

**Supporting men who use anabolic steroids: A sequential  
multi-methods study**

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## **Abstract**

### **Background**

An increasing amount of research exploring use of anabolic androgenic steroids (AAS) has been undertaken over the past three decades and, in recent years, there has been a growing awareness of this form of substance use on a societal level and as a public health problem in the UK. However, there have been few public health interventions aiming to respond to this and there is little evidence-based guidance available to support health professionals working with users.

### **Aim**

The aim of the research was to identify ways that intervention providers can influence men who use AAS and support them to improve their health and manage risk. To achieve this the research explored factors that influence users' choices, and identified priorities and opportunities for interventions.

### **Methodology**

The research followed a sequential design over four studies, where findings informed the development of subsequent studies. Study 1 was a systematic review examining the content and effectiveness of interventions with the intention of influencing AAS use. Study 2 was the development of an evidence-based socioecological framework through which to explore factors that influence AAS users' behaviours and to identify opportunities for interventions. Study 3 used largely unstructured interviews with 33 stakeholders with a range of expertise and experiences with AAS to identify priorities to address and potential interventions in response to these. Semi-structured interviews in study 4 followed up these findings with 12 men who use AAS who ranged from new users to very experienced users. These qualitative studies were analysed using thematic analysis, which moved from an initial inductive and data driven approach to one that was more deductive as interviews became more structured. The Behaviour Change Wheel model informed the research and in particular the principle of developing an in depth understanding of a behaviour in order to influence it. The findings from the four studies supported the development of a conceptual map exploring the provision of

support and information to users. A complex systems approach to understanding health behaviours underpinned the map and identification of potential interventions in response to the priorities identified.

## **Results**

A range of priorities to support users to improve their health and manage risk emerged. Opportunities to respond to these were identified, supported by the development of the conceptual map of support and information provision. This map is intended for stakeholders to use in the development of effective responses in their local communities. Applying a systems approach to the provision of support to AAS users helps recognise the competing and complex influences on users across the socioecological spectrum and supports a thorough understanding of their behaviours. The findings indicate the need to go beyond the current provision of support services in the form of needle and syringe programmes and steroids clinics to respond to the priorities identified. Involving influential individuals or role models as change agents within users' social networks and important environments such as gyms will increase opportunity to influence AAS choices and norms, and subsequently reduce risk of poor health outcomes amongst this population.

## **Keywords:**

- Anabolic steroids
- Harm reduction
- Service provision
- Complex systems
- Socioecological model
- Qualitative methods
- Evidence synthesis

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## List of abbreviations

AAS	Anabolic androgenic steroids
BBV	Blood borne virus
BCT	Behaviour change technique
BCW	Behaviour change wheel
COREQ	Consolidated criteria for reporting qualitative research
EPHPP	Effective public health practice project
GP	General practitioner
JBI	Joanna Briggs Institute
IPED	Image and performance enhancing drugs
NICE	National Institute of Health and Care Excellence
NSP	Needle and syringe programme
PCT	Post-cycle therapy
PRISMA	Preferred reporting items for systematic reviews and meta-analysis
PSHE	Personal, social and health education
RAP	Risk avoidance partnership project
WADA	World anti-doping agency

## Publications

Articles based upon two studies in this research have been published in academic journals.

i) Based upon study 1:

Bates, G., Begley, E., Tod, D., Jones, L., Leavey, C. & McVeigh, J. 2017. A systematic review investigating the behaviour change strategies in interventions to prevent misuse of anabolic steroids. *Journal of Health Psychology*, Oct 1: 1359105317737607; doi: 10.1177/1359105317737607

ii) Based upon study 2:

Bates, G., Tod, D., Leavey, C. & McVeigh, J. 2018. An evidence-based socioecological framework to understand men's use of anabolic androgenic steroids and inform interventions in this area. *Drugs: Education, Prevention and Policy*, Jul: 1-9; doi:10.1080/09687637.2018.1488947

