborative goal setting and motivational interviewing was unmeasured, hence, it is difficult to determine their confounding effects.

5.2.3.1 Covariates

Facebook Engagement

Facebook engagement was assessed using a modified version of Passive and Active Facebook Use Measure (PAUM; Gerson et al., 2017). The PAUM is an adapted version of Facebook Activity Questionnaire (FAQ; Junco, 2012), however, items that were not relevant for this study were removed, and new items which directly pertain to active and passive use were added to form the PAUM. Thus, the PAUM retains the format of the FAQ and asked participants to rate how often they engaged in 13 activities on Facebook when visiting the site. Answer categories were presented on a five-point Likert-type scale, ranging from (1) *Never (0% of the time)* to (5) *Very frequently (close to 100% of the time)*. Three of these items (i.e., "Chatting on FB chat", "Creating or RSVPing to events", and "Looking through my friends' profiles") were removed because they were irrelevant to the instructions given to participants.

The final scale consisted of 10 items which load onto three main types of Facebook behaviour: active social (Cronbach α score 0.38 T0, -0.49 T1, -0.32 T2), active non-social (Cronbach α score 0.47 T0, -0.00 T1, 0.78 T2), and passive (Cronbach α score 0.33 T0, 0.98 T1, 0.60 T2) behaviours. The PAUM uses frequency of feature use as an indicator of engagement style, however, it cannot directly measure how engaged an individual is while using Facebook.

Socio-demographic information

Information on participants' age range, sex, ethnicity, marital status, educational level and employment status were collected. Table 15, and Figures 5-9, shows the demographic characteristics of all participants.

5.2.3.2 Main Study Outcomes

Goal attainment

Goal attainment was assessed using the BGSI (Clare et al., 2015). For each goal that was identified in the goal setting interviews, participants provided a goal attainment rating, which is a measure of current actual performance using a scale ranging from 1 (*Cannot do or am not doing successfully*) to 10 (*Can do and am doing very successfully*). Goal attainment descriptors were established during the goal setting interviews to obtain a clear definition of what would represent no attainment (0%), partial attainment (25%, 50% and 75%), and complete attainment (100%). This helped to define different degrees of progress. The primary outcome measure of performance was analysed whereby an overall, unweighted mean rating for attainment across goals was calculated at baseline and each follow-up time-points by dividing the sum of the ratings for all goals set by the participant by the number of goals set.

Participants also rated readiness to change and importance. Readiness to change ratings measured how ready the participant was to make changes, using a scale of 1 (*Not ready to work on the goal*) to 10 (*Extremely ready to work on the goal*). Importance ratings measured how important the goal was to achieve, using a scale of 1 (*Not important at all to achieve this goal*) to 10 (*Extremely important to achieve the goal*). The readiness to change and importance ratings were assessed only at baseline, while the goal attainment rating was repeated at follow-up time-points.

Level of Physical Activity

The short version of the International Physical Activity Questionnaire (IPAQ-SF; Lee et al., 2011) assessed engagement with PA in daily life. This seven- item

questionnaire asked participants in terms of "how many days in a week" and "how much time per day" they engaged in four types of activities (i.e., vigorous activity, moderate activity, walking and sitting) over the last seven days. Total activity scores (METs [minutes/week]) were calculated by adding times across all activities (except for sitting), with higher scores reflective of greater energy expenditure. The IPAQ-SF has been recommended for population prevalence studies, where time is limited, because it is shorter and thus less onerous to complete than the long version (Craig et al., 2003). The IPAQ is a valid and reliable measure of PA (Craig et al., 2003).

Mental Wellbeing

The seven-item Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Ng Fat et al., 2017) was used to assess mental wellbeing. The SWEMWBS contains positively worded items covering feeling and functioning aspects of mental wellbeing, which were answered on a five-point Likert-type scale ranging from 1 (*None of the time*) to 5 (*All of the time*). The total score is from 7.0 to 35.0. 7.0 from 20.0 indicates low level of mental wellbeing, 20.7 to 27.0 moderate, and 28.1 to 35.0 indicates high level of mental wellbeing. There was a satisfactory level of internal reliability for this measure at T0 (α = .77) and T1 (α = .78), but poor at T2 (α = .58) and T3 (α = .58).

Physical Activity Regulation and Relative Autonomy Index

Physical activity regulation was assessed using the Behavioural Regulation in Exercise Questionnaire version 3 (Markland & Tobin, 2004; Wilson et al., 2006). Participants were requested to respond to the BREQ-3 in terms of their reasons for wanting to exercise or engage in PA. BREQ-3 consists of 24 items that measures the six types of motivation (i.e., intrinsic motivation, integrated regulation, identified regulation, introjected regulation and external regulation, and amotivation) along the STD continuum from controlled to autonomous motivations for PA behaviour (R. M. Ryan & Deci, 2000).

Participants responded to the items on a five-point Likert-type scale ranging from 0 (*Not true for me*) to 4 (*Very true for me*). Scores from each subscale were used to represent a separate behavioural regulation latent variable in the SDT model explaining exercise behaviour. Several studies have provided evidence of the internal consistency and validity of this instrument, especially across different cultural contexts (Cavicchiolo et al., 2022; Chai et al., 2022; Cid et al., 2018; Elsborg et al., 2021; Ersöz et al., 2021; Luo et al., 2022; Siegmund et al., 2017; Teixeira et al., 2012). For this study, the BREQ-3 indicated a good internal consistency for external regulation (Cronbach's α .84 at T0, .73 at T1, .79 at T2, .82 at T3) and integrated regulation (.83 at T0, .64 at T1, .78 at T2, .78 at T3), whilst amotivation (.76 at T0, .61 at T1, .65 at T2, .65 at T3), introjected regulation (.83 at T0, .56 at T1, .63 at T2, .64 at T3), identified regulation (.58 at T0, .48 at T1, .67 at T2, .56 at T3), and intrinsic regulation (.79 at T0, .53 at T1, .62 at T2,.65 at T3) were not as strong.

The subscales were combined to form a single score which gives an index of the degree to which respondents feel self-determined versus controlled. This is called a Relative Autonomy Index (RAI) and is calculated with the following formula: RAI = (amotivation x (−3)) + (external regulation x (−2)) + (introjected regulation x (−1)) + (identified regulation x (+1)) + (integrated regulation x (+2)) + (intrinsic motivation x (+3)). The score ranges from -24 to +24 with higher, positive scores indicating greater relative autonomy; lower, negative scores indicating more controlled regulation. There was a satisfactory level of internal reliability for this measure at T0 (α = .73), T1 (α = .73), T2 (α = .70) and T3 (α = .70).

OPC Perception

One item was used to measure the effectiveness of the *OPC manipulation*, which was the primary manipulation. At T2, participants in all the conditions rated the statement "During the last 12 weeks, most people within the study were aware of my goal(s)/commitment" using a five-point Likert scale (1 = *Strongly disagree*, 5 = *Strongly*

agree). The validity of this single item measure has been documented in a previous PC study (Nyer & Dellande, 2010).

Perceived Social Support

To measure *perceived social support* (i.e., the amount of emotional, tangible, and informational support received from others), an adapted version of Shaw et al.'s (2007) social networks and support (SNaS) scale was used as it provides a useful method of assessing social relationship dimensions. Originally, a subscale of the SNaS uses 10 items to measure enacted support. However, for this study, only five of these items were relevant. Two items measured the amount of emotional support received from others (e.g., "How often was someone bene right there in a stressful situation?"). Three items measured the amount informational support received from others (e.g., "How often has someone suggested some action that should be taken in order to deal with a problem?"). Participants responded to the items on a five-point Likert scale ranging from 0 (*Never*) to 4 (*Very often*). Overall, the scale had a high level of internal consistency at T1 (α = .80), and T2 (α = .80).

Perceived Relatedness-Need Satisfaction

To measure *perceived relatedness need-satisfaction* (i.e., feelings of closeness and belonging to a social group), the six-item scale employed by Sheldon et al. (2011) which asks participants to rate their experience in the past week using a scale ranging from 1 (*Not true*) to 9 (*Very true*). The three positive (connection) items were "I felt a sense of contact with people who care for me, and whom I care for," "I felt close and connected with other people who are important to me," and "I felt a strong sense of intimacy with the people I spent time with." The three negative (disconnection) items were "I was lonely," "I felt unappreciated by one or more important people," and "I had disagreements or conflicts with people I usually get along with". General connection and disconnection scores were computed by averaging the relevant items. General connection had a high level of internal consistency at T1 (α = .84), and T2 (α =

.80), but disconnection had a low level of internal consistency at T1 (α = .24), and T2 (α = .09)

Table 12:
Schedule of all outcome measures taken at all the various time-points (Study 2)

			Covariates		Main study outcomes				Manipulations checks		
Time-points	Conditions	Goal development	Facebook engagement	Socio-demographic information	Goal Attainment	Level of PA	Mental well-being	Relative autonomy	OPC perception	Social support perception	Relatedness Need-Satisfaction
Baseline (T0)	A	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
	B	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
	C	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
1	A	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
	B	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
	C	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗
	A	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓

2	B	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
	C	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗
3	A	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗
	B	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗
	C	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗

5.2.4 Procedure

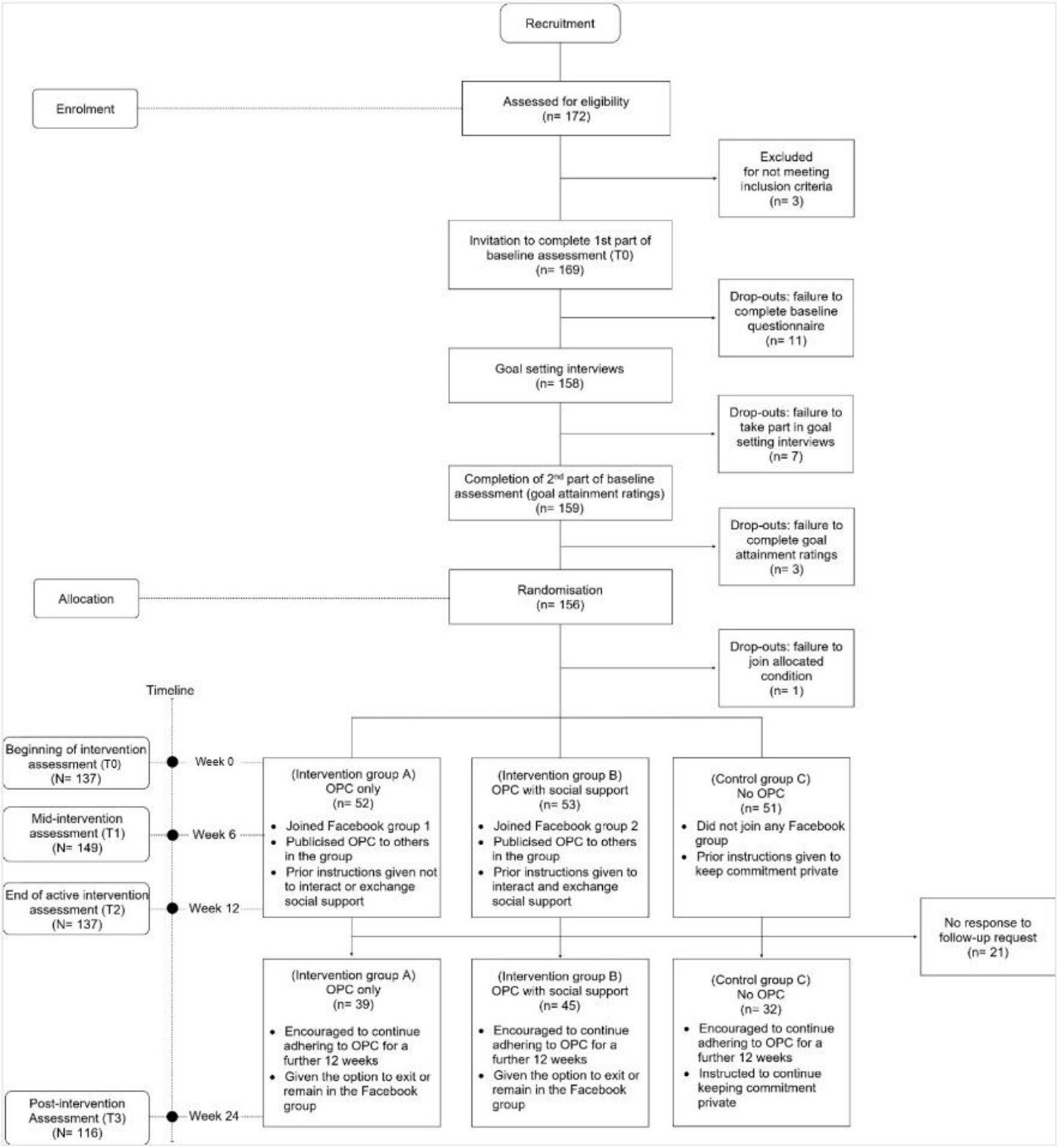
Participants were recruited using one of three methods: an email sent to Liverpool John Moores University (LJMU) staff and students, a paid advert campaign on Facebook (Appendix 5C), or an advert posted on a research participant recruitment platform (www.callforparticipants.com) (Appendix 5E). Recruitment took place on a rolling basis from February to August 2022. "Rolling recruitment" refers to a continuous process of recruiting participants, rather than a single, fixed period, allowing for ongoing data collection and analysis as participants join the study over time. Potential participants were provided with information about the study, and, if interested, answered a series of online screening questions to determine eligibility.

Those deemed eligible were required to provide informed consent, after which they were directed to complete first part of the baseline assessments (T0) that was administered online. After the completion of the first part of the baseline assessment, participants took part in the goal setting interviews, after which they completed the second part of the baseline assessments (also at T0) which was to rate their attainment, readiness to change and importance for all their identified goals. After this, participants were randomised into one of three conditions (see 5.2.2). Randomisation was implemented using a stratified randomisation to ensure that there was an equal distribution of Facebook engagement levels (3 levels: active social, active non-social, passive) in each of the intervention conditions and the control condition, and then selecting a participant from each stratum using a random number generator. No blinding techniques were applied.

Overall, the intervention lasted for 24 weeks: the initial 12 weeks being the active phase of the intervention, and at the end of this period participants were given the choice to either exit the Facebook group or remain for the remaining 12 weeks. Six weeks into the intervention (T1), participants were invited via email to complete mid-intervention assessments, as shown in Table 12. Participants were provided with a unique URL, and login details to access the questionnaire. Further reminders were

sent to those who had not completed the assessment after 48 hours. At the end of the active phase of the intervention (12 weeks, T2), participants were invited again by email to complete follow-up assessments (end of active intervention assessment), using the previously issued login details. After completing their T2 assessments, participants were encouraged to remain in their allocated condition, even though participants in the intervention conditions could remove themselves from the Facebook groups. Participants completed the post-intervention assessment at 24 weeks (T3). Assessment of outcomes at each timepoint was hosted and submitted online.

Figure 14:
Flow diagram describing study procedure including: recruitment, randomisation, and those lost to follow-up, and final sample analysed (Study 2)



5.2.5 Data Analysis

Quantitative analyses were conducted using SPSS version 28© software and an alpha level of .05 was used for all tests. Data were first screened for outliers and missing values. Where present, missing values were scrutinised to detect systematic patterns of nonresponse that may impact subsequent analyses. Internal consistency estimates of score reliability was then calculated. The analysis of data consisted of two parts: a preliminary analysis and a main analysis. In the preliminary analysis, descriptive statistics were calculated for the sociodemographic characteristics and study variables, as shown in Table 10 and 11 respectively. In addition, in the preliminary analysis, a series of independent t-tests, Welch-t-test and one-way ANOVAs were used to test the manipulation checks. A Fisher's exact test was used to compare the baseline sociodemographic differences between the conditions. Post hoc analysis involved pairwise comparisons using multiple Fisher's exact tests (2 x 2) with a Bonferroni correction for which statistical significance was accepted at $p < .016667$.

The main analysis addressed the study hypothesis by conducting a 2 × 3 mixed ANOVA to compare the differences between the three conditions (i.e., OPC vs. OPC + SS vs. private condition) as between-subjects factor, and time points (i.e., time: T0, T1, T2 & T3) as within-subjects factor, using goal attainment, PA, PA regulation and mental wellbeing as the dependent variables (Hypothesis 1). Hypothesis 2 was tested using a one-way ANOVA to compare the changes in the study variables at the various time-gaps. Greenhouse–Geisser corrections for violations of sphericity were applied.

5.2.6 Post-hoc Power Analysis

Given that they were different analytical tests that were carried out, each with their own requirement for sample size, post-hoc power analyses were conducted with some of these key statistical tests. The results were mixed. Some of these tests were underpowered, due an insufficient sample size. For example, a post-hoc power calculation indicated that the required sample size to achieve 80% power for detecting

a medium effect (Cohen's f = .25), at a significance criterion of α = .05, for the one-way ANOVA at T2 which compared the level of PA between the three conditions, would have been n = 252. Thus, the obtained sample of n = 106 was not adequate to test the study's hypothesis. With this sample size, a G*Power (version 3.1.9.7) indicated a power of .42, with the obtained effect size (η^2 = .029), and a significance criterion of α = .05.

Similarly, for the one-way ANOVA comparing the differences in PA between the intervention conditions and the control condition, the required sample size to achieve 80% power for detecting a medium effect (Cohen's f = .25), at a significance criterion of α = .05, is n = 210. Thus, the obtained sample of n = 106 was not adequate to test the study's hypothesis. With this sample size, a G*Power indicated a power of .79, with the obtained effect size (η^2 = .053), and a significance criterion of α = .05.

Other analytical tests were able to achieve the required power, which meant the minimum sample size was met for these tests to detect an appropriate effect size at the desired level of significance. For example, a priori power analysis was also conducted using G*Power to determine the minimum sample size that was required for the preliminary analysis. In regard to the changes in relative autonomy index as function of time, results indicated that the required sample size to achieve 80% power for detecting a medium effect (Cohen's f = .25), at a significance criterion of α = .05, non-sphericity correction ε = 1, is n = 43. Thus, the obtained sample size of n = 136 was adequate to test the study's assumption.

Regarding the manipulation check which assessed the effectiveness of the OPC manipulation, a post hoc power analysis (between the intervention conditions and the control condition) indicated a power of 1.00, with the obtained effect size (Cohen's d = 1.285, or f = 0.642), a significance criterion of α = .05, and a sample size of n = 137. Even when comparing the manipulation check between the three conditions, a post hoc power analysis indicated a power of 1.00, with the obtained effect size (η^2 = 0.285), a significance criterion of α = .05, and a sample size of n = 137.

5.2.7 Ensuring Quantitative Rigour

Rigour refers to the extent to which the researchers worked to enhance the quality of the studies. Table 13 (below) shows the specific strategies used to ensure rigour, through the assessment of validity (internal and external), reliability and objectivity. These three concepts are critical to assessing quantitative research to determine the quality of tools or instruments utilised in the study, and its findings (Basham et al., 2019; Claydon, 2015; Duffy & Chenail, 2009; Frambach et al., 2013; Heale & Twycross, 2015; Maula & Stam, 2020; Mellinger & Hanson, 2020; Nha, 2021; Onuma et al., 2023). According to Heale and Twycross (2015), a highly rigorous research study will provide evidence of how all these factors have been addressed.

Table 13:
Strategies adopted to achieve validity, reliability and objectivity (Study 2)

Rigour Criteria	Purpose	Original Strategies	Strategies applied in this study to achieve rigour
Internal validity	To ensure that the observed results represent the truth in the population of study (Patino & Ferreira, 2018).	• Randomisation	• Participants were randomly assigned to intervention and control groups thereby cancelling out the effects of extraneous variables.
		• Incomplete disclosure	• Participants were not fully informed about the study's procedure in order to prevent biasing the results.
		• Standardised treatment conditions	• Investigator ensured that goal setting interviews were standardised for all participants regardless of group allocation. To achieve this, all interviews were guided by a structured goal setting template.
		• Experimental manipulation and manipulation check	• Investigators ensured that the independent variable (OPC only and OPC + SS) were manipulated, and an assessment was performed to evaluate how well the manipulation was effective.

		• Reducing attrition	• As much as possible, attrition rate was reduced. Specific strategies included: offering incentives, ensuring constant communication with participants, and ensuring that participants identified meaningful goals for the study.
		• Confounding variables	• The analytic process took into account the presence covariates which may affect the study's results.
		• The use of control groups	• The use of a true control group to provide a baseline of results to compare with the findings.
External validity	To ensure that the findings of the study can be generalised to other people, settings, situations, and time periods(Andrade, 2018).	• Use of inclusion and exclusion criteria	• The inclusion and exclusion criteria were clearly defined and ensured that participants who took part were representative of similar individuals or populations.
		• Field experimentation	• The intervention was conducted in a natural setting (i.e., Facebook) as this applicable to the real world.
		• Psychological realism	• Participants were given the freedom choose their goals and were open to enact the behaviours that were necessary to achieve goal attainment.

		• Stratified random sampling	• Participants were randomly assigned into homogenous subgroup based on confounding characteristics that may skew the results, and then randomly selecting among each stratum to form the final sample.
Reliability	To strengthen a study's ability to reproduce a consistent result over time and across different observers (Heale & Twycross, 2015).	• Study protocol	• A logical process was followed and documented to show what procedures were followed in terms of recruitment, sampling, experimentation, data collection and analysis.
		• Test-retest reliability	• Data collection occurred at different time-points (i.e., T0, T1, T2 and T3) from the same participants, and the data from these time-points were correlated.
		• Internal reliability testing of a set of scale	• Reliability testing was conducted for the measurements/instruments taken in this study, to ensure that different items or questions are consistent with one another.
Objectivity	To ability to conduct research without being influenced by any personal biases or opinions (Rogers, 2000)	• Setting clear and specific research questions	• Setting clear, specific and unambiguous research questions helped to narrow the investigator's focus and maintain a structured

			approach. This also helped to avoid subjective interpretations.
		• Supervisory team review	• The investigator frequently reported back to the supervisory team which allowed other experts to critically evaluate the research process.
		• The use of validated measurements	• The measurements/instruments used in this study have been validated in previous studies to ensure production of reliable, accurate results.
		• Passive voice	• A decision was made to communicate in a passive voice (i.e., third person point of view) rather than in the first-person. This is seen as more objective and convincing.

5.3 Results

5.3.1 Preliminary Analysis

5.3.1.1 Behavioural intention

Goal importance and goal attainment/physical activity

A Spearman's rank order correlation was run to assess the relationship between goal importance and goal attainment, and between goal importance and PA. A Spearman' correlation was used because the basic assumptions of linearity and continuous variables necessary to perform a Pearson's correlation were not met. Preliminary analysis showed that the relationship to be non-monotonic, as assessed by visual inspection of scatter plot. There was a statistically significant, positive correlation between goal importance and goal attainment: at T0, r_s (156) = .544, p < .001, a non-significant, positive correlation at T1, r_s (156) = .135, p < .102, and a statistically significant, weak negative correlation at T2, r_s (156) = -.240, p < .005, and T3, r_s (156) = -.253, p < .003.

There was a non-significant, negative correlation between goal importance and PA at T0, r_s (156) = -.033, p < .680, and at T1, r_s (156) = -.049, p < .555. A statistically significant, weak positive correlation between goal importance and PA at T2, r_s (156) = .175, p < .041, and a non-significant, negative correlation between goal importance and goal attainment at T3, r_s (156) = -.070, p < .414.

Goal readiness and goal attainment/physical activity

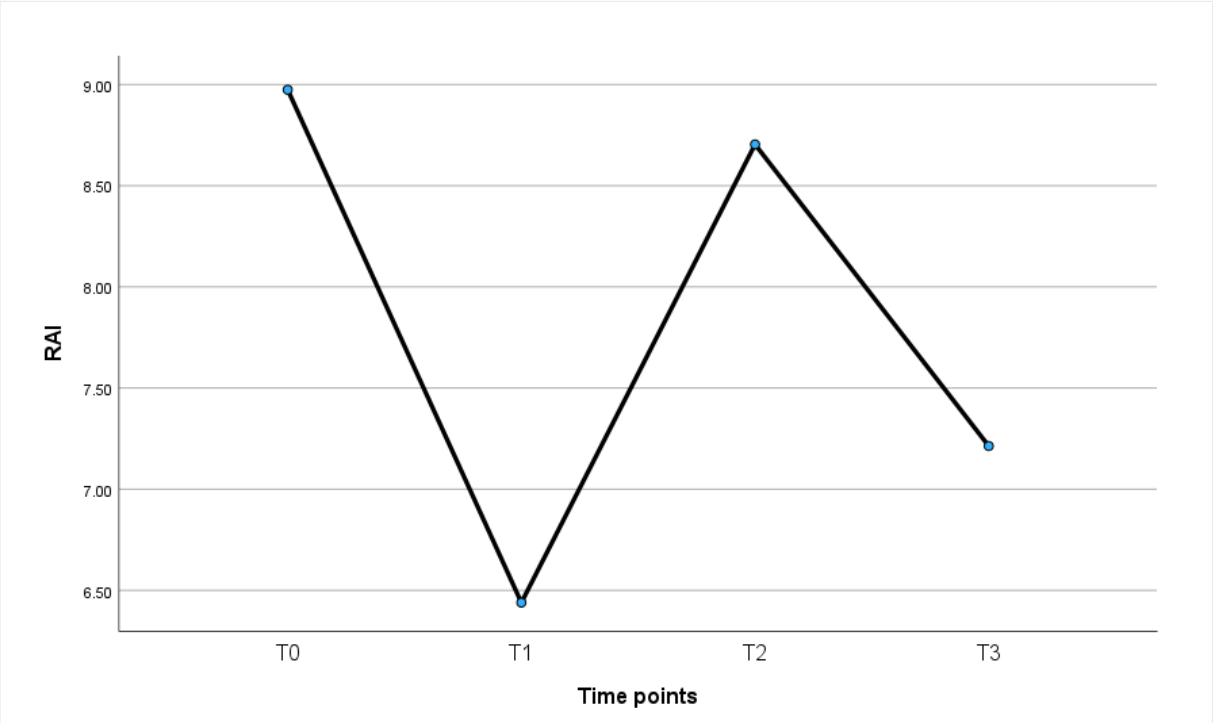
There was a very weak and non-significant positive correlation between goal readiness and goal attainment at T1 (r_s (148) = .082, p = .323), a very weak negative and significant correlation at T2 (r_s (137) = -.267, p = .002), and a very weak and non-significant negative correlation at T3 (r_s (140) = -.235, p = .005).

There was a very weak and non-significant negative correlation between goal readiness and PA at T1 (r_s (148) = -.047, p = .574), a very weak negative and non-significant correlation at T2 (r_s (137) = .109, p = .205), and weak negative and non-significant correlation at T3 (r_s (140) = -.073, p = .390).

5.3.1.2 Changes in relative autonomy over time

A one-way repeated measures ANOVA was conducted to determine whether there were statistically significant differences in RAI scores over the 24-week intervention. RAI scores were normally distributed at T1, and T2 time points, but not for T0 and T3, as assessed by Shapiro-Wilk's test (p >.05). The assumption of sphericity was violated, as assessed by Mauchly's test of sphericity, $\chi^2(2)$ = 21.557, p = <.001. Therefore, a Greenhouse-Geisser correction was applied (ε = .894). Relative autonomy index scores were statistically significantly different at the different time points during the intervention, F(2.683, 362.140) = 8.663, p < .001. There was increase in RAI from T0 (M = 8.97; SD = 6.62) to T1 (M = 6.44; SD = 4.56), a statistically significant mean increase of 2.54, 95% CI [1.44, 3.63], p < .001. There was decrease from T1 to T2 (M = 8.70; SD = 6.34), a statistically significant mean decrease of -2.27, 95% CI [-.335, -1.195], p < .001. There was an increase from T2 to T3 (M = 7.21; SD = 6.78), a statistically significant mean increase of 1.49, 95% CI [.173, 2.808], p < .001. A graphical illustration of the changes in RAI over the course of the intervention is shown in Figure 15 below.

Figure 15:
Average RAI scores for all participants during the course of the intervention

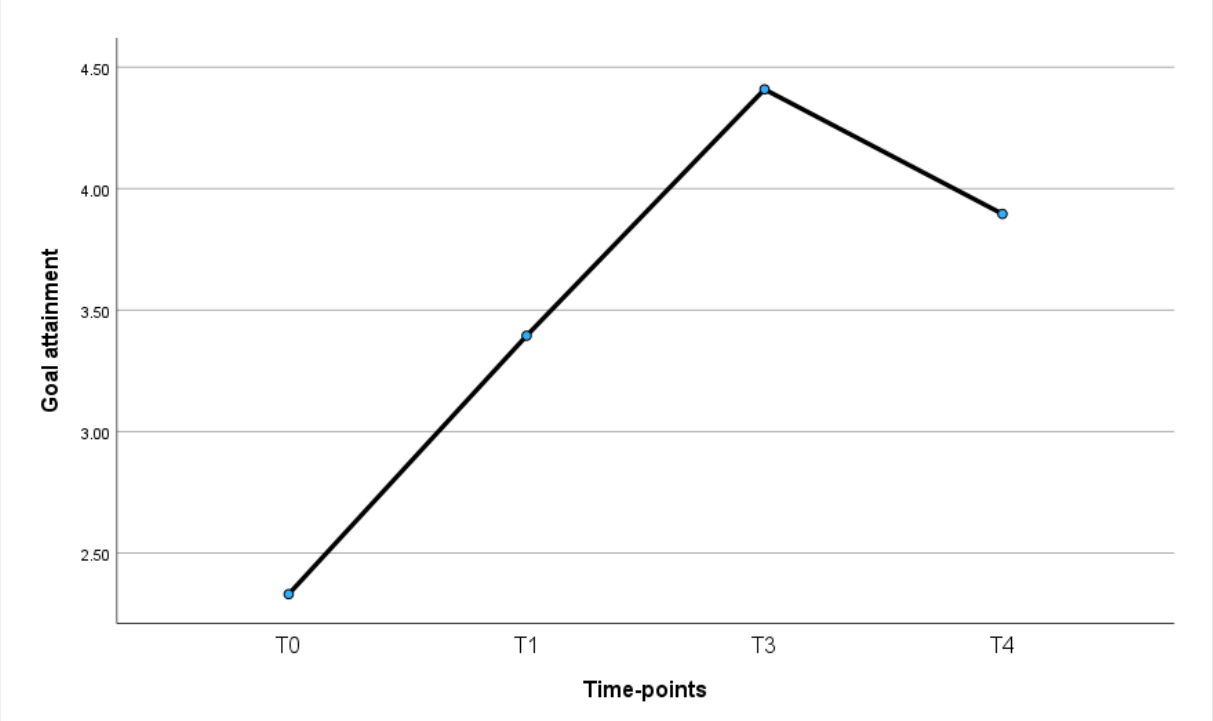


5.3.1.3 Changes in goal attainment over time

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in goal attainment over the course of the 24-week OPC intervention. There were no outliers and the data was normally distributed at each time point, as assessed by boxplot and Shapiro-Wilk test ($p > .05$), respectively. The assumption of sphericity was not met, as assessed by Mauchly's test of sphericity, $\chi^2(5) = 57.099$, $p = <.001$. Epsilon (ε) was .815, as calculated according to Greenhouse and Geisser (1959), and was used to correct the one-way repeated measures ANOVA.

The OPC intervention elicited statistically significant changes in goal attainment over time, $F(2.445, 330.037) = 77.984$, $p = <.001$, partial $\eta^2 = .366$, with goal attainment increasing from T0 ($M = 2.33$, $SD = .55$) to T1 ($M = 3.40$, $SD = 1.14$) and to T2 ($M = 4.41$, $SD = 1.50$), but decreasing at T3 ($M = 3.90$, $SD = 1.36$). A graphical illustration of the changes in goal attainment over the course of the intervention is shown in Figure 16.

Figure 16:
Changes in goal attainment over the course of the intervention

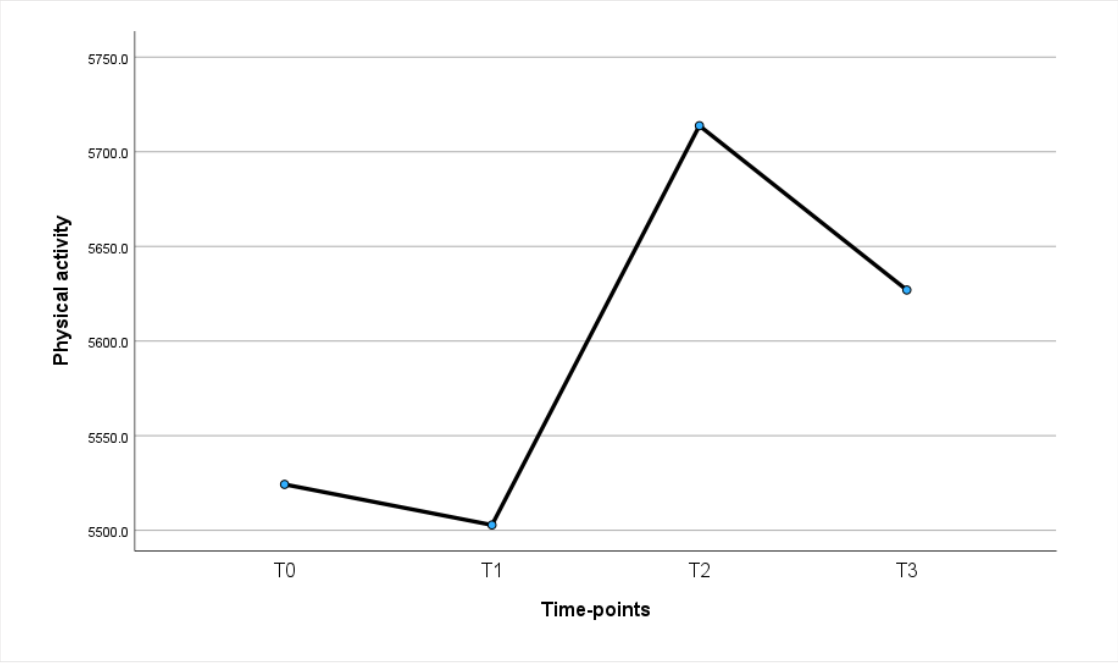


5.3.1.4 Changes in physical activity over time

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in PA over the course of the 24-week OPC intervention. There were no outliers, and the data was normally distributed at each time point, as assessed by boxplot and Shapiro-Wilk test ($p > .05$), respectively. The assumption of sphericity was not met, as assessed by Mauchly's test of sphericity, $\chi^2(5) = 73.358$, $p = <.001$. Epsilon (ε) was .722, as calculated according to Greenhouse and Geisser (1959), and was used to correct the one-way repeated measures ANOVA.

Contrary to expectations, there was no statistically significant difference in PA between pre-goal setting interview (T0) ($M = 552426$, $SD = .6020.18$) and any of the post-goal setting interview time-points such as T1 ($M = 5502.82$, $SD = 2910.63$), with a mean decrease of -21.44, 95% CI [1486.75, 1529.62], $p = 1.00$; T2 ($M = 5713.75$, $SD = 2868.59$), with a mean increase of 189.49, 95% CI [1724.245, 1345.274], $p = 1.00$; and T3 ($M = 5626.96$, $SD = 2930.64$), with a mean increase of 102.70, 95% CI [1566.84, 1361.43], $p = 1.00$. A graphical illustration of the changes in PA over the course of the intervention is shown in Figure 17.

