Jackman, P, Hawkins, R, Whitehead, AE and Brick, N

Integrating models of self-regulation and optimal experiences: A qualitative study into flow and clutch states in recreational distance running

Published in *Psychology of Sport and Exercise*: https://doi.org/10.1016/j.psychsport.2021.102051

Integrating models of self-regulation and optimal experiences: A qualitative study into flow and clutch states in recreational distance running

Patricia C. Jackman[1*], Rebecca M. Hawkins[1], Amy E. Whitehead[2], and Noel E. Brick[3]

[1]School of Sport and Exercise Science, University of Lincoln, Lincoln, UK

[2]School of Sport and Exercise Sciences, Liverpool John Moores University, UK

[3]Department of Psychology, Ulster University, Coleraine, UK

*Address correspondence to: Patricia Jackman, School of Sport and Exercise Science, University of Lincoln, Brayford Pool, Lincoln, UK. Email: pjackman@lincoln.ac.uk. Phone: +441522837105

ORCID ID

Patricia C. Jackman	0000-0002-5756-4494	@Trish_Jackman
Rebecca M. Hawkins	0000-0002-5816-8186	@_RebeccaHawkins
Amy E. Whitehead	0000-0003-0611-364X	@a_whitehead1
Noel E. Brick	0000-0002-3714-4660	@noelbrickie

CRediT Authorship Statement

Patricia C. Jackman: Conceptualisation, Methodology, Formal analysis, Investigation, Writing - Original Draft, Writing - Review & Editing, Visualisation, Project administration; **Rebecca M. Hawkins**: Formal analysis, Writing - Review & Editing; **Amy E. Whitehead**: Formal analysis, Writing - Review & Editing; **Noel E. Brick**: Conceptualisation, Methodology, Formal analysis, Writing - Original Draft, Writing - Review & Editing; Visualisation.

Abstract

Objective: In this study, we aimed to understand the self-regulatory processes facilitating optimal experiences in running by integrating models of self-regulation with flow and clutch states.

Method: Using an event-focused approach, we interviewed 16 runners less than one day on average after recreational running activities (M = 22.17 hours later, range = 3-46) they described as positive, rewarding experiences. Our analysis drew on principles for thematic and connecting analyses.

Results: We structured our analysis of the self-regulatory processes facilitating flow and clutch states into three overarching themes: *forethought*; *monitoring*; and *control*. Flow was facilitated by intrinsic experiential motives and non-specific goals, whereas clutch states involved an intrinsic motive to accomplish specific goals. The perceived ease and pleasure during flow motivated runners to continue this experience, which appeared to be aided by active and involuntary distraction. Conversely, clutch states were described as more effortful and less pleasant during the run, with active self-regulation strategies used to exert control over cognition and manage feelings of difficulty. Attending to specific outward or internal sensory stimuli appeared to initiate changes that contributed to the disruption of flow, although many runners described transitioning into a clutch state after flow disruption. No runner reported transitioning from a clutch state into flow.

Conclusions: Our study offers novel insights into optimal experiences in running by integrating models of self-regulation with flow and clutch states. We discuss how these insights can inform research and applied practice seeking to develop interventions for promoting optimal experiences during running.

Keywords: endurance exercise; enjoyment; optimal experience; goal setting; metacognition; physical activity

Integrating models of self-regulation and optimal experience: A qualitative study into flow and clutch states in recreational distance running

Aim

To understand self-regulatory processes that facilitate optimal experiences in running by integrating models of self-regulation with flow and clutch states

Method

Sixteen runners recruited after positive, rewarding experiences in recreational runs

Event-focused interviews exploring their psychological states during the run

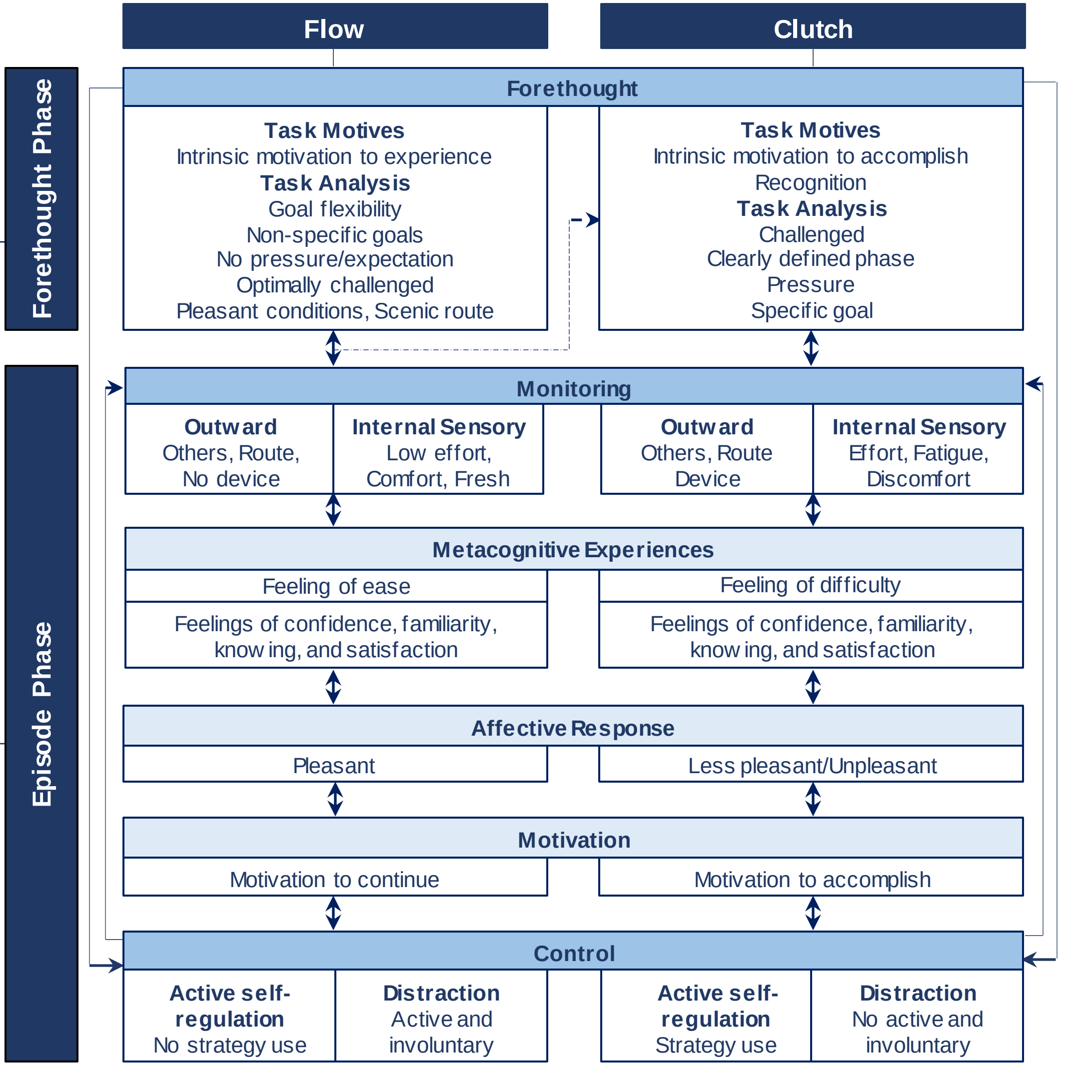
Findings

Three overarching themes – *forethought*, *monitoring*, and *control* – structured into two, interconnected phases

Conclusions

Our findings could have implications for research and applied practice seeking to develop interventions for promoting optimal experiences during running

Patricia C. Jackman, Rebecca M. Hawkins, Amy E. Whitehead, and Noel E. Brick



Introduction

Running is one of the most prevalent forms of physical activity (PA) globally, with between 7.9% and 13.3% of adults estimated to participate (Hulteen et al., 2017). The increased popularity in running over the last decade is reflected by the proliferation in race entries (e.g., Anderson, 2021) and growth of community-based mass participation events, such as “parkrun” (Stevinson et al., 2015). Furthermore, schemes aiming to increase PA through running have been developed by leading health organisations (e.g., Couch to 5K - National Health Service, 2021) and sport federations (e.g., Start to Run - Fokkema et al., 2019). As running is a relatively inexpensive, accessible form of PA for many adults (Hulteen et al., 2017), it could be a promising approach to increase PA. However, evidence suggests about one-third of novice runners drop out of running programmes within six months (Fokkema et al., 2019), and, in some instances, almost two-thirds have dropped out within 10 weeks (Johnson et al., 2020). Therefore, the development of innovative strategies that help to promote more sustained participation could help to maximise the health benefits and longevity associated with running behaviour (e.g., Pedisic et al., 2020).

There is growing recognition that people’s experiences during PA are an important determinant of long-term adherence (Brand & Ekkekakis, 2018). Given that pleasure during exercise is more likely to predict future PA behaviour than displeasure (Rhodes & Kates, 2015), understanding how more pleasant experiences can be promoted during running could be an important mechanism for increasing long-term engagement. Optimal experiences are defined as positive subjective experiences characterised by feelings of pleasure that are produced as a result of exerting effort (Jackson & Wrigley, 2004). A widely used framework for understanding optimal experiences is flow (Csikszentmihalyi, 1975). Flow is an intrinsically rewarding psychological state, involving total task absorption, perceptions of control, and a sense of effortlessness (Csikszentmihalyi, 2002). Contemporary views on flow are mainly based on Csikszentmihalyi’s (2002) nine dimensions framework, which conceptualises flow as an amalgam of challenge-skills balance, clear goals, unambiguous feedback, action-awareness merging, concentration on the task at hand, sense of control, loss of self-consciousness, time transformation, and autotelic experience. Due to the claimed desirability of these experiential features, flow appears to be a useful framework for understanding optimal experiences in running (Csikszentmihalyi et al., 2017).

Despite the widespread adoption of the nine dimensions framework in flow research in exercise (Jackman et al., 2019), the first qualitative evidence on flow in exercisers offered a different perspective on optimal experiences in this setting (Swann et al., 2019). Swann et al. (2019) interviewed 18 exercisers, including three runners, on average two days after rewarding experiences and suggested that *two* psychological states can characterise these experiences: flow and a second "clutch" state. Flow and clutch states were purported to share some characteristics, but flow was described as a state involving ease, effortless attention, and enjoyment *during* exercise, whereas clutch states were reported as being more intense, effortful, and only perceived as enjoyable *after* an activity (Swann et al., 2019).