## Chapter 1: Introduction

### Anabolic androgenic steroids

Anabolic androgenic steroids (AAS) are synthetically produced variants of the male hormone testosterone, most commonly used to promote muscle growth and fat loss. They are the most prominent of a broader range of substances known as image and performance enhancing drugs (IPEDs) that include drugs used to modify appearance or physical, cognitive and sexual performance. Beyond increasing muscle and changing body weight, IPEDs are used for a range of reasons including to change skin colour, enhance sexual function, prevent fatigue and to counter the side effects related to AAS. Many people who use IPEDs will not use AAS, but people who use AAS frequently use other IPEDs as part of a complex regimen of substance use during their cycle<sup>1</sup> (Sagoe et al., 2015, Bates and McVeigh, 2016). In the literature, there is great overlap between the two terms, with IPEDs a common term focusing on people using drugs for muscle enhancement purposes. The focus of this research is specifically on people who use AAS for muscle enhancement (from here on referred to as 'users'<sup>2</sup>) rather than the wider population of IPED users. For example, someone who uses AAS and other IPEDs such as the peptide hormone Human Growth Hormone is relevant to the research, but someone who injects the synthetic hormone Melanotan for skin tanning or uses Sildenafil (Viagra) for sexual enhancement and does not also use AAS is not.

Since the middle of the 20<sup>th</sup> century, AAS have been prescribed for a range of medical purposes, for example in hormone replacement therapies. Historically, use of these substances outside medical settings has been most strongly associated with 'doping' to enhance sporting performance amongst elite athletes and in particular in sports such as

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<sup>1</sup> The cycle includes an 'on' period where a person uses AAS, typically lasting from a few weeks to many months, followed by an 'off' period without using AAS to give the body a break before starting another 'on' period. The length of 'on' and 'off' cycle periods varies greatly and, in some cases, individuals may progress to long-term continuous use with little or no 'off' cycle.

<sup>2</sup> The term 'users' when referring to people who use any drug is controversial and can be seen as stigmatizing. Using terms such as 'people who use AAS' help to overcome these issues. However, for reasons of brevity and to help the flow of the text, 'users' will be used throughout when referring to this population.

athletics, cycling, power lifting and bodybuilding where strength, power, endurance and muscularity are highly valued. The association between AAS and improvements in sporting performance and aesthetics are well established (Bhasin et al., 1996), with large doses alongside physical training leading to substantial increases in muscularity (Hartgens and Kuipers, 2004). In sport the harms of drug use to competition itself and to the sense of fair play has long been a topic of debate (Fraleigh, 1984, Todd, 1987). Scandals in the past decade, such as with the cyclist Lance Armstrong and the identification of state-sponsored doping in Russia, highlights that AAS and, more widely, IPED use amongst athletes remains a concern. The use of a range of substances including AAS are prohibited in sport. Consequences to athletes from using them include lengthy bans from competition, damage to reputation and limiting future earnings in accordance with the World Anti-Doping Agency's (WADA) Prohibited List (WADA, 2017).

Beyond elite sport AAS use<sup>3</sup> has been reported since the 1980s (Buckley et al., 1988, Johnson et al., 1989) and evidence suggests that globally it is increasingly widespread outside of sports environments (Sagoe et al., 2014b, Pope et al., 2014a, McVeigh and Begley, 2016). It is now acknowledged that participation in sport is not the primary risk factor for AAS use (Harmer, 2010) and probably has not been for some time. Indeed, in an article exploring the history of AAS, Kanayama and Pope state that, "By the end of the 1980s, the typical AAS user was no longer an elite athlete, and indeed often even a competitive athlete at all, but instead a young man in a local gym who simply wanted to get stronger and look more muscular" (page 4) (Kanayama and Pope, 2017). The overarching motivation for AAS use in most cases is associated with desire to develop an attractive and healthy physique or to enhance muscle growth and physical strength (Sagoe et al., 2014a, Brennan et al., 2016), but the reasons driving this appear to represent a broad and complex range of factors (Bates et al., 2018). Users make up a heterogeneous population amongst which exists much variation in terms of drug use and lifestyles (Christiansen et al., 2016, Zahnnow et al., 2018) and it is difficult to describe a 'typical' user. People who use AAS include a diverse range of individuals. This includes

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<sup>3</sup> In the related literature, terms such as 'misuse' and 'abuse' are frequently applied to describe non-medical AAS use. However, such terms apply a presumption about the nature of this i.e. that it is necessarily harmful and 'bad'. Therefore, 'use' is the preferred term here and should be interpreted as any AAS use not prescribed by a medical professional.

what Kanayama and Pope describe as “ordinary rank and file male gym clients” (pg 5) who are motivated by aesthetic changes (Kanayama and Pope, 2017), recreational athletes (Sagoe et al., 2014b) and those working in environments such as the police and nighttime economy where strength and size can be highly valued (Hoberman, 2017, Hoberman, 2015, Maycock, 1999, Midgley et al., 2001).