Figure 17:
Changes in physical activity over the course of the intervention



5.3.2 Manipulation Checks

A one-way analysis of variance (ANOVA) was conducted to test the efficacy of the OPC manipulation. As hypothesised, participants' perception of their OPC differed significantly between the three conditions. Participants in the intervention conditions (i.e., condition A & B) endorsed the manipulated value more often (M = 3.70) than the control condition (condition C, M = 2.02), a mean difference of 1.67 (95% CI [1.20 to 2.15], p <.001) that was statistically significant. As also hypothesised, OPC perception was highest for condition B (M = 3.98, SD = 1.38), followed by condition A (M = 3.41, SD = 1.26), and condition C (M = 2.02, SD = 1.26), and the differences between the three conditions was statistically significant, F (2, 136) = 26.754, p = < .001, η^2 =.285. Turkey post hoc analysis revealed that, as hypothesised, the mean difference between condition B and C (1.956, 95% CI [1.30 to 2.62], p < .001) was statistically significant, however the difference between condition B and A (.566, 95% CI [-.08 to 1.21], p = .099) was not statistically significant.

A Welch t-test was conducted to test the efficacy of the social support manipulation between condition A and B at T2. This was due to the assumption of

homogeneity of variances being violated, as assessed by Levene's test for equality of variances (p = .009). There was a statistically significant difference in social support scores between condition A (M = .46; SD = .44) and B (M = 2.80; SD = .70), which was a statistically significant difference, MD = 2.33 (95% CI [2.0935 to 2.5761], t(78.194) = 19.264, p < .001). The validity of the relatedness manipulation was assessed using a Welch t-test between condition A and B. The test also confirmed the manipulation of conditions, condition B evidenced significantly higher relatedness scores (M = 4.63, SD = .76) than condition A (M = 3.25, SD = .48), a mean difference of 1.38 (95% CI [1.12 to 1.65], t(78.051) = 10.493, p < .001).

5.3.3 Baseline differences of demographic variables

Sociodemographic characteristics for participants are summarised in Table 14. There were no significant differences between the three conditions on demographic variables such as age range (p = .781), sex (p = .442), marital status (p = .059), ethnicity (p = .081) and employment status (p = .270). However, in terms of level of education, there were significant differences in proportions between the three conditions, as assessed by Fisher's exact test (p < .001). The proportion of participants in condition B who held a bachelor's degree were significantly higher (54.7%) than the proportions in the other conditions. Participants in condition C who held a doctorate degree were in higher proportion (11.8%) compared with the other two conditions. Participants in condition A who were high school/college graduates were in higher proportion (28.8%) compared with the other two conditions.

Table 14:
Sociodemographic characteristics of participants at baseline (T0) (Study 2)

Baseline characteristics	**Conditions**				
	Condition A n (%)	Condition B n (%)	Condition C n (%)	Total n (%)	*p*

Sex	Males	19 (36.5%)	25 (47.2%)	19 (37.3%)	63 (40.4%)	.442
	Females	33 (63.5%)	27 (50.9%)	32 (62.7%)	92 (59.0%)	
	Other	0 (0.0%)	1 (1.9%)	0 (0.0%)	1 (0.6%)	
Marital status	Married	17 (32.7%)	20 (37.7%)	12 (23.5%)	49 (31.4%)	.059
	Single	24 (46.2%)	16 (30.2%)	18 (35.3%)	58 (37.2%)	
	Divorced	3 (5.8%)	9 (17.0%)	8 (15.7%)	20 (12.8%)	
	Separated	0 (0.0%)	3 (5.7%)	0 (0.0%)	3 (1.9%)	
	Widowed	0 (0.0%)	0 (0.0%)	1 (2.0%)	1 (0.6%)	
	Other	8 (15.4%)	5 (9.4%)	12 (23.5%)	25 (16.0%)	
Age range	18-24	11 (21.2%)	10 (18.9%)	11 (21.6%)	32 (20.5%)	.781
	25-34	18 (34.6%)	23 (43.4%)	13 (25.5%)	54 (34.6%)	
	35-44	12 (23.1%)	10 (18.9%)	15 (29.4%)	37 (23.7%)	
	45-54	8 (15.4%)	9 (17.0%)	9 (17.6%)	26 (16.7%)	
	55-64	1 (1.9%)	1 (1.9%)	2 (3.9%)	4 (2.6%)	
	65 and above	2 (3.8%)	0 (0.0%)	1 (2.0%)	3 (1.9%)	
Employment status	Full-time	35 (67.3%)	41 (77.4%)	34 (66.7%)	110 (70.5%)	.270
	Part-time	7 (13.5%)	2 (3.8%)	4 (7.8%)	13 (8.3%)	
	Unemployed	0 (0.0%)	3 (5.7%)	1 (2.0%)	4 (2.6%)	
	Self-employed	3 (5.8%)	2 (3.8%)	0 (0.0%)	5 (3.2%)	
	Student	5 (9.6%)	4 (7.5%)	8 (15.7%)	17 (10.9%)	
	Retired	2 (3.8%)	1 (1.9%)	3 (5.9%)	6 (3.8%)	
	Other	0 (0.0%)	0 (0.0%)	1 (2.0%)	1 (0.6%)	
	Doctorate degree	4 (7.7%)	3 (5.7%)	6 (11.8%)	13 (8.3%)	
	Master's degree	7 (13.5%)	19 (35.8%)	20 (39.2%)	46 (29.5%)	
	Bachelor's degree	22 (42.3%)	29 (54.7%)	11 (21.6%)	62 (39.7%)	

Level of education	Trade/technical/vocational	15 (28.8%)	2 (3.8%)	7 (13.7%)	24 (15.4%)	
	High school/college graduate	15 (28.8%)	2 (3.8%)	7 (13.7%)	24 (15.4%)	< .001
	Some high school	1 (1.9%)	0 (0.0%)	2 (3.9%)	3 (1.9%)	
	Other	1 (1.9%)	0 (0.0%)	2 (3.9%)	3 (1.9%)	
Ethnicity	White or White British	24 (46.2%)	19 (35.8%)	23 (45.1%)	66 (42.3%)	
	Asian or Asian British	3 (5.8%)	4 (7.5%)	0 (0.0%)	7 (4.5%)	
	Black/African/Caribbean or Black British	25 (48.1%)	27 (50.9%)	23 (45.1%)	75 (48.1%)	
	Mixed/Multiple ethnic groups	0 (0.0%)	1 (1.9%)	0 (0.0%)	1 (0.6%)	.081
	Hispanic or Latino	0 (0.0%)	1 (1.9%)	0 (0.0%)	1 (0.6%)	
	Other	0 (0.0%)	0 (0.0%)	4 (7.8%)	4 (2.6%)	

Note: * $p < .05$.

5.3.4 Baseline difference of study variables

A one-way ANOVA was conducted to test baseline differences for the study variables (i.e., goal attainment, PA, mental well-being and relative autonomy between the three conditions) (see Table 15). A one-way ANOVA was also used to test the differences in changes for all the study variables at T0 to T1, T1 to T2, T2 to T3 and T0 to T2 time-gaps. There was no statistically significant difference for PA, $F(2, 153) = .026$, $p < .975$ and relative autonomy $F(2, 153) = 1.339$, $p < .265$. However, mental well-being was statistically significantly different for the three conditions, $F(2, 153) = 6.976$, $p < .001$. The intervention conditions scored significantly higher ($M = 23.16$) than the control condition ($M = 21.24$), a mean difference of 1.90 (95% CI [.8571 to 2.9617], $p < .001$). The was also a significant mean difference between condition A and C ($MD =$

2.23, 95% CI [.7016 to 3.7682], p = .002), but not between condition A and B (MD = .65, 95% CI [-.8490 to 2.1512], p = .558).

Table 15:
Descriptive statistics for all study variables at all time-points (Study 2)

	T0 (Baseline)		**T1 (6 Weeks)**		**T2 (12 Weeks)**		**T3 (24 Weeks)**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Condition A								
Goal attainment	2.08	.51	3.06	.90	5.00	1.14	4.74	1.06
PA	5674.81	2822.36	5526.21	3102.26	5163.38	2899.76	5838.64	3003.64
Mental well-being	23.48	3.60	20.89	2.33	23.03	4.08	23.13	3.43
Relative autonomy	10.77	6.63	5.85	3.45	8.74	7.76	8.94	6.36
Condition B								
Goal attainment	2.34	.52	4.13	1.18	5.30	1.01	3.05	1.23
PA	5428.68	8980.48	5680.17	3062.39	6313.23	2985.09	5539.92	3055.33
Mental well-being	22.83	2.80	23.23	2.10	23.23	2.10	23.13	2.78
Relative autonomy	8.63	6.95	8.43	5.99	8.38	5.72	7.71	6.48
Condition C								
Goal attainment	2.57	.55	2.93	.84	2.82	.95	3.88	1.18
PA	5505.94	2680.65	5247.49	2472.01	5587.79	2607.95	5591.72	2725.62
Mental well-being	21.24	2.90	23.18	3.67	21.80	3.74	21.43	2.96
Relative autonomy	9.60	6.55	6.20	4.39	9.21	5.41	5.23	7.17

There was also a statistically significant difference in goal attainment between the three conditions, $F(2, 153) = 11.242$, $p < .001$. The intervention conditions scored

significantly less (M = 2.21) than the control condition (M = 2.57), a mean difference of -.3621 (95% CI [-.5397 to -.1845], p < .001). Condition C scored greater (M = 2.57, SD = .55) than condition A (M = 2.08, SD = .51) and condition B (M = 2.34, SD = .52), a mean difference of .4918 (95% CI [.2423 to .7413], p < .001) and .2323 (95% CI [-.0164 to .4811], p = .072) respectively. The above results suggest that the randomisation was successful for PA and relative autonomy, but not for goal attainment and mental well-being.

5.3.5 Main analysis

A 4 (Time: T0 vs. T1 vs. T2 vs. T3) × 3 (condition: condition A vs. condition B vs. condition C) mixed ANOVA was performed to analyse the effect of OPC on the study variables. A complex contrasts test was used to compare the difference between the combination of the intervention conditions (i.e., condition A & B) with the control condition (i.e., condition C).

5.3.5.1 Physical activity

Assumptions

Figures 18 shows the mean METs as a function of time. There were no outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. METs scores were normally distributed for condition A at T1 (p = .055), T2 (p = .202) and T3 (p = .160), but not normally distributed for the other data sets (p < .05). There was homogeneity of variances for all data sets, as assessed by Levene's test of homogeneity of variance (p > .05). The homogeneity of covariance was violated, as assessed by Box's test of equality of covariance matrices (p < .001). Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the two-way interaction, $\chi^2(5) = 72.31$, p < .001.

Hypothesis testing

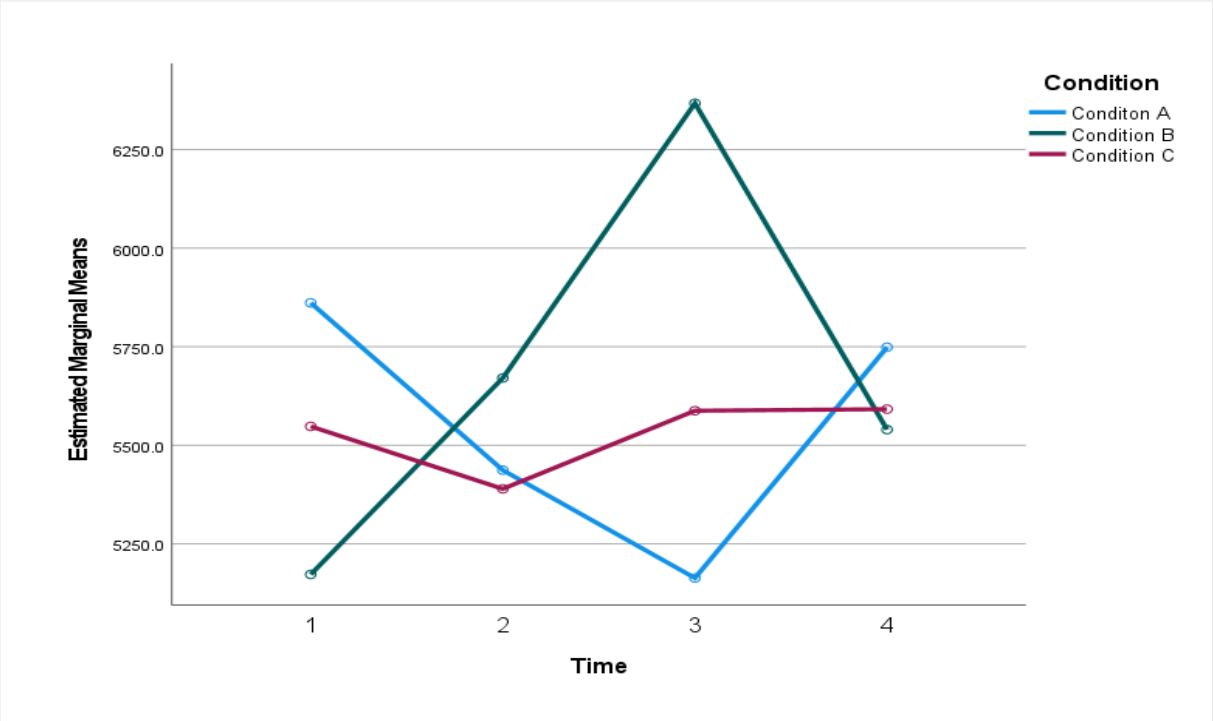
There was no statistically significant interaction between condition and time on METs, $F(4.327, 287.769) = .512$, p = .741, partial η^2 = .008. The main effect of time did

not show a statistically significant difference in METs at the different time points, $F(2.164, 287.769) = .081$, $p = .934$, partial $\eta^2 = .001$.

Group effects

The main effect of condition also revealed non statistically significant differences in METs between three conditions, $F(2, 133) = .079$, $p = .924$, partial $\eta^2 = .001$. Contrast test showed no statistically significant difference, at T1, between the intervention conditions ($M = 5603.19$; $SD = 4633.45$) and the control condition ($M = 5247.49$; $SD = 27472.01$), a mean difference of 355.70, 95% [-568.373, 1279.76], $p = .448$. No statistically significant difference, at T2, between the intervention conditions ($M = 5738.31$; $SD = 4392.31$) and the control condition ($M = 5587.79$; $SD = 2607.95$), a mean difference of 150.51, 95% [-843.224, 1144.253], $p = .774$. No statistically significant difference, at T3, between the intervention conditions ($M = 5689.28$; $SD = 4531.30$) and the control condition ($M = 5597.72$; $SD = 2725.62$), a mean difference of 97.56, 95% [-930.205, 1125.318], $p = .857$. Hence, H1 and H2 is not supported for the PA variable.

Figure 18:
Mean METs scores as a function of time



5.3.5.2 Goal attainment

Assumptions

Figure 19 shows mean goal attainment as a function of time. There were no outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. Goal attainment scores were normally distributed for condition A at T2, condition B at T1 and T2, and condition C at T0 and T1, as assessed by Shapiro-Wilk's test ($p > .05$). However, goal attainment scores were not normally distributed for condition A at T0 ($p < .001$), T1 ($p < .001$), and T3 ($p < .001$), condition B at T0 ($p < .001$), and T3 ($p < .002$), and condition C at T2 ($p < .001$) and T3 ($p < .002$). There was homogeneity of variances at T2 ($p = .449$) and T3 ($p = .350$), as assessed by Levene's test of homogeneity of variance, but there was violation at T1 ($p = .015$). There was homogeneity of covariances, as assessed by Box's test of equality of covariance matrices ($p = .012$). Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the two-way interaction, $\chi^2(2) = 72.31$, $p < .001$.

Hypothesis testing

There was a statistically significant interaction between condition and time on goal attainment scores, $F(5.388, 358.329) = 46.047$, $p < .001$, partial $\eta^2 = .409$, $\varepsilon = 328.319$.

Group effects

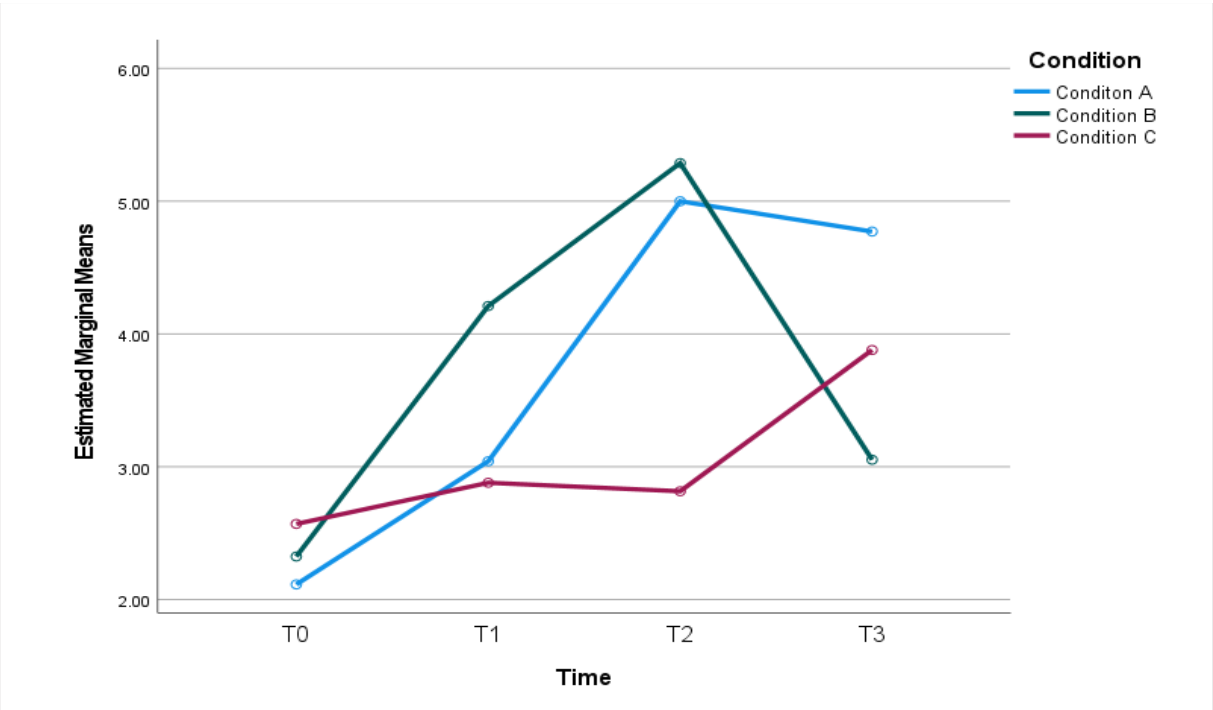
The main effect of group showed that there was a statistically significant difference in mean goal attainment between the conditions $F(2, 133) = 23.157$, $p < .001$, partial $\eta^2 = .258$. At T1, as expected goal attainment was higher in the intervention conditions ($M = 3.60$; $SD = 1.48$) than in the control condition ($M = 2.93$; $SD = .84$), these differences were statistically significant $F(2, 145) = 22.167$, $p < .001$, partial $\eta^2 = .234$. Condition B scored statistically significantly higher ($M = 4.13$; $SD = 1.18$) than condition A ($M = 3.06$; $SD = .90$) and condition C ($M = 2.90$; $SD = .84$). At T2, goal

attainment was statistically significantly higher in the intervention conditions (M = 5.15; SD = 1.51) compared to the control condition (M = 2.82; SD = .95), $F(2, 134)$ = 75.986, p < .001, partial η^2 = .531. Condition B scored significantly higher (M = 5.29; 1.01) compared to condition C (M = 2.82; SD = .95), with a mean difference of 2.48 (95%, CI, 1.9656 to 2.9964, p <.001), but not significantly higher than condition A (M = 5.00; MD = .2969, p = .349). At T3, the intervention conditions scored higher in goal attainment (M = 3.91; SD = 1.68) compared to the control condition (M = 3.88; SD = 1.18), however this difference was not statistically significant. Unexpectedly, condition B scored significantly lower than condition A (MD = -1.687, SE = .235 [-2.2437 to -1.1299], p <.001) and significantly lower than condition C (MD = -.8267, SE = .244 [-1.4051 to -.2482], p = .003).

Time effect

The main effect of time showed a statistically significant difference in goal attainment at the different time points, $F(2.694, 358.329)$ = 125.637, p < .001, partial η^2 = .486. There was a statistically significant effect of time on goal attainment for condition A ($F(3, 135)$ = 113.293, p < .001, partial η^2 = .716), condition B ($F(2.426, 111.594)$ = 80.338, p < .001, partial η^2 = .636), and condition C ($F(2.117, 88.932)$ = 21.123, p < .001, partial η^2 = .335). H1 is not supported for the goal attainment variable at all time-points except for at T2. H2 is also not supported for the goal attainment variable.

Figure 19:
Mean goal attainment scores as a function of time



5.3.5.3 Mental wellbeing

Assumptions

Figure 20 show mean mental wellbeing scores as a function of time and condition respectively. There were no outliers in the data, as assessed by inspection of a boxplot. Mental wellbeing scores were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). There was homogeneity of variances at T1 ($p = .354$) and T3 ($p = .926$), however there was violation at T2 ($p < .001$), as assessed by Levene's test of homogeneity of variance. Homogeneity of covariances was not met, as assessed by Box's test of equality of covariance matrices ($p < .001$). Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the two-way interaction, $\chi^2(5) = 35.91$, $p < .001$.

Hypothesis testing

There was a statistically significant interaction between the condition and time on mental wellbeing, $F(5.252, 349.273) = 6.316$, $p < .001$, partial $\eta^2 = .087$.

Group effects

The main effect of condition showed that there was a statistically significant difference in mental well-being between the conditions $F(3, 133) = 6.140$, $p = .003$, partial $\eta^2 = .085$. At T1, the intervention conditions scored unexpectedly lower (M = 22.00) than the control condition (M = 23.23), a mean difference of -1.12 (95% CI, [-2.2394 to .0018], $p = .50$) which was not statistically significant. There was a statistically significant difference in mental well-being between the three conditions at T1, $F(2, 148) = 10.894$, $p < .001$, partial $\eta^2 = .131$. Condition B scored significantly higher (M = 23.24) than condition A (M = 20.76) but not significantly higher than condition C (M = 23.23). At T2, the intervention conditions scored significantly higher (M = 23.14) than the control condition (M = 21.80), a mean difference of 1.3251 (95% CI [.0043 to 2.6460], $p = .49$) which was statistically significant.

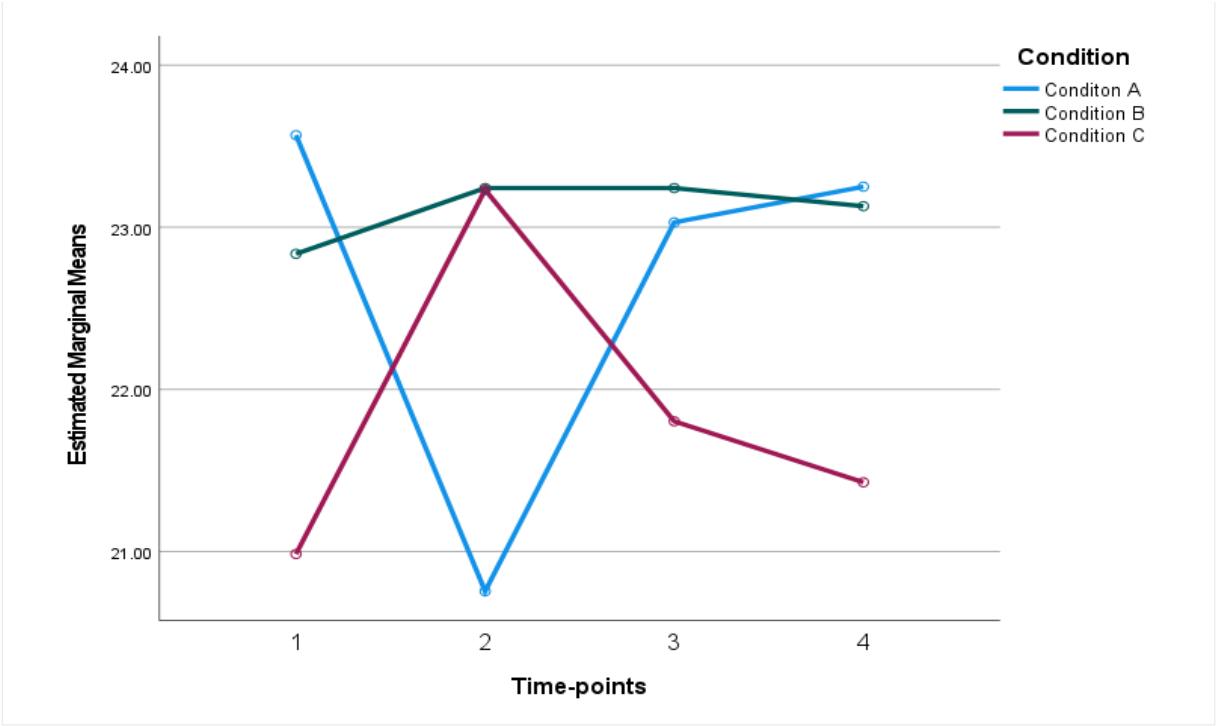
There was no statistically significant difference in mental well-being between the three conditions at T2, $F(2, 139) = 2.333$, $p < .101$, partial $\eta^2 = .033$. At T3, the intervention conditions scored significantly higher (M = 23.19) than the control condition (M = 21.43), a mean difference of 1.7026 (95% CI, [.5873 to 2.8178], $p = .003$) which was statistically significant. There was a statistically significant difference in mental well-being between the three conditions at T3, $F(2, 140) = 4.558$, $p < .012$, partial $\eta^2 = .062$. Condition B scored significantly higher (M = 23.13) than condition C (M = 21.43), with a mean difference of 1.7028 (95% CI, [.1637 to 3.2418] $p = .026$), but not significantly higher than condition A (M = 23.25), with a mean difference of .0004 (95% CI, [-1.4813 to 1.4821], $p = 1.00$).

Time effect

The main effect of time did not show a statistically significant difference in mental well-being at the different time points, $F(2.626, 349.273) = .247$, $p < .838$, partial $\eta^2 = .002$. However, the effect of time was significant for condition A ($F(2.378, 1710.101) = 5.978$, $p = .002$, partial $\eta^2 = .117$), and condition C ($F(1.562, 1098.631) = 4.663$, p = .020, partial $\eta^2 = .100$), but not for condition B ($F(1.962, 836.524) = .285$, p = .749, partial $\eta^2 = .006$. Hence, H1 for mental wellbeing is not supported at T1, but was supported at T2

and T3. H2 is also not supported for mental wellbeing at T1 and T3, but was supported at T2.

Figure 20:
Mean mental wellbeing scores as a function of time



5.3.5.4 Relative autonomy

Assumptions

Figure 21 show mean relative autonomy index scores as a function of time and condition respectively. RAI scores were normally distributed for all the conditions at all the time-points ($p > .05$), except for condition C at T3 ($p < .001$). The assumption of homogeneity of variances was violated at T1 ($p < .001$) and T2 ($p = .031$), except for at T3 ($p = .914$) where there was homogeneity of variances, as assessed by Levene's test for equality of variances. The homogeneity of covariances was violated, as assessed by Box's test of equality of covariance matrices ($p < .001$). Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the two-way interaction, $\chi2(5) = 23.96$, $p < .001$.

Hypothesis testing

There was a statistically significant interaction between condition and time on RAI scores, F (450.417, 8848.462) = 3.385, p = .004, partial η^2 = .048.

Group effects

The main effect of condition showed that there was no statistically significant difference in RAI between the three conditions, F(2, 133) = .742, p = .478, partial η^2 = .011. At T1, RAI score for the intervention conditions (M = 6.90) was higher than the control condition (M = 5.41), a mean difference of .9445 (95% CI, [-.6161 to 2.5050], p = .233) although this was not statistically significant. Relative autonomy index score for condition B (M = 8.12) was significantly higher than condition A (M = 5.69), a mean difference of 2.5789 (95% CI [.2954 to 4.8625], p = .023), but not significantly higher than condition C (M = 5.41). This was a statistically significant difference, F (2, 148) = 4.30, p = .015, partial η^2 = .056.

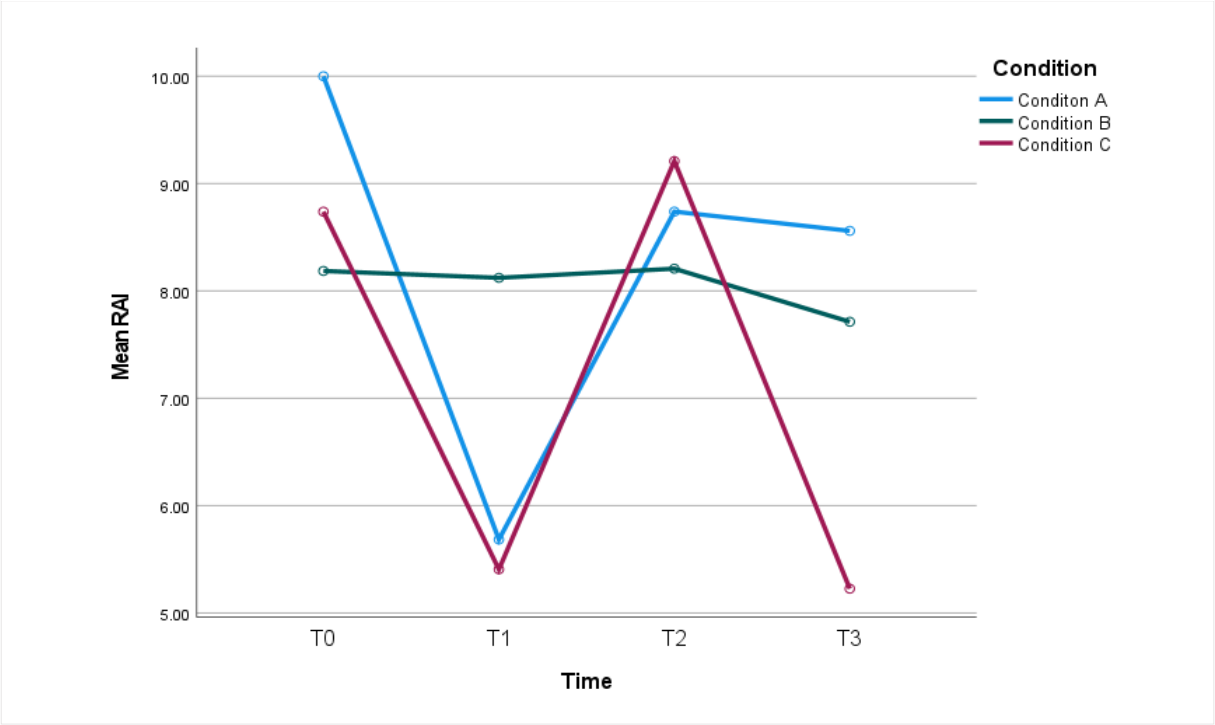
At T2, the intervention conditions scored unexpectedly lower (M = 8.48) than the control condition (M = 9.21), a mean difference of -.6496 (95% CI [-2.8032 to 1.5039], p = .551) which was not statistically significant. RAI for condition B (M = 8.21) was unexpectedly lower than for condition A (M = 8.74) and condition C (M = 9.21), with a mean difference of -.35892 (95% CI [-3.7278 to 3.0100], p = .965) and -.82909 (95% CI [-3.6105 to 1.9523], p = .758) respectively, both of which were not statistically significant.

At T3, the RAI score for the intervention condition (M = 8.14) was significantly higher than for the control condition (M = 5.23), a mean difference of 3.0996 (95% CI [.6874 to 5.5119], p = .017). RAI for condition B was higher (M = 7.71) than for condition C (M = 5.23), a mean difference of 2.4860 (95% CI [-.9629 to 5.9349], p = .204) which was not statistically significant. Unexpectedly, RAI for condition B was lower than for condition A (M = 8.56), a mean difference of -1.2272 (95% CI [-4.3331 to 1.8786], p = .616) which was also not statistically significant.

Time effect

In terms of the main effect of time, there was no statistically significant effect of time on RAI scores for condition A (F (1.645, 74.009) = 4.752, p < .003, partial η^2 = .096), condition B (F (1.792, 82.412) = .570, p < .549, partial η^2 = .012), but the effect on time on RAI scores was statistically significant for condition C (F (3, 3887.005) = 6.273, p < .001, partial η^2 = .130). Hence, H1 for the relative autonomy variable is supported at T1, but not at T2 and T3. H2 for relative autonomy was not supported at all time points. A post-hoc analysis of all primary outcomes is provided in appendix 5E to 5L.

Figure 21:
Relative autonomy as a function of time



5.4 Discussion

The main objective of the present study was to verify the efficacy of an OPC intervention. The study investigated the effect of two types of OPC (i.e., one with SS and one without) in improving goal attainment, PA, mental wellbeing, and relative autonomy, compared with a control condition that kept their commitments private.

The results from the preliminary analysis suggest that identifying relevant and important goals is a poor predictor of PA-related goal attainment, which is inconsistent with other studies which have shown that a relationship exists between motivation and goal attainment (Dellande & Nyer, 2007b; Gopinath & Nyer, 2009; Nyer & Dellande, 2010). An attempt was made in this study to examine whether it is possible that participants who make an OPC can be autonomously extrinsically motivated to adhere to their OPC as a function of time. Granted, Ryan and Deci (2002) do not suggest that relative autonomy is intended as a development continuum *per se*, whereby individuals must progress from each stage of internalisation with respect to each regulation. However, it is interesting to know whether the range of behaviours that can be assimilated to the self does increase over time: as participants experience better relationship with their social groups (relatedness), feeling more effective in achieving their goals (competence), and acting on these goals with greater interest and integrated values (autonomy) (Gilal et al., 2022; Wasserkampf & Kleinert, 2015). However, results from the preliminary analysis did not support this assumption. Perhaps the time-scale for this study was too short to observe any statistically significant differences.

Goal attainment and mental wellbeing improved in both intervention groups over the intervention period. Perhaps as participants experienced greater attainment of their PA-related goals, this produced positive effects in their mental well-being. This assumption is consistent with well-established studies endorsing the link between PA and mental wellbeing (Eric et al., 2020; Hallam et al., 2023; Ibáñez Román et al., 2023; Kadariya et al., 2019; Mason & Kearns, 2013; Ramírez-vélez et al., 2021; Thompson Coon et al., 2011). Contrary to expectation, PA did not increase in the same fashion as goal attainment. This contradiction may be due to fact that participants expected to be judged on an absolute scale based on the attainment of specific goals they had committed to, rather than on an absolute scale of how much they had walked, or vice versa.

There were no differences observed for relative autonomy between those who made an OPC and those who kept their commitment private, over the intervention period. This could have been due to the study design itself, which may have undermined the satisfaction of participants' autonomy. Although all attempts were made ensure that the identified goals were not externally endorsed, all other aspects of the study (e.g., instruction to make an OPC, instruction to exchange SS) could have contributed to non-self-determined or controlled forms of motivation. For example, one could ask: did the intervention participants post their OPC or provide SS in the Facebook group due to motives that emanate from the self, or was it due to the external rewards or pressures of the intervention? Research has shown that controlling contingencies can reduce autonomy in a wide range of contexts (Gillet et al., 2012; Jakobsen, 2022; Mitchell et al., 2020; Ryan & Deci, 2000; Vansteenkiste et al., 2006). This explanation is supported by the results which show that, at T3, participants who made an OPC scored higher in relative autonomy than the control condition.

Between T1 and T2, it could be the case that all participants, regardless of condition, acted upon more controlled regulation due to the pressure of conforming to the study's instructions. However, it was at T3 that intervention participants were given the freedom to exist the Facebook groups, whilst participants in the control condition were encouraged to keep their commitments private. With these controlling contingencies removed, participants in the intervention conditions may have operated in a more autonomy-supportive "real-world" environment, which may explain why their relative autonomy increased post-intervention.

In terms of the first hypothesis, the study demonstrated that short-term behaviour modification of goal attainment is possible for all participants, regardless of whether they made an OPC or not. The short-term effect of OPC would have been consistent with Balk-Møller et al.'s (2017) study, except in this study even those who kept their commitment private were also able to improve their goal attainment. This may be due to all participants taking part in the goal setting interviews, which served to motivate compliance with their commitments. If this is so, then it is consistent with

other studies which have shown that goal setting interviews represents a strong candidate to augment internet-delivered lifestyle medication programmes (ID-LMPs), due to enhancing autonomous motivation and commitment to behaviour change (Fortune et al., 2019; Lavilla-Gracia et al., 2023; Miller, 2023; Miller & Rollnick, 2003; Sawyer et al., 2020; Soderlund, 2018).