Along with proposing experiential differences between flow and clutch states, Swann et al. (2019) presented initial evidence suggesting further distinctions in terms of the contexts in which these states were reported, how each state occurred, and their perceived outcomes. Flow was purported to occur in situations involving novelty, variation, exploration, and flexible outcomes through a sequential process involving five steps: positive event, positive feedback, increase in confidence, challenge appraisal, and setting open goals. Several of these features align with perspectives on motivation, including self-determination theory's (SDT) postulation of competence as a basic psychological need (Deci & Ryan, 2000), as well as evidence concerning the positive association between novelty and intrinsic motivation (Gonzalez-Cutre et al., 2016), and the positive effects of perceived variety on task enjoyment (Dimmock et al., 2013). Alternatively, clutch states were described late in activities, in pressured situations, and in achievement contexts, and were proposed to occur through a relatively sudden, sequential, four-step process: situation feedback, challenge appraisal, setting specific goals, and a step up in effort expended. In comparing these processes, one difference was that flow was suggested to occur when open goals (e.g., "see how well I can do") were reported, whereas specific goals (e.g., set number of repetitions) were antecedents to clutch states. Finally, intrinsic rewards were reported after each state, but flow was energising, whereas clutch states were exhausting.

Based on the initial evidence on flow and clutch states in exercise (Swann et al., 2019), this integrated perspective, which has received more attention in sport versus exercise to date (e.g., Jackman et al., 2017, 2019; Swann et al., 2017), could be a promising approach to better understand optimal experiences in recreational running. Temporal contrasts in reported enjoyment for flow and clutch states are worthy of consideration because of the importance of affective responses during exercise for predicting long-term PA adherence (Rhodes & Kates, 2015). Thus, understanding how runners can most reliably induce flow and manage clutch states could help to generate novel insights into which psychological strategies might – or might not – be useful for optimising running experiences. For instance, if flow is rewarding during the experience, there is a need to understand what helps runners to induce this state. In contrast, if clutch states are considered more rewarding after runners have achieved a specific goal, identifying strategies that can help runners to manage the intense effort during this psychological state and achieve their goal(s) could be beneficial. Specific to clutch, these psychological strategies may include active self-regulatory techniques such as self-talk or relaxation (Brick et al., 2019; Swann et al., 2017). In contrast, preliminary evidence across multiple sports suggested that "positive" distractions (i.e., those that focus attention away from the task) are more likely to help "manage and maintain" a flow state (Swann et al., 2017, p. 388). Although the use of psychological strategies to enhance endurance performance has been studied extensively (e.g., Brick et al., 2014; McCormick et al., 2015), how these strategies might help to induce flow and manage clutch states has not yet been explored in exercisers, and within runners specifically.

Setting goals and implementing strategies to manage one's performance are also integral sub-processes of self-regulation. As such, self-regulation is one framework that could potentially help to generate novel insights into how optimal experiences in running are facilitated. Self-regulation is defined as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p. 14) and has recently been proposed as a framework to advance understandings of the use of psychological strategy interventions during endurance activity (McCormick et al., 2019). Effective self-regulation involves three cyclical phases: an anticipatory *forethought* phase that occurs before a task; a *performance* phase that occurs during an activity; and a *self-reflection* phase that occurs on cessation of an activity (Zimmerman, 2002). Each of these phases incorporate specific processes. The forethought phase involves setting goals based on key sources of self-motivation, including one's intrinsic interest and outcome expectations for the task ahead (Zimmerman & Moylan, 2009). The performance phase, in turn, is influenced by the forethought phase (e.g., by the nature of the goals set) and involves both self-observation and self-control. Self-observation includes self-monitoring (i.e., mental tracking of one's performance processes and outcomes) and the results of these monitoring processes influence subsequent decisions about the nature and extent of self-control required. When engaged, self-control can include the use of task-specific strategies (e.g., motivational self-talk, distraction) that align with one's goals and task interests (Zimmerman & Moylan, 2009). Given the parallels between optimal experiences and self-regulatory subprocesses in the forethought phase (e.g., the nature of goals set) and during the performance phase (e.g., the specific strategies employed), integrating models of self-regulation with flow and clutch states has intuitive appeal and could be a promising avenue to progress our understanding of optimal experiences during running.

An additional component of self-regulation is metacognition. Specifically, metacognition refers to the insight people have into their own cognitive processes and is essential to plan, monitor, and control thoughts and actions during self-regulated activity (Brick et al., 2016; Dinsmore et al., 2008). Monitoring and control are achieved via several metacognitive processes. Monitoring is a metacognitive skill that is facilitated by metacognitive experiences (i.e., metacognitive feelings and metacognitive judgements and estimates). These experiences include implicit feelings of task difficulty that form a representation of a task (e.g., that a task is easier or harder than desired), indicate the fluency of cognitive processing, and facilitate awareness of progress towards a goal. More so, according to Efklides' (2011) metacognitive and affective model of self-regulated learning (MASRL), these feelings have affective qualities (e.g., positive or negative valence) that impact on affective and motivational responses during task performance and, in turn, provide a stimulus for self-regulatory control and the engagement of psychological strategies in a given context.

Within the endurance exercise domain, Brick and colleagues applied a metacognitive perspective to understand attentional focus and psychological strategy use in recreational (Brick et al., 2020) and elite (Brick et al., 2015) runners. The findings suggested that runners—especially more experienced runners—planned cognitive strategy use before an activity and metacognitively monitored and controlled their cognitive processes during running. Control was achieved by engaging strategies such as motivational self-talk or adapting one's pace, for example, depending on the context (e.g., goals) or demands (e.g., perceived difficulty) of the running activity. This work has helped to provide a clearer understanding of the role of metacognition within endurance settings, but how these self-regulatory processes interact with flow and clutch states during running is unknown. Additionally, Swann et al. (2019) reported that some exercisers, including one runner, described flow and clutch states at different points in the same activity, but how individuals manage the transition between these states (e.g., disruption of flow and subsequent shift to clutch to optimise performance) in running is also unknown.

The purpose of this study, therefore, was to understand self-regulatory processes that facilitate optimal experiences in running by integrating models of self-regulation with flow and clutch states. Accordingly, we aimed to address three research questions: (RQ1) how can self-regulatory processes facilitate flow states in running?; (RQ2) how can self-regulatory processes facilitate clutch states in running?; and (RQ3) how can self-regulatory processes facilitate transitions between flow and clutch states in running? By doing so, we sought to provide a deeper insight into the regulatory processes underlying optimal experiences in running. In turn, answering these questions could aid the development of practical guidelines for coaches, practitioners, and organisations seeking to assist runners to optimise performance or sustain longer-term running behaviour.

Methods

Research Approach

We approached this study philosophically from the perspectives of ontological realism and epistemological constructivism (Maxwell, 2012). Thus, we assumed that psychological states, although not directly observable, are real phenomena that exist independent of our knowledge of them but adhere to the view that our knowledge of these phenomena is partial, theory-laden, and context-dependent. Given the centrality of causal understanding in realist research (Sayer, 1992), we selected this philosophical position as we aimed to integrate models of self-regulation with flow and clutch states to better understand the regulatory processes underpinning flow and clutch states. Despite this, we recognise that other philosophical positions could have been adopted to generate different forms of knowledge. The event-focused interview method (Jackman et al., 2021) was used as we sought to generate detailed, chronological recall of experiences after, and in relation to, specific running activities.

Consistent with our epistemological position, we reflected on how our identities shaped the research process, claims made, and conclusions that can be drawn. At the time of the study, the first and second authors had published research on optimal experiences and goal setting, while the third and fourth authors had published studies on self-regulation in endurance activities. The first, third, and fourth authors were also committed runners, thus holding some “insider knowledge” on running and endurance cultures. While aware that these backgrounds shaped the research process, we treated our guiding theoretical backgrounds as fallible and evaluated these critically throughout. Nonetheless, as our knowledge of the world is constructed from our own perspectives, we recognise that researchers adopting alternative theoretical standpoints may have generated alternative explanations. To enable further evaluation of our analytical choices and trustworthiness of our conclusions, we summarised our analytical journey in an audit trail (see Supplementary File 1).

Participants

After gaining ethical approval from the first author’s university ethics committee, we sampled participants based on pre-determined criteria following guidelines for event-focused interviews (Jackman et al., 2021). Using a similar approach to Swann et al. (2019), individuals were eligible to take part if they were aged 18 years or over and reported a positive, rewarding experience in a recent, recreational run. We placed no constraints on eligibility based on running performance or experience levels, but competitive runs were not eligible. No incentive was offered for participation. To reduce the potential for influencing preconceptions, we did not include terms relevant to the study (e.g., flow or clutch) in the study information or inclusion criteria. Two approaches were used to recruit participants. First, we posted a study advertisement on social media inviting runners interested in a study on optimal experiences to contact the first author. Interested individuals were sent an information sheet and asked to contact the researcher as soon as possible if they had a positive, rewarding experience in a run. Second, when we became aware of runners who appeared to have an eligible experience (e.g., following a social media post), the first author contacted the individual to provide them with the study information and invited them to partake. Adapting de Pauw et al.'s (2013) classification system for use with runners, sixteen participants (female *n* = 8, male *n* = 8; *M* age = 27.81 years) classified as either trained (i.e., level 3; *n* = 11) or recreationally trained (i.e., level 2; *n* = 5) were recruited following this strategy (see Table 1). As two runners reported two separate eligible running activities, we generated data on 18 runs.

[INSERT TABLE 1 ABOUT HERE]

Procedures

All interviews were conducted by the first author, who had extensive experience in event-focused interviewing. After satisfying the sampling criteria, the first author and participants agreed a time for an interview as soon as possible after the relevant run. Participants provided informed consent for data to be recorded, stored, and published. The interviews were conducted online (*M* length = 75.56 minutes, range = 64-101 minutes) and took place 22.17 hours on average (*SD* = 13.02, range = 3-46 hours) after the running activities. We adopted a semi-structured, open-ended approach to allow the interviewees to expand on areas of interest that arose during the interview (Sparkes & Smith, 2014). The interview solicited information about the psychological state of participants across the entire activity, but participants were also asked to identify at which points (i.e., time and/or distance) their run was positive and/or rewarding. Thus, we only determined whether or not any reported psychological states corresponded with flow, clutch, or neither after the interview (see below). After initial demographic questions, the interview schedule consisted of four themes: (1) general description and chronological recall of the activity (e.g., "from start to finish, can you explain how the run unfolded?"); (2) chronological recall of the experience of participants during the run (e.g., "can you describe what you were thinking and feeling [at this stage]?"); (3) transitions between psychological states at different stages (e.g., processes, experiential changes); and (4) exploration of the continuation of their positive and/or rewarding experiences (e.g., "what helped you to prolong that experience until that point?"). Brief notes were made as the participants chronologically recalled the sequence of stages during the run to ensure that the psychological states described could be distinguished temporally. In addition, curiosity-driven questions (Smith & Sparkes, 2016) were used to elicit more information on the points discussed. Before concluding the interview, participants were asked if they had any further potentially relevant information to add. After conducting the interviews, the first author transcribed the recordings verbatim.