## Why is this research needed?

### Prevalence

Globally the lifetime prevalence of AAS has been estimated at 3.3%, with higher prevalence amongst males (6.4%) (Sagoe et al., 2014b). However, the true extent of AAS use is difficult to estimate. Evidence on prevalence of AAS use in the UK is very limited, but data from the crime survey in England and Wales suggests that use has increased slightly in the past decade (Home Office, 2018). Data from needle and syringe programmes (NSP) also indicates that AAS use may be increasing with the numbers of users accessing such services growing substantially over the past 25 years, and in some parts of the country users makes up the largest client group (McVeigh and Begley, 2016). However, this does not necessarily indicate an increase in prevalence and could, for example, instead be the result of better engagement and recruitment strategies (Vinther and Christiansen, 2017). While the evidence on prevalence remains limited, the evidence base more generally related to AAS and understanding those who use them has increased substantially over the past two decades (McVeigh and Begley, 2016). One effect of this increased research focus, alongside greater recognition in society of AAS use and desire to increase muscularity amongst men, particularly young men, is that it may give the illusion that use is increasing when actually it may simply indicate greater awareness. However, even if we recognise that no accurate indication of prevalence exists and are unclear the extent to which use may or may not be increasing, there is clear evidence of continued widespread use both in the UK and internationally. Further, there is no expectation for a coming decline in AAS use or the desire to increase muscularity amongst men (Kanayama and Pope, 2017).

## Associated harms to health

While the evidence on harms from using AAS has increased substantially in recent years it still generally represents an emerging evidence base with many gaps. Although AAS can be used without adverse consequences, such as when used therapeutically, risk of harm is expected to increase with the far greater doses observed when AAS are used outside of clinical settings (Harmer, 2010). However, there is little evidence of the association between dose and risk. Much of the evidence of health harms amongst users comes from observational studies, and in particular case reports, over the past thirty years. It is beyond these studies, which rely on self-reported information about doses and types of AAS, to ascertain the level of use that is associated with particular harms and therefore the picture is somewhat incomplete. However, there is an ever-increasing evidence-base exploring related harms seeking to address this. Use is associated with a range of acute and chronic adverse consequences (Pope et al., 2014b) that range greatly from cosmetic (e.g. acne) to critical (e.g. cardiovascular disease, liver function) with evidence of potential psychological harms (e.g. increased aggression, mania) (ACMD, 2010b). The quality and nature of the evidence on these different areas of health varies, but in some it is becoming more substantial. For example, the link between use and damage to the reproductive system following AAS withdrawal (Christou et al., 2017, El Osta et al., 2016) and adverse cardiovascular events including raised blood lipid levels, hypertension, changes in cardiac function and myocardial infarction (Pereira dos Santos et al., 2014, Baggish et al., 2017, Thiblin et al., 2015) are increasingly supported through research. Additionally, it is suggested that as the AAS users who started using in the 1980s and 1990s get older, the long-term effects from these substances on conditions normally associated with onset in middle or older ages may emerge (Pope et al., 2014b).

## Associated risk behaviours

Beyond the harms to health directly attributable to AAS, users can be at risk through a variety of related behaviours that vary greatly, which reinforces the heterogeneous nature of this group of substance users. For many, their cycles can be complex and they may use a variety of AAS and other IPEDs at any one time or progressively (Bates and McVeigh, 2016, Sagoe et al., 2015). The majority of users inject their drugs and are