Although short-term behaviour was possible, for some of the primary outcomes, post-intervention maintenance of these behaviour was more challenging, demonstrated by the fact that more than half of the participants' rating for goal attainment and PA at the end 24 weeks returned to relatively the same level as at baseline. Although not a hypothesis of this study *per se*, inadvertently the results are consistent with interventions that aim to positively influence EBRBs in that they typically produce only small to moderate effects that fade quickly when the intervention ceases (Barte et al., 2010; Hall & Kahan, 2018b).

Contrary to the second hypothesis, the overall results show that OPC, whether with or without SS, is not significantly more effective than making a private commitment in terms of the primary outcomes. At T2 and T3, the participants who received SS scored higher for goal attainment and mental wellbeing (respectively), than the other conditions. At other time-points the differences were either not statistically significant, or unexpectedly, the control condition scored significantly greater than the intervention conditions. It could be the case that making a private commitment strengthened participants' personal norm, which is an internalised social norm or feelings of moral obligations to do "the right thing" (Schwartz, 1973).

Consequently, it has been shown that personal norms can be triggered after a social norm intervention (Doran & Larsen, 2016; Han et al., 2018; Kim & Seock, 2019), thereby moderating the relationship between social norms and behaviour change. The Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) may help in explaining why participants who made a private commitment resulted in more of the desired behaviour at certain timepoints. The ELM assumes that when people do not have strong pre-existing attitudes about a certain topic (i.e., people with weaker personal

norms), they are more likely to persuaded by the publicness with which they declare their commitment to a position. Thus, one can assume that participants who made a private commitment had stronger personal norms which provided a guidance, or an internal compass, on what is the "normal" thing to do (Cialdini & Trost, 1998), even in the absence of social expectations. This line of reasoning is consistent with Schultz et al. (2016) and Thøgersen (2009) who have both argued that when an individual has stronger moral beliefs about a certain topic, the level of social validation they get from their surroundings should impact them less.

The failure of this study to detect increases in primary outcomes related to receiving SS may be explained by relatively low amounts of SS which occurred in Facebook group B versus that which occurred in Facebook group A. Although participants in Facebook group B were instructed to provide SS whenever a new member joined the group and publicised his/her commitment, interactions mostly ceased a short while after the OPC was made. Participation rates in the Facebook-based online SS component of this intervention are similar to other studies that reported an average of close to one post per participant (Kim et al., 2012; Kosma et al., 2005; McKay et al., 2001)

Future iterations of this research might attempt prompting participants to provide weekly updates of their OPCs, rather than making the OPC once. Indeed, such a recommendation is consistent with how Munson et al. (2015) designed their intervention, whereby participants' exercised freedom regarding the frequency of their OPC. Perhaps in a more continuous or granular domain (e.g., if they chose how often they publicise their commitments), significant differences in OPC may be observed between the Facebook groups. Although Munson et al. (2015) found an unwanted selection effect whereby participants created fewer commitments when those commitments were made public.

It could also be that the choice of whether or not to exchange SS was externally endorsed and not completely in the participants' control. Hence, given the extrinsic nature of exchanging SS in this, it is unsurprising that this activity was not sustained.

This is consistent with studies demonstrating the short-term effects of extrinsic motivation (Buckworth et al., 2007; Mitchell et al., 2020; Ryan & Deci, 2000; Sansone & Tang, 2021; Vansteenkiste et al., 2006).

As a prerequisite, all participants were required to identify one performance-related goal and up to three process goals. Interestingly, most participants utilised maximised their process goal allowance, with only a few opting to choose one or two process goals to work on. This has implications for future interventions as it suggests people wish to focus on a wide number of specific goals, when given the choice. Although the performance-related goal was to be related to a standard of PA that participants would like to achieve, they were given the flexibility to choose the types of process goals that would enable them to achieve the overarching performance-related goal. It was interesting to note that the process goals participants chose were not only focussed on PA (Miller et al., 2013; Thorogood et al., 2011) and diet related actions (Fogelholm et al., 2012; Salas-Salvadó et al., 2019) – both of which are considered important and modifiable EBRBs – but participants' process goals also focussed on behaviour medication strategies such as self-monitoring of food intake (Cavero-redondo et al., 2020; Dalle Grave et al., 2011; Kelley & Abraham, 2004), potion control (Rolls, 2014), meal planning (Konsor et al., 2021), and stimulus control (Vine et al., 2013). All of which has been demonstrated to support in individual's self-regulation skills and resources in the change process.

5.4.1 Strengths & Limitations of the Study

5.4.1.1 Strengths

A major strength of this study rests on its approach for enhancing rigour, via the assessment of validity, reliability and objectivity. Table 11 demonstrates the specific steps or actions taken to accomplish each of these three quality criteria. Although it is usually argued that a trade-off exists between internal and external validity (Aguiar Doutor et al., 2022; Jimenez-Buedo & Miller, 2010; Jiménez-Buedo & Miller, 2010; Loudon et al., 2015; Simpson et al., 2014; Trafimow, 2023), much effort

was made to ensure that the study design, conduct, and analysis were not influenced by extraneous factors or variables, and also that the findings of this study can be generalised to other contexts. Even when these extraneous factors could potentially be the researcher's personal biases, much effort was also made to maintain the objectivity of the research process.

Another significant strength of this study was the relatively low attrition rate compared to other ID-LMPs. Attrition, the loss of randomised participants from a study sample, is a very common problem with ID-LMPs (Mathieu et al., 2013; Mouton & Cloes, 2013) and, has also presented a challenge in evaluating the efficacy of OPCs in other studies (Cavallo et al., 2012). The attrition rate for this study was 10% (1% for condition A, 4% condition B, and 5% condition C). The low attrition rate for all the conditions may be the result of all participants being encouraged by the goal setting interviews. It may be the case that strategies used in the goal setting interview (e.g., rapport building, motivational interviewing etc.) enhanced relational development, which then caused participants to be accountable to the principal researcher to remain until the end of the intervention.

Also, the provision of tailored information about participants' previous goal attainment ratings may have contributed to the low attrition rate. There is both theoretical and empirical support for providing feedback about performance. According to Strecher et al. (1995: p.65), "setting goals and then providing no information about goal attainment defeats the rationale for setting goals". Further, it has been argued that without such feedback, the individual will lack information to understand whether he/she should adhere to or change his/her strategy for goal attainment (Locke & Latham, 2002, 2013, 2019).

In a wide range of PA interventions, feedback information about previous performance has been shown to close the gap between desired and actual performance, especially when it is immediate (Kramer & Kowatsch, 2017; Winter et al., 2016). Despite its widespread use in PA interventions, feedback was not intentionally deployed in this study as a method to change behaviour. Yet, one cannot

overlook the positive effect it may have had in keeping participants until the end of the intervention, even if not on their performance. It could also be presumed that the social support from other participants contributed to the low attrition. While this speculation may explain the low attrition for the OPC + SS condition, it fails to explain the low attrition for the other conditions where social support was discouraged, yet attrition was low.

5.4.1.2 Limitations

There are several reasons why the intervention might not have produced benefits over the control condition. One of the reasons relates to the low statistical power. As an example, there were no statistical differences between the three conditions. A post hoc power analysis was conducted for the one-way ANOVA which compared goal attainment between the three conditions at T2. With an effect size of .201, a pooled population standard deviation of 2862.91 and significance criterion of α = .05, the obtained power was .389. Unfortunately, this was substantially below the desired power level (i.e., 80%) that is typically required for the prevention of committing a type II error. A sample size of 385 would have been more than sufficient to achieve this desired power level of 80% for detecting a medium effect, using Cohen's (1988) criteria.

Another potential limitation of this study was the use of a single-item to measure the OPC construct. Of course, single-item measures can have their advantages, for example, the speed of executing such measures can have a direct impact on the mental load associated with answering a questionnaire (Straub & Gefen, 2004). Similarly, Drolet and Morrison (2001) have argued that increasing the number of items increases fatigue, boredom, and lack of concentration. Different emotional states lead to certain inappropriate response behaviours.

However, single-item measures have a low content validity (i.e., their psychometric weakness). A construct can have several different facets, several dimensions that contribute to defining it (Kerlinger & Lee, 2000). Online public

commitment, as previously discussed in chapter 2, is not a unidimensional construct, rather, it consists of several distinct dimensions that can be conceptualised under an overall abstraction. By using a single-item measure, it is possible that the territory of the target construct to be considered valid cannot be covered sufficiently when compared to a multi-item measure (Allen et al., 2022). The second disadvantage with a single-item measure is that it would be very difficult to calculate its reliability (Churchill, 1979; Cuvillier et al., 2021). Measures of reliability usually uses Cronbach's alpha (Cronbach, 1951) to calculate internal consistency, and this coefficient is based on the correlations between the different items. This certainly underscores the need for scale development for assessing OPC.

A third limitation of this study is the self-reported nature of the measures. Self-reported measures have an advantage in that they can be administered to a large sample of people quickly without much effort or financial cost, and they enable the collection of a large amount of quantitative data (Demetriou et al., 2015). Nevertheless, self-reported measures can be subject to response bias, which is the tendency to provide inaccurate or even false answers. Response bias may have potentially impacted the interpretation of the study's results in two ways. First, conventional wisdom suggests that individuals will typically use extreme categories in rating scale response (Lee et al., 2022; Zhang & Wang, 2020), which may perhaps explain the high variability in the study data. Research shows that extreme response styles (ERS) are one of the major sources of common method bias (Podsakoff et al., 2012) and can cause biased statistical estimates (Mõttus et al., 2012) and group comparisons (Moors, 2012).

As in demonstrated in many studies (e.g., Bélanger-Gravel et al., 2013; Dlugonski et al., 2020; Murawski et al., 2020; Robinson et al., 2019), the use of device-based PA instruments would have provided a more reliable and objective measure of PA, due to reducing measurement error (Fiedler et al., 2021; Boddy et al., 2019; Fairclough et al., 2016). However, employing device-based measures are not without limitations. For instance, they do not collect contextual information (Small et al., 2021; Sattler et al., 2021; Hukkanen et al., 2018; Doherty et al., 2017). Another limitation is

the potential for self-selection bias in the samples that are willing to provide accelerometer data, and this may reduce representativeness (Galea & Tracy, 2007). Also, given the wide variety of devices that measure different aspects of movement – from pedometers which measure steps, to more advanced accelerometers which measure changes in speed or direction at a high resolution – it clearly shows that methods for data processing are not yet standardised.

Both device-based and self-reported instruments have their place in measuring different aspects of the PA construct. Self-report instruments are assumed to capture the perceived PA behaviour, whereas device-based instruments aim to capture the continuous acceleration of the body above a certain threshold (Bradenburg et al., 2023). Hence, there is value in combining both types of instruments, depending on the research questions. For example, Donnachie et al. (2020) examined the responsiveness of wearable devices and self-reported measures in detecting PA change during a 12-week weight-management programme, and found that the inclusion of both device-based and self-reported measures demonstrated responsiveness to changes in PA.

A second limitation of this study is the issue of social desirability, in that participants may have responded in a socially acceptable way. Research suggests individuals report higher rates of normative behaviour than is warranted (Brenner & DeLamater, 2016). Requesting participants to publicise and to exchange social support may be valued by the participants and widely seen as good for them in terms of their contribution to their respective Facebook groups and the research generally. Due to this, participants, especially in the control condition, may have provided socially desirable responses to the administered manipulation checks that were consistent with their allocated condition, even when their behaviour did not support such claims.

5.4.2 Conclusion

Prior to this study, there was limited evidence of the efficacy of an OPC intervention influencing EBRBs. Also, there was limited research investigating the importance of SS in the relationship between OPC and behaviour change, although

other OPC studies have qualitatively investigated this topic (e.g., Munson et al., 2015). Behaviour change in this study was measured via increases in goal attainment and PA. This study confirms that, indeed, a BI to change a PA-related behaviour is not sufficient to guarantee behaviour change, which is consistent with the literature on behaviour-intention gap in the area of PA (Amireault et al., 2008; Feil et al., 2023; Sniehotta, Scholz, et al., 2005).

Overall, the findings did not observe any statistically significant differences in the primary outcomes between those who made and OPC and those who kept their commitments private, in order to make conclusive statements about the efficacy of OPC. Before overinterpreting these negative findings, the aforementioned limitations are worth taking into considerations to avoid the danger of type 2 error. All participants were able to increase their scores in primary outcomes during the active phase of the intervention (T0 to T2). Even after the active phase of the intervention had ended, and the intervention participants were given the choice to exit the Facebook groups, a majority of participants (71% in group A, and 93% in group B) decided to remain. Thus, one of the conclusions of this study is that online social networks can provide remarkable opportunities for PA promotion, due to easy access, ability to reach a large audience, low cost, and availability. Internet delivered interventions also offer an alternative to traditionally delivered LMPs in terms of addressing the issue of attrition – a major obstacle for traditionally delivered LMPs (Goode et al., 2016; Honas et al., 2003; Miller & Brennan, 2015; Pirotta et al., 2019). Additionally, the interaction among participants enhances efficaciously social support, which has been understood as a determinant of PA behaviour (Colangelo & Weissbrod, 2019; Golaszewski et al., 2022; Mustafa et al., 2015). Although more research to understand which specific factors are perceived as important for producing optimal goal attainment outcomes.

Chapter 6 – Study 3: A 12-Week Qualitative Follow-Up of Participants Who Attended an Online Public Commitment (OPC) Intervention

6.1 Introduction

The aim of lifestyle modification programmes (LMPs) for obesity and overweight is to address changes in energy balance-related behaviours (EBRBs) (Al-Hazzaa et al., 2012; Barte et al., 2010; Galani & Schneider, 2007; Looney & Raynor, 2013; Wadden, 2006, 2014). Thus, LMPs remain the foundation for optimal prevention and treatment strategies in overweight and obese patients (Al-Hazzaa et al., 2012; Bravata et al., 2003; Diao et al., 2020; Galani & Schneider, 2007; Looney & Raynor, 2013; Wadden et al., 2012; Webb & Wadden, 2017). However, interventions can only be deemed effective if participants remain committed to engaging in these behaviours, both in the short- and long-term. Study 1 (chapter 2) provided an initial qualitative insight into the experiences, beliefs and opinions of those who have made an online public commitment (OPC) to change their EBRBs. Then, utilising a theoretical rationale derived from public commitment (PC) research (Dellande & Nyer, 2007b; Kiesler, 1971; Nyer & Dellande, 2010; Nyer & Gopinath, 2005; Shippee & Gregory, 1982), an OPC intervention (study 2, chapter 4) was designed to encourage participants to commit publicly to engage in EBRBs using computer-mediated communication (CMC).

It was hypothesised in study 2, that participants who make an OPC would have greater increases in goal attainment, physical activity, mental well-being and relative autonomy, than participants who kept their commitment private. It was further hypothesised that participants' whose OPC was accompanied by social support (SS) would have greater increases in the four study outcomes than participants in the private commitment condition. This study builds on studies 1 and 2 through a post-

intervention follow-up of participants who took part in the OPC intervention between February 2022 and January 2023, and who self-reported optimal changes in goal attainment and PA. A qualitative design is employed to explore the perceived success factors responsible for achieving and sustaining behaviour change.

Overweight and obesity remains a pressing public health challenge given the associated adverse medical, psychological, social, and economic consequences (Lv et al., 2017). Lifestyle modification programmes (LMPs) for treating overweight and obesity have traditionally prescribed a combination of diet, PA and cognitive-behavioural therapy (McKay et al., 2001; Salam et al., 2020; Wadden et al., 2012, 2020). Face-to-face (FtF) interventions have previously proven successful for improving EBRBs (Conn et al., 2011; Franzago et al., 2022; Papakonstantinou et al., 2022). However, FtF LMPs are resource and cost intensive (Peels et al., 2014; Schulz et al., 2014), and are often limited by geographical constraints and lack of personalisation. In addition, some people are uncomfortable disclosing sensitive and often stigmatised information in a FtF setting (Puhl & Heuer, 2010; Tomiyama et al., 2018).

An alternative is internet-delivered (ID) LMPs. The last decade has seen an increasing number of internet-delivered (ID) interventions that aim to elicit changes in EBRBS, especially PA behavioural changes (Allam et al., 2021; Irvine et al., 2013; Kosma et al., 2005; Mailey et al., 2016; Massoudi et al., 2010; Wijsman et al., 2013). Due to the increased use and acceptance of the internet and mobile-optimised devices in older adults, ID LMPs are increasingly adopted in health promotion (Wichmann et al., 2020). Despite the popularity and use of ID LMPs for the widescale promotion of PA, few have been designed to incorporate an OPC as a behaviour change technique. Perhaps this may be due to a lack of robust evidence to support the efficacy and effectiveness of ID LMPs which incorporate an OPC strategy, however, it seems a promising approach to support changes in EBRBs (Cavallo et al., 2012; Consolvo et al., 2006; Munson et al., 2015), which is becoming increasing attracting to researchers.

Internet-delivered LMPs offer advantages such as being able to deliver interactive and individualised interventions to large groups (Vandelanotte et al., 2007); the capacity to instantaneously deliver tailored intervention messages to participants without the delays commonly found in print or telephone-delivered interventions (Marcus et al., 2000); and the ability to provide 24-hour access to intervention materials, which increases the convenience, access, and exposure of intervention messages (Joseph et al., 2014). Despite the numerous benefits of ID LMPs over FtF LMPs, they predominantly demonstrate short-term effectiveness in improving EBRBS, especially PA behaviour (Dlugonski et al., 2012; Norman et al., 2007; Portnoy et al., 2008; Vandelanotte et al., 2007). The success of all interventions, whether delivered online or FtF, becomes tangible when the interventions are designed to fit with individual goals, expectations, and motives for behavioural change (Zubala et al., 2017). However, this requires the close consideration and understanding of the target group. To this end, it is crucial to explore the factors underlying their efficacy and effectiveness to inform the development of future research to produce greater behavioural changes.

There is an overwhelming volume of systematic reviews that have identified specific intervention elements of LMPS geared towards the promotion of PA which lead to efficacious outcomes. Some of these elements include: frequency of contacts (Vandelanotte et al., 2007); provision of educational resources (Davies et al., 2012); the use of popular existing social network sites such as Facebook (Napolitano et al., 2013); the use of strong-tie as opposed to weak-ties support networks (Foster et al., 2010); intervention duration (Vandelanotte et al., 2007); tailored delivery (Lustria et al., 2013; Vandelanotte et al., 2007) and provision of feedback (Krebs et al., 2010; Kroeze et al., 2006) amongst others. These reviews are limited to empirical evidence, as opposed to data that provides in-depth understanding of human behaviour and the reasons that govern such behaviour. However, aside from the typical limitations associated with systematic reviews (for example, risk of selection bias, attrition bias, inadequate

blinding; Owens, 2021), none of the included studies utilised an OPC approach to change behaviour. Given that OPC is an under-research area, this is unsurprising. A lack of qualitative data limits a full understanding of why an OPC intervention is effective for promoting PA behaviour change.

To this end, a better research approach would be to conduct a post-intervention follow-up of participants who had received an OPC intervention, in line with the recommendations of Davies et al. (2012), and OPC researchers alike (e.g., Consolvo et al., 2006) who have emphasised the importance of gaining an understanding of the various aspects of ID LMPs that will enhance efficacy and effectiveness. The importance of long-term follow-up of intervention outcomes (i.e., at least 6 months beyond intervention) to capture true maintenance of behaviour change, has also been highlighted (Jennings et al., 2014; Vandelanotte et al., 2007). It is debatable whether a period of 12 weeks is long enough to determine long-term effects of ID LMPs. Hence, the focus of this study is on post-intervention experiences, which is equally as important for an OPC intervention. Especially where an argument commonly pitted against the use of financial incentives – a different form of commitment making – is that the behaviour change is rarely sustained once the intervention ceases (Burns et al., 2012; Jeffery, 2012; John et al., 2012; McGill et al., 2018; Paloyo et al., 2014; Paul-Ebhohimhen & Avenell, 2008; Sykes-Muskett et al., 2015; Wall et al., 2006).

The significance of this study is underscored by the need to conduct a process evaluation especially within complex intervention research. Process evaluation is an essential part of designing and testing complex interventions (Moore et al., 2015). Indeed, from the pragmatic standpoint guiding this entire research process, a key change in the field of evaluation has been a shift towards assessing the 'usefulness' of information for decision-making, in contrast to focusing exclusively on obtaining unbiased estimates of effectiveness (Deaton & Cartwright, 2018). Thus, there is a crucial need to understand the factors which determine the efficacy of OPC's from the perspective of participants who have direct experience of making an OPC in a

controlled setting. In addition, via a post-intervention follow up, there is also a need to understand the factors which determine the effectiveness of an OPC intervention to know how well the intervention works in a real-world setting.

Table 16 (below) shows an overview of the sub-topics and associated studies reviewed in this section, including their research design, target population and location.

Table 16:
Overview of the reviewed sources (Study 3)

Topic	Sub-topic	Authors (date)	Research design	Target population, and location (if know)	Findings
Efficacy of internet-delivered interventions	The efficacy of internet delivered interventions over other types of interventions	Joseph et al. (2014)	Systematic review	Internet- and website-based physical activity intervention targeting adult population	• The finding suggests that internet-delivered physical activity interventions are equally as effective in promoting behaviour change as more established delivery methods such as in-person or print. • Furthermore, since Internet-based interventions have the potential to reach a greater number of people at a lower cost, they represent a cost-effective method in which to promote physical activity.
Factors associated with efficacious outcomes of internet-delivered intervention that elicit changes in EBRBs	Frequency of contacts/interactions with intervention	Vandelanotte et al. (2007)	Systematic review	Internet- and website-based physical activity intervention targeting adult population	Interventions with greater than five communications, such as via e-mail, discussion boards, chat sessions, or online coaches demonstrated more positive changes in physical activity than those with five or fewer contacts.
		Neville et al. (2009)	Systematic review	Computer-tailored primary prevention interventions for physical activity	Ensuring multiple exposures to the intervention material
	Entertainment	Cheung et al. (2011)	Quantitative survey	Facebook users	Entertainment was recognised

				as being a key motivator for Facebook use.
Lack of face-to-face contact	Vandelanotte et al. (2007)	Systematic review	Internet- and website-based physical activity intervention targeting adult population	LMPs without a face-to-face contact with participants at the beginning of the intervention are as effective as those that have an initial face-to-face contact.
Motivation for changing a behaviour or motivation to use an internet intervention as a means to accomplish behaviour change	Hansen et al. (2012)	Experimental (Internet-delivered randomised controlled trial)	Physically inactive adults, Denmark	a Web-based PA intervention can improve their level of PA. However, for unmotivated users, single-tailored feedback may be too brief.
Provision of education resources	Davies et al. (2012)	Meta-analysis	Internet- and website-based physical activity intervention targeting adult population	The meta-analysis showed that including a structured educational materials that involved the exchange of information intended to influence physical activity was the only intervention feature found to moderate intervention effectiveness.
The use of popular existing social network sites	Napolitano et al. (2013)	Experimental (Internet-delivered randomised controlled trial)	University students	The use of Facebook managed to retain a high proportion of participants across the study period (77-96% of users). However, they typically did not achieve high engagement.

	(Günther et al., 2021)	Scoping review	Social media interventions that promote physical activity	• The most commonly incorporated platform in PA interventions is Facebook. • There is no fundamental need for the development of new platforms, but relying on pre-existing applications and using them purposefully will be sufficient for future health behaviour change interventions.
	Rote et al. (2015)	Experimental (internet-delivered randomised controlled trial)	Female undergraduate students, USA	Our hypothesis, that women enrolled in the Facebook Social Support Group would increase steps/day significantly more than women enrolled in a Standard Walking Intervention, was supported.
	Cavallo et al. (2012)	Experimental (internet-delivered randomised controlled trial)	Undergraduate students, USA	An intervention using Facebook to be no more effective than an education only intervention.
The use of participants who already knew each other versus participants who were strangers	Foster et al. (2010)	Experimental (internet-delivered randomised controlled trial)	Nurses, UK	The 105% engagement rate was partly due to recruiting participant who knew each other. This was found to be more in tune with how people use online social networks, given that people more commonly use Facebook to interact with people with whom they share an offline connection as well, rather than using Facebook to interact with new people.

	Receiving feedback	Krukowski et al. (2008)	Cohort	Adults with weight loss intentions	Receiving feedback, including progress process and physiological parameters are positive predictors of success for internet-based weight control programs.
	Tailored delivery	Krebs et al. (2010)	Meta-analysis	Computer-tailored interventions that focus on smoking cessation, physical activity, healthy eating and receiving regular mammography screening	Providing additional contact, updating feedback to reflect a person's changes may increase information relevance and depth of processing.
		Neville et al. (2009)	Systematic review	Computer-tailored primary prevention interventions for physical activity	• Tailoring according to the participant's stage of change was found to be effective. • Tailoring feedback in more than one way was also found to be effective.
		Krebs et al. (2010)	Meta-analysis	Computer-tailored interventions that focus on smoking cessation, physical activity, healthy eating and receiving regular mammography screening	Dynamic tailoring is more efficacious than static tailoring for all interventions employing either single or multiple delivery modes.
		Lustria et al. (2013)	Meta-analysis	Internet-delivered tailored health behaviour change interventions	Tailored websites were significantly more effective than nontailored websites in achieving behavioural outcomes (d = .188)

	Vandelanotte et al. (2007)	Systematic review	Internet-delivered interventions that promote physical activity	Compared with generic information users find tailored information more interesting and engaging because it is personally relevant.
	Krebs et al. (2010)	Meta-analysis	Computer-tailored interventions that focus on smoking cessation, physical activity, healthy eating and receiving regular mammography screening	Computer-tailored interventions can provide large numbers of people with individualised behaviour change information at low cost.
	(Neville et al., 2009)	Systematic review	Computer-tailored primary prevention interventions for physical activity	Compared with generic messages, tailored messages are more likely to be read and remembered, saved, and discussed with others.
	Brug et al. (2005)	Systematic review	Internet-delivered interventions that promote diet	Using a form of computer tailoring that is embedded in the internet-delivered intervention might increase interactivity and in turn enhance participant retention and outcomes.
	Evers et al. (2005)	Systematic review	Computer-tailored primary prevention interventions for physical activity	Using a form of computer tailoring that is embedded in the website-delivered intervention might increase interactivity and in turn enhance participant retention and outcomes.
	Kroeze et al. (2006)	Systematic review	Internet-delivered interventions that promote physical activity and diet	In using computer tailoring, an online questionnaire is linked to scoring algorithms that allow participants to be

				provided with immediate and personally relevant feedback about their health behaviour, plus individually adapted tips and suggestions on how to change.
	(Kroeze et al., 2006)	Systematic review	Internet-delivered interventions that promote physical activity and diet	It is effective to provide feedback that is relevant to performance levels, awareness, motivation, self-efficacy, expectations and goals.
The intervention should be based on theory	Neville et al. (2009)	Systematic review	Computer-tailored primary prevention interventions for physical activity	Whilst it was found that the intervention should be based on theory, no one theory has proven to be more applicable or effective.
	Joseph et al. (2014)	Systematic review	Internet-delivered interventions that promote physical activity	Theoretically based interventions had similar outcomes as non–theoretically based interventions.
The type of technology used	Neville et al. (2009)	Systematic review	Computer-tailored primary prevention interventions for physical activity	Success of the intervention does not appear dependent on the technology used in its delivery.
Multi-modal	Lustria et al. (2013)	Meta-analysis	Internet-delivered tailored health behaviour change interventions	Web-based tailored interventions may include other modalities (i.e., video, audio, discussion forums, chat) that provide greater interactivity and different knowledge, skills building, and self-management tools (e.g., blood glucose monitoring tools; electronic journaling). The multimodal and interactive nature of web-based tailored interventions may

				improve their effectiveness by enhancing patient participation and engagement.
	Norman et al. (2007)	Systematic review	Internet-delivered interventions that promote physical activity and diet	Providing prompts through another medium are effective.
	Rote et al. (2015)	Experimental (internet-delivered randomised controlled trial)	Female undergraduate students, USA	Efficacy of a physical activity intervention using Facebook may be improved by not requiring participants to visit a separate website (other than Facebook) for intervention materials.
	Goodyear et al. (2021)	Systematic review	Social media interventions for physical activity and diet since 2014	• Multi-modal uses of social media, whereby data from wearable fitness trackers was connected with participants' social media accounts, was found to be effective. • The study also provide important evidence of the positive effects of the contemporary uses of technology, in relation to the multi-modal connectivity of smart devices, self-surveillance practices, the automation of actions and the role of gamification in social media interventions.
Targeting single versus multiple health behaviours	Lustria et al. (2013)	Meta-analysis	Internet-delivered tailored health behaviour change interventions	The results indicated that tailored web-based interventions targeting a single health behaviour were not significantly

				more efficacious than those targeting multiple health behaviours.
Self-guided versus expert-guided	Krebs et al. (2010)	Meta-analysis	Computer-tailored interventions that focus on smoking cessation, physical activity, healthy eating and receiving regular mammography screening	No significant differences were obtained when comparing effect sizes of self-guided and expert-guided, web-based tailored interventions. While additional feedback from experts can improve efficacy, interventions with less expert input can be just as effective.
The use of incentives, gamification and other interactive features	Goodyear et al. (2021)	Systematic review	Social media interventions for physical activity and diet since 2014	Interventions that used contemporary social media sites tended to focus on multiple types of social media use (i.e. information, interaction and gamification), and often included a focus on gamification, such as through challenges, competitions or rewards.
	Alley et al. (2018)	Experimental (internet-delivered randomised controlled trial)	Adults, <55y and ≥55y, Australia	An intervention with interactive features may be effective at improving short-term intervention effectiveness in older adults
Intervention duration	Vandelanotte et al. (2007)	Systematic review	Internet-delivered interventions that promote physical activity	Interventions shorter than 3 months did relatively well; five of eight had positive outcomes. The lower efficacy rates for interventions longer than 3 months might be explained by the strong decline in website usage over the course of the intervention, as discussed in the information to follow.

	Joseph et al. (2014)	Systematic review	Internet-delivered interventions that promote physical activity	Longer-term interventions (greater than 6 months in duration) appeared to be as successful in promoting improvements in physical activity as shorter-term interventions.
Self-efficacy	Alley et al. (2018)	Experimental (internet-delivered randomised controlled trial)	Adults, <55y and ≥55y, Australia	• Internet self-efficacy in older adults was positively associated with usability ratings and intervention satisfaction. • Internet self-efficacy was also positively associated with older adults' time spent on the website
Social support and peer networks	Rote et al. (2015)	Experimental (internet-delivered randomised controlled trial)	Female undergraduate students, USA	• The hypothesis, that women enrolled in the Facebook Social Support Group would increase steps/day significantly more than women enrolled in a Standard Walking Intervention, was supported. • The creation of a social support group is pivotal to the success of physical activity interventions using Facebook. • The size of the social support group may be important to consider. Intervention group size can influence the success of an intervention with the ideal group size to facilitate social

			support being 5 to 9 individuals. Groups that are larger than this size risk overloading individuals with information (e.g., if someone has to sort through over 20 posts on the group page every day), while groups that are smaller than 5 individuals may risk not supplying sufficient levels of social support (e.g., if only 2 individuals post regularly).
Valle et al. (2013)	Experimental (internet-delivered randomised controlled trial)	Young adult cancer survivors	The intervention including a social support group resulted in greater increases in physical activity, pointing to the importance of this component within physical activity interventions using Facebook.
Zhang et al. (2015)	Experimental (internet-delivered randomised controlled trial)	Graduate students, USA	• Peer networks significantly improved participation levels while also increasing self-reported levels of engagement with physical activities. • Real-time signals about peers' exercise behaviours constituted the main form of social influence, which may have helped to form participants' normative perceptions about the SHAPE-UP community.
Zhang et al. (2015)	Experimental (internet-delivered	Graduate students, USA	Real-time signals about peers' exercise behaviours constituted the main form of social influence, which may have helped

		randomised controlled trial)		to form participants' normative perceptions about the SHAPE-UP community.
	Divine et al. (2019)	Mixed methods (concurrent design)	Undergraduate students	Facebook (FB) use was related to external and introjected regulation. Positive relationships between FB and autonomous forms of motivation were mediated by relatedness, suggesting that interventions should focus on fostering feelings of connection with others. FB use that encourages relatedness with like-minded individuals has potential to promote autonomous motivation for exercise.
Promotional messages	Zhang et al. (2015)	Experimental (internet-delivered randomised controlled trial)	Graduate students, USA	Promotional messages were effective for increasing initial engagement in exercise classes. However, these effects attenuated over time

6.1.1 Study Aim

The present study involved a thematic analysis of the experiences and perceptions of participants who participated in a 24-week OPC intervention programme aimed at increasing levels of physical activity (PA) and PA-related goal attainment (i.e., study 2). Given the hypothesis of study 2 and the anticipation that making an OPC would result in higher levels of PA, goal attainment, relative autonomy and mental well-being, the purpose of the study was to use a qualitative design with individual semi-structured interviews to collect qualitative data from participants who can best help explain these findings. By understanding what works (that is, effective intervention components) and what does not work (that is, ineffective intervention components) in IDIs that address energy balance-related behaviours (EBRBs), this will increase the efficacy and relevance of these interventions.

6.1.2 Research Questions

The specific research question was:

1. What are the perceived factors that lead to success for those who were able to change their PA behaviour after making an OPC?

6.2 Methods

6.2.1 Design

A qualitative design using semi-structured interviews was chosen as the most appropriate method to address the research questions, given the desire for in-depth data on the experiences of participants who changed their PA behaviour after making an OPC. The study was underpinned by an interpretivist epistemology. Interpretivism is based on the assumption that reality is subjective, multiple and socially constructed. This approach was taken as it allowed for subjective meaning to be explored with each participant while acknowledging the role of context in shaping

knowledge and meaning. Ethical approval for this study was granted by Liverpool John Moores University (LJMU) Research Ethics Committee (Ref: 22/SPS/001).

6.2.2 Participants

Participants were recruited from a previous study investigating the effects of OPC on PA-related goal attainment (i.e., study 2). In this study, a subsample of participants (n = 26) from the two intervention conditions (OPC + SS and OPC only), were invited, using purposeful sampling (i.e., selection of participants that are relevant to the research question). Participants who were able to increase and/or sustain their PA were identified based on self-reports at 6 weeks, 12 weeks and 24 weeks, and invited to participate in the interviews. Of the 26 who were invited, 11 were interviewed. The sample size was not decided upon a priori but data collection continued until data saturation had been reached (i.e., where no new information was being discovered). The decision to halt data collection was based on both "information redundancy" (Braun and Clarke, 2019; Lincoln & Guba, 1985; Low, 2019) whereby the qualitative data collected from the 11 participants was sufficient in explaining the significant findings obtained from the 2nd quantitative study, and the pragmatic constraints of the research process (i.e., time and resources available to the researcher) (Green and Thorogood, 2004; O'Reilly & Parker, 2012).

In terms of information redundancy , it was observed that all possible themes were found after collecting and analysing data from 10 participants. At this point in data collection and analysis, new information produced little or no change to the codebook. The additional interview (+1) was needed to confirm the stopping criteria. This approach is somewhat consistent with Francis et al (2010) and others (e.g., Guest et al., 2006; Ando et al., 2014) who argued that researchers seeking saturation should complete at least 10 interviews that must be concluded by three consecutive interviews. Although more attempts could have been made to conduct more interviews with the 15 potential participants who did not respond to the initial email

(e.g., by sending a reminder email), a pragmatic decision was taken to halt data collection due to the constraints of time and resources.