Data Analysis

Our analysis adopted a flexible version of thematic analysis (TA; Braun et al., 2016) in combination with principles for connecting analysis (Maxwell & Miller, 2008). In Phase 1, the first author, who led the analysis, engaged in familiarisation by reading and re-reading each transcript and making notes about whether a psychological state consistent with descriptions of flow and/or clutch states was reported, drawing on past literature (Swann et al., 2019) as an analytical lens. While doing so, the first author also identified the segment of each run during which participants recounted a flow or clutch state (see Figure 1). During this initial phase, the first author felt that the psychological states described in the account of one runner (Runner 3) did not "fit" with descriptions of optimal experience. Despite *performing* well early in their run, Runner 3 explained that their experience turned more negative: "I probably went a little bit too fast, which ultimately meant that I burnt out at the end". After the fourth author reviewed the transcript and discussed it with the first author, we classified this case as an *exception* (McPherson & Horne, 2006). Although not describing a flow or clutch state, this participant's account "*stayed with us*" (Phoneix & Orr, 2017, p. 274) and was revisited later in our analysis.

For Phase 2, the first author engaged with data on flow and/or clutch states to generate preliminary *codes*, which represented the most basic unit of analysis. The first author combined a broad, deductive coding approach, by drawing on past literature on flow and clutch states (Swann et al., 2019) as a lens through which to interpret the data and generate codes, with an inductive approach grounded in the data (i.e., for data that did not align with the existing model - Braun & Clarke, 2020). To ensure the temporality of the runners' experiences were not lost through fragmentation of the textual data, the first author distinguished the initial codes chronologically in terms of before, during, and after flow and clutch states in line with our research questions. In addition, the first author engaged in initial contiguity-based thinking (Maxwell & Miller, 2008) by exploring and making note of connections within the analysis (e.g., between codes).

Phases 3-5 of our TA involved iterative shifts between initial theme generation, theme development and refinement, and theme naming. Initially, we drew on abductive logic, which involves redescribing a phenomenon to generate new insights that lead to modifications, advancements, or rejections in existing knowledge (Danermark et al., 2019). In doing so, we sought to ensure that we did not only think *with* existing theoretical models, but thought critically *about* them. The first author drew on existing models of optimal experience (Swann et al., 2019) and metacognition (Brick et al., 2015) to conceptually redescribe the codes generated, before developing preliminary *subthemes* (i.e., combining similar codes) and *themes* (i.e., combining subthemes) for each state. In some cases, the initial codes generated could not be redescribed using these models, so alternative labels were formed. The first author then shared the transcripts and their preliminary analysis with the co-authors. Each co-author was assigned approximately one-third of the transcripts (i.e., every transcript was reviewed by two authors) and asked to act as a critical friend (Smith & McGannon, 2018) by appraising the states interpreted, engaging with disconfirming evidence (i.e., other states), reviewing the preliminary analysis and visual summary, and considering alternative explanations. We then met collectively to discuss the analysis and the theoretical concepts that could explain our data, working collaboratively and reflexively to further refine the analysis. Consequently, two additional models of self-regulation and metacognition (Efklides, 2011; Zimmerman, 2002) were integrated to redescribe and structure our themes and subthemes.

After further discussions, we organised our codes, subthemes, and themes into three *overarching themes* for each state. In arriving at our final overarching theme labels, we reflected on the various models incorporated in our analysis to determine which – if any – of these labels were most suitable for structuring our analysis. In line with the abductive analytical perspective, the labels for our overarching themes, as well as the themes they represented, drew on existing theoretical perspectives. Thus, we used the same labels to define our central organising concepts (i.e., overarching themes and themes) for flow and clutch states, with the patterns of meaning pertinent to each state conveyed within our subthemes (see *Results and Preliminary Discussion*) and codes. In this stage of our analysis, we engaged in contiguity-based thinking (Maxwell & Miller, 2008) to structure our analysis in a relational manner. To aid this process, we reviewed the interview transcripts for connections between codes and subthemes, posed retroductive questions (Danermark et al., 2019) about our thematic structure (e.g., what self-regulatory processes facilitate [a subtheme of] flow?), and reviewed data for our exceptional case (i.e., why might Runner 3 not have reported a flow or clutch state, and instead reported a negative experience?). In addition, by returning to the broader self-regulation literature integrated into our analysis (Brick et al., 2015; Efklides, 2011; Zimmerman, 2002), this enabled us to generate explanations for connections between subthemes, themes, and overarching themes (see paths in Figure 2). In Phase 6, a process commenced before the formal "writing up" (Braun et al., 2016), we sought to generate a logical story by illustrating our analysis through interview extracts, integration of literature, and visual summaries. In addition to the aforementioned steps, our analysis and write-up was further refined through the peer review process, with the reviewers acting as critical friends (Smith & McGannon, 2018).

Results and Preliminary Discussion

Of the 18 runs explored through interviews with our sample, flow and clutch states were described for periods in 13 and 12 runs, respectively, with other less optimal states described before and/or after these states. We refer to these relevant flow and clutch states hereafter as cases. Flow and clutch states were reported separately at different stages in 44% (8/18) of runs, with flow states described before, and tending to be reported for longer than, clutch states in each case (see Figure 1 for temporal information on the psychological states described). The sixth phase of our TA is presented in the following sections, starting with an overview of our central organising concepts.

[INSERT FIGURE 1 ABOUT HERE]

Overview of Analysis

A diagrammatic summary of our analysis of self-regulatory processes facilitating flow and clutch states is presented in Figure 2 (see Supplementary File 2 for full TA structure for each state). We structured our analysis into three overarching themes: 'forethought', 'monitoring', and 'control'. The first overarching theme, 'forethought', referred to self-regulatory processes that facilitated flow and clutch states, and comprised two themes: *task motives* (i.e., reasons for running), and *task analysis* (i.e., goal setting, planning, and situational conditions). This overarching theme drew on the first phase of Zimmerman's (2002) cyclical model of self-regulation and the integrated model of flow and clutch states (i.e., context and processes - Swann et al., 2019). The second overarching theme, 'monitoring', concerned attention towards, and responses to, internal or external stimuli during each state, connecting the integrated model of flow and clutch states (Swann et al., 2019) with metacognitive frameworks (Brick et al., 2015; Efklides, 2011). This overarching theme consisted of five themes: *outward monitoring* (i.e., task-relevant stimuli in the environment); *internal sensory monitoring* (i.e., stimuli within the body); *metacognitive experiences* (e.g., feelings of task difficulty); *affective responses* (i.e., degree of pleasure generated in response to monitoring processes); and *motivation* (i.e., nature of motivation *during* the state). The third overarching theme, 'control', referred to efforts to exert control over thoughts, feelings, and/or performance. Drawing on understandings of metacognitive control and cognitive strategy use to self-regulate during endurance activity (e.g., Brick et al., 2014), this overarching theme incorporated three themes: *active-self regulation* (i.e., efforts made to control thoughts, feelings, or actions); *active distraction* (i.e., actively directing attention towards running-irrelevant stimuli); and *involuntary distraction* (i.e., non-directed attention that is captured by running-irrelevant stimuli).

Consistent with the temporal and connecting perspectives in our analysis, we divided the overarching themes into two phases: the "forethought phase", and the "episode phase" (Figure 2). In line with the cyclical model of self-regulation (Zimmerman, 2002), the forethought phase represented the period *prior to* a flow or clutch state, whereas monitoring and control, which together constituted the episode phase, were described *during* a flow or clutch state. Although presented sequentially, these phases were continuous and iterative rather than linear in nature (paths A1 and B1, Figure 2). Integrating Efklides' (2011) MASRL model, the interactions between metacognitive experiences, affect, motivation, and control responses are represented within the episode phase in Figure 2 for flow (paths A2-A6) and clutch states (paths B2-B6). In the following sections, we describe the themes and subthemes (italicised in text hereafter), and explain the paths depicted in Figure 2 where relevant.

[INSERT FIGURE 2 HERE]

Flow States

Represented by path A in Figure 2, flow was described as a state during which runners felt they were "gliding", "cruising", or running "automatically", thus paralleling past descriptions of flow (Swann et al., 2019). This state was reported in the early stages of runs, but never lasted for an entire run (see Figure 1).

Forethought for Flow States

Task Motives. This theme, capturing seven subthemes, concerned the intrinsic experiential motives of the runners at the time of their flow states. Many stated that their run involved *variety*, such as running on a route with different views and/or in a way that was outside their normal routine. In a few instances, runners also reported *exploration*, whereby the run was likened to an "adventure". For example, Runner 12 commented:

> It was out of the routine of what I had been doing and by going somewhere different to run, it [the route] was something different to look at; it was different when you turn the corner, and you go up a different path. It was less thought about running and more about exploring.

Many runners reported *novelty*, which captured how the runners embarked on a new route or were trying a new type of run. The aforementioned subthemes were previously reported in exercise (Swann et al., 2019), but the runners also described several other motives. Most explained they were running for the purpose of *experience simulation*, which, for many, cohered around enjoying the run, rather than being concerned with performance. As Runner 7 said, "the objective was to have fun, and to enjoy it and just to get outside". Relatedly, some described running for *restoration*, referring to a desire to refresh themselves mentally (e.g., release from life stressors) and/or physically (e.g., via a low intensity run). Another motive pertinent to those who ran socially or with their dogs was *relatedness,* whereby the runners were enthused about running with others. As Runner 2 put it, "I was more looking forward to having someone to run with, rather than having to attempt to do it [interval running activity] on my own". In contrast, some referred to the benefits of *autonomy* while running alone, as this provided choice over their desired pace and/or route. Overall, the task motives align with an understanding of flow as an intrinsically rewarding state (Csikszentmihalyi, 2002), such that intrinsic experiential motives may help to facilitate flow.