exposed to risks such as injection site injury, infection and blood-borne viruses (BBVs) (ACMD, 2010b). The quality of illicitly produced AAS cannot be controlled, with many users sourcing their drugs from underground 'laboratories' (Brennan et al., 2018, van de Ven, 2016) where contamination and mislabeling of products is common (Evans-Brown et al., 2009) in comparison to those which are prepared pharmaceutically. Evidence of injection site infections and injuries amongst AAS injectors (Hope et al., 2014) are indications of the impact of bacterial contamination in purchased products. In the UK, there is evidence of HIV, hepatitis B and C infections within this population (Hope et al., 2013, Hope et al., 2016) and indications of low testing uptake (Bates and McVeigh, 2016, Hope et al., 2013) suggests that such infections may go undiagnosed. Generally, studies have identified good practice relating to sharing of injecting equipment, but amongst users there is evidence of equipment sharing albeit to typically low levels (ACMD, 2010a, Bates et al., 2014) and engagement in risky sexual practices (Hope et al., 2013) that highlights the possibility of BBV transmission within and beyond this population. There is evidence that users consume a range of psychoactive substances, especially alcohol, cocaine and cannabis (Sagoe et al., 2015). Differences in attitudes towards substance use may reflect the range of attitudes towards risk and health amongst users, as explored in a recent typology of steroid users (Christiansen et al., 2016). For example, many users will report never drinking alcohol, for example because it would interfere with their training regimes, while others consume very large quantities (Bates and McVeigh, 2016).

### **Mental health and wellbeing**

Dependence on AAS has been theorised since the 1980s (Kashkin and Kleber, 1989, Brower et al., 1989), but has been the subject of greater focus and definition over the past decade, primarily through the work of Pope, Kanayama and colleagues (Kanayama et al., 2009a, Kanayama et al., 2009b). They have suggested that nearly one third of users will develop a form of dependence (Pope et al., 2014a) characterised by continuous use for long periods of time despite, in some cases, the presence of adverse effects. Often this involves continuous administration of high doses. There are similarities and differences with other dependence on other substances. Key differences include that while over time users may increase their dose, the development of a

physical tolerance to AAS through repeated use is unclear. Additionally there is no immediate benefit from use comparable to that from using many psychoactive substances and nor are there typically immediate adverse effects. However, use may be associated with short-term increases in self-confidence and muscularity, and adverse effects can emerge quickly. Similarly to dependence on substances such as tobacco, alcohol or opiates, motivation for AAS use can be to avoid withdrawal symptoms that arise following discontinuation, such as loss of libido, depressed mood and fatigue (Kanayama et al., 2009b).

A common concern for users is that through cessation they will lose the physical gains associated with their steroid use (Griffiths 2016), which can drive continuous use, dedication to physical training and nutrition, and time sourcing and researching steroids. While this has been discussed in the context of AAS dependence, there is an established broader association with a preoccupation with appearance and muscularity. It has been argued that the behaviours applied to increase muscularity amongst men with a body image disorder can represent an 'addiction to body image' (Foster et al., 2015), which shares many characteristics with the proposed diagnostic criteria for AAS dependence (Kanayama et al., 2009b). It is in many ways difficult to distinguish between dependence on AAS and this preoccupation with enhancing muscularity and changing body shape. Indeed, use of AAS in some individuals has been associated with body image disorders such as muscle dysmorphia and a high drive for muscularity (Kanayama et al., 2006, Rohman, 2009). Traditionally, research into body dissatisfaction has focused on females and the desire to lose body weight. However, more recently researchers have explored body image concerns amongst males and identified issues relating to self-evaluation as being too small and desiring to increase muscularity (Frederick et al., 2007, Pope et al., 2000). As with body image disorders amongst females, male body image concerns of this type can range from a dissatisfaction with appearance and desire to change physique to psychiatric conditions where support and treatment may be required.

Muscle dysmorphia is characterised by the perception of oneself as being too small and the obsession with becoming more muscular amongst individuals who have a significant amount of muscle (Grieve, 2007). It was first described in the academic literature as