The sample consisted of men ($n = 4$) and women ($n = 7$) aged between 18 and 57 (mean age 31.4 years). They described themselves as White British ($n = 6$), Black British (African) ($n = 2$), Black British (Caribbean) ($n = 2$) or Asian (Pakistani) ($n = 1$) and as either single ($n = 4$), married ($n = 3$), divorced ($n = 2$), or living with a partner ($n = 2$). Table 17 (below) shows demographic information of all participants, including information about their OPC and PA attainment.

Table 17:
Participant information (Study 3)

Pseudonym	Sex	Age	OPC	PA change (T0 to T2) (METs)	PA change (T2 to T3) (METs)	Condition
Michael	Male	23	Complete 5K run	1102.25	3.65	OPC + SS
Anna	Female	47	To improve aerobic fitness	645.88	196.36	OPC + SS
Veronica	Female	19	Improve level of fitness/endurance	785.93	235.58	OPC + SS
Alex	Female	39	Be able to run continuously for 1 mile	585.68	31.56	OPC + SS
Bob	Male	18	Increase flexibility and aerobic fitness	914.74	198.33	OPC + SS
Sarah	Female	25	To reduce body fat by 25%	974.63	46.92	OPC only
Melody	Female	32	To lose 10kg in 10 weeks	658.76	539.31	OPC only
Victoria	Female	36	To build strength	773.06	6.54	OPC + SS

Lucas	Male	21	To achieve an ideal BMI of 19.5	4215.90	405.74	OPC + SS
Tatiana	Female	57	Exercise 4 days a week at the gym	602.32	521.00	OPC only
Hugo	Male	28	To run 10k within an hour	258.69	827.65	OPC + SS

6.2.3 Interview schedule

The semi-structured interview was guided by an interview schedule (Appendix 6A) based on the research questions described above. Each interview began with broad, general questions that allowed participants to direct the interview and talk at length about themes they found interesting. This was followed up with probes and focussed questions to clarify and deepen the answers. Topics addressed included (1) necessary conditions for making an effective OPC, in terms of increases in PA, and (2) factors influencing the post-intervention sustenance of PA behaviour. The semi-structured interview schedule allowed a flexible structure that could be both responsive to individual accounts, whilst staying focussed on the core aims of the study.

6.2.4 Procedure

During study 2, participants were informed that they may be invited to take part in a semi-structured qualitative interview at the end of the study. Consequently, between December 2022 and February 2023, participants who met the inclusion criteria were contacted by email and phone to take part. Participants were provided with a participant information sheet (Appendix 6B) in advance of the interview, providing further details about the purpose and nature of the study. They also signed and returned a consent form (Appendix 6C) for participation and audio recording, after which a convenient time and location was arranged to conduct the interview.

As an incentive to take part, participants were offered a £10 Love2Shop voucher. All participants were interviewed virtually using Microsoft Teams or Skype. The interviews were conducted on a one-to-one basis to allow participants the space to reflect on their own experience. Interviews lasted between 45 and 60 minutes. Right to withdraw from the study, confidentiality and data security were emphasised, as was follow up support after the study, if required. For the purpose of anonymous reporting, the participants have been given pseudonyms omitting all identifying information. No participants withdrew from the study. In the interest of consistency, the principal researcher conducted all interviews.

6.2.5 Data Analysis

Following the completion of each interview, digital recordings were transcribed verbatim, and data analysis using the inductive thematic analysis procedure outlined by Braun and Clarke (2006), which is a method that is highly adaptable, diverse and compatible with a wide range of methodologies and epistemologies. In particular, it has also been shown to be a useful research tool for gaining into common themes from a heterogenous population (Braun & Clarke, 2006).

The current study was analysed using the six steps of thematic analysis, which includes: step 1 - familiarisation with the dataset, step 2 - initial coding generation, step 3 - generating initial themes, step 4 – developing and reviewing themes, step 5 – refining, defining and naming themes, and step 6 - writing up. This technique was chosen because it offers a flexible method to gain a rich and detailed account of data. Since Braun and Clarke (2006) first introduced traditional thematic analysis, there has been an increasing focus on reflexive thematic analysis (Braun & Clarke, 2019, 2023; Byrne, 2022; Campbell et al., 2021; Kua et al., 2022; Drinkwater et al., 2022; Brennan et al., 2024) – an approach that permits the principal researcher's subjectivity to be the primary tool for data analysis. Adopting a reflexive approach to data analysis was beneficial because – unlike other approaches which accentuate the measurement of accuracy or reliability when coding data (Boyatzis, 1998; Joffe, 2012; Roberts et al.,

2019) – it allowed the researcher to systematically capture and use his insights. Furthermore, it was important to utilise an approach that did not treat the researcher's perspective as a hidden "bias" or weakness to overcome.

To this end, each transcript was read multiple times in an active and subjective manner by searching for patterns and meanings and noting these ideas until it becomes familiar territory. The researcher paid close attention to his initial reactions and assumptions during familiarisation with the dataset. After familiarisation, initial codes of anything that may be of relevance were coded from the data into manageable, discreet excerpts. Then, when all data were coded and collated, the principal researcher re-focused the analysis at the broader level of themes, rather than codes. In this stage, the focus shifted from the interpretation of individual data items within the dataset, to the interpretation of aggregated meaning and meaningfulness across the dataset. This involved sorting the different codes into initial candidate themes, and collating all the relevant coded data extracts within the generated themes. There were no hard-and-fast rule as to what counts as a theme/pattern, or what 'size' does a theme need to be. However, as a practical starting point for determining the prevalence of a theme, it was decided that a criterion for forming an initial candidate theme was at least two occurrences in the data in at least two interviews. This did not necessarily mean that the more occurrences of a theme does not necessarily mean the theme itself is more crucial. A theme was characterised by its significance in answering the research questions. Hence, it was important to retain some flexibility because rigid rules would not have worked, as highlighted by Braun and Clarke (2006). Initial candidate themes that did not fit within the overall analysis or helped to address the research questions were removed later in the analysis.

When the set of initial candidate themes were devised, the next stage involved the refinement of these themes. During this stage, it became evident that some initial candidate themes were not really themes, especially when there was not sufficient data to support them. Indeed, other themes were merged under one overarching

theme, or broken down into separate themes. Themes were refined and defined by capturing the 'essence' of each theme and until data within themes fit together (internal heterogeneity) and each theme was distinct from each other (external heterogeneity; Braun & Clarke, 2006). Thereafter, a thematic map was created. Finally, quotations were selected which clearly represented the generated issues within each theme. The analysis was carried out semantically meaning that the themes were generated within the explicit or surface meanings of the data and the principal researcher was not looking for anything beyond what participants have said. Appendix 6D provides a copy of the research memo that was used to capture's the researcher's thoughts, insights and decisions during the qualitative data analysis.

6.2.6 Methodological Rigour

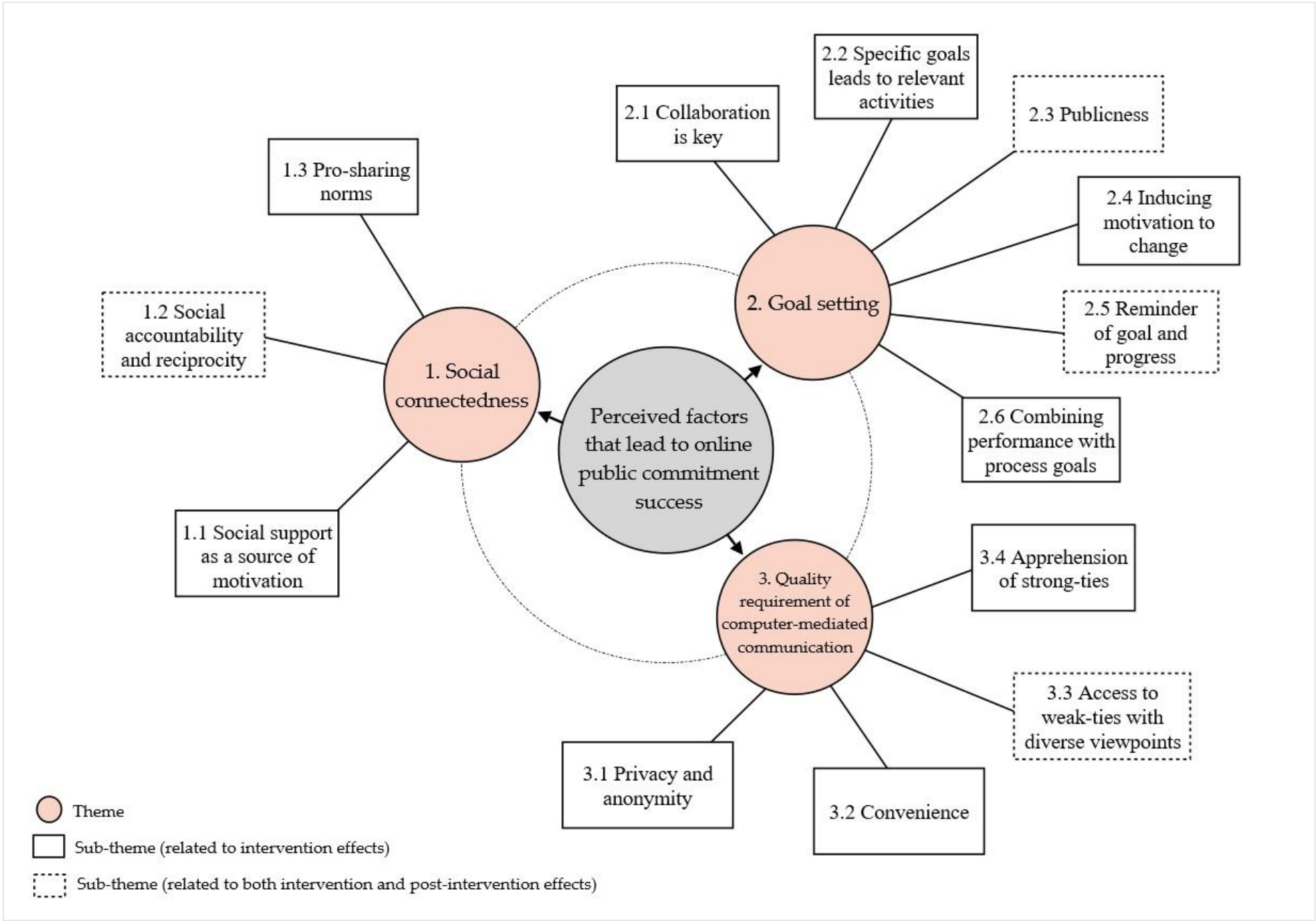
This section describes the various strategies used to assess the rigour of this qualitative study. Rigour has been defined as the strength of the research design and the appropriateness of the methods to answer the research questions (Cypress, 2017). It has been argued that qualitative research, being influenced by multiple realities and being a journey of explanation and discovery, should not be assessed by the same criteria used to assess quantitative research (i.e., validity and reliability). Lincoln and Guba (1985) were the first to suggest a new way of looking at validity and reliability by replacing these terms with the concept of "trustworthiness". Trustworthiness refers to quality, authenticity, and truthfulness of findings of qualitative research (Cypress, 2017), and is assessed by the criteria of credibility, dependability, confirmability and transferability. In fulfilling the four trustworthiness criteria (Lincoln & Guba, 1985), this study implemented many of the strategies outlined in study 1 (Table 6, *section* 4.2.2).

6.3 Results

The analysis of the interviews culminated in the development of three themes, and 16 sub-themes, viewed as essential to determine the experience of all the

participants (see Figure 22). A theme provides some insight in answering the research question, and represents some level of patterned response or meaning within the data set, while a sub-theme are more specific topics under the theme. Most of the sub-themes relate to effects of OPC intervention on short-term behaviour change (i.e., during the 12-week intervention period), whilst some of the themes relate to both short term and post intervention period (after 12 weeks). The contents of each theme and sub-theme are described below (in no particular order) and illustrated using quotes from the participants. Various terminologies (e.g., "a majority of participants" , "most participants", "many participants", "a significant number of participants", "a prominent theme") have been used interchangeably in this section as conventions for representing prevalence of themes/sub-themes in the analysis. Whilst not a core focus of thematic analysis – after all this is a qualitative analysis (Braun and Clarke, 2006) – the number of participants who articulated the theme/sub-theme across the entire dataset has been highlighted to provide context and to support the interpretations of the researcher.

Figure 22:
Thematic diagram of identified themes and sub-themes (Study 3)



Theme 1: Social Connectedness

Social connectedness relates to participants' need for relatedness, or the experience of feeling close and connected to others. It seemed that when the psychological need for relatedness was met through participants' interactions with one another, it became a key driver of motivated behaviour. Facebook provides several key metrics that are important for measuring Facebook group engagement (i.e., posts comments, reactions) and growth (i.e., total numbers, membership requests). A table showing these metrics for the two Facebook groups are shown in Appendix 6E. In a 92-day period, participants in both Facebook groups contributed a total of 211 posts (i.e., an average of 2 posts per day), 711 comments (i.e., an average of 8 comments per day) and 490 reactions. The participation rate showed that 30.8% of the OPC only Facebook group were active members, while 69.8% of the OPC + SS Facebook group were active members. In total, 50.8% of participants in both Facebook groups were active members. These metrics indicates that the two Facebook groups, especially the OPC + SS group, had a relatively stable level of engagement and social connectedness. A larger number of participants actively contributed online content (i.e., "posters") than those preferred who observe and consume content in online communities but do not actively participate in posting or commenting (i.e., "lurkers").

Four sub-themes fall under this theme namely, social support (SS) as a source of motivation, social accountability and reciprocity, pro-sharing norms and shared experiences.

1.1 Social support as a source of motivation

A majority of participants (nine out of 11), mostly in the OPC + SS condition discussed the importance of the SS that was enacted by their OPC. For them, social connectedness was perceived as a conduit for three types of SS, i.e., emotional support, informational support and appraisal. Some participants felt that being a part of the Facebook group allowed them to share their emotions and experiences, vent their

frustrations and daily struggles. In return, group members provided emotional support through understanding and encouragement to persist with their lifestyle changes:

> Although I wasn't able to have a face-to-face interaction with group members, but, I think, it felt like a compassionate network of friends, who were there for me at every step of my journey. (Lucas, OPC + SS condition)

Other participants, like Anna, perceived value in receiving informational support, in the form of advice and guidance on how to solve problems:

> Sometimes, you would get a member sending you a link to useful information to do with my diet plan. (Anna, OPC + SS condition)

There were other participants who enjoyed receiving recognition (e.g., praise) for success in their goal attainment.

> I remember receiving lots of congratulations, especially when I reached a milestone, or I did something great that week. (Veronica, OPC + SS condition)

Although most participants (eight out of 11) acknowledge that SS could be an extrinsic source of motivation influencing goal attainment, some remarked that their motivation to act was due to the activity being intrinsically enjoyable, challenging and fun, rather than gaining approval (or disapproval) from others:

> …because a lot of people when they get any comments often they've gotta continue keeping fit. For me it wasn't like that. I didn't really need the comments and praises. I could do without it. I mean, if I wasn't enjoying the journey the comments wouldn't matter. (Bob, OPC + SS condition)

Although participants in the OPC + SS condition acknowledged that they could exit the Facebook group after the 12 weeks, the exchange of SS was the main reason why they some of them decided to remain in the Facebook group after the 12 weeks.

> I suppose I just wanted to stay until the end… like a few of group members… fellow participants if you like stayed after the 12 weeks. In hindsight I can see why they [group members] chose to stay. It's like if you leave, you will lose all this stuff to do with support, advice and all that. (Bob, OPC + SS condition)

Participants in the OPC only condition often discussed their anticipation for obtaining SS outside of the Facebook group, which influenced their post-intervention motivation.

> Nobody wants to feel unsupported and if you feel you have been isolated, that's bad you know, you just realise the importance of having people around you… who can encourage you. I really needed to get out there, you know. (Tatianna, OPC only condition)

It appeared that participants in the OPC + SS condition, especially those who actively participated in the exchange of SS, experienced positive psycho-social outcomes. For Alex, the decreased loneliness and isolation that came with her social connectedness helped to reduce stress:

> I was lucky. I was just glad I didn't end up in the other group where we couldn't tell anyone about our goals. I would have been so isolated… with no one to talk to. It would have been so stressful I swear. With my [Facebook] group, I had access to lots of people who were there for me… even when at times I was really stressed out, I would get a word of encouragement. (Alex, OPC + SS condition)

Many participants (10 out of 11) reported that the Facebook group allowed them to share common goals, interests, struggles and experiences with each other. There was a common cognitive state of group members, and also a moral and emotional connection with the Facebook group. Indeed, this shared experiences sometimes produced emotional support:

> The way I look at it is this. We all have similar goals… to change our lives around, I mean our health. We are in this together, so we have to support and encourage ourselves through the journey. (Veronica, OPC + SS condition)

1.2 Social accountability and reciprocity

Participants often reported that publicising their OPC in the Facebook group was a way of keeping them accountable to their goals. By making an OPC, participants expected that they would be required to justify their actions to others in the group

> Of course, it's easy to give up on a goal that nobody knows about…. Yes, but even if you are the only one that knows about it, there would be no harm in, you know, giving up or not sticking to your goals, routines. But the fact that others know about it, they can keep you in check, and hold you to your words and actions. (Hugo, OPC + SS condition)

By keeping each other accountable, group members were able to remain accountable to each other and thus, enabled them to function at the best possible level:

> Friends in the group checked on each other, especially if we haven't heard from them in a while to make sure they are okay and still winning. (Michael, OPC + SS condition)

> It was always good to have someone watching you and sometimes perhaps reminding you… it just felt like you had someone you had to answer to… with this I don't think I would have kept to my routine. (Alex, OPC + SS condition)

To such an extent did participants value the social accountability aspect of making of an OPC, that several participants were dismayed about exiting the Facebook group at end of the study. One of their main fears was the absence of social accountability. According to Michael:

> … yeah, it's a shame really, because you have built this network and somehow it has to come to end, and there is nobody to keep you in check. (Michael, OPC + SS condition)

Participants acknowledged that their strong-tie support network (i.e., family and friends) could also play the role of keeping them accountable, especially beyond the intervention period. However, they also felt that their strong-tie support network may not be as effective as members of the study's Facebook group (i.e., weak-tie support network) in providing adequate social accountability, due to a lack of objectivity stemming from more emotional attachment:

> I wouldn't have thought my close friends would have held me more accountable than the ones of Facebook. They wouldn't want to put too much pressure on me I reckon. But the ones on Facebook would be more inclined to tell you as it is… and it's what you need really. (Bob, OPC + SS condition)

Like Bob, there was a tendency for many other participants (who exited the Facebook group) to seek out weak-ties to make new connections in order to continue the process of social accountability.

> For me it was an eye opener… because I didn't realise how much I needed it, especially from strangers. So now I take part in HIIT [High Intensity Interval Training] classes, and I didn't waste any time in telling them my goals, and funny enough one of the members yesterday said to me like "I will call you everyday to remind you to attend classes". It has really helped me a lot this accountability thing. (Tatianna, OPC only condition)

Other participants expressed how the interacting with weak ties who have shared experiences led to non-judgemental interactions and social accountability:

> I was very accepting of comments because I know they genuinely meant well for me. There were going through what I was going through, why would they

be judgemental, they wouldn't, would they? It kept me on track, I think. (Bob, OPC + SS condition)

1.3 Pro-sharing norms

Although most participants generally understood the importance of publicising their OPC to others, especially as a way of remaining socially accountable and receiving SS. Only a small proportion perceived the importance of reciprocating SS, for example, by providing informational and emotional support to others who make their OPC. For these participants, they regarded their informational and emotional support to others as a public good that belongs to the group, hence, they felt obligated to give back and contribute to the group:

> … the responsibility for group members is more or less you don't want to keep stuff to yourself. You want to make sure you are also there for others, giving them something they may need for their situations. (Victoria, OPC + SS condition)

> … you see other ones doing it so why would you want to hold back. (Bob, OPC + SS condition)

By observing other group members share their OPCs, participants realised the necessity of their contribution in the form of providing SS and therefore played a more active role in the Facebook group. Also, by building a pro-sharing norm, participants were able to serve as motivation and accountability for each other, which also increased the positing activity in the group.

Some also found that not only do group members who share similar experiences and goals exchange SS and accountability, they are also more likely to share content and participate in discussions:

> I have been in other types of groups where no one talks to each other. A good example is my Alumni Whatsapp group. I think with this it was different… in

the sense that we have a common identity so the onus is on us to keep being active and not sit back. (Victoria, OPC + SS condition)

Theme 2: Goal setting

One of the most recurrent themes in participants' accounts of their experience was the importance of goal setting and action planning strategies. All participants reported that identifying and working towards attaining personally meaningful goals can be a potentially empowering way of facilitating changes in behaviour. Although some participants reported the ease at which they were able to identify goals, for most it was more challenging. Thus, the goal setting was viewed as beneficial in exploring potential areas which participants would like to manage better, revisiting each of the domains and eliciting specific issues that will form behavioural goals. All participants found that the goal setting process was inspiring and provided them with the motivation to make changes.

The importance of goal setting was apparent in terms of the following sub-themes: 'collaboration is key', 'specific goals lead to relevant activities', 'publicness', 'inducing motivation to change', 'reminder of goal and progress' and 'combining performance with process goals'.

2.1 Collaboration is key, but goals should originate from the self

Most participants (nine out of 11) attributed the success of the goal setting interview to the positive collaboration between themselves and the researcher (i.e., the interviewer). Participants felt that the goal setting interview was warm, flexible and reassuring which made them feel able to share their thoughts and experiences. Rapport building was seen as a vital precursor for eliciting meaningful goals, especially where the interviewer was inquisitive, interested and engaged in the goal setting process. As Sarah described:

> It's not always easy for me to discuss my shortcomings with… who felt like a stranger at the time. But, I think as the interview progressed, and it didn't feel overly formalised. [The interviewer] was engaging and interested in what I had to say. It really made it easy for me to talk more about my goals and areas in my life that I needed to improve. (Sarah, OPC only condition)

Although participants acknowledged the importance of setting goals in collaboration with the interviewer – especially in identifying the areas for improvement within pre-specified domain that were relevant for the intervention – it was frequently mentioned that the goals should originate from the self rather than being externally endorsed.

> Again, like I mentioned before, the goal setting provided the foundation for me to think straight about what I wanted to achieve, but I like the fact that it was person-centred. These were my goals, not goals that were selected for me. (Lucas, OPC + SS condition)

> I remember you [the interviewer] kept like prodding me to decide on the goals myself, even when I had no idea of which goals I wanted to set for myself… you [the interviewer] would always put the ball back in my court. I guess [the interviewer] want me to choose goals that were important to me, so that I can be motivated to achieve them. (Melody, OPC only condition)

To further underscore the importance of setting goals that are internally motivated, several participants talked about how it was important to phrase their goals in the first person.

> I think I really liked the idea, that you suggested or maybe it was I requirement I don't know… but it was really empowering that my commitment was phrased like "I will do this… not anybody else but me. I felt it gave me ownership." (Anna, OPC + SS)

2.2 Specific goals lead to relevant activities

The importance of identifying specific goals was seen to be critical as it helped some participants to know what steps and actions will form the basis for their selected goals, and also what skills are required to carry them out.

> I was getting to the point where I didn't just know what to do anymore. I had tried many things but wasn't getting anywhere. So, for me, the goal setting stuff helped to hit home my difficulties, and also what steps I needed to take to start changing things. (Melody, OPC only condition)

For other participants identifying specific goals helped in documenting change and evaluating progress accurately at follow-up time-points. As the majority of participants reported, it was vital that any activity or action selected as a basis for a goal is one that relates to their intrinsic capacity and one that they have the capacity and potential to undertake. For Lucas, setting specific goals helped him to understand what needs to happen in order to determine whether the goal has been partially or fully achieved:

> After the consultation, I think I was really confident because I knew what I had to do to achieve 5 out of 10 or 10 out of 10. You [The interviewer] made it very clear to me. (Lucas, OPC + SS condition)

For Tatiana, setting specific goals made it possible to evaluate whether it has been achieved or not, and how much progress has been made:

> Yeah, I think, for me… it made is easier for me to rate my goal at the intervals. If I remember, [the interviewee] mentioned about goal descriptors, I think by providing a guideline like that, it made it easier for me to know what ratings I should give my goal at the intervals. (Tatiana, OPC only condition)

Across the narratives, it was evident that goals should be formulated in such a way that a single attainment rating score will provide meaningful and accurate information

about their current attainment in relation to the goal, both when setting the goal and when evaluating progress at follow-up time-points.

2.3 Publicness

For participants in both conditions, the extent to which other group members were aware of their goals affected the attractiveness of goal attainment. The impact of public surveillance was accentuated by the willingness to conform the expectations of others regarding goal attainment:

> I'd say if my goals were kept to myself… I mean if I were in the other group where I had to keep my goals to myself, for me, I think it would be easy to abandon the goal. Because no one would know anyway, so it's easier to just give up. (Hugo, OPC + SS condition)

> I try to always think to myself, what will people say if I give up. I have already told posted my run, and shared all the nice stuff, so its look I can't let anyone down, because it's like I am defeated. (Sarah, OPC only condition)

Whilst the impact of public surveillance was more notable for participants in the OPC + SS condition, possibly due to the interactivity that occurred within their Facebook group, the effect of the "real presence" of others was also felt by participants in the OPC only condition:

> I try to keep at the back of my mind that people are watching me… this happens with my Whatsapp group… you get a lot of friends who mute your profile update and you think nobody can see your update but they are there still observing your every mood… so you gotta continue plodding on. (Victoria, OPC only condition)

In terms of post-intervention effects, several participants commented that even after exiting the Facebook group, they still publicised their commitment/goals to members of their strong-tie support network.

> So, I decided to tell my friends, just a few close friends of course… because I knew they would support me. I did that on my own accord, not that I had to do it. I felt I needed the words of encouragement and supportive environment to continue. (Anna, OPC + SS condition)

Others preferred to continue their journey with weak-ties support network where they hope that by sharing their commitment/goals with others who are likeminded, behaviour change will not be interrupted.

> I'm hoping now that I have joined this Wirral Social Runs group on Facebook, I can still continue to as it was with [the study's Facebook group], you know telling others about my goal. That's my belief anyway. I have been part of this group for a few weeks now but I can see a lot of differences on my self-esteem, everyone is supporting each other… I am more positive about life in general. (Tatianna, OPC only condition)

2.4 Inducing motivation to change

All participants commented on how the goal setting interview helped them to find the motivation to make a positive change. Participants frequently talked about how the goal setting helped them to come to terms with situations or problem areas that needed to be addressed, whether it was an activity that they used to do which they have stopped doing or finding more difficult. Or, an activity that they would like to do, that they are not doing currently or would like to increase. However, not all participants were motivated to engage in the goal setting process or able to identify suitable goals.

> I didn't see the point in it at first. Not that it was a waste of time, you know… but you know change is not always easy. Would I say I wasn't ready for change? Not really, but I guess I just didn't have the 'oomph'. (Sarah, OPC only condition)

> Wow, I think my biggest challenge was identifying goals for myself. I don't' know why that is, maybe because I had tried countless times to lose weight, set goals and then end up giving up again. It could be that I wasn't necessarily motivated as I should have been, yes. (Lucas, OPC + SS condition)

Despite the inability of some participants to identify suitable goals, almost all participants reported that high motivation is critical for achieving their identified goals. To this end, participants placed a lot of emphasis on the usefulness of the goal setting interview in inducing the motivation to start making in positive change.

> I always knew that the motivation was there, perhaps buried. But when I think about the interview itself, how it was sort of empowering… how the onus was on me… I mean it felt like I was given the necessary ingredients to motivate myself to do it, not like in a confrontational way. (Michael, OPC + SS condition)

> It does make you see what's actually important in life. I know it sounds crazy but the goal setting stuff was a life saver. [The interviewer] didn't impose [his] own opinions. It felt collaborative even though I felt in control of my choices and goals. It kinda like gave me responsibility for my actions. (Bob, OPC + SS condition)

Also, by asking participants to rate their readiness to change and how much importance they placed on each identified goal, many participants indicated that it reinforced how important the identified problem(s) were to them and how ready they were to make changes in relation to these problems in order to improve the situation. Participants also stated that these two ratings provided a check on the appropriateness of the identified goals:

> Yes, as I said, it was important that the goals I chose were things that were… in a way important to me. Like, I didn't want to choose goals that were not importance for me, I guess, they wouldn't be motivating for me, or I wouldn't be motivated to stick to them. (Melody, OPC only condition)

2.5 Reminder of goal and progress

Across the narratives, participants expressed a satisfaction of being reminded of their identified goals at follow-up time-points. It helped them re-focus their attention on the behaviour or activity that they had agreed to carry out, achieve, or manage better:

> You know you've got so many things on your mind… work, family, social life and so on. It's hard to remember what goals you set for yourself. Even though I know [the interviewer] sent it in a document but it's been a while and other emails take priority in my inbox, so yes, it was useful to get a reminder of here this is what you agreed to. (Sarah, OPC only condition)

For most participants, like Veronica (OPC + SS condition), being provided with a reminder of the goal attainment ratings made initially was important and useful: "It was really interesting to know where you stand and what progress you need to still make to reach your goal."

Generally, all participants perceived that receiving a reminder of their previous ratings reminded them of how well they were performing or progressing with respect of their identified goals. For example, Melody (OPC only condition) mentioned that: "For me, I was interested in knowing my previous performance, at least it can help me to know if I am going in the right direction."

Several participants conveyed that, not only was being reminded of previous ratings important for knowing how well they were progressing, what they were doing well and where they can improve, but it enacted a figurative restart to the process, especially when their performance faltered.

> I would always share my scores with others in the group, and like 3 weeks into my journey I know I had a dip in my attainment. I would always receive words of encouragement from others, and it made me think "well I shouldn't give up, I can try again". I found it really nice. (Hugo, OPC + SS condition)

Such narratives highlights the importance of feeling connected to and cared for by others. It was important for participants, not only to be reminded about their goal and progress towards the goals, but for these to be accompanied by a sense of belonging and social support. Participants frequently mentioned that, even after the intervention ended, they retained access to the goal setting resources which contained information about their individual OPC and identified goals.

> I usually print documents I feel are important… I don't know but I get a lot of emails, sometimes spam so I kind lose track of important emails. I did print off the [goal setting documentation] and kept it on my desk at home. I would always look through it at least once in a week to remind myself not to give up. (Michael, OPC + SS condition)

> … my hubby helped me with keeping track of my progress. He reminded me constantly of my goals, sometimes he would work with me to continue rating my progress for each goal. (Melody, OPC only condition)

Other participants incorporated their OPC into their fitness apps to ensure they continued carrying out the activities to reach their goals.

> When I got the app, I think one of the questions I was asked was about my goals. I used the same goal… I think I even recorded it in my journal, so it's always there for me to have a look at. (Hugo, OPC + SS condition)

2.6 Combing performance with process goals

Having the ability combine two types of goals appeared to be a helpful strategy employed by most participants. Participants discussed the importance of combining a performance goal with process goals in order to achieve optimal goal attainment. Though participants were required to formulate their goal statement or OPC based on their performance goal, they appeared to value the role that their process goals played in developing their competence and experience of mastery. It would seem that, by enacting the day-to-day controlled actions, participants were able to make constant

adjustments and improvements which helped to their build proficiency and skills to achieve the overarching performance goal.

For example, Anna's performance goal was to improve her aerobic fitness, and one of her process goals was to walk 30 minutes per day, five days a week. She reported the usefulness of integrating both types of goals.

> I think it was really wise to have both types… it's like you need both to work in tandem if you are going to succeed. (Anna, OPC + SS condition)

Bob also concurred Anna's opinion:

> I mean, for me, it was nice to have them in front of me. It's sort of like a blueprint. This is what I need to accomplish, and these are the things I need to do to get me there. Boom. Simple as that. (Bob, OPC + SS condition)

For both Anna and Bob, effectively engaging in the process goals, as a 'road map' to achieving the performance goal, provided them with a sense of mastery over their environment. It could be that achieving these smaller process goals allowed them to monitor their progress over time, and also to stay the course for the longer term performance goal.

One of the most common reasons given for why performance and process goals were effective was based on controllability. For them, process and performance goals are highly controllable because they are dependent on one's own effort rather than the efforts of others. No participants chose to set outcome goals that were dependent on other opponents and external factors. For example, Hugo's performance goal was to run 10k within an hour, and his process goal was to run three days a week.

> I suppose… I think basically I am not competing against anyone but myself. Even if I am doing the run with other people… like say in a sponsored run, my goal depends on me not others. (Hugo, OPC + SS condition)

By engaging in these actions that were within his control, Hugo seemed to have the belief in his capacity to execute the behaviours needed to produce specific performance outcomes.

Theme 3: Quality requirement of computer mediated communication

This theme reflects participants' quality expectations of the Facebook group in terms of four sub-themes: 'privacy and anonymity', 'convenience', 'access to weak-ties with diverse viewpoints', and apprehension of strong-ties'.

3.1 Privacy and anonymity

For most participants (nine out of 11), online privacy remained an important issue that determined whether or not they actively participated and contributed SS. Almost all participants indicated that privacy was implicated in the Facebook group because of the risk of disclosing sensitive information about their behavioural intention. Some participants found that weight-related issues were difficult to discuss with their strong ties support networks. For others, disclosure, in general, always involves some degree of risk because it renders them vulnerable to ridicule, shame or loss of face. Frequently, participants reported the tension between self-disclosure and privacy. Participants considered the Facebook group to be highly secure, meaning that their privacy was protected, and they were more willing to participate and exchange SS and accountability.

> You know, I get very concerned with the type of information I share about myself because I am not outward person like that. Not usually will I disclose to people I do not know. But I felt that the Facebook group was private and inaccessible to every Tom, Dick, and Harry. It really helped me to be comfortable. (Melody, OPC only condition)

Participants also appreciated the option of remaining anonymous. Six participants used their pre-existing Facebook account to join the Facebook group. The rest of the participants created a separate Facebook account to join the Facebook group. The preference for anonymity was greatest amongst these participants because it provided them with the freedom to discuss sensitive topics in an honest fashion, and without the risk of "someone knowing me personally". Although participants can (and often did) attach photos of themselves, they didn't feel obligated to do so. This saves them from being judged by their physical appearance:

> It gets on my nerves sometimes, but I have issues taking pictures of myself and posting it like others did on the platform. I guess everyone is different. I was comfortable just keeping it like that and it worked for me. Who knows, with time I may change. (Anna, OPC + SS condition)

> "Being anonymous helps as you can talk your mind and no one can use it against you or criticise you personally. (Sarah, OPC only condition)

Like Anna, most participants expressed that being anonymous creates an environment in which interactions are non-judgemental.

3.2 Convenience

The convenience provided by the Facebook group was valued by most participants. This is because they could receive responses to problems and questions at any time of the day or night, often within minutes or hours, regardless of physical location. Participants often described this benefit in light of the geographical isolation of the Facebook group members. Some participants also described convenience in terms of the Facebook group being accessible on multiple devices.

> … this morning I got up and did some running. I could get into the group on the go, even at the gym on the treadmill the same thing. It's always available to me, whether I want to use my mobile or even on my smartwatch I can receive notifications. (OPC + SS condition)

3.3 Access to weak-ties with diverse viewpoints

Across the narratives, a preference for weak ties over strong-ties was evident, in terms of making an effective OPC. Participants frequently reported that the Facebook group was particularly useful in connecting them to a weak-tie support network. Participants conceptualised weak-ties as those with whom the degree of emotional intensity, level of intimacy and degree of reciprocity was low. As previously mentioned, participants perceived the SS from weak-ties to be more objective and less emotional than advice from strong-ties such as family and friends. Participants also reported that weak-ties provided different viewpoints that may not be available within more intimate relationships.