Task Analysis. This theme represented six subthemes. *Non-specific goals* spanned the range of flexible goal types described. In contrast to past research that only reported open goals (i.e., no specific end-state - Swann et al., 2019), the goal types described by the runners included open goals, as well as goals with multiple potential end-states (i.e., flexible goals ranging in distance, time, or pace) or, for a few, goals centred on doing one's best in-the-moment (e.g., do your best based on capabilities *at that time* on each interval rather than focusing on pre-determined or previous "best" times). These goals could be anchored to the run as a whole (e.g., to run 8-10 kilometres) and/or to specific phases (e.g., not setting a specific pace goal early in a run). Generally, these goals were initially set before running, as typified by Runner 14:

> We had it in the back of our mind on that Friday and Saturday to say "well, we're not doing a huge amount on Sunday. We've already done a couple of 10 kilometres and we've been able to do that, should we just run on Sunday and just see how far we can go?"

These goals were also facilitated by *goal flexibility,* whereby runners felt free to adapt a specific overall run goal or a structured plan (e.g., pace). This flexible approach appeared to connect to *no pressure/expectation,* which reflected how the runners were less concerned about achieving specific outcomes. Runner 13 articulated that, "I didn't set myself any real targets to start with, it was only during the run [after flow] that I set the targets. That made it a better experience". These perceptions were closely linked to the sense that runners were *optimally challenged,* which centred on how all runners felt they were running to, or in some instances within, their capabilities (e.g., based on their physical state or ability), thus paralleling previous understandings of necessary preconditions for flow (Csikszentmihalyi, 2002; Swann et al., 2019). The final two subthemes focused on the environment. Most flow states involved *pleasant weather conditions* conducive to a pleasurable running experience, while *scenic routes* captured the aesthetically pleasing natural surroundings common to most flow states. In line with the motive for *restoration,* running on *scenic routes* appears to reflect the restorative benefits of natural environments in attention restoration theory (Kaplan, 1995).

Monitoring in Flow States

Outward Monitoring. In the case of flow, this theme comprised three subthemes. All runners reported *not monitoring a device* during flow, which involved directing minimal-to-no attention towards performance feedback. This appeared to distort perceptions of time and prevent the runners from monitoring a stimulus that could potentially disrupt flow, as Runner 7 said:

> I set it [the watch] to tell me what the time of day was and didn't look at it until it beeped, and then it was like, "oh, wow, we've done a mile, that time has passed quick". Normally I'm really attentive to what's going on, and I had no idea yesterday.

Instead, the runners attended to *monitoring the route*, which included looking at the terrain, surface, or path. During flow, this was perceived by runners as a fluent and relatively effortless process. In describing the early stage of the ascent on a mountain run, Runner 6 recalled: "I could see my eyes scanning further in front, and closer to my feet, back and forth in a really flowy manner. It was easy for me to see where my feet had to go without even thinking about it". Some also described *monitoring others,* such as attending to their running partner, for example.

Internal Sensory Monitoring. This theme drew together five subthemes. Consistent with extant literature (Csikszentmihalyi et al., 2017; Swann et al., 2019), flow involved a *low perception of effort*. When the runners were asked, "can you describe how you felt in your body during this experience?", most reported *no discomfort*, which concerned the absence of physical perceptions more common to less optimal states (e.g., muscle aches, tightness). Instead, all runners discussed *feeling fresh*, whereby they felt energetic and did not feel fatigued. Runner 5 remarked that, "my body felt really coordinated and I felt I had a lot of energy. I felt I reached a point where it wasn't painful and didn't ache or hurt.

I didn’t feel any discomfort”. *No breathing difficulties* represented how many runners felt they were not struggling to catch their breath during the run. Some also discussed feeling *relaxed* in their body.

Metacognitive Experiences. This theme consisted of five subthemes. Without signs of discomfort, alongside lower perceptions of effort (path A2, Figure 2), all runners described a *feeling of ease,* such that running did not feel as difficult as normal. As Runner 15 described:

> I didn't feel like I was having to catch my breath or anything like that. That's normally what I associate hard with. For me, it's often my legs that start to feel heavy, or it's an effort to lift them, so there wasn't a need to do that.

Other metacognitive experiences were also described during flow. Runners reported *feelings of knowing* and, specifically, feeling that one did not need to apply an active self-regulatory cognitive strategy during the run. This was typified by Runner 8A who explained, “I was just running really well. It wasn't mentally tiring. I didn't have to think of anything like that, or think of implementing any type of strategy”. This comment also suggests links to a *feeling of satisfaction* with progress on the running task. Similarly, all runners described a *feeling of confidence*, which, for most, consisted of having belief in their ability, as previously noted (Swann et al., 2019). Lastly, *feelings of familiarity* represented how most runners were accustomed with their route, but some were new to certain parts.

Affective Responses. This theme consisted of two subthemes. Based on monitoring processes and metacognitive *feelings of ease* (paths A2 and A3, Figure 2), all runners described *pleasure* during flow, whereby the runners felt good. *Enjoying the run* reflected how in recalling their experience, the runners labelled various elements (e.g., music, scenery) of the running experience as enjoyable during flow. For example, when asked, “You spoke there about enjoyment, so can you just explain what that enjoyment was like?”, Runner 14 said:

> I knew I must be enjoying it and feeling good for me to want to carry on because sometimes if I go for a 5k[ilometre run] and I get to the 5k and I think “Oh my God, I'm really glad I'm done”. But when I got to the end of that 5k I thought “I don't want to go home. I want to stay outside and I want to keep running”.

Motivation. The motivation during flow was characterised by the subtheme, *motivation to continue*, previously termed "motivation for more" by Swann et al. (2019). The runners recalled not wanting the run to end during their flow state. One runner commented, "I felt like I was enjoying the moment really, and that also motivated me to keep doing laps [of a park] because I just wanted that experience to continue" (Runner 5). This reflects how runners tended to describe a desire to stay running to continue their pleasant experience during flow (path A4, Figure 2).

Control in Flow States

Active Self-Regulation. In the case of flow, this theme, consisting of six subthemes, concerned how the runners did not feel a need to engage in active self-regulation and effortful cognitive control. Indeed, in response to curiosity-drive questions posed about these perceptions, the runners identified several active self-regulation strategies that were *not* used, despite a *motivation to continue* (path A5, Figure 2). Most runners described *not thinking about running/technique*, making it clear that they were exerting limited control over their running action. As Runner 8A explained, "I didn't have to necessarily think about running *per se* because I was running well. I didn't have to *do* [emphasis by participant] anything. I was running and I could think of other things". Other subthemes capturing strategies the runners felt were not used during these flow states included *no chunking* (i.e., not breaking the run into smaller parts due to the absence of a specific target to work towards), *no specific pacing*, which appeared to reduce the need to monitor a device (path A6, Figure 2), and *no self-talk* (e.g., "I wasn't having to use internal talking or monologues" [Runner 2]). Further, *running on autopilot* represented the nature of navigational decisions, which most runners described as being automatic and/or spontaneous. In line with goals described in the forethought phase, flow was characterised by *non-specific goal striving* (path A7, Figure 2), whereby the runners continued to pursue goals that lacked specificity and aligned with the *motivation to continue* (path A5, Figure 2). In sum, and drawing on Efklides' (2011) MASRL model, the metacognitive *feelings of ease* during flow gave rise to perceptions of positive affect and a *motivation to continue* (i.e., paths A3 and A4, Figure 2). More so, *feelings of ease* represent fluency in cognitive processing and positive progress on a task and do not signal a need to engage in effortful cognitive control (e.g., use active self-regulatory strategies; leading to path A5, Figure 2). In turn, making positive progress on a task generates metacognitive *feelings of confidence*, *knowing*, and *satisfaction*, for example (path A5 back to A3, Figure 2).

Active Distraction. Capturing three subthemes, this theme reflected how the runners engaged in active distraction during flow. Most solo runners spoke about the role of *audible distractions*, with several pointing out the benefits of music. When asked what helped to prolong their flow experience, one solo runner said:

> I put a lot of songs in there [playlist] that I know motivate me and keep me running and that I can match my pace to the beat of the music. So I think running to music definitely helped me stay in, and prolong, that experience. (Runner 5)

For those who ran with others, *conversing* helped to minimise conscious thought about running. As Runner 11B commented, "the time with [other runner] was the quickest, because I was just thinking about the conversation, and not thinking about running". Lastly, *switched off* was reflective of the perceived absence of conscious, regulatory control during flow in these runners.

Involuntary Distraction. This theme comprised two subthemes. In line with the *scenic route* and desire for *restoration* reported in the forethought phase (path A7, Figure 2), *scenic distractions* concerned the benefits of attending to the natural environment, which limited regulatory control. This was reflected in Runner 13's response when asked, "if you put yourself back into that 6- to 11-kilometre phase, what were you thinking about during that period?"

> What was I thinking about? [pause] I think I was looking at the views. The views distract you from thinking or looking at your watch too much or, you know, concentrating too much on running. You enjoy the views.

Many runners also reported *mind wandering*, whereby their attention drifted away from running and towards reflective or prospective thoughts (e.g., thinking about the week ahead).

Clutch States

Represented by path B in Figure 2, clutch states tended to be reported in the middle-to-late stages of runs, and always after flow for those who described both states at different points in the same run (see Figure 1). In line with past research (Swann et al., 2019), clutch states were described as more "effortful" and less pleasant during running.

Forethought for Clutch States

Task Motives. The task motives for clutch states were represented by two subthemes. All runners described an *intrinsic motive to accomplish*, whereby they were running for the purpose of achievement. Runner 1, who described intrinsic experiential task motives earlier in their run, explained how their desire to achieve a pre-existing running goal was activated by attending to feedback, at which point they identified an opportunity to reach their goal: "By the end of this month, I'd quite like to chip away at that 5-kilometre time. I realised I was about 0.4 of a kilometre off that. I was in the 19-minute mark and thought 'I can just really push this'". Alongside this, some runners were motivated by *recognition* and reported a desire to share news of their success (e.g., personal best) with others (e.g., family, running social media). These subthemes extend understanding of the achievement contexts purported to underlie clutch states in exercise (Swann et al., 2019).

Task Analysis. For clutch states, this theme encompassed four subthemes. Most runners described their clutch state at a point when the run was perceived as *challenging* (e.g., pace or gradient increases, reaching physical limit) and in *clearly defined phases* (i.e., phase with start and end points), as exemplified by Runner 4: "I did have that half-mile split in the second interval, so 1-1.5 miles, where it was a little bit challenging. I had to dig a bit deeper". Within these challenging phases, all runners recalled setting *specific goals* (e.g., precise time or pace), thus paralleling previous research in sport (Swann et al., 2017) and exercise (Swann et al., 2019). For runners who described flow states earlier in the run, these *specific goals* were set, or returned to, during the run *after* a non-specific goal, thus being activated by contextual factors at that point in a run, including their task motive. For example, Runner 14 described a goal formed later in a run:

> I never set out to do it [half-marathon], but once I thought "maybe I will do it" once I got to 18 [kilometres], I was literally like, "you cannot stop now, that would be stupid." So I put pressure on myself.