'reverse anorexia' (Pope et al., 1993) reflecting the similarity with individuals suffering from anorexia nervosa who perceive that they need to lose weight. It was later renamed by the same authors as muscle dysmorphia (Pope et al., 1997). Muscle dysmorphia is included in the fifth edition of the Diagnostic Manual of Mental Disorders (DSM-5) and is considered as part of the wider group of psychiatric conditions known as body dysmorphic disorders, where an individual is preoccupied with a perceived defect in their appearance that may lead to impaired behavioural functioning (Phillips and Crino, 2001). That there is a relationship between AAS and muscle dysmorphia is well established, but the direction of that relationship is unclear (Rohman, 2009). Logically it would appear reasonable to suggest that body image disorders may motivate use amongst individuals who desire to be more muscular. Someone who is highly dissatisfied with their muscularity is likely to desire to take steps to rectify this, and muscle dysmorphia and negative body image during adolescence have been associated with long-term use in adulthood (Kanayama et al., 2006, Pope et al., 2012). However, it may also be possible that AAS use and immersion in a sub-culture where individuals will frequently have ideals of muscularity and strength reinforced could lead to, or enhance, body image disturbances and appearance concerns remain for many users who may have been using for prolonged periods of time (Cohen et al., 2007).

## Responding to AAS use and related harms

It has long been recognised that interventions are required in response to AAS use (Council on Scientific Affairs, 1988, Nutter, 1993) and increasing evidence of the harms to health, and greater awareness about users through the portrayal of muscularity and AAS in media and cultural contexts, further supports this. It is not surprising therefore that there has been an increased focus on this group of substance users amongst UK policy makers in recent years. For example, in the latest review of guidance for the provision of NSPs for people who inject drugs, the National Institute for Health and Care Excellence (NICE) specifically looked at IPED users (National Institute for Health and Care Excellence, 2014) and current UK drug policy includes a section about this same group (Independent Expert Working Group, 2017). The public health response in the UK to AAS use has largely been the provision of injecting equipment to reduce transmission of

BBVs. Attempts to engage with users and provide harm reduction have typically followed models of service delivery developed for other substance users. Primarily, support services have included NSPs in pharmacies and substance use services. In some locations specialist AAS or IPED clinics exist that offer support through staff experienced with, or knowledgeable about, AAS and services that vary greatly, but include those such as nutrition and training advice, health checks and blood tests to engage with users. These specialist clinics have long been championed as part of efforts to provide healthcare and support to this population (Morrison, 1994, O'Connor, 1995, Korkia and Stimson, 1994).

There is a lack of any evidence on the effectiveness of such approaches or, more broadly, other interventions focussing on AAS users with the aim of reducing demand or harms. What intervention evaluations there have been have focussed on preventing initiation, rather than on those people who are already using AAS for whom harm reduction and behaviour change strategies are needed. Internationally, a relatively small number of interventions that explicitly aim to prevent initiation of IPEDs in young people has been implemented and evaluated. Frequently these have been in the context of reducing use amongst athletes. Preventing initiation amongst athlete populations matches WADA's aims to ensure athletes participate in doping-free sports and to support their health (WADA, 2018), but educational approaches are given little attention and are poorly funded in comparison to drug testing and detection policies that underpin the anti-doping approach (Backhouse, 2015). Beyond sport, as the focus on use amongst non-athletes has grown, and the evidence on potential harms to health and the association between AAS and mental health is increasingly recognised, the justification for prevention interventions from a public health perspective increases. Steroids and other IPEDs are not typically however included in substance use prevention programmes, such as those delivered to adolescents in school and family settings internationally (Bates et al., 2017b). As initiation of AAS typically occurs during adulthood (Sagoie et al., 2014a), such programmes may not necessarily be the optimal approach for prevention. Additionally, the low overall prevalence of AAS amongst the population in general may suggest that prevention targeted towards those more likely to use may be a more effective and cost-effective approach than any universal programme.

Beyond the scarcity of evaluations of interventions, there is also a lack of evidence to inform future interventions such as what they should be trying to achieve; how, where and when to implement them; who should deliver them; and what factors will be likely to increase effectiveness. While there has been a substantial amount of research looking at factors such as the characteristics and behaviours of people who use AAS and their motivations and health, there are a lack of frameworks that bring this evidence together, which could directly inform intervention approaches. Consequently, while designing theoretically based interventions is associated with increased effectiveness (Glanz and Bishop, 2010), there is little evidence on which to base recommendations for policy in this area or to inform the development of new interventions. While this study did not involve the development of an intervention, it was informed by The Behaviour Change Wheel (BCW) (Michie et al., 2014). The BCW is a model of behaviour change and a framework to guide intervention development, particularly those aiming to change health behaviours, encourages the user to think outside of what seems obvious or matches their preconceptions.