> I think I am inclined to hear from multiple opinions about my fitness stuff. Each one has something different to offer. I found this in the group… you get lots of comments and advice from different types of people and it all adds value. (Hugo, OPC + SS condition)

Veronica recognises that the homogeneity with her strong-ties may limit the diversity of information and viewpoints obtained about her concerns. For her, interacting with a more diverse network of people also increases the number of social comparisons she can make about her goals vis-`a-vis others:

> There was definitely a healthy competition amongst ourselves… you are pitting yourself against people from all walks of life, genders, age groups and personalities. You don't get that your circle of friends in that way. (Veronica, OPC + SS condition)

Many of the participants (10 out of 11) described seeking weak-ties connection beyond the intervention period. For example, Anna joined a local fitness class as a way of connecting with like-minded individuals with similar goals. It was important for her to replicate this connection in her fitness journey.

> I felt comfortable as the weeks progressed…. The fact that we were all there for the same reason and also because they didn't know me on a personal level, like all that stuff didn't matter (Anna, OPC only condition)

Other participants attempted to replicate this connection using Facebook groups

> When it ended, I was really eager to join a similar group because I kinda think it ended prematurely for me… . Then I found this really nice group on Facebook called Wirral Social Runs group… like I really love it and the support system is really fantastic. (Melody, OPC only condition)

3.4 Apprehension of strong-ties

Participants often mentioned that an important quality of the Facebook group was that it was limited to only weak-ties support network members, which, as identified in earlier themes, appears to be variable in the process of SS and social accountability mobilisation. Many participants expressed an apprehension for communicating an OPC to members of their strong-ties support network. For them, strong-ties are incapable of providing SS or social accountability because they feel that their close ties lack shared experience:

> For me, again, I would rather be in group with like-minded individuals even if I am not close with them. What matters to me is this thing of collective goal, like-mindedness, shared experiences, which you don't get with close friends or close family members. (Veronica, OPC + SS condition)

Mixed feelings were evident with regard to feeling understood by strong-ties. Some participants felt that strong-ties often minimise their concerns especially when seeking support for goal attainment failures. Participants reported that strong-ties would typically avoid having in-depth conversations about weight-related topics or emotional talk about problems. Other participants preferred to discuss with individuals whom they share overlapping relationships, rather than those who are not interpersonally close.

6.4 Discussion

This study provides unique insight into the experiences of individuals who demonstrated optimal adherence to their PA-related OPC. This study adds to the OPC and PC literature especially regarding the potential enablers which may affect the efficacious delivery of an OPC intervention, and the emergent themes also provide direction for further research.

The findings indicate that ID-LMPs that incorporate an OPC technique have a great potential for influencing changes in PA. This is consistent with the several advantages that have been attributed to ID-LMPs in general, such as access to a large number of respondents at minimal cost, availability of intervention at any place any time, and the possibility of receiving feedback as well as providing personalised information (Lustria et al., 2013). Strong research supports the use of popular existing social networks such as Facebook to promote PA (Cavallo et al., 2012; Günther et al., 2021; Napolitano et al., 2013; Rote et al., 2015). Although this study was not concerned with the effects of a particular channel for OPC, it contributes to the notion that the success of ID-LMPs does not depend on the technology used in its delivery (Neville et al., 2009). Unlike other studies which show that using online social networks can achieve high level of engagement, participation and retention (Davies et al., 2012; Napolitano et al., 2013), the findings of this study suggest that more needs to be done to increase engagement between participants.

The first overarching theme 'social connectedness' reflected the importance of feeling close and staying connected to others when making an OPC. From the perspective of self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000, 2006), the satisfaction of an individual's psychological need for relatedness, (as well as autonomy and competence) is necessary for optimal human functioning. Within PA research, a large number of studies have demonstrated that individuals' motivation for engaging in PA behaviour is determined by the social environment's ability to satisfy their need for relatedness (Divine et al., 2019; Kang et al., 2020; Kim

& Gurvitch, 2020; Vlachopoulos & Michailidou, 2006; Xu et al., 2021; Zhang, Ren et al., 2022). The findings suggest that when participants develop positive relationships with others, a strong SS system will be created which can help in making an effective OPC.

Participants in this study found that the exchange of SS was crucial in following through with their OPC, which is consistent with other ID LMPs that advocate the efficacious use of SS and peer networks (Rote et al., 2015; Valle et al., 2013; Zhang et al., 2015). Consistent with previous research, the findings demonstrate that receiving SS can strengthen ties with one's online community and enhances social connectedness (Welbourne et al., 2013), is associated with positive health outcomes such as reduced stress (Welbourne et al., 2013), provides opportunities for social comparisons which helped participants to manage uncertainty about their goal pursuits (Adelman et al., 1987; Helgeson et al., 2000; Wright et al., 2010), and is associated with less perceived risk with health-related self-disclosures (Wright & Bell, 2003).

Although the overall importance of SS in making an effective OPC is consistent with the literature, some of the findings in relation to SS also diverge from the literature. For example, reviews of ID LMPS would suggest that SS from strong-ties support network is more favourable than from weak ties (Neville et al., 2009). In fact, one study attributed its effectiveness to recruiting participant who knew each other (Foster et al., 2010). In contrast, the findings of this study support the that weak-ties are perhaps more beneficial than strong-ties in providing objective and less emotional SS, among those who choose to use online support. This idea complements previous quantitative and qualitative research concerning people's motives for communicating with weak-ties support network in the process of SS mobilisation (Lam et al., 2023; Wright, 2012; Wright et al., 2010; Wright & Miller, 2010; Zigron & Bronstein, 2019). Prior to the internet, individuals seeking to change their PA-related behaviour were somewhat limited in terms of their options for finding potential weak-tie support. Participants found that computer-mediated support groups not only make it possible

for one to gain access to plethora of individuals with shared experiences, but it also provides access to diverse points of view and information that may not be available within more intimate relationships (Adelman et al., 1987; Wright et al., 2010).

The exchange of SS from weak-ties support network as well as social accountability appeared to be sources of autonomous motivation. Yet, a downside to SS was the commonly disclosed apprehension of obtaining SS from strong-ties support network. Participants in this study found the SS they received to be effective in term of their goal pursuits. Indeed, the pursuit of these goals are congruent with previously identified goals for participating in online communities (Bauer et al., 2013; Britt, 2017; Buchanan & Coulson, 2007; Newman et al., 2011). Given that participants voluntarily chose to participate in consistence with their needs and individual characteristics, this can create an unintentional self-selection bias, whereby this type of intervention appeals more to those who prefer a weak to strong ties.

The second overarching theme 'goal setting' reflects the importance of identifying specific and relevant goals which form the basis of the OPC, and then developing an action plan to achieve goal attainment. The importance of goal setting as an effective strategy to promote PA is consistent with previous studies (Albers et al., 2023; Baretta et al., 2019; Berry et al., 2023; Cameron et al., 2018; Chase et al., 2018; Iwasaki et al., 2017; Kwasnicka et al., 2020; Lynch et al., 2023; Swann et al., 2020, 2023). Lifestyle intervention programmes that have incorporated goal setting strategies have been shown to enhance goal-orientated performance (Locke & Latham, 2002), however, there is a lack of ID-LMPs targeting PA which incorporate goal setting as behaviour change technique.

A number of novel insights were apparent in relation to goal setting. For example, many participants found the collaborative nature of the goal setting to be greatly effective. Whilst a majority of goal setting studies have experimentally manipulated goals by assigning goals to study participants (Chang & Lorenzi, 1983; Latham & Yukl, 1976; Lozano & Stephens, 2010; Polzer & Neale, 1995), however, in

naturally occurring circumstances, those who intrinsically desire to change their PA related behaviour will not be assigned a goal. Thus, the finding supports the notion that self-set goals are predictive of autonomous motivation (Lozano & Stephens, 2010) and yield greater goal commitment and self-efficacy for goal achievement than assigned goals (Gerhardt & Luzadis, 2009; Latham et al., 1978; Strang et al., 1978). Although reviews of ID-LMPs have also shown that no significant difference in outcomes exist between self-guided and expert guided interventions (Lustria et al., 2013).

Another aspect of goal setting which is corroborated by the findings is the importance of providing feedback about goals and progress. Within goal setting research, goal feedback is said to be one of the factors that moderate the goal-performance relationship. According to Locke and Latham's (2002) goal setting theory and Carver and Scheier's (1981) control theory, for goals to be effective, people need summative feedback that reveals progress in relation to their goals. If they do not know how they are doing, it is difficult or impossible for them to adjust the level or direction of their effort or to adjust their performance strategies to match what the goal requires. In this study, participants found that receiving feedback on their progression to goal attainment impacts the goal setting–performance effect, as it guides future direction and allocation of available resources towards a goal. In the domain of PA, there is extensive evidence from quantitative studies on the strong association between the effectiveness of goal setting and receiving feedback (Finch et al., 2019; Hall et al., 2016; Liu & Chan, 2016; Middelweerd et al., 2014; Patel et al., 2016; Schembre et al., 2018). Also, in reviews of factors which determine the efficacious design of ID LMPs, the importance of providing feedback has been highlighted (Krebs et al., 2010; Kroeze et al., 2006; Krukowski et al., 2008).

Locke and Latham's (2002) goal setting research demonstrates that the goal-performance relationship is strongest when people are committed to their goals (Brewer et al., 2014). The concept of goal commitment (i.e., one’s attachment to or

determination to reach a goal regardless of the goal's origin) resonates here with the findings of the current study. Participants frequently talked about the importance of the goal setting interview, in terms of helping establish which difficulties or areas for improvement are most relevant and therefore likely to develop into meaningful goals. This may suggest that selecting such goals are more likely to enhance their determination and effort towards achieving these goals. Deshon and Landis' (1997: p.106) study is relevant in this context because they conceptualised goal commitment as "the degree to which the individual considers the goal to be important, is determined to reach it by expending effort over time, and is unwilling to abandon or lower the goal when confronted with setbacks and negative feedback". It is thus unsurprising that highly committed individuals exert more effort, and are more persistent toward goal attainment, than individuals who are less committed to the goal (Hollenbeck & Klein, 1987; Klein et al., 2020).

With regard to goal types, the findings differ from the labelling goal types noted in goal setting research, but mirror how goal types (i.e., *process*, *performance* and *outcome* goals) have been characterised in the sport domain (Locke & Latham, 2013). Indeed, empirical findings substantiated that each goal type has distinct effects on goal setting outcomes in sports (Chou & Zou, 2020; Early et al., 1989; Filby et al., 1999; Kolovelonis et al., 2011; Williamson et al., 2022). For example, according to goal setting theory, process goals (or commonly referred to as "learning goals" in some literature (Locke & Latham, 2013) are important when tasks are new and complex, but when a skill is already mastered, goals of achieving a certain level of attainment may be just as motivating, particularly in academic settings. None of these findings, however, have been confirmed with older adults in the context of PA behaviour. In this study participants emphasised the importance of combining a performance with one or more process goals, however, without a true control group (that is, one who did not receive goal setting support) it is difficult to determine the extent to which it was efficacious in influencing behaviour change. Despite this, the findings demonstrate

that ability to enact the day-to-day controllable actions (i.e., process goals) helped to enhance participants' competence and self-efficacy, which in turn helped them to make progress towards their performance goals. This suggest that self-efficacy and competence may bridge the gap between setting detailed goals and goal attainment, which is consistent with several studies in the context of PA (e.g., Iwasaki et al., 2016; Poag & McAuley., 2016; Wang et al., 2019; Taylor et al., 2024).

Goal contents theory (GCT), a mini-theory of SDT, grows out of the distinction between intrinsic and extrinsic goals and their impact on well-being and behaviour. According to the theory, intrinsic goals (i.e., goals that are related to personal growth, affiliation, and physical health) are more likely to lead to psychological need satisfaction, than extrinsic goals (i.e. goals that are related to wealth, appearance, and fame) (Chu & Zhang, 2022; Johnson & Buzinde, 2022; Seghers et al., 2014; Gunnell et al., 2014; Vansteenkiste et al., 2006; Duncan et al., 2017). The findings of this study do not allow conclusions to be drawn regarding the differences in goal contents. For example, one of the participants' goals was to lose 10kg in weight. It is difficult to know whether this goal will fulfil the participant's physical health (intrinsic), or physical appearance (extrinsic). However, given that – in study 1 – mental wellbeing scores was significantly higher for participants who made an OPC than those who kept their commitment private (at 6- and 12-weeks of the intervention), it could be speculated that the satisfaction of their need for relatedness led to a higher level of mental wellbeing. This is consistent with the literature linking relatedness and psychological well-being (Fotiadis et al., 2019; Grabowska-Chenczke et al., 2022; Holt et al., 2019; Lawton et al., 2017).

The third overarching theme 'quality requirement of computer-mediated communication' highlights several requirements that a CMC environment ought to satisfy in order to produce an effective OPC. The first of these factors (that is, anonymity), would seem to contradict the PC literature, in terms of how the observed presence of an audience could alter an individual's attention to the self. Traditional

theories of PC – both classical (Kiesler, 1971; Kiesler & Corbin, 1965; Kiesler & Sakumura, 1966; Shippee & Gregory, 1982; Wang & Katzev, 1990) and contemporary (Hartini et al., 2017; Lokhorst et al., 2010b, 2013; Nyer & Dellande, 2010) – claim that factors such as identifiability, social presence and source proximity will have a significant effect on attitudinal changes. In contrast, the findings of this study do not suggest that a lack of physical interaction or anonymity translated into a lower degree of influence over other participants. One possible explanation, based on social identity model of deindividuation effect (SIDE; Reicher et al., 1995) could be that participants defined themselves as group members, hence the anonymity of the members of the Facebook group decreased attention regarding their interpersonal differences, and enhance the salience of the group and social identity. Such situations would result in a greater adherence to OPC based on normative influence (Moral-Toranzo et al., 2007).

6.4.1 Strengths and Limitations

When considering the results of the present study, there were several strengths and limitations that should be taken into consideration. A key strength of the study was the collection of data whilst participants were still actively engaged in goal-oriented behaviours, even though many had exited the Facebook group. Due to this, the risk of recall bias was reduced. Another key strength was the use of semi-structured interviews as data collection method because it allowed participants to freely share their perspectives in response to a set of questions. Notwithstanding the fact that the interviews were guided by an interview schedule, participants were given the flexibility to direct the conversations, and indeed many participants did. Given the pre-existing relationship between the principal researcher and participants, re-establishing trust and rapport was easy, thus allowing for an in-depth exploration into participants' experiences, perspectives and perceptions.

Despite these strengths, the study is not without limitations. First, the present study provides a snapshot in time of experiences of those who took part in an OPC intervention. Given the fact that attrition in lifestyle interventions typically occurs

after six months (Goode et al., 2016; Honas et al., 2003; Pirotta et al., 2019), it is possible that conducting the interviews at 12 weeks may not have provided a comprehensive understanding of the determinants of post-intervention adherence to PA-related goal attainment. Subsequent studies should report participants' changing experience over a period of six months or more. Second, the small sample size required by a qualitative approach, as well as the convenience nature, can limit the transferability of the results to a wider base of individuals who have taken part in an OPC intervention, participants were recruited from a sample who took part in a single OPC intervention. Third, only one researcher was involved in the collection and analysis of data, which may have given rise to researcher bias. The final limitation is that only those who had successful PA-related goal attainment were interviewed. Participants who did not do so well could have also provided important insights into barriers or limitations of an OPC intervention, which could have provided a more holistic understanding of the perceived factors that lead to OPC success.

6.4.2 Future Research and Applied Implications

The practical implications of this study suggest that OPC interventions can produce behavioural changes in PA, both on a short-term and post-intervention period. An OPC intervention should be designed in a way that satisfies an individual's psychological need for relatedness. The OPC intervention should also be based on theory, such as goal setting theory (whereby individuals take part in a collaborative goal setting interview to identify specific and meaningful goals; see Locke & Latham, 2002, 2013), and behavioural commitment (whereby making a commitment binds the individual to the position implied by his/her or decision; see Kiesler, 1971). Addressing individuals' need for volition when making an OPC may take different forms. For example, although the goal setting should be collaborative, individuals must be provided with a sense of autonomy so that the identified goals are important and meaningful to them. Individuals should also have freedom, in terms of who they share their OPC to, and how often they share. In terms of encouraging post-

intervention OPC adherence, an OPC intervention should provide an avenue whereby individual can continue public their commitments in other environments, whether via CMC or not. The OPC intervention should also provide an avenue for individuals to continue accessing their identified goals and goal statements.

Future research may benefit from a longer-term follow-up. Given that the research on obesity suggest that more than half of the those who succeed in following the recommendations of an LMP, eventually return to baseline within two years, and by five years, more than 80% also return to baseline. Indeed, follow-up studies should be conducted at these periods. Future research should also explore the effects of different channels for OPC rather than viewing a particular channel as a mere conduit for OPC about PA behaviour.

6.4.3 Conclusion

In summary, the present study has made a useful start to understanding the perceived factors that lead to success in PA-related behaviour changes. Participants found social connectedness, goal setting and quality requirement of the Facebook group to be highly effective, both in terms of short-term behaviour change, and post-intervention adherence to their PA-related goal attainment. The findings demonstrate whenever people make their behavioural intentions public, the behavioural impact if these intentions is enhanced. The finding further reiterates findings from other studies that demonstrates the role of SS in mediating the relationship between a behavioural intention and behaviour change. In addition, this study makes a methodological contribution to the field in demonstrating a novel way to design an OPC intervention, as well as addressing some of the methodological gaps of existing research.

Chapter 7: Synthesis of Findings

7.1 Introduction

The research was motivated by the widespread occurrences of online public commitment (OPC) among individuals who intend to engage in energy balance-related behaviours (EBRBs), despite there being a lack of research to support this phenomenon. The overall aim of this thesis was to provide a comprehensive conceptual understanding of OPC, its effect on EBRBs, and the psychological mechanisms underlying its influence on behaviour change. A secondary purpose of this thesis was to understand the efficacious factors related to an OPC intervention

which aim to promote EBRBs. Following an outline of the background and significance of the broad area of study (chapter 1), the thesis began with a review of the literature to set the theoretical premise (chapter 2) and a discussion of the principles and ideas that inform the design of the research study (chapter 3). This was followed by three original studies (chapters 4, 5 and 6) designed to provide a comprehensive understanding of OPC. This chapter (chapter 7) starts by providing an overview of the methods used in this thesis and summarising the main finding of each study. Then, the findings from all three studies are synthesised and presented as meta-inferences, using a joint display framework (Guetterman et al., 2015; Plano Clark & Sanders, 2015). These meta-inferences are also discussed in the context of existing research.

7.2 Overview of Methods and Results

This thesis used a mixed method and exploratory sequential design (ESD) to explore the concept of OPC. To address the overall aim of the thesis, three phases of investigation was conducted. The first phase was a qualitative exploration of the experiences, opinions, and perceptions of those who have previously made an OPC towards EBRBs. Fifteen participants were recruited to take part in semi-structured interviews. Recruitment of participants continued until data saturation, which is defined as 'information redundancy' or the point at which no new themes or codes 'emerge' from data (Braun & Clarke, 2021). These interviews were transcribed and analysed using Braun and Clarke's (2006) thematic analysis framework. The thematic analysis then yielded several topical and recurring themes around the conceptual elements of OPC, the possible psychological mechanisms underlying its effect, and the necessary conditions for making an effective OPC. Overall, this phase of the investigation found that OPC is a multidimensional construct consisting of several underlying dimensions: *behavioural intention* (BI) (whereby making a commitment is binding of the individual to the position implied by his/her OPC); *self-initiated* (whereby the individual who makes an OPC does so with a certain degree of volition

in the performance of the act); *active rather than passive* (whereby the act of making an OPC is done with a certain degree of irrevocability); *publicised using computer mediated communication* (CMC) (wherein the various types of CMC facilitates the publicness of OPC). The thesis also found that the possible psychological mechanisms underlying the effect of OPC can be based on an anticipated fear of social disapproval (e.g., criticism, ridicule etc), the prospect of obtaining social rewards (e.g., encouragement, praises etc.), or a change in the salience of some aspect of the self. All these psychological mechanisms were transcended by an instinctual desire to appear consistent in the eyes of others.

The second phase of the investigation was an experimental study to test the efficacy of an OPC intervention in producing greater increases in goal attainment, physical activity (PA), mental wellbeing and relative autonomy. One hundred and fifty-six participants took part in this study and were randomly allocated to one of three conditions, that is, two intervention conditions (OPC only; OPC + social support), and one control condition (private commitment). It was hypothesised that participants in the intervention conditions would have greater increases in the four primary outcomes than those in the control condition, but the participants in the OPC + social support (SS) condition will have greater increases than the other conditions. There was a lack of consistency in the results obtained, some results were statistically significant (e.g., participants who made an OPC reported greater increases in goal attainment than those who kept their commitments private), other results were not statistically significant (e.g., differences in PA between the three conditions), and other results were contrary to the hypothesis (e.g., a decrease in relative autonomy between 6 weeks and 12 weeks).

The third phase was a post-intervention follow-up of participants whose self-reported assessments demonstrated that they had successfully increased their goal attainment and PA over the intervention period. Semi-structured interviews were utilised to qualitatively explore the perceived factors that lead to the efficacious

implementation of an OPC intervention from the perspective of participant themselves. Again, the interviews were transcribed and analysed using Braun and Clarke's (2006) thematic analysis framework. The results of this phase of the investigation showed that internet-delivered interventions (IDIs) such as an OPC intervention offer a promising opportunity to promote EBRBs, however, there are certain factors (e.g., support in goal setting) which are perceived to influence the efficacy of these interventions. Table 18 presents the aim, research questions/hypothesis and key findings from the three phases of investigation.

Table 18:
Research question/hypotheses and key findings from all studies

Study and aim	Research questions/hypothesis	Key findings
Phase/study 1 **Aim** To explore the common themes in the reported experiences of participants who have previously made an online public commitment.	1. How is OPC conceptualised by those making OPCs towards EBRBs? 2. What are the psychological mechanisms underlying the effect of OPC on behaviour change? 3. What are the necessary conditions for making an effective OPC in the context of EBRBs?	• An OPC is a behavioural intention (BI), whether the BI is related to the performance of a specific action, attainment of a desired outcome or both. • An OPC is one which is publicised using computer mediated communication (CMC). • An OPC is active rather than passive, thus more related to posting behaviour rather than lurking behaviour. • An OPC is one in which the committed individual perceives his/herself as the origin of the behaviour rather than the result of external reasons. • The effects of OPC are postulated to be consequences of multiple process, including the anticipated fear of social approval, the prospect of obtaining social rewards and self-concept alignment, all of which are transcended by an instinctual desire to appear consistent in the eyes of others.

Phase/study 2 **Aim** The aim of this study to investigate the effect of an online public commitment (OPC) intervention delivered via Facebook in promoting increases in PA, goal attainment, mental wellbeing and relative autonomy.	H1. H2	Participants assigned to the intervention conditions will report significantly greater increases in scores for goal attainment, PA, mental wellbeing and relative autonomy than the control condition at all follow-up time-points (i.e., T1, T2 & T3), but the condition B will have the greater increase in scores than the other two conditions.	• There was a statistically significant interaction between condition and time on goal attainment scores. • At T1 and T2, goal attainment was significantly higher in the intervention conditions than in the control condition. • The main effect of time showed a statistically significant difference in goal attainment at the different time points. • There was no statistically significant interaction between condition and time for PA. • There was a statistically significant interaction between the condition and time on mental wellbeing. • The main effect of condition showed that there was a statistically significant difference in mental well-being between the conditions. • At T2, the intervention conditions scored significantly higher in PA than the control condition. • At T3, the intervention conditions scored significantly in PA higher than the control condition.

			• There was a statistically significant interaction between condition and time on relative autonomy scores. • At T1, relative autonomy score for the intervention conditions was higher than the control condition.
Phase/study 3 **Aim** To identify quantitative findings that need additional explanation, and to collect qualitative data from participants who can best explain these findings.	1.	What are the perceived factors that lead to success for those who have successfully changed their PA behaviour after making an OPC?	• The exchange of social support was a source of motivation. • The goal setting process was useful because: o Setting goals in collaborative with others made it easier to identify meaningful goals, but the goals have to originate from the self. o Identifying specific goals leads to relevant activities. o The goal statement developed as part of the goal setting interview should be made public. o It is crucial to identify goals where the motivation to change is high. • There are certain quality expectations of the computer mediated communication through which the OPC is made public, such as: o Privacy o Convenience o Anonymity

	○ Provide access to weak-ties with diverse viewpoints

7.3 Synthesis of Findings

A key feature of mixed methods research (MMR) is the meaningful integration of qualitative and quantitative data to address common research questions and hypothesis (Guetterman et al., 2015). Integration can occur at different points, for example, at the design level, the methods level or the interpretation and reporting level (Skamagki et al., 2024). The purpose of this integration is to end up with valid and well-substantiated conclusions about the OPC phenomenon. The ESD design and the pragmatic approach underpinning this thesis allowed for the separate collection and analysis of qualitative and quantitative data sets.

In this section, four integrated findings are presented as meta-inferences, following recommendations and techniques proposed by Fetters (2023), Guetterman et al. (2015) and others (Haynes-Brown & Fetters, 2021; Hitchcock & Onwuegbuzie, 2022; Legocki et al., 2015; Tashakkori & Teddlie, 2008; Younas et al., 2023a). Meta-inferences are defined as explanations or conclusions in the form of a narrative, story, or theoretical statement generated at the end of the study from the individual quantitative and qualitative inferences (De Craemer et al., 2015; Hitchcock & Onwuegbuzie, 2022; Tashakkori & Teddlie, 2008). In generating these meta-inferences, the findings from the three studies were compared against each other and also in context of existing literature, additional value was sought, and conclusions were drawn. In this process, the integration or fit of the four findings could include convergence (i.e., where two or more data sets produce nearly identical results), partial convergence (i.e., where two or more data sets produce results that are complementary to each other), divergence (i.e., where two or more data sets produce results that are inconsistent with each other), or silence (i.e., where two of the data sets produces results that is not corroborated by another). Although the integrated findings are presented as meta-inferences, all findings build together to address a common purpose that is to provide a comprehensive and conceptual understanding of OPC. Table 19 presents a joint display coding matrix, which displays the meta-

inferences identified, and whether the three phases/studies of investigation converge, complement (or partial convergence), diverge or are in silence with the meta-inferences.

Table 19:
Joint display coding matrix displaying meta-inferences

Meta-inferences	Study 1: Qualitative	Study 2: Quantitative	Study 3: Qualitative	Result
1. An online public commitment should involve the development of an action plan designed to provide motivation and guidance towards a goal.	✓	○	✓	Partial convergence
2. The benefits associated with being socially connected with a weak-tie support network enhances the effect of an online public commitment.	✓✓	✓	✓✓	Convergence
3. Computer mediated communication is a vehicle of online public commitment, but there are certain conditions that must be met to produce an optimal online public commitment.	✓✓	○	✓✓	Convergence
4. An online public commitment mainly works for behaviours under volitional control.	✓✓	✓	✓✓	Convergence

Key: ✓✓ = Convergence ✓ = Partial Convergence ○ = Silence ✗ = Divergence

7.3.1: Meta-inference 1

An online public commitment represents a behavioural intention towards a specific behaviour or desired outcome. Although it is a poor predictor of subsequent behaviour, it should involve the development of an action plan designed to provide motivation and guidance towards a goal.

This meta-inference suggests that making an OPC needs to be encapsulated within a goal setting and action planning framework to help bridge the gap between intentions and behaviour. More specifically, there is need to differentiate between a motivational phase where commitments are formed and the volitional phase where the intended behaviour is enacted. This disconnect has been coined the *intention-behaviour gap* (Feil et al., 2023; Sniehotta, Scholz, et al., 2005). This meta-inference is supported by findings from the two qualitative studies. Study 1 (qualitative) demonstrated that the "commitment" in OPC denotes an individual's behavioural intention (BI) or motivation to engage in a specific behaviour or achieve a certain outcome. Participants in study 1 frequently conceptualised their OPCs as being the self-instructions to achieve desired outcomes, or performing actions directed towards attaining these outcomes. This idea is consistent with previous research which have shown that BIs are the motivational factors that capture how much effort an individual is willing to make in order to perform a behaviour (Ajzen & Fishbein, 1980; Ajzen, 1991b, 1988; Di Maio et al., 2021; Durau et al., 2022; Filby et al., 1999; Ong et al., 2022; Triandis, 1980). This means that an individual's OPC, like any other BI, is a key predictor of subsequent behaviour or behaviour performance.

However, as the literature has also pointed out, forming good intentions is not enough to change PA behaviour (Amireault et al., 2008; Fife-Schaw et al., 2007; Ogden et al., 2007; Sniehotta, Scholz, et al., 2005). Findings from study 2 (quantitative) do not

provide evidence that making an OPC is the most proximal determinant of subsequent behaviour. However, they underscore the notion that BI is a necessary, yet insufficient antecedent of PA behaviour for many (Feil et al., 2023). In study 2, a 1-item (readiness to change) scale was used to provide quantitative information about how motivated participants were to achieve the change. A Spearman's correlation showed that there was a very weak and non-significant association between readiness to change and goal attainment at all the time-points. Similarly, there was a very weak association between readiness to change and PA at all the time-points.

Given that all participants – regardless of their condition – took part in the goal setting interviews (GSIs) to identify and develop their goals/commitments, it was necessary to test whether there were any statistically significant differences in PA, before and after the GSIs. This assumes that the GSIs may have enacted the motivation needed for behaviour change. Results show no statistically significant differences in PA between pre-GSIs and any of the time-points post-GSIs. When combined, these results suggest that how motivated people are to change the way they currently manage their life is a poor predictor of PA behaviour change. This means other factors may also moderate the intention-behaviour gap.

Findings from study 3 complements this meta-inference by providing contexts as to how participants were able to successfully bridge this gap. For participants in this study, taking part in the GSIs helped with the process of translating their BIs into behaviour. Firstly, many participants commented on how the GSIs enhanced motivation and performance. Central to the GSIs was the identification of specific and meaningful goals, which was used to develop their OPCs. Some participants had difficulties identifying which areas to work on, hence the GSIs helped elicit potential areas for improvement. Consequently, the GSIs helped with setting personally meaningful goals within the areas where they were motivated to work to achieve that change. The role of motivation in understanding the intention-behaviour gap is well documented in the context of PA (Ashford, 2010; Chen et al., 2023; Deci & Ryan, 1985;

Faries, 2016; Parks et al., 2003; Pearl et al., 2015; Pietilä et al., 2023; Wee & Dillon, 2022; Willem et al., 2017)

Other participants found that the action planning that accompanied the GSIs helped to initiate action by specifying when, where and how to act. Indeed, this provided the necessary self-regulation technique to transform their abstract goals into action. By planning, participants were able to form an active mental representation of the target situation. According to Gollwitzer (1999), this representation makes situational target cues more easily accessible and critical situations more easily detectable. Table 20 shows the key findings from the three individual studies and how these findings are corroborated by the existing studies.

Table 20:
Relevant findings from the individual phases of investigation regarding meta-inference 1

Phase/study	Relevant findings
1: Qualitative study (Chapter 4)	• A prominent theme within all participants' descriptions of OPC was of them being self-instructions, that capture an underlying personal motivation or commitment to act in the direction of behaviour change, otherwise described as a behavioural intention (BI). • Seven participants described their OPC in terms of performing a specific behaviour; and seven participants described their OPC in terms of achieving a desired outcome. • Two participants described their BIs in terms of performing or engaging in a specific behaviour, in which the specified behaviour was the desired outcome in and of itself
2: Quantitative study (Chapter 5)	• There was a very weak and non-significant positive correlation between goal readiness and goal attainment at

	T1 (r_s (148) = .082, p = .323), a very weak negative and significant correlation at T2 (r_s (137) = -.267, p = .002), and a very weak and non-significant negative correlation at T3 (r_s (140) = -.235, p = .005). • There was a very weak and non-significant negative correlation between goal readiness and PA at T1 (r_s (148) = -.047, p = .574), a very weak negative and non-significant correlation at T2 (r_s (137) = .109, p = .205), and weak negative and non-significant correlation at T3 (r_s (140) = -.073, p = .390). • There was no statistically significant difference in PA between pre-goal setting interview (T0) (M = 552426, SD = .6020.18) and any of the post-goal setting interview time-points such as T1 (M = 5502.82, SD = 2910.63), with a mean decrease of -21.44, 95% CI [1486.75, 1529.62], p = 1.00; T2 (M = 5713.75, SD = 2868.59), with a mean increase of 189.49, 95% CI [1724.245, 1345.274], p = 1.00; and T3 (M = 5626.96, SD = 2930.64), with a mean increase of 102.70, 95% CI [1566.84, 1361.43], p = 1.00.
3: Qualitative study (Chapter 6)	• Participants reported that identifying and working towards attaining personally meaningful goals can be a potentially empowering way of facilitating changes in behaviour. • Participants acknowledged the importance of setting goals in collaboration with the interviewer – especially in identifying the areas for improvement within pre-specified domain that were relevant for the intervention.

	• Many participants commented on how the goal setting interview helped them to find the motivation to make a positive change. Participants frequently talked about how the goal setting helped them to come to terms with situations or problem areas that needed to be addressed.
Literature review	• Behavioural intention is a necessary, yet insufficient antecedent of physical activity for many. Successful translation of a positive intention into behaviour is nearly at chance (Feil et al., 2023). • Action planning showed incremental predictive validity for changes in exercise over and above behavioural intentions. Action planning is a powerful self-regulatory tool that can help to translate goals into behaviour (Sniehotta et al., 2005). • Self-efficacy and planning seemed to be functional as proximal predictors of health behaviours. When predicting health behaviours, these two self-regulatory variables should be used in addition to the behavioural intention (Schwarzer et al., 2007).

7.3.2: Meta-inference 2

The benefits associated with being socially connected with a weak-tie support network enhances the effect of an online public commitment

This meta-inference underscores the importance of satisfying an individual's need to feel connected to other people when making an effective OPC. Being socially connected to others, especially with individuals who do not consider themselves members of a close personal network, provides several benefits

Study 1 (qualitative) found that participants with previous experience of making an OPC valued various types of enacted social support that enhanced the effectiveness of their OPC. Social support (SS) has been defined as "support accessible to an individual through social ties to other individuals, groups, and the larger community" (Lin et al., 1979: p.63). Some participants enjoyed receiving advice, guidance and recommendation to other information source that helped them know of potential next steps that may work well. Receiving this type of informational support helped to alleviate negative experiences of participants' stressful event, which is consistent with several studies (Cohen & McKay, 2020).

Most participants enjoyed receiving praises, empathy, encouragement, compliments and other forms of emotional support that was reciprocated by making an OPC. Receiving this type of social support was essential in keeping virtually all participants motivated to fulfil their OPC. To such an extent was the value of enacted SS that several participants commented that without receiving SS they would have given up in their OPC journey in a real-world setting.

The importance of SS was also reflected in study 3 (qualitative) findings. In this study, participants who successfully demonstrated short-term OPC success felt that a major factor which led to an efficacious OPC was 'social connectedness'. This theme

reflects the satisfaction of the psychological need for relatedness, which has been shown to produce greater outcomes in PA-related behaviour changes (Divine et al., 2019; Kim & Gurvitch, 2020; Reis et al., 2000; Zhang, Ren, et al., 2022). One medium by which social connectedness makes people adhere to their OPC is via social accountability, whereby an individual's social group observes and ensures that he/she follows through with the promised activity.

Also, the SS that comes with being connected to others, propels individuals to engage in goal directed behaviours. This is consistent with study 1 (qualitative) findings, and existing studies which have demonstrated a positive relationship between SS and PA motivation. Both qualitative studies (studies 1 and 3) also converge on the notion that not all social connections are equally potent source of SS. For a variety of reasons, participants in both qualitative studies expressed a preference for obtaining SS from weak-ties rather than strong-ties support network. Because members of weak-tie networks do not typically share an intimate relational history, as they provide access to diverse points of view and information typically unavailable within more intimate relationships (Stevenson & Gilly, 1991)

The quantitative results showed that receiving SS can have short-term effect on goal attainment. Participants whose OPC was accompanied with SS demonstrated greater but short-term increases in goal attainment at 6- and 12-weeks, but not post-intervention. This suggest that, although SS helps individuals to achieve their OPC on a short-term basis, the sustenance of this behaviour is much more challenging when the intervention ceases and possibly when SS is no longer available. Despite this inconsistency, the findings of study 3 (qualitative) shows that those who were able to achieve post-intervention behaviour changes attributed this to the social accountability that continued to occur within their real-world setting. Table 21 shows the key findings from the three individual studies and how these findings are corroborated by the existing studies.