This quote also illustrates the final subtheme, *pressure*, which appeared to stem from the increased emphasis on performance achievement during clutch states for some runners.

Monitoring in Clutch States

Outward Monitoring. This theme combined three subthemes. Runners aiming for a specific time, distance, and/or pace discussed *monitoring their device* (path B1). Most used this information to assess goal progress and aid decision-making. As Runner 11A said, “The watch basically dictated how I ran, because from looking at it, I decided if I needed to run quicker, slower, or stay the same”. *Monitoring the route* included task-relevant and goal achievement-relevant stimuli (e.g., path, road, end-point), while some also reported *monitoring others* (e.g., running partner). Overall, descriptions of outward monitoring indicated deliberate attempts to direct attention towards task-relevant stimuli during clutch states in contrast to flow.

Internal Sensory Monitoring. This theme consisted of six subthemes. In line with understanding of clutch states (Swann et al., 2017, 2019), all runners described *high perceptions of effort*, while many discussed feeling *fatigued*. Runner 16 said, “By the end, I was very fatigued, in terms of exertion levels, it was an 8.5 or 9 [out of 10]”. Some runners also described perceptions of *discomfort*, with a few reporting *increased heart rate* and/or *heavier breathing*. These subthemes were exemplified in the following interview extract:

> Runner 7: I was definitely making more of a conscious effort to make my legs run and make sure that I'm feeling strong going up it [the hill] and being more aware of that.
>
> Interviewer: OK. That sense of awareness that you had, so in terms of your body, what were you aware of as you were going up that hill?
>
> Runner 7: My breathing getting heavier, my heart rate was gone up, my legs were starting to ache because it was hard getting up the hill. My feet were probably starting to ache a bit and hurt as well.

Despite these bodily perceptions, most runners still felt their *body was working well*, which reflected how the runners appeared to be able to manage these bodily perceptions while attempting to achieve their goal through the use of self-regulatory strategies.

Metacognitive Experiences. This theme comprised five subthemes. Concomitant with the intense effort of clutch states (path B2, Figure 2), all runners described a *feeling of difficulty*. Despite this, all runners simultaneously discussed a *feeling of confidence*, whereby they believed they could reach their goal, as previously reported (Swann et al., 2019). As Runner 7 put it, “That effort level had changed. I had to work harder and be more consistent with it, but I never wanted to give up. I could still go and I could still make it to the top of the hill”. Making progress towards one’s goals could create a *feeling of satisfaction*, as Runner 2 commented, “Every time you ticked off one [repetition], it probably felt even more satisfying, like “I've just done 12, yes [celebration sound], just done 13”. It’s that mental boost”. *Feeling of knowing* reflected how all runners felt a need to adopt specific strategies (see below) to control their thoughts, feelings, and/or performance. Additionally, some runners described a *feeling of familiarity*, which centred on familiarity with the route.

Affective Responses. This theme consisted of two subthemes. Based on both outward and internal sensory monitoring, and increased *feelings of difficulty* (paths B2 and B3, Figure 2), some runners reported *less pleasure* (as opposed to distinctly unpleasant feelings), whereby they did not feel as good as during flow, for example. The runners also described *less enjoyment while running*. Indeed, although some described enjoyment, this usually reflected how the runners felt after a clutch state, which could still be during the run or after it. Runner 16 said, “I enjoy the fact I have a PB [personal best]. Did I enjoy running at what is a very quick pace for me for 40 minutes? No. I don’t think I did”. Thus, the positive affect related to clutch states was described *after* the runners achieved their goal.

Motivation. Consisting of one subtheme, this theme reflected the runners’ *motivation to accomplish* during clutch states, despite feeling less pleasure during the run (path B4, Figure 2). This was exemplified by Runner 2: “My goal at that point was just to finish. The goal was to do the 14 repetitions. That was the goal, I just wanted to finish and complete it.” As reflected in this quote, runners wanted to achieve the *specific goal* underlying their clutch state (path B5, Figure 2).

Control in Clutch States

Active Self-Regulation. This theme, capturing 11 subthemes, concerned psychological strategies runners described in attempts to control their thoughts, feelings, and performance during clutch states. These strategies appeared to aid the attainment of the runners' goals, which ultimately contributed to them perceiving clutch states as positive and rewarding. Most described using *self-talk* (e.g., motivational or instructional statements), while many reported controlling their *running technique, cadence/rhythm* (i.e., stride pattern), and/or *pacing*, as illustrated by this example:

> I tried to make sure, "okay, am I running smoothly? I'm not stomping my feet on the ground, I'm ticking over nicely, my breathing is under control", just little aspects like that to try make the effort as comfortable as I could. (Runner 4)

This quote also demonstrates *breath control*¸ which some runners reported when regulating their increased breathing rate (path B6, Figure 2). *Specific goal striving* represented the direction of effort by all runners towards achieving the *specific goals* set in the forethought phase (path B7, Figure 2). In pursuing these goals, all runners reported *chunking*, whereby these *specific goals* were fragmented into more proximal sub-goals. Runner 10 discussed using this strategy to make incremental progress: "I was using little goals along the way. There were points along the route where I was saying to myself, 'if you get to this point, then that's a win'". Almost all runners spoke about focusing on what was left "to go" as they neared their goal end-state, which appears to resemble the premise that focusing on an end-state reference point as one nears a goal can help maintain motivation (Wallace & Etkin, 2018). Some also described making *tactical decisions* to aid progress (e.g., adapt running line), *drawing on social support* (e.g., from a training partner), or using *imagery* (e.g., imagine end-goal location). Many referred to *acceptance* of the intense effort and discomfort during clutch states, knowing that these feelings would only last for a short, finite period. As Runner 2 put it, "To beat your best from before, you have to take it to the next level and accept that it's going to be a bit tough, especially faster stuff. You know it's not going to be nice at the end". This quotation also illustrates how for some runners, especially those in training for a future running event, the *high perceptions of effort* and *feeling of difficulty* during clutch states were viewed as necessary to make specific performance improvements. Given that clutch states were goal-driven, effortful, and characterised by high levels of cognitive control, this psychological state, at least for those in training, appears to share some experiential overlap with the concept of deliberate practice (Eccles et al., 2021; Ericsson et al., 1993). In sum, and from a self-regulatory perspective, increased metacognitive *feelings of difficulty* suggest a lack of fluency on a task that is experienced as negatively valenced affect (Efklides, 2011; path B3, Figure 2). In turn, negative affect can trigger a need to engage in self-regulatory control in pursuit of a valued goal, such as a personal best (paths B4 and B5, Figure 2). Subsequently, making positive progress on the task (e.g., maintaining goal pace), and knowing one is using effective active self-regulatory techniques to do so, had a tendency to increase *feelings of confidence* and *satisfaction* (paths B5 back to B3, Figure 2). This cluster of metacognitive experiences reported during clutch states represented a state of high challenge/difficulty, but also one where runners perceived they had the ability to reach their goal.

Active Distraction. This theme comprised three subthemes. Many described *not switching off*, which reflected how the runners did not recall being able to distract themselves. *Not conversing* and *not drawing on audible distractions* applied to some runners who felt such distractions were not as useful (i.e., for performance or to manage the intense effort), or attended to, when pursuing their goals during clutch states.

Involuntary Distraction. This final theme contained a single subtheme. *Not attending to scenic distractions* captured descriptions from a few runners who did not recollect attention being diverted towards task-irrelevant scenery, which contrasted to earlier in these runs. This aligned with a desire to maintain regulatory control over cognition during clutch states (paths B3 to B5, Figure 2).

Transition between Flow and Clutch States

In all cases, flow states were disrupted before the end of the running activities. No runners reported a disruption in clutch *per se*, as the runners successfully reached their goals in each case, thus culminating in the perception of a rewarding experience. Clutch states were reported after 8/13 cases of flow, but this transition, represented by path C in Figure 2, was not necessarily immediate, and the runners described other less optimal states for varying lengths of time between both states, as depicted in Figure 1. No participant reported a transition from a clutch state into flow. For most, reaching their *specific goal* marked the end of their run, which, for some, was welcomed. When referring to their effort, Runner 16 said, "I wouldn't have been able to hold onto it for much longer than that, so I was pleased to finish it when I did it". Despite reporting more enjoyment while running after their clutch state, one runner explained that it was difficult to resume a *feeling of ease* because of the perceived discomfort at that point: "The legs were feeling a little bit heavier. It certainly wasn't the same sense of being in the zone and going through the motions as it was the first bit [flow]" (Runner 15). The overarching theme, 'monitoring for flow disruption', comprised five themes representing attention directed towards stimuli and subsequent responses involved in flow disruption. In the case of runners who transitioned to a clutch state, this preceded the forethought phase for clutch (via paths A1 and C, Figure 2).

Monitoring for Flow Disruption

Outward Monitoring. This theme combined two subthemes. *Monitoring the route* referred to a change in the gradient (i.e., going uphill) or interruptions on the route (e.g., traffic lights). Some runners discussed *monitoring a device*, as Runner 6 reflected, "I saw my time and thought 'oh, that's not as fast as I'm used to'". Consequently, attending to performance feedback on a device appeared to trigger analytical thoughts and increased conscious control during the activity (e.g., pace regulation).

Internal Sensory Monitoring. Drawing together six subthemes, this theme concerned perceived changes in bodily perceptions. Many runners described *higher perceptions of effort*, wherein they needed to exert more effort, thus contrasting to flow. Some reported the onset of *discomfort*, which reflected perceptions of "heaviness", tightness, or soreness, especially in the lower body. As Runner 15 commented, "I noticed that it was uphill. It meant that my thoughts were more directed towards my feet finding it a little bit more difficult". Others also referred to feeling *fatigued*, which, for most, concerned the perceived onset of physical tiredness. Finally, a few runners described noticing *increased heart rate*, *temperature changes* (i.e., feel warmer or colder), and *breathing more intensely*.

Metacognitive Experiences. Representing five subthemes, this theme reflected changes in responses to monitored stimuli. Most reported a shift from a metacognitive *feeling of ease* in flow to a *feeling of difficulty*. Runner 2 explained this switch: "It's actually like someone has turned on my senses a bit more and my brain has to start sending something to my legs, and my legs start to tell me, 'this is hard'". *Feeling of knowing* reflected how runners now felt a need to increase self-regulatory control, again contrasting to flow. Some also reported that the initial disruption involved a *feeling of doubt*, wherein they felt less confident. The remaining subthemes, *feeling of (dis)satisfaction* (e.g., some were satisfied with performance) and *feeling of unfamiliarity* (i.e., unsure where to go) were reported by a few runners. This amalgam of metacognitive feelings tended to result in a reduction in positive affect and *change in motivation*.