Rather than developing interventions based upon personal experiences or presumptions, the model encourages the user through a systematic and rigorous process to choose options based upon evidence and theory. For example regarding what the target of any intervention should be, what needs to happen for this behaviour to change, and how this change can be brought about (Michie et al., 2014, Michie et al., 2011). The authors describe the guide as particularly valuable to inform the early stages of intervention development in a process such as the Medical Research Council's Guidance on Complex Interventions (Craig et al., 2008). Michie and colleagues (Michie et al., 2014) go on to state that the guide is "a way of harnessing whatever understanding exists and identifying valuable areas for extending that understanding" (pg14). The initial stages of the BCW guide were particularly relevant to this study, focussing on understanding and defining the problem that needs to be addressed. The authors state that "if the assessment is not thorough, the formulation of the problem is less likely to be accurate, and the intervention less likely to be effective" (pg25). The steps within this stage involve using rigorous methods to identify the problems that

need to be addressed and being specific about what needs to change and in whom, and what needs to happen in order for this change to occur.

## Research aims and objectives

The aim of this research was to explore ways that intervention providers can influence decision-making amongst men who use AAS to improve their health and manage their risk. The following objectives were developed to address the gaps in the current evidence base and to inform the development of interventions.

- i) To identify how interventions seeking to influence AAS use have tried to change decision-making, and the effectiveness of these approaches.
- ii) To bring together factors that influence AAS use from different sources and in different environments into one framework to support intervention development.
- iii) To identify opportunities for health professionals and other potential intervention providers to influence users' decisions and choices.
- iv) To explore what interventions need to address in order to improve health amongst AAS users and to help them manage their risk, and how this might be achieved.

A fifth objective was established later in the research, reflecting the findings from the four studies.

- v) To map the support that users seek and encounter and, using this, identify approaches to improve the provision of support and information.

## Research design

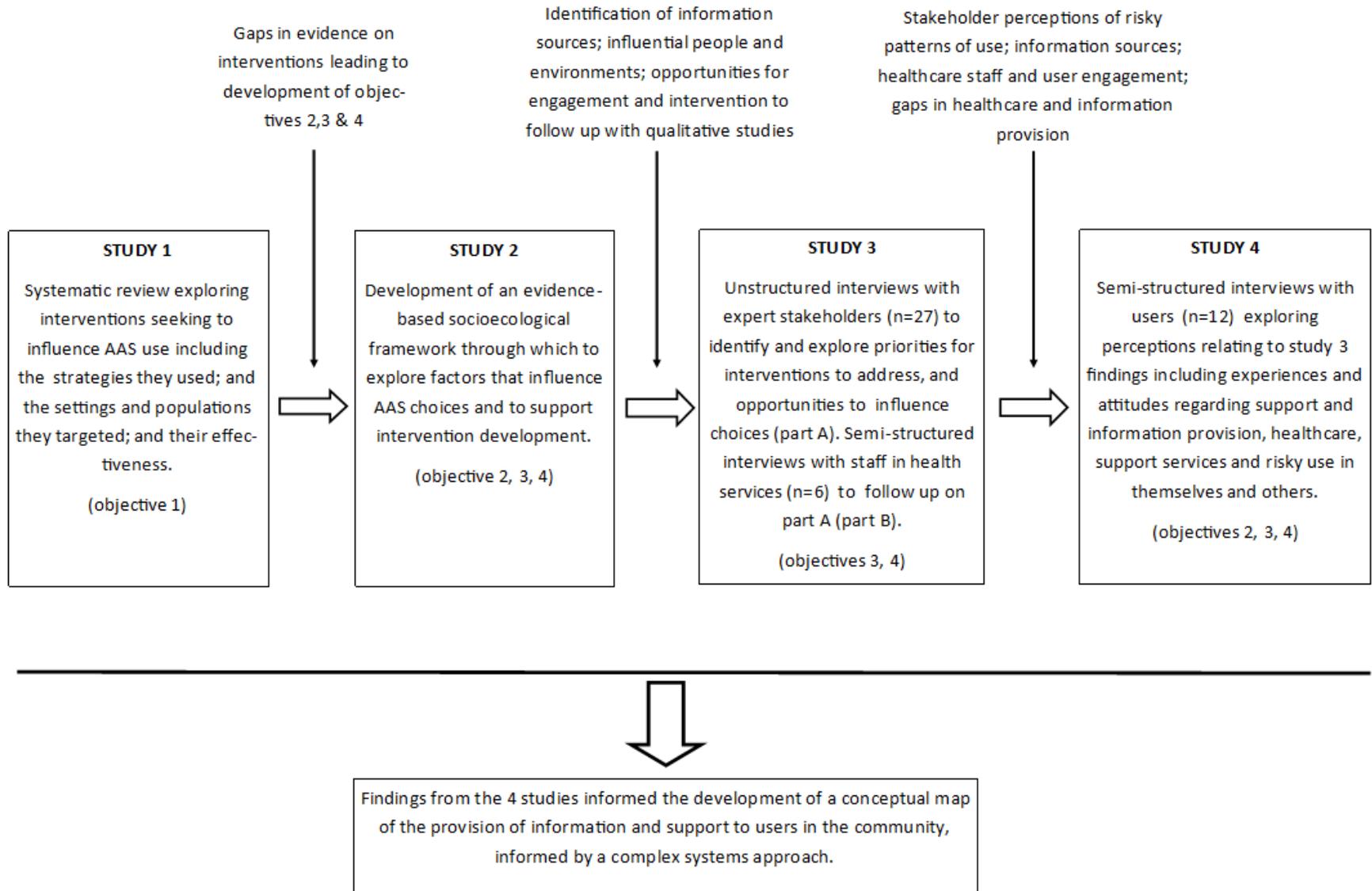
A sequential design over four studies, summarised in figure 1, was developed to address the objectives outlined previously. This included two literature-based studies (studies 1 & 2) and two qualitative studies (studies 3 & 4). Study 1 was a systematic review examining the content and effectiveness of interventions that have been carried out with the intention of influencing AAS use. In study 2, a review of predominantly