Table 21:
Relevant findings from the individual phases of investigation regarding meta-inference 2

Phase/study	Relevant findings
1: Qualitative study (Chapter 4)	• Receiving informational support bolstered problem-solving skills, lowering the appraisal of the stressful situation. • Receiving emotional support helped to ensure that participants remained motivated to fulfil their OPC. • Obtaining social support from weak-ties support network is preferable because strong-ties are perceived as inadequate and incapable of providing satisfactory support.
2: Quantitative study (Chapter 5)	• At 6-weeks interval, participants in the OPC + social support condition reported greater increases in goal attainment (M = 4.13; SD = 1.18) than the OPC only condition (M = 3.06; SD = .90) and the private commitment condition (M = 2.90; SD = .84). • At 12-weeks interval, Condition B participants in the OPC + social support condition scored significantly higher (M = 5.29; 1.01) compared to the OPC only condition (M = 2.82; SD = .95), with a mean difference of 2.48 (95%, CI, 1.9656 to 2.9964, p <.001), but not significantly higher than private commitment condition (M = 5.00; MD = .2969, p = .349).
3: Qualitative study (Chapter 6)	• Receiving social support from others provides the motivation for goal attainment. • Social connectedness can lead to others holding a committed individual accountable to fulfil his/her OPCs.

Literature review	• Social support critically reduces or ameliorates the negative experiences of an individual's stressful event (Cohen & McKay, 2020). • The effect of physical exercise commitment was observed exclusively through the mediating role of relatedness need satisfaction, while that of physical exercise adherence was through both competence and relatedness needs satisfaction (Zhang et al., 2022). • The effect of PA commitment was observed exclusively through the mediating role of relatedness need satisfaction, while that of physical exercise adherence was through both competence and relatedness needs satisfaction (Han & Won, 2022)

7.3.3: Meta-inference 3

Computer mediated communication (CMC) is a vehicle of online public commitment, but there are certain conditions that must be met to produce an optimal online public commitment.

This meta-inference confirms the role of CMC as a conduit for publicising an OPC. This meta-inference is not concerned with the effects of particular types of asynchronous and synchronous CMC (e.g., blogs, email, social networking sites, videoconferencing etc.), but simply uses the medium as a conduit for OPC about EBRBs. The first findings from the thesis to fully support this meta-inference come from the study 1 (qualitative). Participants reported being aware of the increasing role that CMC plays in human communication and interaction, and that general internet-

based behaviour can be characterised as containing higher levels of online self-disclosures (Joinson, 2001). In this light, all participants described an OPC as a BI which is publicised to others using CMC. Participants admitted that it is commonplace for individuals to disclose intimate information about themselves and their future desired actions, using the arrays of different CMCs including their functionalities and affordances. Although some participants contended that the lack of non-verbal cues can weaken the interpersonal bonds that transmit social influence, most expressed a belief that users can exploit the technological aspects of CMC to enhance their OPC.

Study 3 (qualitative) further supports and expands the findings of study 1 (qualitative), especially highlighting some of the necessary conditions that CMC must satisfy to produce an optimal OPC. When participants in this study were asked about the factors that led to their OPC success, almost all participants valued the privacy and anonymity of the Facebook group. Due to the sensitive and personal nature of the OPCs, most participants did not want outsiders to see their discussions unless they were also members of the group. Participants also relied on the visual anonymity that CMC provides to reveal their OPC far more intimately than they would be inclined to do without the intermediation of CMC. This tendency is consistent with existing studies (Joinson, 2001). This suggest that, not only does CMC serve as a vehicle for OPC, but it must also restrict non-members from seeing the groups' content and members, and allow the concealment of one's physical indent (i.e., visual anonymity).

The quantitative findings in study 2 are in silence with this meta-inference. In study 2, Facebook groups were designed to allow participants in the intervention groups to publicise their OPC to others. Although the Facebook groups were set as private groups and participants were allowed to join the group with a fictitious Facebook profile, however, without a control condition that did not have these same settings it is difficult to determine a cause-and-effect relationship. Future research is needed to investigate whether making an OPC under the conditions of privacy and visual anonymity is more effective than without these conditions. Table 22 shows the

key findings from the three individual studies and how these findings are corroborated by the existing studies.

Table 22:
Relevant findings from the individual phases of investigation regarding meta-inference 3

Phase/study	Relevant findings
1: Qualitative study (Chapter 4)	• Participants described an OPC as a behavioural intention which is made public using CMC. • Participants contend that, although CMC is characterised as lacking non-verbal cues, users can still exploit the technological aspects of CMC in order to enhance their OPCs.
2: Quantitative study (Chapter 5)	(No relevant findings)
3: Qualitative study (Chapter 6)	• Participants perceived that the efficacy of an OPC is based on ensuring the privacy of the CMC platform, so that non-members are prevented from accessing the platform's content and its members. • Participants perceived that the efficacy of an OPC is based on allowing visual anonymity, so that members have the ability to conceal their physical identify if they so choose.
Literature review	• Self-disclosure is higher in CMC than face-to-face, and that both visual anonymity and heightened private/reduced public self-awareness can be implicated in this effect. As the internet becomes a ubiquitous part of people's lives, so psychologists will increasingly need to include the medium as well as the person in any analysis of social behaviour (Joinson, 2001).

- Specific technical affordances of CMC such as editability and off-line composition, with the passage of conversational time in suspension, have been argued to allow CMC users to augment their self-presentations in a process called hyperpersonal interaction (Walther, 2007).

7.3.4: Meta-inference 4

An online public commitment mainly works for behaviours under volitional control.

This meta-inference relates to an individual's reasons or rationale for initiating an OPC. An online public commitment works in tandem with the satisfaction of an individual's need for autonomy, whereby the decision to initiate the OPC itself is driven by the perception as to whether initiating the OPC will service an individual's psychological need for autonomy. From the perspective of self-determination theory (SDT; Ryan et al., 1985; Ryan & Deci, 2002) autonomy refers to being perceived as the origin or source of one's own behaviour (deCharms, 1968; Ryan & Connell, 1989). Autonomy is often confused with concepts such as individualism and independence (Davies et al., 1997; Steinberg & Silverberg, 1986), which indeed can thwart an individual's need for relatedness. But, within SDT, autonomy refers not to being independent, detached or selfish but rather to the feeling of volition that can accompany any act (Ryan & Deci, 2000). Self-determination theory posits that when the need for volition is supported, people will be intrinsically motivated to undertake tasks for their own sake because they are interesting, enjoyable, and inherently rewarding, and, as a consequence, are likely to persist with the behaviours (Hagger et al., 2014; Watt & Richardson, 2015).

It was clear from the findings in study 1 (qualitative) that volition is an important underlying dimension of OPC. Participants described an OPC as one which is 'self-initiated'. Participants in the study 1 frequently made reference to interpersonal attributions of causality. That is, they described their OPC as one in which they perceived themselves as the "origin" of the behaviour, rather than as a "pawn" to heterogenous forces. To such a great extent were participants grounded in the notion that an OPC should be volitionally made, that many of them even questioned whether an OPC that is influenced by excessive external pressure was an OPC at all. Such graduations in the experience of perceived locus of causality (PLOC) with regard to one's own behaviour was particularly explicit in the experiences of participants in study 3.

The importance of volitional control over making an OPC was also reflected in the findings of study 3 (qualitative). For these participants, what made their OPC to be effective was that they viewed their behaviours as voluntary and not endorsed by external forces, therefore they concluded that they have come to these decisions by themselves and that their behaviours were meaningful and reflect their true motivations. Participants stressed the importance of volition, in that the process of identifying and developing goals should be facilitated by a sense of choice and freedom from external pressure. In this sense, support for volition allows individuals to actively transform the values of making an OPC into their own. Thus, it could be said that participants had an internal PLOC (I-PLOC) which motivated their follow-through behaviour. Research has shown that when individuals have a more I-PLOC for behaviour, they will exert greater effort and persistence in performing the behaviour than when they have a more external PLOC (Deci & Ryan, 2000; Ryan & Deci, 2002).

Participants in study 1 (qualitative) made a distinction between two types of motivation underlying an OPC: the motivation underlying the initiation of the OPC itself (discussed above), and the motivation for engaging in the behaviours prescribed

by the OPC. The findings of study 1 (qualitative) suggests that one of the reasons why people adhere to their OPC is based on the desire for social approval and the fear of social disapproval (Nyer & Dellande, 2010; Parrott et al., 1998). In this respect, SDT makes it clear that engaging in behaviours for externally referenced reasons can yield detrimental effects on autonomous motivation (Deci & Ryan, 1985; Ryan & Deci, 2000; Vansteenkiste et al., 2006).

Self-determination theory's organismic integration theory (OIT) further posits that even extrinsically motivated behaviours can be integrated into one's core values and sense of self (Gilal et al., 2022; Gilal et al., 2022; Wasserkampf & Kleinert, 2015), such that the new behaviour becomes increasingly self-determined over time. This may explain why participants in study 3 (qualitative) attributed the success of their OPC to the fact that the goal setting interview offered a sense of volition which allowed them to identify meaningful goals. One would assume that if participants' actions, decisions and goals in the goal setting interviews were a result of external pressures, this may have possibly thwarted the efficacy of participant's OPC (Deci & Ryan, 1985, 2000; Ryan & Deci, 2002, 2006).

Although the two qualitative studies provide a complementary understanding of the role of I-PLOC both as an underlying dimension of the OPC construct, and as necessary condition for making an effective OPC, the quantitative data did not find any statistically significant correlation between goal attainment and relative autonomy, or between PA levels and relative autonomy. In study 2 (quantitative) it was hypothesised that participants who made an OPC and received SS would report greater increases in relative autonomy index (RAI) than participants who made an OPC without SS and participants who kept their commitment private. This hypothesis was based on the idea the contextual support for relatedness and competence will facilitate the process of internalisation and development of optimal motivation (Patrick & Williams, 2012). Contrary to expectations, the quantitative findings did not fully support this meta-inference, because at a certain time-point the RAI for the OPC

+ SS condition was greater than the other conditions (i.e., T1), and at other time-point the RAI for the OPC + SS condition was significantly lower than the other conditions (i.e., T2 & T3). A one-way repeated measure ANNOVA showed that the OPC + SS condition did not experience any statistically significantly changes in RAI over time, $F(3, 177) = .652$, $p = 583$. These results are unsurprising given that a 3-week interval may be too short to examine the tenability of OIT. Table 23 shows the key findings from the three individual studies and how these findings are corroborated by the existing studies.

Table 23:
Relevant findings from the individual phases of investigation regarding meta-inference 4

Phase/study	Relevant findings
1: Qualitative study (Chapter 4)	• An OPC is one which is self-initiated, that is, the committed individual must have an internal locus of causality and perceive him/herself as the origin of the behaviour. • Although participants acknowledged that OPC could be extrinsically enforced, over time they concluded that their behaviour was voluntary and a reflection of their true motivations.
2: Quantitative study (Chapter 5)	• At 6-weeks (i.e., T1) RAI for the OPC + SS condition was greater than the other conditions and at 12-weeks (T2) and 24-weeks (T3) the RAI for the OPC + SS condition was significantly lower than the other conditions. • A one-way repeated measure ANNOVA showed that the OPC + SS condition did not experience any statistically significantly changes in RAI over time, $F(3, 177) = .652$, $p = 583$.

3: Qualitative study (Chapter 6)	• Participants recognised that although the involvement of external others is useful in a goal setting process, however, the goals should originate from the individuals making the OPC.
Literature review	• Autonomy for participation and self-control are important to change one's healthy lifestyle through regular exercise participation (Ahn & Kim, 2022). • Autonomy is significantly associated with physical activity. Therefore, attempts to improve autonomy in individuals may be a useful intervention strategy in improving physical activity levels (Ramsey & Hall, 2016). • Goal-setting participation is positively associated with goal commitment (Locke & Latham, 2002; Sholihin et al., 2011).

7.4 Conclusion

Integrating qualitative and quantitative methods, data, and findings is of utmost importance in mixed methods research (MMR) and distinguishes MMR from monomethod research (Bazeley, 2018; Fetters & Molina-Azorin, 2017; Plano Clark & Sanders, 2015). In this chapter, the juxtaposing of qualitative and quantitative findings side-by-side generated four distinct meta-inferences to be made which provided new insights about the OPC concept. In generating these meta-inferences, it was important to compare the qualitative and quantitative findings, look for value, and finally draw conclusions. During this process, the findings from the two qualitative studies and the quantitative study were compared by assessing convergence, complimentary (i.e., partial convergence) and divergence. Meta-inferences require researchers to engage in higher-level reasoning and analysis as they provide knowledge that surpasses the sum of each type of individual finding (Bazeley, 2018; Plano Clark & Ivankova, 2018).

There was convergence within the second, third and fourth meta-inferences, and a partial convergence within the first meta-inference (see Table 15). The integrated findings are novel for several reasons.

Firstly, this is the first known study of OPC that integrates qualitative and quantitative findings. Although other MMR of OPC exists (Consolvo et al., 2006; Munson et al., 2015), but these studies fail to link qualitative and quantitative findings to generate meta-inferences in a process analogous to the "theory development from observations" (Venkatesh et al., 2013: p.39) where observations are inferences from distinct components of an MMR study. Consequently, there is a lack of comprehensive understanding of peoples' perspectives of making an OPC towards energy balance-related behaviours (EBRBs), aligned with the lived experiences of those who have taken part in an OPC intervention, including whether making an OPC is empirically more effective than making a private commitment. Given that well-developed and supported meta-inferences contribute to rigor and quality of MMR (Tashakkori & Teddlie, 2008; Venkatesh et al., 2013; Younas Fàbregues, et al., 2023b), it could be argued that existing studies of OPC, especially those that apply separate qualitative and quantitative methods without drawing out inferences from the integrated findings, hinders the primary objective of an MMR study.

Secondly, the meta-inferences generated in this chapter provide knowledge that surpasses the sum of each type of finding. Take for example, the fourth meta-inference which suggests that OPC mainly works for behaviours under volitional control. Numerous studies have frequently attributed the effects of public commitment and OPC on contingencies that are operationally separable from the action *per se* (Cialdini et al., 1995; Coupe et al., 2019; Munson et al., 2015; Nyer & Dellande, 2010; Nyer & Gopinath, 2005; Pallak & Cummings, 1976; Parrott et al., 1998), however, the integration of findings demonstrates that making an OPC is non-instrumentally focussed, instead originating autotelically from taking in a value or regulatory process into one's core sense of self. Culminating at this meta-inference

would not have been possible without connecting claims from the separate strands of the qualitative data (i.e., studies 1 and 3) which converge on the notion that making an OPC should be accompanied by an internal locus of causality. This notion was complemented by the quantitative findings (i.e. study 2) which showed that, at certain time-points, those who made an OPC were more likely to identify with the value of an activity and accept full responsibility for doing it. The basic strategy in complementarity is to create a division of labour, so that each method offers something that would be difficult for the other to produce (Morgan, 2018).

Thirdly, the integrated findings are also novel, not only because qualitative and quantitative inferences were consistent with one another to produce a *mutually illuminating* (Bryman, 2007) understanding of OPC. However, as was found with the first meta-inference, the main advantage of divergence between the qualitative and quantitative claims is not the differences that it generates but the opportunities that it provides for investigating those differences. In the first meta-inference, although findings from the two qualitative studies (studies 1 and 3) converge on the important role that goal setting plays in initiating an effective OPC, the quantitative findings did not find any statistically significant impact of goal setting on PA-related behaviour change. This meta-inference demonstrates how pursuing divergent results can produce insights that are both theoretically interesting and empirically addressable. Unfortunately, as was also found with the first meta-inference, much of the work that exemplifies research based on divergence also indicates how difficult it is to design a study around divergence as an explicit goal (Maxwell & Loomis, 2003; Morgan, 2018). It is also hard to predict in advance how much effort it will take to produce meaningful results.

In sum, the insights derived from integrating qualitative and quantitative inferences at the end of studies 1, 2 and 3, demonstrate how meta-inferences are crucial for achieving added value and synergy in MMR. There is an ongoing need to understand the protocols for generating meta-inferences, especially considering their

pivotal role in helping researchers achieve full qualitative and quantitative integration (Morgan, 2018).

Chapter 8: Conclusions: Limitations, Implications and Future Directions

8.1 Strengths and Limitations of the Research

In this final chapter, the strengths and limitations of the thesis are discussed under separate headings. Numerous key strengths are evident in this thesis in the context of its methodology, however, five of these are worth mentioning and discussed below. Several limitations are also discussed here that may impact or influence the interpretation of the findings. The theoretical and practical implications are highlighted, followed by directions for future research.

8.1.1 Strengths

The first strength of this thesis is its underpinning epistemological stance. Qualitative research is usually underpinned by interpretivism, which is based on the assumption that social reality is not singular or objective, but is rather shaped by human experiences and social contexts (Ryan, 2018). On the other hand, positivism – – which is the epistemological stance underpinning quantitative research – rejects the interpretivist approach that reality is subjective, multiple and socially constructed. Instead, positivism makes the assumption that a single tangible reality exists—one that can be understood, identified, and measured (Park et al., 2020). The incommensurability argument suggest that different paradigms involve irreconcilable worldviews and are therefore incompatible (Liu, 2022; Morgan, 2014; Shannon-Baker, 2016). This thesis was underpinned by pragmatism as its epistemological stance, which allowed the research process to steer clear of metaphysical debates about the nature of truth and reality and focus instead on 'practical understandings' of concrete, real-world issues (Kelly & Cordeiro, 2020; Patton, 2002). This research was not only concerned contributing to the knowledge on a theoretical level, but also on producing

useful and actionable knowledge for practitioners and designers of lifestyle medication programmes (LMPs), discussed further in section 7.2.2.

This thesis adopted a mixed methods approach and an exploratory sequential design (ESD) to address the research questions. Adopting this methodological approach was a key strength of this thesis. Given that online public commitment (OPC) is under-researched, using a combination of qualitative and quantitative approaches was useful in providing a fuller picture and stronger inference than using either approach on its own (Wasti et al., 2022). The use of semi-structured interviews in study 1 generated extensive data that allowed subdomains of ideas to be studied, which were then used to reinforce the hypothesis for further investigation. Quantitative methods were used in study 2 to investigate the effects of OPC on energy balance-related behaviours (EBRBs). In study 3, qualitative data was collected from specific participants to expand and explain on quantitative results. Adopting this approach helped to obtain more rigorous conclusions by employing two methods in such a way that the strengths of the qualitative methods offset the weaknesses of the quantitative methods and vice versa (Dawadi et al., 2021; Plano Clark & Ivankova, 2018).

The third strength of this thesis, somewhat related to the aforementioned strength, lies in being able to generate meta-inferences by integrating claims from qualitative and quantitative methods. The meta-inference is an indicator of a mixed methods study's yield and quality. Despite the critical importance of meta-inferences in mixed methods research (MMR) and their underlying meaning being well established (Bryman, 2007; Moseholm & Fetters, 2017; Younas Pedersen et al., 2023), there is no actual mixing or integration of claims takes place in many studies intended as MMR (Bryman, 2007). Such studies, according to Schoonenboom (2022), cannot be considered a real MMR but rather two sperate studies. However, in the interpretation and reporting level of this thesis (chapter 7), the individual qualitative and quantitative inferences were compared by assessing convergence, divergence, silence,

and complementarity. This led to the generation of meta-inferences, which provides greater insights into the OPC phenomenon and its implications. As a "hallmark" of MMR (Moseholm & Fetters, 2017), well-developed and supported meta-inferences contributed to the interpretive rigour of the thesis by ensuring credible and plausible inferences and meta-inferences were drawn from the raw and rigorously analysed data.

The fourth strength of this thesis is the provision of conceptual and definitional clarity regarding the OPC phenomenon which provide a strong platform for future work in OPC. Despite the burgeoning popularity of internet-delivered interventions (IDIs) and traditional public commitment (PC) interventions that promote changes in EBRBs, theoretical inconsistencies have hampered the development of a coherent understanding of OPC, especially the specification of its underlying dimensions. This is the first known study to gather the beliefs, perceptions and attitudes of those with first-hand experience of making an OPC towards EBRBs, and then using this insight to explore its potential operationalisation that could enable experimental research on it.

The fifth strength of this thesis, by no means the last, is the design of a randomised controlled trial (RCT) to test the efficacy of an OPC intervention to promote EBRBs. Although RCTs are regarded as the gold standard for ascertaining the causal relationship between interventions and outcomes (Fernainy et al., 2024; Hariton & Locascio, 2018), they can be expensive and time-consuming to design, amongst many other disadvantages. In designing the RCT (study 2), this thesis was able to overcome some of the frequently mentioned disadvantages of RCT. For example, a common disadvantage is the lack of generalizability, or low external validity (Green & Glasgow, 2006) due to strict protocols that result in participants who may be unrepresentative of real-world population. In study 2, not only was there a low attrition of participants, but participants differed greatly both in demographic characteristics and the types of physical activity (PA)-related goals they identified.

Also, multiple methods were used to measure PA-related behaviour change (that is, increases in PA and goal attainment). All of which contributed to strengthening the external validity of the results.

8.1.2 Limitations

It is also important, however, to note that there were some limitations to this thesis. Firstly, although the research on PC is vast, especially within the context of pro-environmental behaviours, there was limited research examining the relationship between PC and EBRBs. There were even fewer research studies examining the relationship between OPC and EBRBs. Although the lack of existing research underscores the critical need to conduct research in this area, it created some limitations. For example, it was difficult to obtain a good estimate of the effect size that was necessary for performing a statistical power analysis. This meant that insufficient participants were inadvertently enrolled to draw meaningful conclusions, which poses the risk of arriving at a biased conclusion (e.g., type-2 error) and weakening external validity.

The use of self-reported data is another limitation of the study that may potentially threaten the reliability and validity of assessments taken, especially in study 2. One issue with self-reported data is social desirability, which is pertinent in this research because it would not be uncommon for participants in this study to over-quantify their goal attainment, PA and other scores. Study 2 would have benefited from an objective measurement of PA changes (e.g., pedometer), as demonstrated in other studies (Armstrong et al., 2019; Bravata et al., 2007; Freak-Poli et al., 2020). Unfortunately, this was not financially viable at the time. Participants who joined the Facebook groups (in study 2) may have underreported socially undesirable EBRBs, and over reported more desirable attributes to maintain a positive self-concept (Antheunis et al., 2020; Scott & Fullwood, 2020b; Walther et al., 2011, 2015; Wright, 2005). Another issue with the use of self-reported data is memory recall, as

participants may not accurately remember or recall past events, leading to inconsistencies in the data.

Another limitation with the lack of research in the area of OPC relates to the lack consensus regarding the definition and conceptualisation of OPC as a distinct construct. This ambiguity meant that, unfortunately, OPC was measured using a single item. While it has long been argued that the use of single-item measures should not constitute a "fatal flaw" (Wanous et al., 1997), resistance to their applicability and reliability continues (Bergkvist, 2015; Fuchs & Diamantopoulos, 2009; Gogol et al., 2014).

Secondly, although, as stated in *section 7.1.1*, one of the strengths of the thesis is the pragmatic worldview which emanate from a desire to produce useful and actionable knowledge, the relative weighting of the qualitative and quantitative approaches always requires caution. Weighting refers to the relative importance or priority of the quantitative and qualitative methods for answering the study's questions. Due to the exploratory nature of this thesis, a greater emphasis and priority was placed on the qualitative methods, and the quantitative method was used in a secondary role to address the research problem. Furthermore, the quantitative element – being a pilot/feasibility study – would not have the same rigour or statistical power as a full-scale investigation.

Thirdly, any research study is limited by the data collection methods that are chosen. Most of the semi-structured interviews in study 3 were conducted using telephone or Microsoft Teams. Also, due to the impact of COVID-19 some of the goal setting interviews for study 2 were also conducted using telephone or Microsoft Teams. Although there are some reported advantages of telephone interviews (e.g., decreased cost and travel, ability to reach geographically dispersed respondents, participants are willing to talk freely and to disclose intimate information (Novick, 2008)), there were some limitations. Prominent among these limitations is the absence of visual cues which might compromise qualitative data. Absence of visual cues is said

to have a number of effects, including the loss of informal communication and contextual information, the inability to develop rapport or to probe, and the misinterpretation of responses (Novick, 2008; Opdenakker, 2006; Sturges & Hanrahan, 2004; Sweet, 2002). Of course, it can be argued that the semantic approach employed in this thesis to analyse the data tends to downplay the importance of nonverbal interview data. However, telephones are also thought to reduce rapport through loss of contextual data and use of technology per se may be viewed as intrusive for some participants (Novick, 2008; Shuy, 2016). Another data collection method that had some limitations was the use of an online form to recruit participants for study 2. There are undoubtedly some individuals who were more likely than others to have access to the internet and complete an online form, due to factors such as the digital divide (Acilar & Sæbø, 2023; Lythreatis et al., 2022; Mubarak & Suomi, 2022; Soomro et al., 2020). This can lead to self-selection bias (Thompson et al., 2003; Wright, 2005).

There could also be limitations to the 'level' at which themes were generated in the qualitative studies. As described in chapter 6, a semantic analysis was used, which explores the meaning on a surface level, drawing out themes that are readily and explicitly generated. Although it could be said that analysing data at the semantic level ignores the underlying ideas, assumptions, and conceptualizations – and ideologies – that are theorised as shaping or informing the semantic content of the data (Braun & Clarke, 2006), it could also be argued that even in semantic coding, the researcher plays an active and interpretative role in generating initial codes, generating/reviewing themes, and then defining/naming these themes. Afterall, codes and themes do not 'emerge' from the data or reside in the data, waiting to be found. Therefore, achieving thematic analysis – whether semantic or latent – would require researcher to go beyond the descriptive level of the data and give consideration to both the meaning constructed and communicated by the participant and the researcher's interpretation of this meaning (Patton, 2002).

Finally, the lack of researcher triangulation in the data analysis of the second qualitative study (study 3) is another limitation. Including two or more coders in the coding process is a crucial component of assessing the validity, reliability, trustworthiness, and perceived quality of research conclusions. Also, the use of multiple coders inserts an additional level of scrutiny and rigor to the coding process through added perspectives of different researchers that transcends the imagination of a single individual (Cofie et al., 2022). Notwithstanding, in the absence of researcher triangulation, the use of peer debriefing helped to enhance the trustworthiness and the credibility of the qualitative findings, as agreed by (Lincoln & Guba, 1985; Spall, 1998).

8.2 Implications of Research Findings

The analysis of both the quantitative and qualitative data obtained in this thesis provides a comprehensive understanding of OPC, in terms of its underlying dimensions, its effect in influencing EBRBs, the psychological mechanisms underlying this effect and the perceived factors that determine its effectiveness. The findings from this thesis have implications relating to theory, practice and subsequent research.

8.2.1 Implications for Theory

The findings of this thesis contribute and even challenges existing research. Some of these findings are discussed below:

8.2.1.1 Online public commitment as a behavioural intention

Taken together this thesis suggests that the effects of OPC on behaviour change can partly be explained by the theory of planned behaviour (TPB; Ajzen & Fishbein, 1980; Ajzen, 1991b, 2002), in that an individual's behaviour is determined by his/her intention to engage in that behaviour. Forming positive behavioural intentions (BIs) is often seen as the first step toward behaviour change (Heckhausen & Heckhausen, 2018). Conceptualisations of both PC and OPC in the literature have rarely applied the TPB in explaining their effects on behaviour change, which can limit a fuller

understanding of these concepts. Viewing an OPC from the perspective of a BI has several theoretical implications, especially taking into consideration TPB's three types of beliefs that affect an individual's BI to perform a specific behaviour.

The theory of planned behaviour would suggest that individuals are more likely to fulfil their OPCs if they have a favourable attitude (beliefs about the likely consequences of the behaviour) and subjective norms (beliefs about the normative expectations of others) about the behaviour, and have a high degree of perceived control (beliefs about the presence of factors that may facilitate or impede performance of the behaviour). These beliefs bear a resemblance to the findings of this thesis. For example, the findings show that the anticipation of social approval or the avoidance of social disapproval can influence OPC adherence, which is consistent with how the subjective norm construct of TPB has been shown to influence behaviour in a wide range of settings, including health, education and organisational behaviour (Al-Swidi et al., 2014; Barbera & Ajzen, 2020; Ham et al., 2015; Wu et al., 2022; Xu et al., 2022).

However, the findings of this thesis contribute to this research by proposing the idea that people can be inherently motivated to internalise the regulation of subjective norms. Several theories of health behaviour, such as the Health Belief Model (Khodaveisi et al., 2021), have applied a combination TPB's constructs to explain and predict individual changes in health-related behaviours. However, there are hardly any studies which have applied the various aspects of the model's key construct to provide a comprehensive understanding of the OPC construct. More critical research is needed to assess the role of control and behavioural beliefs when individuals make an OPC towards EBRBs.

This thesis suggests that, although forming intentions instigates psychological processes that support the realisation of those intentions, these process alone do not guarantee intention realisation. This is consistent with numerous studies which have found that there is a discrepancy between BIs and subsequent follow-through behaviour (Amireault et al., 2008; Rhodes & Dickau, 2012; Sniehotta, Scholz, et al.,

2005). This gap is concerning as it may lead to overestimating the effectiveness of OPC interventions based on participants' self-reported intentions. The few experimental studies of OPC have failed to find a statistically significant relationship between OPC and goal attainment (Consolvo et al., 2006; Munson et al., 2015). Interestingly, these studies failed to operationalise the role of goal commitment, which this thesis found to be an important conceptual element of OPC. Without goal commitment, an OPC can have no motivational effect, in line with goal setting theory (Hollenbeck & Klein, 1987; Klein et al., 1999, 2020; Locke & Latham, 2002, 2013; Seijts & Latham, 2000).

8.2.1.2 The role of social support

The thesis demonstrates the relevance of social support (SS) when people make an OPC towards EBRBs, especially PA. Indeed, the importance of SS in PA-related behaviours is widely recognised (de Camargo et al., 2023; Golaszewski et al., 2022; Hailey et al., 2023; Koh et al., 2022; Laird et al., 2016; Ma, 2023; Mendonça et al., 2014; Penna et al., 2022; Smith et al., 2023; Stevens et al., 2020). However, despite the importance of SS, seldom do studies of OPC investigate whether SS functions as a moderator of the relationship between OPC and goal attainment, even though qualitative data from a handful of OPC studies would suggest that SS is important (Consolvo et al., 2006; Munson et al., 2015).

This thesis contributes to existing literature on the impact of SS in promoting EBRBs, whether face-to-face (de Camargo et al., 2023; Golaszewski & Bartholomew, 2019; Hailey et al., 2023; Hwang et al., 2010; Laird et al., 2018; Smith et al., 2023), or online (Clarkson et al., 2022; Kearns & Whitley, 2019; Smith Anderson-Bill et al., 2011; Son et al., 2021; Stragier et al., 2018; Zhang et al., 2016). However, existing OPC studies (e.g., Cavallo et al., 2012; Munson et al., 2015) and studies exploring the relationship between PA and SS (e.g., Koh et al., 2022; Mendonça et al., 2014), have focussed exclusively on SS from strong-ties support network (e.g., family and friends). The findings of this thesis diverge from existing research by suggestion that individuals who make an OPC may opt for weak-ties as opposed to strong-ties support network,

especially because the former provides access to more diverse viewpoints and is more adept at providing objective, dispassionate feedback about EBRBs.

This finding supports existing research regarding weak-tie versus strong-tie support network preference (Adelman et al., 1987; Lam et al., 2023; Wright, 2012; Wright et al., 2010; Wright & Miller, 2010; Zigron & Bronstein, 2019). More research is needed to assess the differences between perceived and enacted SS, given that existing research in this area has noted this conceptual distinction (Chen et al., 2022; Han et al., 2018; Kim, 2014; Lakey et al., 2010; Li et al., 2015; Xia et al., 2012). More research also needs to account for individual and cultural differences in the process of SS mobilisation, and how SS manifests via commuter mediated communication (CMC) and weak-ties support network in comparison with face-to-face (FtT) contexts.

8.2.1.3 The importance of publicness

The findings of this thesis provide insights into the importance of *publicness*, that is the extent to which others are aware of one's BI or PA-related goal. Whereas previous PC studies have found that attitudes stated publicly are relatively stable and are more likely to result in consistent behaviours (Gollwitzer et al., 2009a; Gopinath & Nyer, 2009; Kiesler, 1971; Nyer & Dellande, 2010; Nyer & Gopinath, 2005; Pallak et al., 1980; Pallak & Cummings, 1976), this thesis is amongst the few studies that have examined PC in the context of CMC where other individuals are not physically co-present. This is important because individuals increasingly adopt CMC in numerous aspects of their communication and interaction with others whom they may never encounter in person, yet interactions takes place to attain various goals (Bradford et al., 2017).

Unlike other OPC studies which merely view CMC as conduit through which an OPC is communicated to others (Cavallo et al., 2012; Consolvo et al., 2006; Munson et al., 2015), this thesis found that CMC have certain characteristics, functionalities and affordances (e.g., privacy, anonymity and convenience) which may hinder or facilitate

the effect of OPC on goal attainment or behaviour change. Given the wide array of CMCs, it would be useful to explore how these types of CMCs could moderate the effect of OPC. The finding of the quantitative study is limited to Facebook group, thus the extent to which these findings can be applicable to other types of CMCs is low. More research is needed to whether perceptions of publicness differ across frequently discussed mediums: CMC, FtT and written word. Also, given the crucial role of CMC in impression formation and management (Antheunis et al., 2020; Jiang et al., 2011; Scott & Fullwood, 2020b, 2020a; Walther, 1996, 2007; Walther et al., 2015), more critical research is needed around the effects of publicness (bi-conditional) on participants' self-perceptions or identities.

8.2.2 Implications for Practice

This thesis has focussed on establishing "what works" in lifestyle intervention programmes (LMPs) that promote EBRBs, exploring how practitioners can effectively support individuals to translate their intentions into goal-oriented actions. The main research impact of this thesis concerns the use of OPC as behaviour change technique (BCT) to promote healthy EBRBs, whether this is to help people lose weight, eating a healthy diet, or becoming more physically active. Weight loss support groups (e.g., Weight Watchers®, Slimming World® etc.) can incorporate OPC within their weight management programmes to encourage members to share their weight loss goals/commitment with others to create social accountability. However, the OPC should not be externally endorsed to prevent the risk of external locus of causality, which may consequently diminish members' autonomous motivation.

Fitness coaches and personal trainers have usually incorporated goal setting strategies within the personalised programme offered to their clients. The findings of this thesis highlight the importance of encouraging clients to make their goals public using CMC. The value of making these goals public lies in the SS that is enacted and social accountability. The findings of this thesis also suggest that seeking SS from weak-ties support network is more advantageous than strong-ties, because weak-ties

provide access to more objective and diverse viewpoints, amongst benefits. Dietitians can also benefit from the findings of this thesis. Alongside providing nutrition and diet resources, dietitians can also encourage their patients to publicly commit to engage in healthy eating. Given that a positive energy balance is the main driver of weight gain and obesity (Basolo et al., 2021; Hall et al., 2012; Romieu et al., 2017; Van Stralen, Te Velde, et al., 2011; Van Stralen et al., 2011; Westerterp, 2018), all of these practical examples demonstrate how practitioners who focus on creating a negative energy balance can incorporate OPC as a BCT to influence behavioural and lifestyle changes.