Affective Response. This theme contained two subthemes. Many runners reported *displeasure*, whereby they no longer felt as good. Similarly, some runners felt the run was *no longer (as) enjoyable*. As one runner remarked, "There was a bunch of makeshift steps that I had to do and they were just pretty gruelling. So I just pushed on through but it wasn't really enjoyable at that point anymore" (Runner 6). Overall, negative affective responses appeared to stem largely from changes in internal sensory monitoring and metacognitive feelings.

Motivation. The final theme consisted of the subtheme, *motivation changes*. For those who transitioned into a clutch state (path C, Figure 2), this change involved switching to an *intrinsic motive to accomplish* a *specific goal*, as Runner 1 explained: "I consciously looked at the watch and thought 'actually, I'm not far off five kilometres here. I could try and push on.' That's when the goal shifted". Subsequently, the runners reported a desire to engage in self-regulatory control to achieve this newly-set goal (path B7, Figure 2). In many cases, there appeared to be an initial need to engage self-regulatory control to, for example, override initial *feelings of doubt* and manage *feelings of difficulty* (e.g., due to changes in path A2 or A4, Figure 2). Alongside making progress, these strategies helped runners to re-appraise their goal as challenging but achievable, thus aligning with the forethought phase facilitating a clutch state. Runners who did not report a transition into a clutch state appeared content to finish their run. Some, including those with a motive for *restoration*, reported engaging self-regulatory control to ensure that the run did not lead to exhaustion prior to disengaging from the run. As these runners also reported *feeling fresh* and being *switched off* during flow, their experiences during these runs appear to share conceptual space with the psychological state of rest (Eccles & Kazmier, 2019).

General Discussion

In this study, we aimed to understand self-regulatory processes that facilitate optimal experiences in running by integrating models of self-regulation with flow and clutch states. In addressing three research questions, we advance existing understandings of optimal experiences by providing insights into the self-regulatory processes facilitating flow (RQ1), clutch states (RQ2), and the transition from flow into clutch (RQ3). No transition from a clutch state into flow was described. Our findings parallel some reported in past studies on the integrated model of flow and clutch states (Swann et al., 2017, 2019). This includes, for example, that flow and clutch states in runners can be distinguished based on effort perceptions and that in recreational contexts, flow tends to be perceived as pleasant *during* the experience, whereas the positive affect related to clutch states is perceived *after* reaching a specific goal. In addition, we extend that work by integrating processes from models of self-regulation (Efklides, 2011; Zimmerman, 2002) and metacognition in endurance activities (Brick et al., 2015).

Our analysis offers many novel insights into the processes that might facilitate optimal experiences in runners. One relates to goal types that may facilitate flow. Within the integrated model of flow and clutch states, Swann et al. (2017, 2019) suggested that flow states were facilitated by setting an open goal *after* a sequence consisting of a positive event, positive feedback, increase in confidence, and challenge appraisal. However, the current study offers an alternative perspective on open goals in two ways. First, open goals were only one of several non-specific goal types that facilitated flow, with many runners setting effort-based goals and/or range goals (i.e., include two end-state reference points – Scott & Nowlis, 2013), which were flexible and lacked a single end-point. Thus, our understanding of goal types that could facilitate flow states can be broadened to include other non-specific goals. Second, the runners reported that their non-specific goals were set *before* an activity, but flow was described during the run. Thus, rather than only setting an open goal *during* the activity after the remaining steps in the process of flow occurrence (i.e., positive event, etc.), as proposed by Swann et al. (2019), our findings suggest that a potential mechanism to promote flow could involve engaging in self-regulatory forethought (e.g., Zimmerman, 2002) and setting non-specific goals before an activity.

Relatedly, the current study appears to provide a more dynamic perspective on the nature of goal setting within running tasks compared to prominent models of goal setting (e.g., process, performance, and outcome goals – Kingston & Hardy, 1997). Specifically, runners in the current study reported changes in the specificity of their goals *within* these runs, which, along with a shift in motives, appeared to be a key factor in the transition from flow into clutch states (path C, Figure 2). Furthermore, these goals were not always connected hierarchically (i.e., a non-specific goal was not pursued to achieve a specific goal). Some runners who described a transition into clutch states after flow reported setting specific goals *during* the run, despite setting a non-specific goal for the entire run in the forethought phase, whereas others reported temporarily setting aside their specific goals during flow, when they adopted a more flexible approach. Thus, our findings suggest the runners set macro-goals, which applied to the run as whole, and micro-goals, which were contextually-bound (e.g., specific temporal and task-motivation contexts), pertained to briefer time periods, and produced different optimal experiences within the activity.

Several of the intrinsic motives underlying flow paralleled components of basic psychological needs theory (Deci & Ryan, 2000) and evidence in PA concerning the adaptive motivational benefits of novelty (Gonzalez-Cutre et al., 2016) and variety (Dimmock et al., 2013). In comparing flow and SDT, Deci and Ryan (2000) suggested that the basic needs of autonomy and relatedness, which were described as motives by some runners in our study, did not align with initial understanding of flow (Csikszentmihalyi, 1975). Given that flow occurred when participants were optimally challenged and had a feeling of confidence, there appears to be a relationship between flow and in-the-moment psychological need satisfaction, which may have implications for runners' wellbeing (Johnson et al., 2020) and long-term adherence (Stevinson et al., 2015).

The current study also provides novel insights into the role of metacognition in flow and clutch states in running. In addition to the inclusion of metacognitive planning (e.g., of goals set) during the forethought phase, metacognitive experiences during running elicited distinct affective and motivational responses during flow and clutch states. Efklides (2011) proposed that affect felt in achievement situations is essentially the memory of metacognitive experiences and emotions experienced during task processing. As such, experiencing and remembering a run as enjoyable (e.g., flow) or less enjoyable (clutch) during the activity reflects varying feelings of difficulty, confidence, or satisfaction, for example, during the task. More so, pleasant affective states during PA are considered important to longer-term adherence (e.g., Brand & Ekkekakis, 2018). Thus, factors such as non-specific goals that may facilitate metacognitive feelings of ease, a metacognitive experience unique to flow experiences in the present study, could have implications for promoting longer-term PA adherence.

Additionally, metacognitive knowledge of task-specific strategies (e.g., chunking, motivational self-talk), alongside setting and pursuing specific goals, appeared key to facilitating and maintaining a clutch state. Moreover, when feelings of difficulty increased, signalling a need to engage self-regulatory control over cognition to achieve a newly-set goal, knowledge of relevant cognitive strategies appeared to increase feelings of confidence (e.g., to achieve one's goal) and satisfaction (i.e., with progress) during the goal-striving clutch state. This interaction of metacognitive knowledge, metacognitive experiences, and performance are considered critical for the formation of expectancy-value beliefs and achievement-related choices, persistence, and performance (e.g., Eccles & Wigfield, 2020; Efklides, 2011). Furthermore, the interest and enjoyment value of running as a form of activity may also be increased by achievement-related experiences (i.e., clutch) that an individual can attribute to their own effort and that results in positive affective reactions and memories (e.g., satisfaction, post-task enjoyment) (e.g., Eccles & Wigfield, 2020). This proposition also aligns with the 'effort paradox' (Inzlicht et al., 2018), whereby the lower perceived effort and feelings of ease during flow increases the value (i.e., affective) of running *concurrently*, but the outcomes produced by the high perceived effort exerted during clutch states (i.e., by persisting to achieve a specific goal) augments the value of running *retrospectively*. Thus, for clutch states, effort could be costly, but valued if a goal is achieved. Given that affective responses during exercise more strongly predict long-term PA adherence than post-exercise affect (Rhodes & Kates, 2015), temporal contrasts in enjoyment between flow and clutch are worthy of further consideration.

Finally, with regard to cognitive strategies, most published flow interventions in sport and exercise are based on active self-regulation strategies that seek to increase self-regulatory control (e.g., mindfulness, imagery - Goddard et al., 2021). However, the runners described relaxing control during flow through distraction rather than active self-regulation. Although Swann et al. (2017) previously referred to the utility of positive distractions to maintain flow in sport, the current evidence offers a more refined understanding of the types of distraction during flow in running by drawing on an existing model (e.g., Brick et al., 2015). The reporting of involuntary distractions during flow could have applied implications as involuntary distractions may be associated with greater exercise adherence (Brick et al., 2014). Overall, our findings support calls for researchers and applied practitioners to reconsider the content of flow interventions (Goddard et al., 2021).

Applied Implications

We suggest these findings could have implications for recreational runners, as well as coaches, practitioners, and organisations (e.g., community-based running clubs) committed to improving the experience of runners and exercisers. The findings illustrate the potential benefits for runners of setting non-specific goals and/or including room for goal flexibility in their running when seeking to promote flow. Specifically, the findings suggest that setting non-specific goals, underpinned by intrinsic motives, prior to an activity could be beneficial. Although many runners will follow a structured plan, allowing room for flexibility in that plan at different stages of running activities could be beneficial for experiencing flow. In addition, while setting specific goals might elicit a positive, rewarding experience in the form of a clutch state, runners should be aware that pursuing this type of goal is likely to heighten the importance of employing active self-regulation strategies. Thus, runners could benefit from developing metacognitive knowledge (e.g., of cognitive strategies) and skills (e.g., planning; Brick, Campbell, Sheehan, et al., 2020; Brick, Campbell, & Moran, 2020) to be equipped for the self-regulation needs of pursuing a specific goal.

Limitations

The study provides insights into self-regulation of flow and clutch states specifically in outdoor, recreational running, but the findings might not necessarily resonate with individuals in other exercise or competitive running activities. Findings were drawn from a sample of English-speaking participants in early adulthood from Western cultures, the majority of whom had at least one year of running experience. Therefore, the findings should be understood within these contexts. The recruitment process will have omitted potentially relevant participants and as most participants were sampled after self-reported positive, rewarding experiences, there is potential for self-selection bias. Further, the sampling approach may have missed potentially valuable insights by not recruiting participants who did not achieve positive, rewarding experiences, although we sought to overcome this by considering other states described by the runners in our study in our analysis. Finally, our analysis drew on existing models to form what we deemed to be plausible explanations, but we recognise that other explanations may have been generated through other theoretical lenses.