Aside from EBRBs, OPC can also be used as a BCT across a wide variety of behavioural domains where people have found it difficult to translate their intentions into actions. Three of these domains are discussed below.

Education

A recent report shows that dropout rates in UK universities are at their highest in four years (Bryson, 2023; Jack, 2023). Increasing number of students who enrol to study at UK universities unfortunately fail to complete their course. This suggest that intention-behaviour gap is a critical problem in higher education. To deal with this problem, universities can exploit OPC as a BCT to encourage student entrants to:

1. make a commitment to attaining a performance goal (e.g., "I will complete my degree with a first-class classification), and the specific, short-term actions (e.g., "I will spend 1 hour a week, 3 days a week, for independent studying") that may help them to achieve the performance goal.
2. publicise their goals/commitment to weak-ties support network (e.g., fellow students) using CMC.
3. leveraging on the weak-ties to provide SS.

In this instance, making an OPC can contribute to students' motivation to complete their course effectively. Some students may be motivated to act due to the anticipated personal and social disapproval and penalties for failure to follow through with the promised activities. Indeed, for others who commit and follow-through on a behaviour, the act of making an OPC commits them to certain self-view (e.g., "I am a successful and persistent university student") which then produces consistent behaviours.

Social Marketing Practice

Practicing social marketers – whose aim is to "influence a target audience to voluntarily accept, reject, modify or abandon a behaviour for the benefit of individuals, groups or society as a whole" (Kotler et al., 2002: p.5) – can also derive value from the findings of this thesis. Bringing about behavioural changes for social good rather than commercial good is difficult, especially with a target audience that does not always recognise it has a problem (Rundle-Thiele, 2015). In the same way that social marketers apply marketing principles to the solution of social problems, OPC can also be used as BCT to encourage individuals to publicise their intention to adopt behaviours that benefit themselves and the society.

In an attempt to show their commitment to environmental and social issues, companies are increasingly leveraging the internet to launch social marketing campaigns that aim to influence behaviours and promote positive societal change. For example, Adidas®' "Run for the Oceans" global initiative uses the power of sports to raise awareness for the ocean plastic crisis. Individuals are encouraged to run as many miles as possible and record their distances in the Adidas® app, and for every mile that is ran, Adidas® promised to clear up 10 plastic bottles from beaches and islands. Individuals are also encouraged to make sustainable choices when it comes to running clothing and shoes. By incorporating OPC within these types of social marketing initiatives, individuals can be prompted to publicise their actions, and provided with

social support, autonomy and access to weak-ties support network to enhance the effectiveness of the OPC.

Organisational behaviour

Within organisational behaviour, employee retention is vital for the long-term competitive advantage and organisational success and longevity (Al Kurdi et al., 2020; AlQudah et al., 2023; Alzaid & Dukhaykh, 2023; Das & Baruah, 2013; Elsafty & Oraby, 2022; Ghani et al., 2022; Terera & Ngirande, 2014). Organizations need not only attract experienced and talented employees to the organisation, but they also need to keep them for a long time (Elsafty & Oraby, 2022). Recent studies show that 56% of Gen-Z workers (i.e., those born between 1997 and 2012) are considering changing jobs in the next 12 months (Franklin, 2024). Given that Gen-Z are projected to make up around 27% of the workforce by 2024, developing a robust retention strategy is crucial in addressing high employee turnover.

Organisations can apply the findings of this thesis to improve employee retention. This can be achieved by encouraging employees to make public their organisational commitment, defined by Porter (1968) as the willingness of employees to exert high levels of effort and persistence on behalf of the organisation and a strong desire to remain in the organisation. Encouraging Gen-Z employees to utilise CMC (e.g., social networking sites) to publicise their organisational commitment is especially relevant for Gen-Z employees, given that their social media usage continues to be the highest compared to other age groups (Dixon, 2024a). Therefore, leveraging on Gen-Z's most preferred communication method to enact an OPC can be one way to increase their retention in the workplace.

8.2.2.1 Recommendations for lifestyle interventions that aim to promote EBRBs

Below are recommendations for LMPs based on the findings of studies 1, 2 & 3.

- **It is recommended that LMPs should incorporate a collaborative goal setting process to help participants with the identification of goals for the intervention**. In a detailed conversation that is guided by the interventionist, the participant's current situation and areas for improvement should be identified within pre-specified domains that are relevant to the intervention. It is important to identify a performance-related goal, and one or more process goals that underpin the performance-related goal. Goals, in this sense, are personal commitment about a behaviour that the person wishes to carry out or achieve. These commitments are statements about observable, measurable behaviour, and not about feelings or wishes. It is important that the goals or commitments are realistic and potentially achievable within the defined time-period. This may involve developing a broadly expressed objective into a precise and focussed goal, confirming to SMART principles (i.e., specific, measurable, achievable, realistic and time-bound). Ideally, the goals or commitment should be phrased in the first person to make it more personal for them, based on the performance-related goal that the individual wants to achieve, and it should also be stated positively.
- **Individuals should be encouraged to focus on goals or commitments that are personally meaningful and relevant**. Thus, it would be useful, during the collaborative goal setting interview, to establish how motivated the individuals are to change the way they currently manage their life, whether overcoming a specific problem or making some improvements in everyday life. One way to do this, could be to ask the

individual to provide quantitative information about how important the identified problem(s) are to him/her and how ready he/she is to make changes in relation to these problems in order to improve the situation. This may provide a check on the appropriateness of the identified goals or commitments, which may impact on the degree of progress that can be made, or may even suggest that the goal is unsuitable due to lack of motivation and that a different goal should be negotiated.

- **The commitment should be made in public using Facebook groups as a communication tool or have the potential to be publicised**. Preferably, the type of CMC should be synchronous and offer opportunities for individuals to have access to weak-ties support network with shared experiences, and where the exchange of SS can be facilitated. Ideally, the virtual environment should allow individuals to be anonymous, if they so choose, and protect the privacy of the individuals.
- **The commitment must be perceived by the individual to be voluntary or internally motivated, and not coerced**. They must perceive that they have come to these decisions by themselves, and there indicative of their true motivations.

8.2.2.1 Digital Exclusion

Despite the potential of OPC in influencing behaviour change in the context of EBRBs, there is a downside, in that an OPC intervention is only accessible to those who have access to digital technologies (e.g., smartphones, tablets), internet connectivity and digital literacy. Although internet's global adoption continues to grow, unfortunately disparities continue to exist between and within countries, due to socio-economic, educational, demographic, and geographic factors. A digital disparity persists across areas of the UK. London has the lowest proportion of internet non-users (7.0%) while Northern Ireland continues to have the highest proportion (14.2%), followed by the

North-East of England (12.1%) (ONS, 2019). The term 'internet non-users' refers to those who have never used the internet or last used it more than 3 months ago. Since 2011, adults over the age of 65 years have consistently made up the largest proportion of the adult internet non-users, and over half of all adult internet non-users were over the age of 75 years in 2018 (ONS, 2019). Only 76% of people with any kind of impairment have Foundation Level digital skills, compared to 91% of people with no impairment (Lloyds Bank, 2024). On a macro-level, least developed countries (LDCs), especially in sub-Saharan Africa, parts of South and Southeast Asia face significant challenges in bridging the digital divide, with limited access to internet and digital skills.

Those who are digitally excluded face major challenges, for example in seeking employment, accessing banking and managing money, and taking-up online learning opportunities (Reisdorf & Rhinesmith, 2020; Holmes & Burgess, 2022; Greer et al., 2019; Kwiatkowska & Skórzewska-Amberg, 2019). Digital exclusion leads to marginalisation thereby compounding health inequalities (Madewell et al., 2023). There is also a clear connection between digital exclusion and social isolation (Ekoh et al., 2021; Dhakal et al., 2023; Chadwick et al., 2022; Anrijs et al., 2023). Given the important role that social support plays in OPC, there is an urgent need to provide individuals with the necessary skills to access the digital tools to make an effective OPC.

This research underscores the urgent need to improve digital inclusion so that everyone can engage with health information and services, which are increasingly delivered digitally. If policy and funding prioritise digital-first services without addressing the barriers to digital inclusion, it is highly likely to result in increasing inequalities by excluding people who are unable to benefit from digital services (Mistry & Jabbal, 2023). Several digital inclusion approaches have been suggested including making devices available to people without access, building digital skills and confidence, befriending services, and creating video content (Mistry & Jabbal,

2023). It is also recommended that technologies can also be designed to address the specific needs of disadvantaged groups, for example, meaningfully involving users, tailoring services and interventions to target groups' contexts, delivering credible messages and having a clear logic model of how services using technology improve health (Honeyman et al., 2020).

8.2.3 Directions for Future Research

Based on the findings of this thesis, and the strengths and limitations identified in section 7.1, recommendations are made for future research in two sections: (a) research to substantiate the impact of OPC, (b) research to test hypothesis about the psychosocial processed involved in OPC intervention.

8.2.3.1 Research to substantiate the impact of OPC

- **Development of a scale to measure OPC** – In study 2, the OPC construct was measured simply as a manipulation check, using a single item scale. Thus, there is an urgent need to develop a reliable and valid scale to measure OPC as multidimensional construct, taking into account not directly observable latent concepts such as BI, publicness, volition etc. Some of these latent variables are multidimensional, thus the scale will need to be evenly split into subscales that represent one composite OPC scale.
- **Degree of publicness** – In study 2, OPC was operationalised by directly assigning participants to conditions in which publicness is either present or absent, resulting in a categorical construct. Publicness traditionally indicates the degree to which a commitment is made public (Hollenbeck et al., 1989; Kiesler, 1971; Pallak et al., 1980; Pallak & Cummings, 1976). Thus, research is needed to test the original assumption of publicness by evaluating the moderating influence of audience size in the context of CMC.
- **Longitudinal research** – To further assess the effect of OPC on post-intervention behaviour change, future research should employ continuous

or repeated measure to follow participants for at least a year. This is because problems with attrition and nonadherence exist for LMPs that are often evaluated in the short-term (Lemstra et al., 2016).

8.2.3.2 Research to test hypothesis about the psychosocial process involved in OPC intervention

- Research is needed to explore the role of various forms of extrinsic motivation (i.e., integrated, identified, introjected, and external regulation) situated along a self-determination continuum (Deci & Ryan, 1985), and underlying the effect of OPC. This is important, because most of the psychological mechanisms that underly the effect of making a PC are thought to be extrinsically motivated (Gollwitzer et al., 2009a; Lokhorst et al., 2013; Nyer & Dellande, 2010; Nyer & Gopinath, 2005), yet, behaviour change is more likely to be sustained if there is autonomous motivation (Deci & Ryan, 1985; Flannery, 2017; Sansone & Tang, 2021). Such studies should explore the associations between an individual's EBRB motivations and goal attainment, based on the organismic integration theory (OIT) (Brunet et al., 2012; Schnoll & Zimmerman, 2001). It will be interesting to know how the contextual factors that promote internalisation and the integration of behavioural regulation can lead to sustained behaviour changes.

8.3 Concluding Remarks

This thesis does not seek to make conclusive claims regarding the efficacy nor effectiveness of OPC as behaviour change technique. Instead, it seeks to provide a comprehensive understanding on various aspects of OPC, along with prompting future OPC intervention designers to add effective intervention components. What is clear, especially from review of the literature (*chapter 2*), is that OPC is often viewed as a unidimensional construct, consisting of only a BI element. In this sense, the

individual who makes an OPC is seen as working through obstacles in the pursuit of a goal. Yes, an OPC captures the motivational factors that influence a given behaviour whereby the stronger the intention to perform the behaviour, the more likely the behaviour will be performed. But, there are other mediating and moderating variables that seem to be at play in the relationship between OPC and behaviour change, thus, meaning that OPC is a multidimensional construct. Findings showed that by making an OPC, individuals garner information, emotional support through interactions within their social networks. Such platforms offer users several benefits, such as privacy, convenience, anonymity and access to weak-ties support network. All of which increases the effectiveness of an OPC.

At the core of the OPC construct is the notion that making a public commitment in the presence of others increases one's motivation to stay the course (Bradford et al., 2017; Lokhorst et al., 2013; Pallak & Cummings, 1976). Public commitment and OPC researchers alike have tended to conclude that this effect is moderated by the desire to obtain social rewards or avoid social sanctions, which, according to SDT (Ryan & Deci, 2002) is the least self-determined form of motivation, because it is accompanied by pressure, tension and anxiety (Deci et al., 1994). Numerous studies have been published to explain the psychological constructs underlying the effect of PC/OPC, many of these explanations are based on outcomes extrinsic to the behaviour itself (Gollwitzer et al., 2009a; Lokhorst et al., 2013; Nyer & Dellande, 2010). However, the usefulness of these traditional behavioural theories and models is limited in explaining durable or even long-term behaviour changes. Also, it is quite surprising that existing theories do not address the *quality* of extrinsic motivation.

The findings of this thesis point to the notion that, although making an OPC in the presence of others can be extrinsically motivated, however, an individual's preference for consistency can be integrated into one's self-concept whereby the individual identifies with the value of these external forces and accepts full responsibility for them. According to SDT, the contextual support for self-

determination should facilitate this process of integration (Deci & Ryan, 1985; Ryan & Deci, 2000), leading to a state of enhanced persistence and resistance to counter-attitudinal attacks (Ahluwalia et al., 2001; Cialdini & Trost, 1998; Hollenbeck et al., 1989).

In the context of obesity and overweight, mechanisms which influence resistance to attitude change and produce durable changes in EBRBs are crucial in improving physical and health outcomes (Barte et al., 2010; Hall & Kahan, 2018a; Lv et al., 2017; Romieu et al., 2017). The evidence base for maintenance of weight loss via the promotion of EBRBs has grown substantially in the last decade and now is the right time for PC and OPC research to borrow some insights from SDT. Lifestyle modification interventions that aim to target changes in EBRBs would benefit from incorporating OPC as an active ingredient to bring about behaviour change.

Appendices

Chapter 4 Appendices

Appendix 4A: Recruitment email

Hello,

- **Are you 18 years and above?**
- **Have you ever set a goal for yourself to either be more physically active, go on a diet, or to lose weight?**
- **And, did you publicly declare this goal on the internet?**

If you answered "yes" to all these questions, then I would like to invite you to take part in my PhD study. In this research I am exploring people's experiences and opinions of making an online public commitment related to weight loss, diet and physical activity behaviour.

If you choose to take part, you will be invited to attend a one-off face-to-face interview with the principal investigator (*i.e.* the interviewer), lasting approximately 45 minutes – 1 hour. The interviewer will ask you several open-ended questions about your experiences of making an online public commitment and the effect you think it had in complying with your weight-related goal/s. The interview will take place at Liverpool John Moores University. If you are unable to take part in a face-to-face interview, a telephone interview may be provided as an alternative.

Details of the research are included in the participant information sheet attached to this email. If you would like further information or would like to participate, please contact me at B.O.Omuso@2019.ljmu.ac.uk. Your participation would be greatly appreciated.

Kind regards,

Boma Omuso
B.O.Omuso@2019.ljmu.ac.uk

Appendix 4B: Social media ad

Appendix 4C: Consent form

LIVERPOOL JOHN MOORES UNIVERSITY
CONSENT FORM

Title of Project: A qualitative exploration of online public commitment related to weight loss, diet and physical activity behaviour.

Boma Omuso – School of Sport and Exercise Sciences – Faculty of Science

1.	I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights.	☐
3.	I understand that any personal information collected during the study will be anonymised and remain confidential.	☐
4.	I agree to take part in the above study.	☐
5.	I understand that the interview will be audio recorded and I am happy to proceed.	☐
6.	I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymised.	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature
Name of Person taking consent *(if different from researcher)*	Date	Signature

Note: When completed 1 copy for participant and 1 copy for researcher

4D: Participant information sheet (pages 1-4)

LIVERPOOL JOHN MOORES UNIVERSITY
Participant Information Sheet

LJMU's Research Ethics Committee Approval Reference:

Project Title: A qualitative exploration of online public commitment related to weight loss, diet and physical activity behaviour.

School: Sport and Exercise Sciences **Faculty:** Science

Name and Contact Details of the Principal Investigator:
Mr Boma Omuso (PhD Student) – B.O.Omuso@2019.ljmu.ac.uk

Supervisors and their Contact Details:
Dr Paula Watson – P.M.Watson@ljmu.ac.uk
Prof. Rachel McLean – R.McLean@ljmu.ac.uk

You are being invited to take part in a study. Before you decide it is important for you to understand why the study us being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for taking the time to read this.

---

1. **What is the purpose of the study?**
   The purpose of the study is to gain a deeper understanding of online public commitment in relation to weight loss, physical activity and dieting behaviour. Online public commitment is generally defined as the public declaration of a goal to change weight-related behaviour and using the internet as a platform. A typical example is someone posting an update on his or her Facebook that he or she wants to lose weight 3 stones within 6 months. The important thing here is that (1) such a declaration is made using the internet as a platform (e.g. Facebook post, recording and sharing a YouTube video, blogging about it, 'tweeting' about it, sharing it on an online support group, making it known on an online discussion forum), and (2) the declaration is made public for other people to see, and perhaps interact with it.

   Prior research shows that declaring a goal in a public setting will make them more likely to happen. Obesity is a becoming a national health crisis, and the need to identify effective strategies to change weight-related behaviour is of utmost importance.

2. **Who can take part?**
   - You are aged 18 or above
   - You have previously made an online public declaration which included the following:
     - To either be more physically active, eat healthily or lose weight.

- Your online declaration could either be very specific (e.g. saying you are going to drink 2 litres of water every day) or more general (e.g. saying you are on a quest to eat more healthily)
- You made this declaration using the internet as a medium (e.g. Facebook posting to friends, blogging, joining online support groups, tweeting etc).

- You are willing to participate in a semi-structured, face-to-face, audio-recorded interview lasting 45 minutes to 1 hour.

If you would like to take part but are unsure if your experience is relevant, please contact the researcher to discuss whether you are eligible

3. **Do I have to take part?**
   No. It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. You can withdraw at any time by informing the principal investigator without giving a reason.

4. **What will happen to me if I take part?**
   You will be interviewed by the principal investigator. The interview will be a qualitative semi-structured and face-to-face format. You will be asked to talk about your experiences of making an online public commitment (e.g. what you understand by online public commitment, what role this played in your behaviour change, and what you think worked well / didn't work well about it). Although the agenda of the interview is relatively set, you are free to have your own train of thoughts. If you do not understand a question, the principal investigator can rephrase the question, or you can choose not to answer the question. There are no right and wrong answers. The principal investigator is mainly interested in your honest opinions and experiences.

   The interview will last approximately 45 minutes to 1 hour, and will take place only once. The interview will either take place at Liverpool John Moores University's library (study room) or a meeting room in LJMU's Redmonds building or Primrose Hill building.

   Before the start of the interview, the principal investigator will provide you with a brief explanation of the study and what will happen during the interview. If you decide to take part, you will be asked to complete a consent form. The interview will be audio recorded using a dictaphone.

   If you wish to take part and are unable to get to Liverpool the possibility of a telephone interview could be explored with the researcher.

5. **Will I be recorded and how will the recorded media be used and stored?**
   The interview will be audio recorded to allow accurate transcription. Note taking may also take place. The audio recording will be used only for analysis. No other use will be made of them without your written permission.

   Your personal information and audio recordings will be stored and processed using LJMU secure server (M: Drive). These services have been the subject of careful assessment to ensure they comply with UK data protection law and the University's own privacy policies.

   Interviews will be audio recorded on a dictaphone. As soon as possible the recording will be transferred to secure storage and deleted from the recording device.

6. **Will the information be kept confidential?**
The information you provide as part of the study is the study data. Any study data from which you can be identified (e.g. from identifiers such as your name, date of birth, audio recording etc.), is known as personal data. This includes more sensitive categories of personal data (sensitive data) such as your race; ethnic origin; politics; religion; trade union membership; genetics; biometrics (where used for ID purposes); health; sex life; or sexual orientation.

When you agree to take part in a study, we will use your personal data in the ways needed to conduct and analyse the study and if necessary, to verify and defend, when required, the process and outcomes of the study. Personal data will be accessible to the study team. In addition, responsible members of Liverpool John Moores University may be given access to personal data for monitoring and/or audit of the study to ensure that the study is complying with applicable regulations.

When we do not need to use personal data, it will be deleted or identifiers will be removed. Personal data does not include data that cannot be identified to an individual (e.g. data collected anonymously or where identifiers have been removed). However, your consent form, contact details, audio recordings etc. will be retained for 5 years.

7. **What are the possible benefits of taking part?**
Whilst will be no direct benefits to you for taking part in the study, but it is hoped that this work will help to understand online public commitment and understand how it might be used to help other people lead healthier lifestyles.

8. **What will happen to the results of the study?**
The results of this study will form part of the basis of a PhD thesis, peer-reviewed journal publication and conference presentation.

9. **Who has reviewed this study?**
This study has been reviewed by, and received ethics clearance through, the Liverpool John Moores University Research Ethics Committee (Reference number: **UREC reference: 19/SPS/041**).

10. **What if something goes wrong?**
There are no expected risks or disadvantages of taking part. The interview questions are not expected to cover any sensitive issues. However, if at any point you are uncomfortable or upset you are free to withdraw from the study.

If during your interview you raise anything that causes the principal investigator concern about your physical or mental health, they may raise these concerns with you and may recommend appropriate support networks (e.g. GP, websites).

If you have a concern about any aspect of this study, please contact the principal investigator who will do their best to answer your query. The principal investigator should acknowledge your concern within 10 working days and give you an indication of how they intend to deal with it. If you wish to make a complaint, please contact the chair of the Liverpool John Moores University Research Ethics Committee (researchethics@ljmu.ac.uk) and your communication will be re-directed to an independent person as appropriate.

11. **Data Protection Notice**

Liverpool John Moores University is the sponsor for this study based in the United Kingdom. We will be using information from you and/or your medical records in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after your information and using it properly. Liverpool John Moores University will process your personal data for the purpose of research. Research is a task that we perform in the public interest. Liverpool John Moores University will keep identifiable information about you for 5 years after the study has finished.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the study to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.

You can find out more about how we use your information at by contacting secretariat@ljmu.ac.uk.

If you are concerned about how your personal data is being processed, please contact LJMU in the first instance at secretariat@ljmu.ac.uk. If you remain unsatisfied, you may wish to contact the Information Commissioner's Office (ICO). Contact details, and details of data subject rights, are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/

12. Contact for further information

Boma Omuso – B.O.Omuso@2019.ljmu.ac.uk
Dr Paula Watson – P.M.Watson@ljmu.ac.uk
Prof. Rachel McLean – R.McLean@ljmu.ac.uk

Thank you for reading this information sheet and considering taking part in the research. You may keep this copy, and if you agree to participate in the interview, you will be asked to sign a consent form.

4E: Interview Guide (pages 1-3)

Interview Schedule

Pre-Checklist:

- ☐ Welcome & brief explanation of study.
- ☐ Give the participant a copy of the **participant Information sheet**.
- ☐ Give the participant 2 copies of a **consent form** to sign. One copy should be given to the participant.
- ☐ Conduct interview.
- ☐ Conclude interview & explain to participant how to make contact if he/she has any queries.

Research Questions:

Q1. How does public commitment manifest in an online context?

Q2. What is the effect of online public commitment in regards to adhering to EBRBs?

Q3. What are the factors that determine the effectiveness of online public commitment?

	Background information	Research Q1	Research Q2	Research Q3
Interview Q1	✓			
Interview Q2	✓			
Interview Q3		✓		
Interview Q4		✓		
Interview Q5			✓	
Interview Q6				✓
Interview Q7				✓
Interview Q8	✓			

1. Tell me about what EBRBs you wanted to achieve?

- Did you set an **initial** goal for yourself? Tell me about the goal
- How **important** was the goal for you to achieve?
- What **motivated** you to make this change? (Link weight-related motivation SDT)

(Probing questions)

Page **1** of **3**

- "I want to fit in"
- "Because I feel pressure from others"
- "I personally believe it is the best thing for my own health"

2. What do you understand by the term "online public commitment"?

For the purposes of the interview, I'd like us to think of Online public commitment as "is the act of affirming a goal in public using the internet as a platform"

3. Tell me about a time (or times) when you made an online public commitment.

- Why did you feel you needed to make your goal known to others, rather than keeping it private?
- Why was the commitment made online?

4. How was the online public commitment made?

- Which online **platform** or tool did you use to make the public commitment?
  - Why did you decide to use this tool(s)?
- Did you use any **offline** means of making your goals known to other?
- Tell me about the **actual** online public commitment was made, in terms of its content? Describe it.

  (Probing question)
  - Was it a text format, audio or video format?
  - Can you show it, if you still have it on your phone?
- How **often** did you make the online public commitment?
- What kind of **feedback**/response did you get from making the online public commitment?
- Who were the **audience** of the online public commitment?
- What were your **feelings** during this public commitment?

5. How effective did you feel the online public commitment was?

(Probing questions) Think about whether it was effective on:

- your goal commitment?
- complying with your goal (short term behaviour change)?
- changing your behaviour (long term behaviour change)?
- your health outcome

6. **If it was effective, why was it effective?**

- What was it about the online public commitment that made you to become **more committed**? (Link online public commitment motivation with SDT)
- What was it about the online public commitment that made you to **comply with your goal**?
- What was it about the online public commitment that made you to **change your behaviour**?
- What was it about the online public commitment that had a **positive effect on your health**?

Further questions

- If it was not effective, why do you think it was not effective?
- If it had a negative effective, why do you think it had a negative effect?
- What could have made it more effective?
- What were some of the factors that made it effective?

7. **How do you feel the effects would have compared if you had made this commitment offline?**
(e.g. verbally to friends/family, posters, hard copy newsletter, writing down on a post-it on fridge)

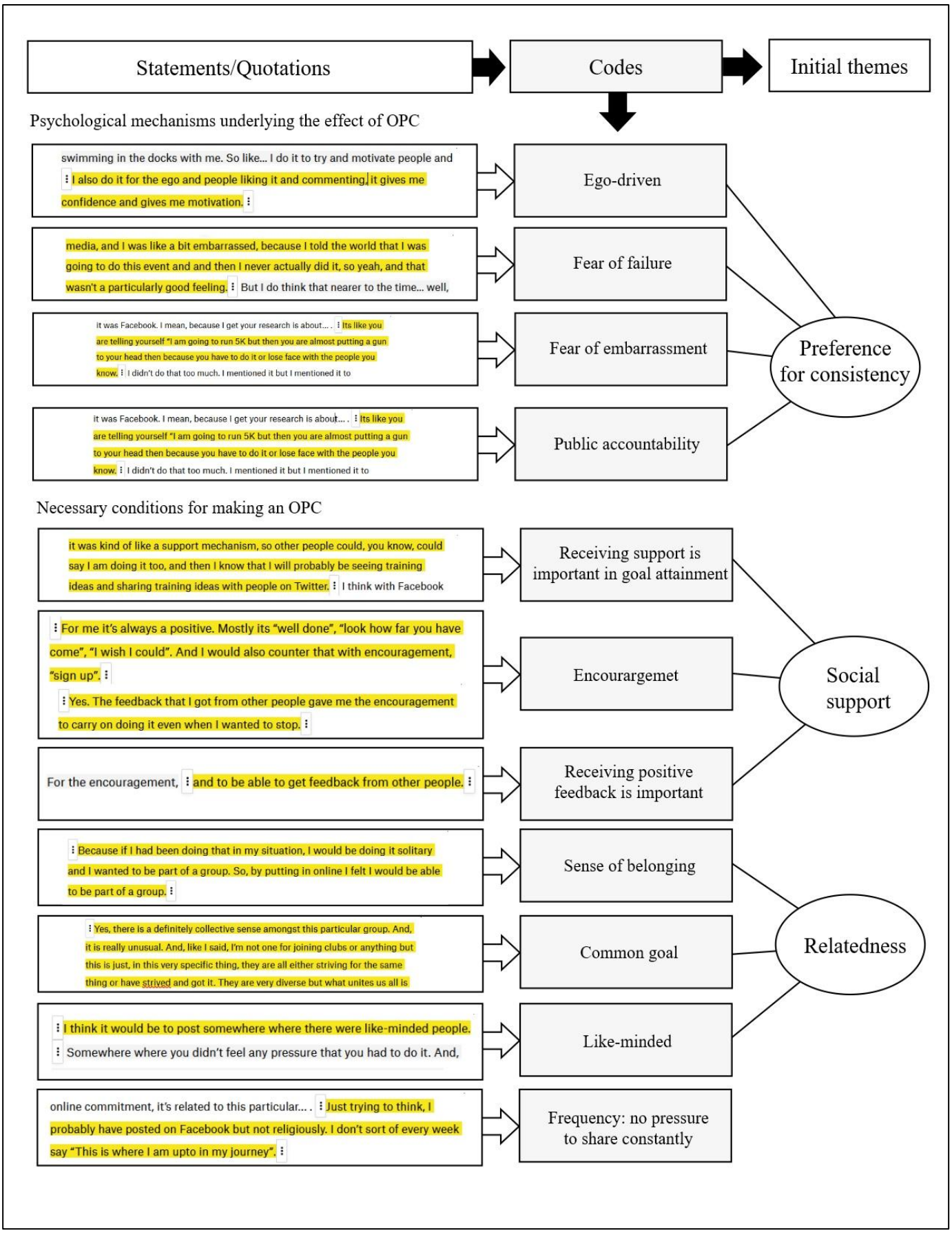
Part of my research is about trying to understand the concept of online public commitment and what it means to people.

8. **So now you've reflected on your experiences, what would you say online public commitment means to you?**

(Probing questions)

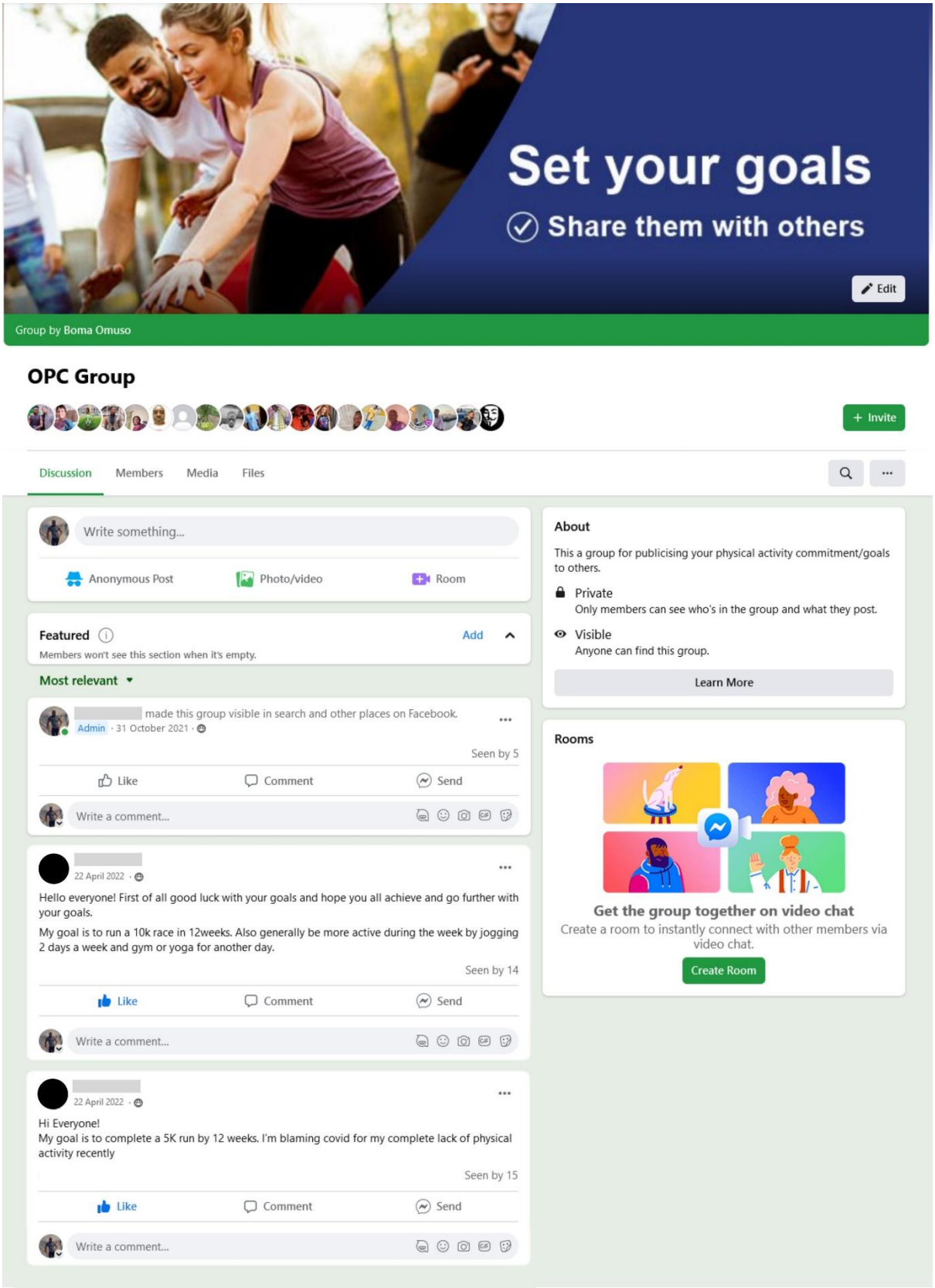
- If you were to define online public commitment, how would you define it?
- Do you have any ideas how online public commitment could be used to help others change their health behaviours?

Appendix 4F: Thematic approach used in study 1

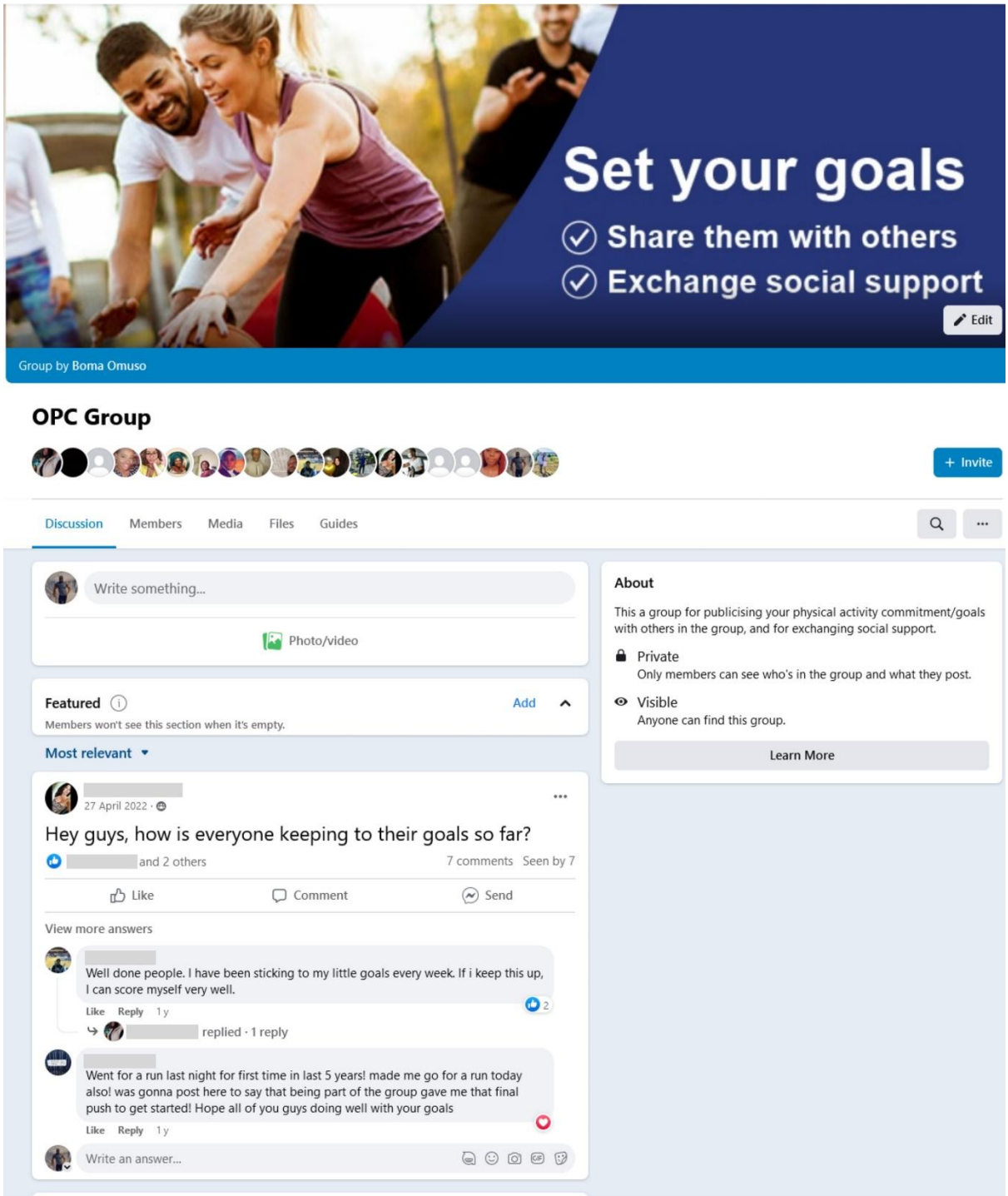


Chapter 5 Appendices

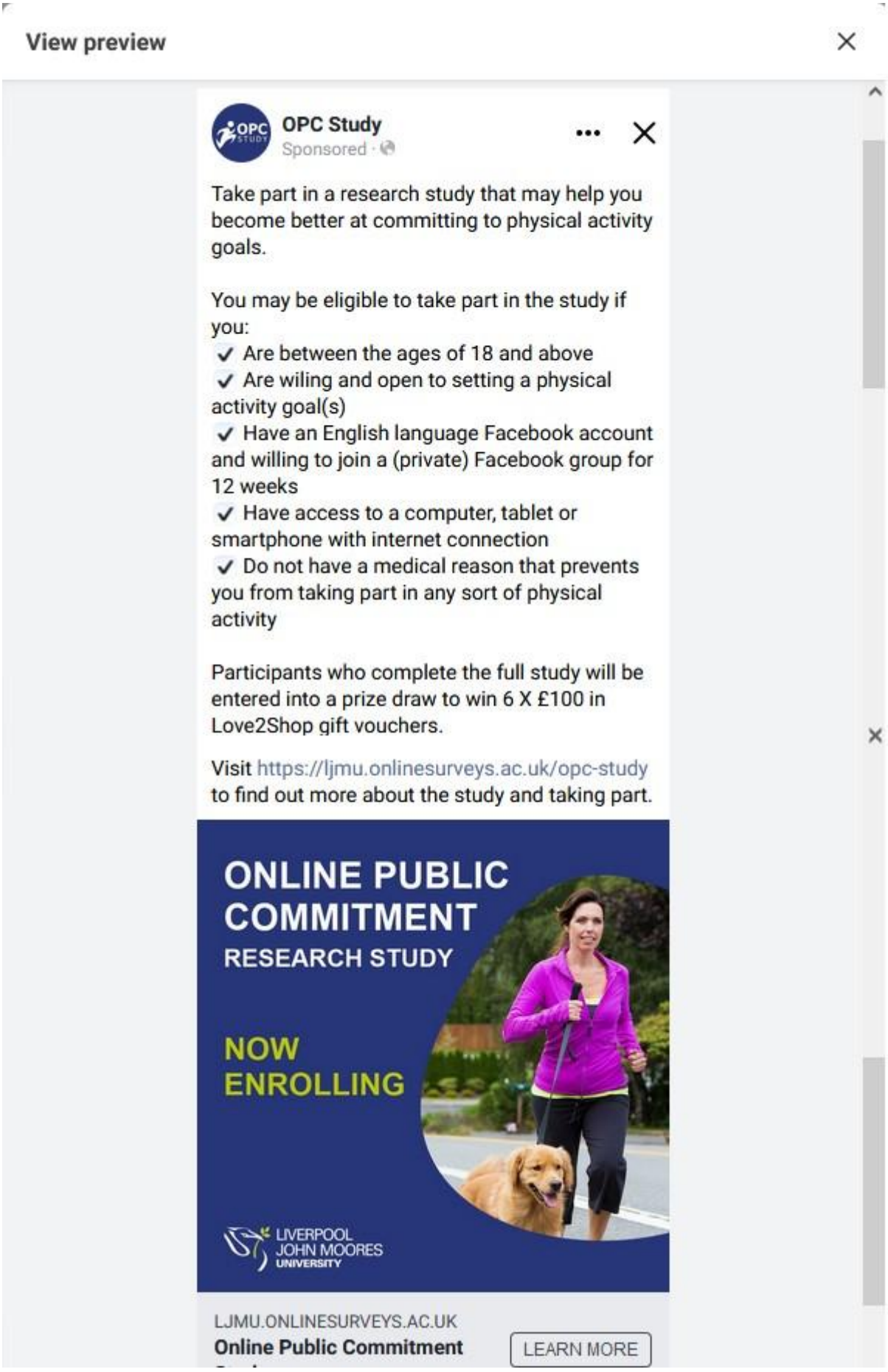
Appendix 5A: Facebook Group A



Appendix 5B: Facebook Group B



Appendix 5C: Facebook Advert



Appendix 5D: Call for Participants Advert (highlighted in red)

Online Public Commitment (OPC) Research Study

Liverpool John Moores University, GB

Do you want to become more physically active? Do you want to become better at setting and attaining your physical activity goals? We are looking for women and men, between of ages of 18 and above, who are willing to take part in a 12-week research study, investigating the effects of publicising...

12 Week(s) to complete

A prize draw to win one of 6 x 100GBP Love2Shop vouchers

Experiment

Online

Losartan and Emotional Learning

University of Oxford, GB

We are looking for healthy volunteers aged 18-50 years and fluent in English to take part in a study investigating how a single dose of the medication Losartan affects certain aspects of learning and memory, which we know are important for psychological treatment to work.

4 Hour(s) to complete

50 pounds

Experiment

Warneford Ln, Headington, Oxford OX3 7JX, UK

Human float capability in water: lab and swimming pool-based study

Leeds Trinity University, GB

We are investigating how body type and biological sex (i.e., male or female) influence floating capability in water, which could help inform national water safety advice and could also help us to advise on drowning risk. This research could help prevent unintentional drownings in water. Three...

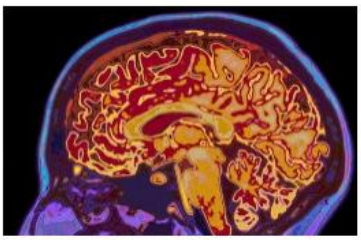
135 Min(s) to complete

£50 GBP Amazon voucher per participant

Experiment

Horsforth, Leeds, UK

Rethinking Teacher Recruitment: Attracting Prospective STEM Teachers



ESTRA study

King's College London, GB

We are looking for people who had Anorexia Nervosa or Bulimia Nervosa in the past and have been recovered for 6 months or more

Feasibility and acceptability of gonorrhoea whole genome sequencing

University College London, GB

Appendix 5E: *Post-hoc* analysis for goal attainment between condition A (OPC only), condition B (OPC + Social Support), and condition C (private commitment) at T1, T2 and T3

T1:

Multiple Comparisons

Dependent Variable: Goal Attainment (T1)

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-1.06628*	.21177	.000	-1.5709	-.5617
		Condition C	.12905	.17595	.744	-.2899	.5480
	Condition B	Conditon A	1.06628*	.21177	.000	.5617	1.5709
		Condition C	1.19533*	.20424	.000	.7085	1.6822
	Condition C	Conditon A	-.12905	.17595	.744	-.5480	.2899
		Condition B	-1.19533*	.20424	.000	-1.6822	-.7085

*. The mean difference is significant at the 0.05 level.

T2:

Multiple Comparisons

Dependent Variable: Goal Attainment (T2)

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-.29688	.22214	.379	-.8263	.2325
		Condition C	2.18411*	.22107	.000	1.6568	2.7114
	Condition B	Conditon A	.29688	.22214	.379	-.2325	.8263
		Condition C	2.48098*	.20531	.000	1.9916	2.9704
	Condition C	Conditon A	-2.18411*	.22107	.000	-2.7114	-1.6568
		Condition B	-2.48098*	.20531	.000	-2.9704	-1.9916

*. The mean difference is significant at the 0.05 level.

T3:

Multiple Comparisons

Dependent Variable: Goal Attainment (T3)

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	1.68681*	.23416	.000	1.1289	2.2447
		Condition C	.86016*	.23419	.001	.3016	1.4187
	Condition B	Conditon A	-1.68681*	.23416	.000	-2.2447	-1.1289
		Condition C	-.82665*	.25403	.005	-1.4323	-.2210
	Condition C	Conditon A	-.86016*	.23419	.001	-1.4187	-.3016
		Condition B	.82665*	.25403	.005	.2210	1.4323

*. The mean difference is significant at the 0.05 level.

Appendix 5F: *Post-hoc* analysis for increases in physical activity (METs) between condition A (OPC only), condition B (OPC + Social Support), and condition C (private commitment) at T1, T2 and T3

T1:

Multiple Comparisons

Dependent Variable: T1_PA

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-153.9572	626.3629	.967	-1645.462	1337.548
		Condition C	278.7226	569.7253	.877	-1079.535	1636.981
	Condition B	Conditon A	153.9572	626.3629	.967	-1337.548	1645.462
		Condition C	432.6798	554.4228	.716	-887.623	1752.982
	Condition C	Conditon A	-278.7226	569.7253	.877	-1636.981	1079.535
		Condition B	-432.6798	554.4228	.716	-1752.982	887.623

T1:

Multiple Comparisons

Dependent Variable: T2_PA

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-1149.8487	606.9900	.146	-2595.845	296.148
		Condition C	-424.4103	583.9248	.748	-1816.801	967.981
	Condition B	Conditon A	1149.8487	606.9900	.146	-296.148	2595.845
		Condition C	725.4385	586.3556	.435	-672.183	2123.060
	Condition C	Conditon A	424.4103	583.9248	.748	-967.981	1816.801
		Condition B	-725.4385	586.3556	.435	-2123.060	672.183

T3:

Multiple Comparisons

Dependent Variable: T3_PA

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	298.7251	615.6738	.878	-1167.342	1764.792
		Condition C	246.9191	594.3099	.909	-1169.193	1663.031
	Condition B	Conditon A	-298.7251	615.6738	.878	-1764.792	1167.342
		Condition C	-51.8060	609.4140	.996	-1504.669	1401.057
	Condition C	Conditon A	-246.9191	594.3099	.909	-1663.031	1169.193
		Condition B	51.8060	609.4140	.996	-1401.057	1504.669

Appendix 5G: *Post-hoc* analysis for increases in mental wellbeing between condition A (OPC only), condition B (OPC + Social Support), and condition C (private commitment) at T1, T2 and T3

T1:

Multiple Comparisons

Dependent Variable: T1_Mental_Wellbeing

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-2.33788*	.45211	.000	-3.4148	-1.2609
		Condition C	-2.28775*	.61689	.001	-3.7591	-.8164
	Condition B	Conditon A	2.33788*	.45211	.000	1.2609	3.4148
		Condition C	.05013	.59411	.996	-1.3687	1.4690
	Condition C	Conditon A	2.28775*	.61689	.001	.8164	3.7591
		Condition B	-.05013	.59411	.996	-1.4690	1.3687

*. The mean difference is significant at the 0.05 level.

T2:

Multiple Comparisons

Dependent Variable: T2_Mental_Wellbeing

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-.19595	.67155	.954	-1.8061	1.4142
		Condition C	1.22716	.82982	.306	-.7515	3.2059
	Condition B	Conditon A	.19595	.67155	.954	-1.4142	1.8061
		Condition C	1.42311	.64376	.077	-.1216	2.9679
	Condition C	Conditon A	-1.22716	.82982	.306	-3.2059	.7515
		Condition B	-1.42311	.64376	.077	-2.9679	.1216

T3:

Multiple Comparisons

Dependent Variable: T3_Mental_Wellbeing

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-.00041	.63178	1.000	-1.5052	1.5044
		Condition C	1.70236*	.66230	.031	.1243	3.2804
	Condition B	Conditon A	.00041	.63178	1.000	-1.5044	1.5052
		Condition C	1.70277*	.60595	.017	.2576	3.1479
	Condition C	Conditon A	-1.70236*	.66230	.031	-3.2804	-.1243
		Condition B	-1.70277*	.60595	.017	-3.1479	-.2576

*. The mean difference is significant at the 0.05 level.

Appendix 5H: *Post-hoc* analysis for increases in relative autonomy between condition A (OPC only), condition B (OPC + Social Support), and condition C (private commitment) at T1, T2 and T3

T1:

Multiple Comparisons

Dependent Variable: T1_Relative_Autonomy_Index

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	-2.57894*	.98525	.028	-4.9322	-.2256
		Condition C	-.34501	.79413	.901	-2.2362	1.5462
	Condition B	Conditon A	2.57894*	.98525	.028	.2256	4.9322
		Condition C	2.23392	1.04600	.088	-.2589	4.7268
	Condition C	Conditon A	.34501	.79413	.901	-1.5462	2.2362
		Condition B	-2.23392	1.04600	.088	-4.7268	.2589

*. The mean difference is significant at the 0.05 level.

T2:

Multiple Comparisons

Dependent Variable: T2_Relative_Autonomy_Index

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	.35892	1.41153	.965	-3.0100	3.7278
		Condition C	-.47017	1.41090	.941	-3.8391	2.8987
	Condition B	Conditon A	-.35892	1.41153	.965	-3.7278	3.0100
		Condition C	-.82909	1.16686	.758	-3.6105	1.9523
	Condition C	Conditon A	.47017	1.41090	.941	-2.8987	3.8391
		Condition B	.82909	1.16686	.758	-1.9523	3.6105

T3:

Multiple Comparisons

Dependent Variable: T3_Relative_Autonomy_Index

	(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	Conditon A	Condition B	1.22723	1.30429	.616	-1.8786	4.3331
		Condition C	3.71326*	1.41591	.028	.3355	7.0910
	Condition B	Conditon A	-1.22723	1.30429	.616	-4.3331	1.8786
		Condition C	2.48602	1.44579	.204	-.9629	5.9349
	Condition C	Conditon A	-3.71326*	1.41591	.028	-7.0910	-.3355
		Condition B	-2.48602	1.44579	.204	-5.9349	.9629

*. The mean difference is significant at the 0.05 level.

Appendix 5I: *Post-hoc contrasts analysis* for goal attainment between intervention condition (condition A & B) and control condition (condition C), at T1, T2 and T3

T1:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T2)	Assumes equal variances	1	2.3325	.19070	12.232	134	.000	1.9554	2.7097
	Does not assume equal variances	1	2.3325	.18215	12.806	91.446	.000	1.9708	2.6943

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T2)	Cohen's d	1	1.03574	2.252	1.799	2.700
	Hedges' correction	1	1.04158	2.239	1.789	2.684

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T2:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T2)	Assumes equal variances	1	2.3325	.19070	12.232	134	.000	1.9554	2.7097
	Does not assume equal variances	1	2.3325	.18215	12.806	91.446	.000	1.9708	2.6943

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T2)	Cohen's d	1	1.03574	2.252	1.799	2.700
	Hedges' correction	1	1.04158	2.239	1.789	2.684

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T3:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T3)	Assumes equal variances	1	.0168	.21196	.079	137	.937	-.4024	.4359
	Does not assume equal variances	1	.0168	.21443	.078	78.707	.938	-.4101	.4436

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
Goal Attainment (T3)	Cohen's d	1	1.15678	.014	-.345	.374
	Hedges' correction	1	1.16316	.014	-.343	.372

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

Appendix 5J: *Post-hoc contrasts analysis* for physical activity (METs) between intervention condition (condition A & B) and control condition (condition C), at T1, T2 and T3

T1:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_PA	Assumes equal variances	1	355.701	499.2768	.712	145	.477	-631.099	1342.502
	Does not assume equal variances	1	355.701	466.8010	.762	122.067	.448	-568.373	1279.775

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_PA	Cohen's d	1	2886.0896	.123	-.216	.462
	Hedges' correction	1	2901.1257	.123	-.215	.460

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T2:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_PA	Assumes equal variances	1	150.514	523.3897	.288	134	.774	-884.660	1185.688
	Does not assume equal variances	1	150.514	500.2812	.301	91.059	.764	-843.224	1144.253

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_PA	Cohen's d	1	2842.7077	.053	-.308	.414
	Hedges' correction	1	2858.7431	.053	-.306	.411

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T3:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_PA	Assumes equal variances	1	97.557	538.5568	.181	137	.857	-967.403	1162.516
	Does not assume equal variances	1	97.557	517.2342	.189	88.821	.851	-930.205	1125.318

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_PA	Cohen's d	1	2939.1636	.033	-.326	.392
	Hedges' correction	1	2955.3772	.033	-.324	.390

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

Appendix 5K: *Post-hoc contrasts analysis* for mental wellbeing between intervention condition (condition A & B) and control condition (condition C), at T1, T2 and T3

T1:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_Mental_Wellbeing	Assumes equal variances	1	-1.1188	.48549	-2.304	145	.023	-2.0784	-.1593
	Does not assume equal variances	1	-1.1188	.56183	-1.991	69.773	.050	-2.2394	.0018

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_Mental_Wellbeing	Cohen's d	1	2.80640	-.399	-.740	-.056
	Hedges' correction	1	2.82102	-.397	-.736	-.056

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T2:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_Mental_Wellbeing	Assumes equal variances	1	1.3251	.62084	2.134	136	.035	.0974	2.5529
	Does not assume equal variances	1	1.3251	.66239	2.001	70.694	.049	.0043	2.6460

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_Mental_Wellbeing	Cohen's d	1	3.38239	.392	.028	.754
	Hedges' correction	1	3.40119	.390	.028	.750

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T3:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_Mental_Wellbeing	Assumes equal variances	1	1.7026	.56400	3.019	137	.003	.5873	2.8178
	Does not assume equal variances	1	1.7026	.55056	3.092	84.181	.003	.6077	2.7974

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_Mental_Wellbeing	Cohen's d	1	3.07799	.553	.187	.917
	Hedges' correction	1	3.09497	.550	.186	.912

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

Appendix 5L: *Post-hoc contrasts analysis* for relative autonomy between intervention condition (condition A & B) and control condition (condition C), at T1, T2 and T3

T1:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_Relative_Autonomy_Index	Assumes equal variances	1	.9445	.82110	1.150	145	.252	-.6784	2.5673
	Does not assume equal variances	1	.9445	.78721	1.200	107.085	.233	-.6161	2.5050

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T1_Relative_Autonomy_Index	Cohen's d	1	4.74642	.199	-.141	.538
	Hedges' correction	1	4.77114	.198	-.140	.536

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T2:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_Relative_Autonomy_Index	Assumes equal variances	1	-.6496	1.17731	-.552	134	.582	-2.9781	1.6789
	Does not assume equal variances	1	-.6496	1.08535	-.599	99.049	.551	-2.8032	1.5039

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T2_Relative_Autonomy_Index	Cohen's d	1	6.39437	-.102	-.462	.260
	Hedges' correction	1	6.43044	-.101	-.460	.258

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

T3:

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_Relative_Autonomy_Index	Assumes equal variances	1	3.0996	1.21990	2.541	137	.012	.6874	5.5119
	Does not assume equal variances	1	3.0996	1.27368	2.434	73.044	.017	.5612	5.6381

Contrast Effect Sizes

		Contrast	Standardizer[a]	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
T3_Relative_Autonomy_Index	Cohen's d	1	6.65758	.466	.101	.828
	Hedges' correction	1	6.69430	.463	.101	.824

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation for all the groups.
Hedges' uses pooled standard deviation for all the groups, plus a correction factor.

Chapter 6 Appendices

Appendix 6A: Interview schedule

	Questions	Prompts
1.	I'd like you to talk about your experiences of taking part in the online public commitment (OPC) study.	
2.	What motivated you to start working on your PA-related behaviour?	• What role did your health play? • What impact did social accountability play?
3.	Can you tell me what you think is the most rewarding or best part of taking part in the OPC study?	• In what ways was the study rewarding?
4.	What did you find to be the most difficult or challenging part of changing your PA-related behaviour?	• Why was this the most difficult or challenging part? • What could have made this less difficult or challenging?
5.	What aspects of the study did you find effective in terms of increasing your PA and achieving your goals?	• How did you feel about the goal setting interview? • How did you feel about the Facebook group? • How did you feel about publicising your goals to others? • How did you feel about the social support that you received (if any)?
6.	What aspects of the study did you find less effective in terms of increasing your PA and achieving your goals?	• How did you feel about the goal setting interview? • How did you feel about the Facebook group? • How did you feel about publicising your goals to others? • How did you feel about the social support that you received (if any)?
7.	I'd like to talk about your experiences after the 12 weeks of the OPC study	
8.	Did you exit the Facebook group after the 12 weeks, if so, why?	• Why did you/did you not exit the Facebook group? • How did this make you feel?
9.	What made you remain committed to achieving your goals after the study ended (i.e.., between 12 weeks and 24 weeks)?	• What were some of the changes or differences that you felt before and after the 12 weeks?
10.	What did you find to be the most difficult or challenging part of remaining committed to your goals after the 12 weeks?	

6B: Participant Information sheet for study 3 (pages 1-6)

LIVERPOOL JOHN MOORES UNIVERSITY

Participant Information Sheet

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Title of Study: Follow-Up Semi-Structured Interviews - Exploring the Effects of an Online Public Commitment Intervention

You are being invited to take part in a study. Before you decide it is important for you to understand why the study us being done and what participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for taking the time to read this.

1. **Who will conduct the study?**

Principal Investigator:
Mr Boma Omuso
B.O.Omuso@2019.ljmu.ac.uk

Research Supervisor
Dr Paula Watson
P.M.Watson@ljmu.ac.uk

2. **What is the purpose of the study?**
   This is a follow-up qualitative study to explore the ongoing effects of participation in an OPC intervention study, and also the facilitators of post-intervention OPC adherence. Adherence has been shown to be an important predictor of post-intervention adherence to physical activity goal setting, however in any physical activity behaviour non-adherence is a problem. We are interested in understanding the ongoing effects of your participation in the previous OPC intervention study, and the facilitators of post-intervention adherence.

3. **Why have I been invited to participate?**
   You have been invited because we are hoping to recruit participants who have previously taken part in an intervention study testing whether making an online public commitment (OPC) with social support is more effective than making an OPC without social support or keeping the commitment private. In this study, we are interested in following up

individuals who have sustained their OPC adherence after the intervention study ended to explore the factors that have influenced their post-intervention adherence. You have been identified as one of the individuals in the intervention group who have continued to adhere to their OPC after the intervention study ended, therefore your experience, views and opinions are very relevant to the research objectives. We are aiming to interview approximately 15 participants to take part in a semi-structured interview lasting no more than 1 hour.

4. **Do I have to take part?**
   No. It is up to you to decide whether or not to take part. Please, read this information sheet, which describes the study in detail. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. You can withdraw at any time by informing the investigators without giving a reason and without it affecting your rights. All the information collected will be treated confidentially. If you withdraw from this study, unless you specifically request for all your data to be destroyed, any information provided up to the point of withdrawal will remain in the study.

5. **What will happen to me if I take part?**
   Before participating in the study, you will be asked to sign a consent form. Once the signed consent form is received, the principal investigator will contact you to arrange a date and time convenient to conduct the semi-structured interview. Your individual views will be sought through an invitation to **semi-structured interviews**. Interviews should last no more than 1 hour and will with your permission be audio-recorded and subsequently transcribed. You will be able to leave at any moment if you want or need to without giving a reason and without it affecting your rights.

   During the interview you will be asked about your experiences, thoughts and feelings in the previous intervention you took part in. Aside from this, you will also be asked about how you are currently able to maintain adherence to your OPC following the intervention study.

   As these are 'semi-structured', every participant will be asked the same main questions, but these questions may differ from person to person. The main questions will lead to further supplementary questions based on your responses and particular experience. You will be provided with a copy of the main questions at the time of the interview. Interviews will be at a location of your own choosing and may be conducted in person or via Microsoft Teams. It is advised that you complete the interview in an environment where you feel comfortable, have privacy, and will not be overheard or interrupted. No one other than the interviewer and the interviewers' supervisor will have access to the raw data and interview material. The report will be written up in such a way that your anonymity will be maintained, unless specifically agreed otherwise and recorded in writing.

6. **How long would the interview take?**
   The time it takes for an interview varies, depending on how much you have to say, but most interviews last at least an hour. If you would prefer, we can interview you on two different occasions. Remember, if you want to stop the interview at any time, you can do so without giving any reason at all.

7. **Will I be recorded and how will the recorded media be used?**
   Audio recording is necessary to make sure the transcript is correct. Verbal consent will be asked again prior to the interview starting and the audio being recorded. We do not want to misquote anything you may say during the interview, therefore only speech captured via audio recording will be used in the study. You should be comfortable with the recording process at all times and you are free to request stopping of the recording at any time.

   Interviews will be audio recorded on an encrypted audio recording device and as soon as possible the recording will be transferred to secure storage and deleted from the recording device. Video will not be recorded. All identifiable information will be pseudonymised at the point of transcription. The audio and/or video recordings of your activities made during this study will be used only for analysis. No other use will be made of them without your written permission. Interviews will be audio recorded on a password protected audio recording device and as soon as possible the recording will be transferred to secure storage and deleted from the recording device.

8. **Will my participation in the study be confidential and my personal identifiable information be protected?**
   The information you provide as part of the study is the **study data**. Any study data from which you can be identified (e.g., from identifiers such as your name, date of birth, audio recording etc.), is known as **personal data**. Your personal data, including your age, gender and responses to our task will only be identifiable by a unique participant ID number. In accordance with data protection law, Liverpool John Moores University is the Data Controller for this study. This means that we are responsible for making sure your personal information is kept secure, confidential and used only in the way you have been told it will be used. All researchers are trained with this in mind, and your data will be looked after in the following way:

   - Only the study team at Liverpool John Moores University will have access to your personal information, but they will anonymise it as soon as possible. Your name and any other identifying information will be removed and replaced with a random ID number. This will be completed on the same day as your interview.

- Your name will only appear on the consent forms you sign and on the sheet you sign if you receive a voucher payment. The consent form that we keep will be stored securely and separately from your study data.

- You will be asked to refrain from mentioning individual names to avoid yourself or other Facebook group members from being identified. If any of these are mentioned during the interview, they will be removed at the point of transcription, or anonymised to protect your/their anonymity.

- An encrypted university-provided dictophone will be used for recording. Recordings will be transferred to the University's server for storage. Once the recordings are saved in this secure location, they will be deleted from the recording device.

- Audio-recordings of the interviews will be digitally transcribed by the principal investigator (BO) who only will have access to the recordings. Transcripts will be produced in a private environment using headphones so only the transcriber will be able to hear the interview. Transcripts will be created promptly and will only be stored in university approved encrypted locations. Transcripts are necessary for thematic analysis of the interviewee's responses.

- Your anonymised transcript will be securely sent to the research supervisor (PW) who will check the analysis is accurate. This researcher will not have access to any of your personal information and will not know who participated in the interviews.

9. **Are there any possible disadvantages or risks from taking part?**
   There are no foreseeable physical risks from participation, but as the case with all interviews around potentially sensitive topics, participation may carry some risk of emotional or psychological distress.

10. **What are the possible benefits of taking part?**
    Whilst will be no direct benefits to you for taking part in the study, but it is hoped that you will find it an interesting experience, telling us about your experience in the previous intervention study that you may have taken part in.

11. **What will happen to the data provided and how will my taking part in this project be kept confidential?**
    The information you provide as part of the study is the **study data**. Any study data from which you can be identified (e.g., from identifiers such as your name, date of birth, audio recording etc.), is known as **personal data**. This includes more sensitive categories of

personal data (**sensitive data**) such as your race; ethnic origin; politics; religion; trade union membership; genetics; biometrics (where used for ID purposes); health; sex life; or sexual orientation.

When you agree to take part in a study, we will use your personal data in the ways needed to conduct and analyse the study and if necessary, to verify and defend, when required, the process and outcomes of the study. Personal data will be accessible to the study team. When we do not need to use personal data, it will be deleted or identifiers will be removed. Personal data does not include data that cannot be identified to an individual (e.g., data collected anonymously or where identifiers have been removed). However, your consent form, contact details, audio recordings etc. will be retained for 6 years.

12. What will happen to the results of the study?

The investigator intends to publish the results in a PhD thesis and may be published in a journal article.

13. Who has reviewed this study?

This study has been reviewed by, and received ethics clearance through, the Liverpool John Moores University Research Ethics Committee (Reference number: 22/SPS/001).

14. Who to contact for further information or with any concerns?

If you have a concern about any aspect of this study, please contact the principal investigator who will do their best to answer your query. The investigator should acknowledge your concern within 10 working days and give you an indication of how they intend to deal with it. If you wish to make a complaint, please contact the university Research Ethics Committee (researchethics@ljmu.ac.uk; 0151 9046467).

15. What happens now?

Thank you for reading this information sheet. If you are happy to take part in the proposed research project based on the information it contains, please complete and sign the attached consent form and return to me.

16. Data Protection Notice

Liverpool John Moores University is the sponsor for this study based in the United Kingdom. We will be using information from you in order to undertake this study and will act as the data controller for this study. Liverpool John Moores University will keep identifiable information about you for 6 years after the study has finished

As a university we use personally-identifiable information to conduct research to improve health, care and services. As a publicly-funded organisation, we have to ensure that it is in the public interest when we use personally-identifiable information from people who have agreed to take part in research. This means that when you agree to take part in a research study, we will use your data in the ways needed to conduct and analyse the research study. Health and care research should serve the public interest, which means that we have to demonstrate that our research serves the interests of society as a whole. We do this by following the UK Policy Framework for Health and Social Care Research.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the study to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.

You can find out more about how we use your information by contacting Tina Sparrow, the Liverpool John Moores University Data Protection Officer at DPO-LJMU@ljmu.ac.uk

If you wish to raise a complaint on how we have handled your personal data, you can contact our Data Protection Officer who will investigate the matter. If you are not satisfied with our response or believe we are processing your personal data in a way that is not lawful you can complain to the Information Commissioner's Office (ICO).

Thank you for reading this information sheet and for considering taking part in this study and if you have any further questions please contact:

Mr Boma Omuso (Principal investigator)
School of Sports and Exercise Sciences
B.O.Omuso@2019.ljmu.ac.uk

Dr Paula Watson (Research supervisor)
Senior Lecturer
School of Sports and Exercise Sciences
P.M.Watson@ljmu.ac.uk

Note: A copy of the participant information sheet should be retained by the participant with a copy of the signed consent form.

Appendix 6C: Consent Form for study 3

LIVERPOOL JOHN MOORES UNIVERSITY
CONSENT FORM

Title of study: Follow-Up Semi-Structured Interview - Exploring the Effects of an Online Public Commitment Intervention

Name of Principal Researcher: Boma Omuso, B.O.Omuso@2019.ljmu.ac.uk

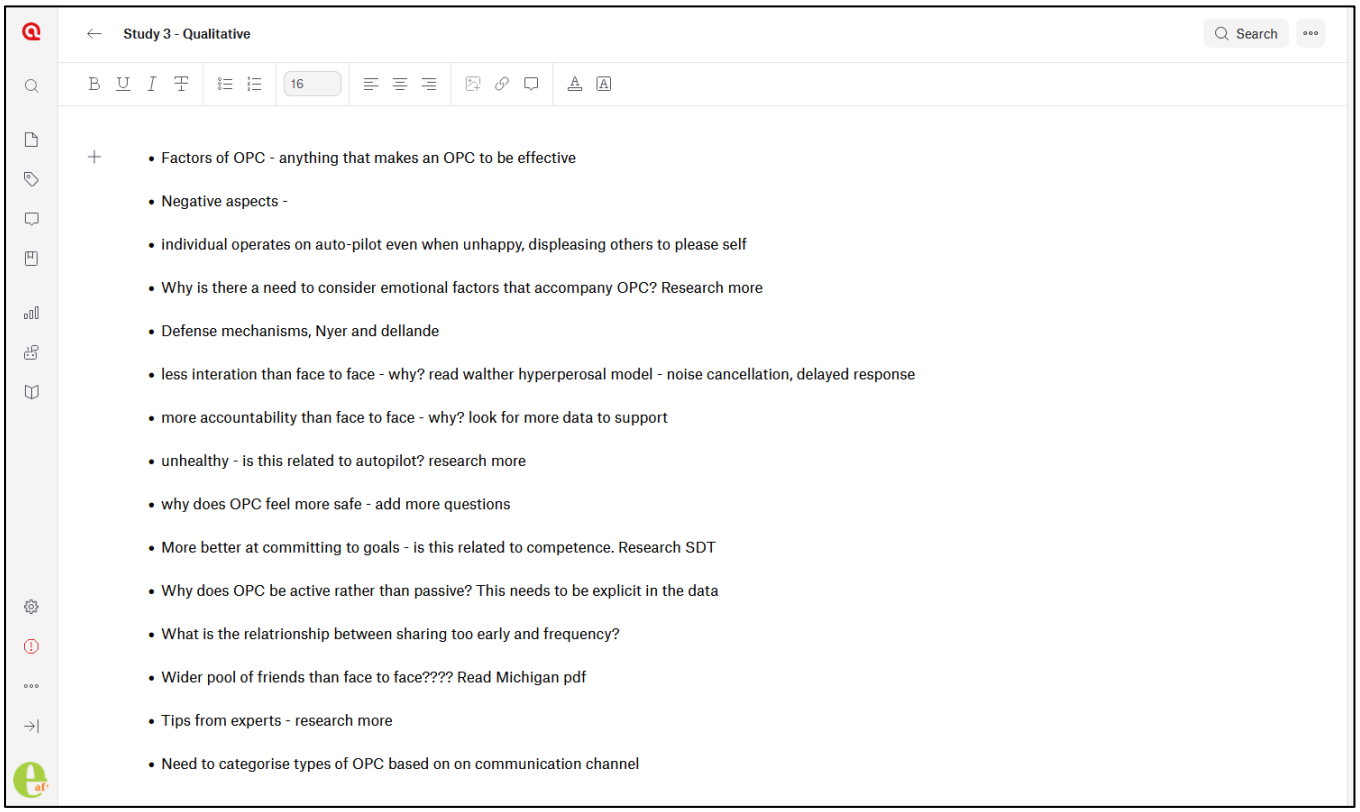
1. I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights. ☐
3. I understand that any personal information collected during the study will be anonymised and remain confidential. ☐
4. I agree to take part in the semi-structured interview. ☐
5. I understand that the interview will be audio / video recorded and I am happy to proceed. ☐
6. I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymised. ☐

Name of Participant	Date	Signature
		X _____
Name of Participant	Date	Signature
		X _____

Note: When completed 1 copy for participant and 1 copy for researcher

Consent Forms vs 4 May 2012 Page 1 of 1

Appendix 6D: Research memo for study 3



Appendic 6E: Key metrics for the two Facebook groups

Metrics		Facebook Group A (OPC only)		Faebook Group B (OPC + Social Support)		Total	
		Count	Average per day	Count	Average per day	Total count	Total average per day
Growth	Total members	52	0.6	53	0.8	105	1.1
	Membership requests	52	0.6	53	0.8	105	1.1
Engagement	Total posts	49	0.5	162	1.7	211	2.30
	Total comments	0	0	711	7.7	711	7.7
	Total reactions	81	0.9	409	4.4	490	0.5
	Total active members	16		37		53	
	Popular days	Thursdays, Sundays		Mondays, Thursdays, Sundays			
	Popular times	2pm, 6pm, 7pm, 8pm		2pm, 6pm, 7pm, 8pm, 9pm			

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