Future Directions

To build on current findings, future studies could investigate self-regulation of optimal experiences in other PA activities, while also exploring how different PA characteristics (e.g., length, social aspects, environment) influence regulation of flow and clutch states in other settings. Researchers could aim to recruit a more diverse sample, including participants from a wider range of cultures and age groups. While the sample included runners who were relatively new to running, future studies could focus more specifically on beginner or elite runners, potentially over time. When designing future studies on self-regulation of flow and clutch states, researchers should consider using other sampling approaches (e.g., less optimal states) and conducting multiple event-focused interviews. Lastly, the findings should be tested in future, which could lead to further support for, or refinement of, findings generated in our study. Such research should also consider the potential implications for longer-term engagement in running and PA.

Conclusions

This study provides novel, and supporting, insights that extend understandings of optimal experiences in running. We generated differences in terms of forethought, monitoring, and control processes involved in the regulation of flow and clutch states. Flow was facilitated by setting non-specific goals and distraction. Clutch states were underpinned by specific goals and managed through active self-regulation, which helped runners to achieve their goals, albeit without the same positive affect described during flow. Our study might offer naturalistic generalisability as the findings may resonate with runners, and analytical generalisability by producing new theoretical insights (Smith, 2018). We present the findings with a view to aiding the running community and suggest they could be used to inform the design of schemes that aim to help recreational participants optimise their running experiences, which could have implications for long-term engagement.

References

Andersen, J. J. (2021, March 19). *The State of Running 2019*. https://runrepeat.com/state-of-running

Brand, R., & Ekkekakis, P. (2018). Affective–reflective theory of physical inactivity and exercise. *German Journal of Exercise and Sport Research*, *48*, 48–58. https://doi.org/10.1007/s12662-017-0477-9

Braun, V., & Clarke, V. (2020). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*. Advance publication online. https://doi.org/10.1080/14780887.2020.1769238

Braun, V., Clarke, V., & Weate, P. (2016). Using thematic analysis in sport and exercise research. In B. Smith & A. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 191–205). Routledge.

Brick, N. E., Campbell, M. J., & Moran, A. P. (2020). Metacognition and goal-directed self-talk. In A. T. Latinjak & A. Hatzigeorgiadis (Eds.). *Self-Talk in Sport* (pp. 51-63). Routledge.

Brick, N. E., Campbell, M. J., Sheehan, R. B., Fitzpatrick, B. L., & MacIntyre, T. E. (2020). Metacognitive processes and attentional focus in recreational endurance runners. *International Journal of Sport and Exercise Psychology, 18*(3), 362-379. https://doi.org/10.1080/1612197X.2018.1519841

Brick, N. E., MacIntyre, T. E., & Campbell, M. J. (2016). Thinking and action: A cognitive perspective on self-regulation during endurance performance. *Frontiers in Physiology, 7*, 158. https://doi.org/10.3389/fphys.2016.00159

Brick, N., Campbell, M. J., & Swann, C. (2019). Metacognitive processes in the self-regulation of endurance performance. In C. Meijen (Ed.), *Endurance Performance in Sport: Psychological Theory and Interventions* (pp. 81-95). Routledge.

Brick, N., MacIntyre, T., & Campbell, M. (2014). Attentional focus in endurance activity: New paradigms and future directions. *International Review of Sport and Exercise Psychology, 7*(1), 106-134. https://doi.org/10.1080/1750984X.2014.885554

Brick, N., MacIntyre, T., & Campbell, M. (2015). Metacognitive processes in the self-regulation of performance in elite endurance runners. *Psychology of Sport and Exercise, 19*, 1-9. https://doi.org/10.1016/j.psychsport.2015.02.003

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety.* Jossey-Bass.

Csikszentmihalyi, M. (2002). *Flow: The classic work on how to achieve happiness*. Rider Books.

Csikszentmihalyi, M., Latter, P., & Weinkauff Duranso, C. (2017). *Running Flow*. Human Kinetics.

Danermark, B., Ekstrom, M., & Karlsson, J. C. (2019). *Explaining society: Critical realism in the social sciences.* Routledge.

Deci, R. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

De Pauw, K., Roelands, B., Cheung, S. S., De Geus, B., Rietjens, G., & Meeusen, R. (2013). Guidelines to classify subject groups in sport-science research. *International Journal of Sports Physiology and Performance, 8*(2), 111-122. https://doi.org/10.1123/ijspp.8.2.111

Dimmock, J., Jackson, B., Podong, L., & Magaraggia, C. (2013). The effect of variety expectations on interest, enjoyment, and locus of causality in exercise. *Motivation and Emotion, 37*, 146-153. https://doi.org/10.1007/s11031-012-9294-5

Dinsmore, D. L., Alexander, P. A. & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review, 20*, 391-409. https://doi.org/10.1007/s10648-008-9083-6

Eccles, D. W., & Kazmier, A. W. (2019). The psychology of rest in athletes: An empirical study and initial model. *Psychology of Sport and Exercise, 44*, 90-98. https://doi.org/10.1016/j.psychsport.2019.05.007

Eccles, D. W., Leone, E. J., & Williams, A. M. (2021). Deliberate practice: What is it and how can I use it? *Journal of Sport Psychology in Action.* Advance online publication. https://doi.org/10.1080/21520704.2020.1850577

Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology, 61*, 101859. https://doi.org/10.1016/j.cedpsych.2020.101859

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist, 46*(1), 6-25. https://doi.org/10.1080/00461520.2011.538645

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363-406.

Goddard, S. G., Stevens, C., Jackman, P. C., & Swann, C. (2021). A systematic review of flow interventions in sport and exercise. *International Review of Sport and Exercise Psychology.* https://doi.org/10.1080/1750984X.2021.1923055

González-Cutre, D., Sicilia, A., Sierra, A. C., Ferriz, R., & Hagger, M. S. (2016). Understanding the need for novelty from the perspective of self-determination theory. *Personality and Individual Differences, 102*, 159-169. https://doi.org/10.1016/j.paid.2016.06.036

Hulteen, R. M., Smith, J. J., Morgan, P. J., Barnett, L. M., Hallal, P. C., Colyvas, K., & Lubans, D. R. (2017). Global participation in sport and leisure-time physical activities: A systematic review and meta-analysis. *Preventive Medicine, 19*, 14-25. https://doi.org/ 10.1016/j.ypmed.2016.11.027

Inzlicht, M., Shenhav, A., & Olivola, C. Y. (2018). The effort paradox: Effort is both costly and valued. *Trends in Cognitive Sciences, 22*(4), 337–349. https://doi.org/10.1016/j.tics.2018.01.007

Jackman, P. C., Crust, L, & Swann, C. (2017). Systematically comparing methods used to study flow in sport: A longitudinal multiple-case study. *Psychology of Sport and Exercise, 32*, 113-123. https://doi.org/10.1016/j.psychsport.2017.06.009

Jackman, P. C., Hawkins, R. M., Crust, L., & Swann, C. (2019). Flow states in exercise: A systematic review. *Psychology of Sport and Exercise, 45*, 101546. https://doi.org/10.1016/j.psychsport.2019.101546

Jackman, P. C., Schweickle, M. J., Goddard, S. G., Vella, S. A., & Swann, C. (2021). The event-focused interview: what is it, why is it useful, and how is it used? *Qualitative Research in Sport, Exercise and Health.* Advance online publication. https://doi.org/10.1080/2159676X.2021.1904442

Jackson, S. A., & Wrigley, W. J. (2004). Optimal experience in sport: Current issues and future directions. In T. Morris & J. Summers (Eds.), *Sport psychology: Theory, applications and issues* (pp. 423-451). John Wiley & Sons.

Johnson, L. J., Cronin, L., Huntley, E., & Marchant, D. (2020). The impact of the "RunSmart" running programme on participant motivation, attendance and well-being using self-determination theory as a theoretical framework. *International Journal of Sport and Exercise Psychology.* Advance publication online. https://doi.org/10.1080/1612197X.2020.1819368

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology, 15*(3), 169-182. https://doi.org/10.1016/0272-4944(95)90001-2

Kingston, K. M., & Hardy, L. (1997). Effects of different types of goals on processes that support performance. *The Sport Psychologist, 11*(3), 277–293.

Maxwell, J. A. (2012). The importance of qualitative research for causal explanation in education. *Qualitative Inquiry, 18*(8), 655–661. https://doi.org/10.1177/1077800412452856

Maxwell, J. A., & Miller, B. A. (2008). Categorizing and connecting strategies in qualitative data analysis. In P. Leavy, & S. Hesse-Biber (Eds.), *Handbook of emergent methods.* Guilford Press.

McCormick, A., Meijen, C., & Marcora, S. (2015). Psychological determinants of whole-body endurance performance. *Sports Medicine, 45*, 997–1015. http://doi.org/10.1007/s40279-015-0319-6

McCormick, A., Meijen, C., Anstiss, P. A., & Jones, H. (2019). Self-regulation in endurance sports: theory, research, and practice. *International Review of Sport and Exercise Psychology, 12*(1), 235-264. https://doi.org/10.1080/1750984X.2018.1469161

McPherson, G., & Horne, S. (2006). Exploiting exceptions to enhance interpretive qualitative health research: insights from a study of cancer communication. *International Journal of Qualitative Methods, 5*(2), 1–11. https://doi.org/10.1177/160940690600500210

National Health Service (2021, March 19). Couch to 5K: week by week. https://www.nhs.uk/live-well/exercise/couch-to-5k-week-by-week/

Pedisic, Z., Shrestha, N., Kovalchik, S., Stamatakis, E., Liangruenrom, N., Grgic, J., Titze, S., Biddle, S. J. H., Bauman, A. E., & Oja, P. (2020). Is running associated with a lower risk of all-cause, cardiovascular and cancer mortality, and is the more the better? A systematic review and meta-analysis. *British Journal of Sports Medicine, 54*(15), 898–905. https://doi.org/10.1136/bjsports-2018-100493

Phoenix, C., & Orr, N. (2017). Analysing exceptions within qualitative data: promoting analytical diversity to advance knowledge of ageing and physical activity. *Qualitative Research in Sport, Exercise and Health, 9*(3), 271-284. https://doi.org/10.1080/2159676X.2017.1282539

Rhodes, R. E., & Kates, A. (2015). Can the affective response to exercise predict future motives and physical activity behavior? A systematic review of published evidence. *Annals of Behavioural Medicine, 49*(5), 715-731. https://doi.org/10.1007/s12160-015-9704-5

Sayer, A. (1992). *Method in social science: A realist approach*. Routledge.

Scott, M. L., & Nowlis, S. M. (2013). The effect of goal specificity on consumer goal reengagement. *Journal of Consumer Research, 40*(3), 444-459. https://doi.org/10.1086/670766

Smith, B. (2018). Generalizability in qualitative research: misunderstandings, opportunities and recommendations for the sport and exercise sciences. *Qualitative Research in Sport, Exercise and Health*, *10*(1), 137-149. https://doi.org/10.1080/2159676X.2017.1393221

Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: Problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology, 11*(1), 101-121. https://doi.org/10.1080/1750984X.2017.1317357

Smith, B., & Sparkes, A. C. (2016). Interviews: Qualitative interviewing in the sport and exercise sciences. In B. Smith and A. C. Sparkes (Eds.), *Routledge Handbook of Qualitative Research Methods in Sport and Exercise* (pp. 103–123). Routledge.

Sparkes, A. C., & Smith, B. (2014). *Qualitative research methods in sport, exercise and health*. Routledge.

Stevinson, C., Wiltshire, G., & Hickson, M. (2015). Facilitating participation in health-enhancing physical activity: A qualitative study of parkrun. *International Journal of Behavioural Medicine, 22*, 170-177. https://doi.org/10.1007/s12529-014-9431-5

Swann, C., Crust, L., Jackman, P., Vella, S., Allen, M., & Keegan, R. (2017). Psychological states underlying excellent performance in sport: Towards an integrated model of flow and clutch states. *Journal of Applied Sport Psychology, 29*(4), 375-401. https://doi.org/10.1080/10413200.2016.1272650

Swann, C., Jackman, P. C., Schweickle, M. J., & Vella, S. A. (2019). Optimal experiences in exercise: A qualitative investigation of flow and clutch states. *Psychology of Sport and Exercise, 40,* 87–98. https://doi.org/10.1016/j.psychsport.2018.09.007

Wallace, S. G., & Etkin, J. (2018). How goal specificity shapes motivation: A reference points perspective. *Journal of Consumer Research, 44*(5), 1033-1051. https://doi.org/10.1093/jcr/ucx082

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Academic Press.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*, 64-70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *The educational psychology series. Handbook of metacognition in educatio*n (pp. 299–315). Routledge/Taylor & Francis Group.

Table 1

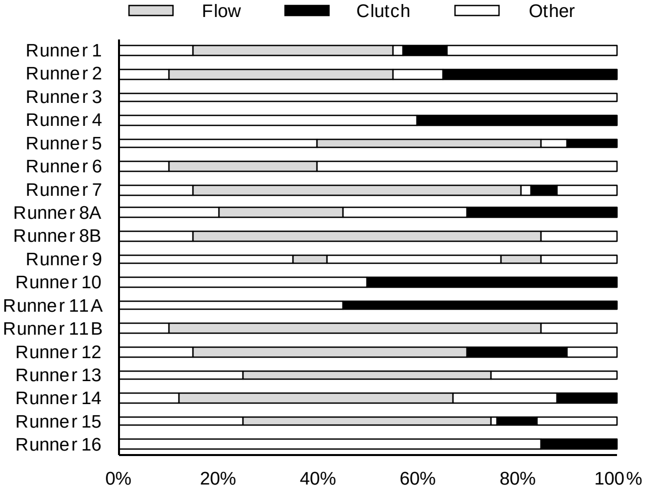
Participant characteristics, sampling information, and running task characteristics

Participant characteristics								Sampling		Running-task characteristics		
Pseudonym	Gender	Nationality	Age	Years running	Days running per week	Performance level[1]	Participation status[2]	Hours later	Sampling rationale	Run type	Length (Minutes)	Social context[3]
Runner 1	Female	British	25	13	4-5	Level 3	Recreational	18	Self-reported	Continuous	40	Solo run
Runner 2	Female	British	28	8	5	Level 3	In training	40	Identified	Intervals	60	Paired run
Runner 3	Male	British	24	2	2-3	Level 3	Recreational	44	Self-reported	Personal time-trial	21	Solo run
Runner 4	Male	British	20	0.91	3	Level 3[4]	In training	19	Self-reported	Intervals	45	Solo run
Runner 5	Female	British	26	0.50	3	Level 2	Recreational	14	Self-reported	Continuous	78	Solo run
Runner 6	Male	Canadian	30	5	5	Level 3	In training	18	Self-reported	Continuous	70	Solo run
Runner 7	Female	British	27	7	3	Level 3[4]	Recreational	26	Self-reported	Continuous	90	Paired run
Runner 8	Male	British	23	3	6	Level 3	In training	18; 4	Self-reported	Intervals (A); continuous (B)	67; 47	Solo runs
Runner 9	Male	British	30	6	4-5	Level 2	Recreational	22	Self-reported	Continuous	40	Solo run
Runner 10	Female	British	38	0.10	2-3	Level 2	Recreational	3	Self-reported	Continuous	32	Solo run
Runner 11	Male	British	20	3	5	Level 3	In training	44; 20	Self-reported	Intervals (A); continuous (B)	40; 60	Paired run; group run
Runner 12	Female	British	33	19	2-3	Level 3	Recreational	4	Self-reported	Continuous and intervals	50	Group run
Runner 13	Female	Irish	29	14	3	Level 3[4]	Recreational	23	Identified	Continuous	100	Solo run
Runner 14	Female	British	29	6	3	Level 2	Recreational	17	Self-reported	Continuous	134	Solo run
Runner 15	Male	British	35	0.50	3	Level 2	Recreational	46	Identified	Continuous	105	Solo run
Runner 16	Male	British	28	3	3-4	Level 3[4]	Recreational	19	Identified	Personal time-trial	40	Solo run

Note: (1) Performance level categories were based on recommendations by de Pauw et al. (2013). Level 2 – recreationally-trained: practiced for several years on a regular basis of at least 3 days per week; Level 3 - trained: practicing for up to 10 years and ≥ 5 hours per week. (2) Recreational: running without a future competitive running goal; in training: preparing for an event; (3) Group indicates three or more people; (4) other forms of physical activity (e.g., cycling) were also considered.

Figure 1

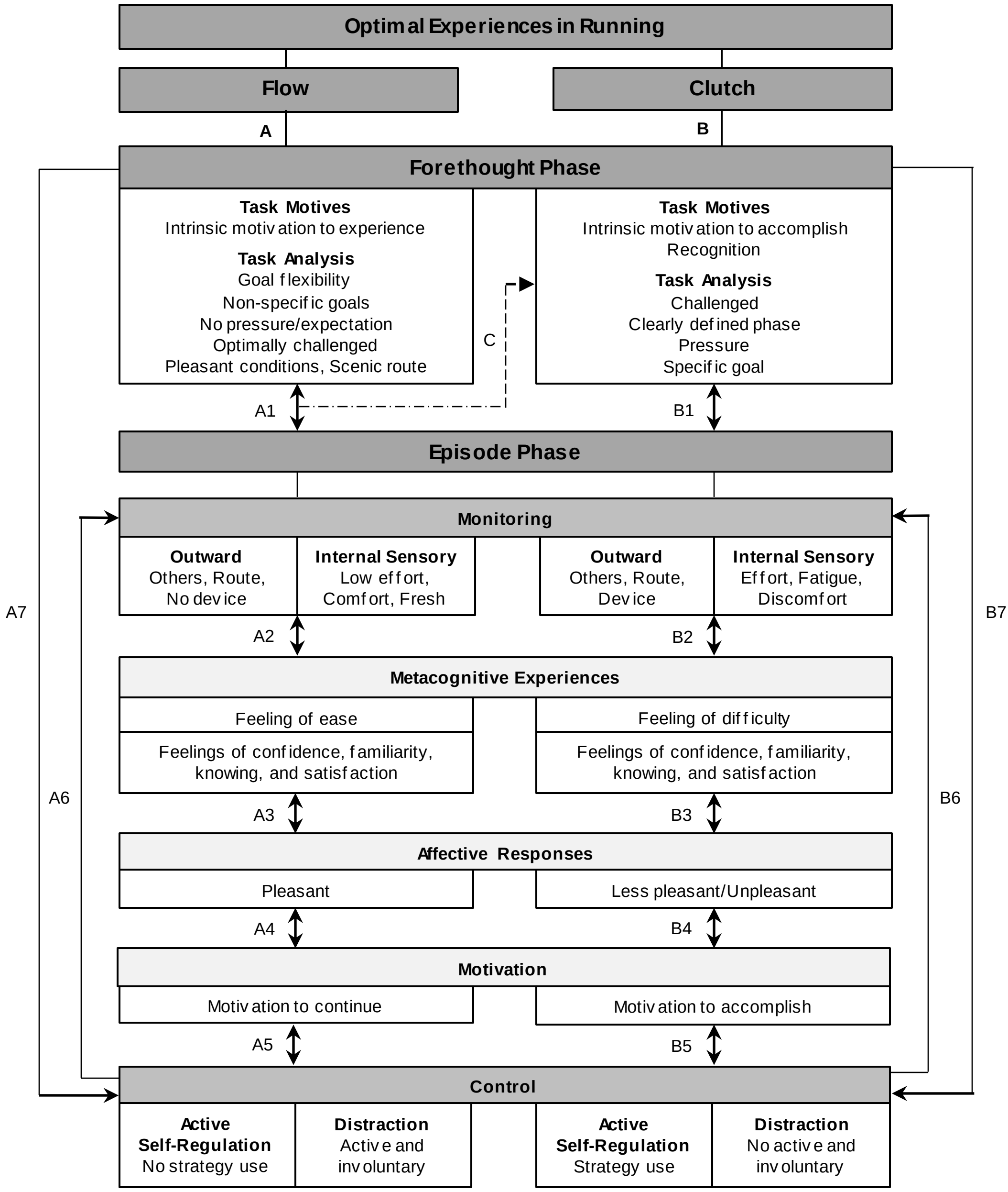
Segments of runs during which flow, clutch, and other states were reported.



Note. The approximations for flow and clutch states were based on estimates reported by participants during the interviews.

Figure 2

Summary of thematic and connecting analyses for self-regulatory processes facilitating flow and clutch states.



Note. Path A represents the self-regulation processes for flow, path B represents the self-regulation processes for clutch states, and path C represents the transition from flow to a clutch state. Both flow and clutch states were organised into two phases: the forethought phase and the episode phase. The paths presented within these phases for flow (A1-A7) and clutch (B1-B7) illustrate the interconnectedness and complexity of these states. The transition from flow to clutch, depicted as path C, demonstrates how changes in monitoring (via A1) preceded a transition into a clutch state for some.