qualitative evidence was used to develop a socioecological framework through which to explore factors that influence men's decision making regarding their AAS use and to identify opportunities for interventions. Study 3 used a focus group and unstructured interviews with stakeholders with a range of expertise and experiences with AAS to explore priorities for interventions to improve health and reduce risk, and identify how these priorities might be addressed. Study 4 used semi-structured interviews with users to follow up on findings from study 3, and continued to identify needs and opportunities for interventions and support. The final stage in the research, the development of a conceptual map of information provision and support, and identification of approaches to improve this, was developed to reflect the needs and evidence gaps identified in the studies carried out and through reflection on the findings of the research.

#### Pragmatic and reactive approach

Following the principles of pragmatism, in this study the design and methods were developed according to the research question (Johnson and Onwuegbuzie, 2004) to ensure that the methods used throughout the study addressed the gaps in evidence identified in the most appropriate manner. This led to the evidence reviews in studies 1 and 2 and qualitative methods used in studies 3 and 4, which reflected the identified need for an inductive driven research design. The approach used in this study has much in common with the 'methodological eclecticism' aspect of mixed methods (Johnson and Onwuegbuzie, 2004, Teddlie and Tashakkori, 2010), which recognises the importance of flexibility and drawing upon different methods and perspectives to research a topic, rather than rigidly sticking to a favoured approach. It has been argued that mixed methods do not necessarily have to include elements from both quantitative and qualitative paradigms (Morse, 2010b), but it is typically defined as research that combines both qualitative and quantitative research (Johnson et al., 2007). This research however combined evidence from two evidence reviews and two qualitative studies and more closely resembled a multimethod design, defined as "the conduct of two or more research methods, each conducted rigorously and complete in itself, in one project" (pg 190) (Morse, 2010a). Within a sequential multimethod design, a QUAL→qual approach consists of one dominant qualitative study supplemented by a second qualitative project that follows on from the first. This was the approach taken for the qualitative studies

Figure 1: Research design



and was appropriate for the inductive nature of this research (Morse, 2010a). Collectively, the aim of these studies was to explore what AAS interventions should address and how they can do. The first qualitative study, study 3, was the more substantial and generated ideas from stakeholders, which were then followed up on in study 4 with users, who were likely to offer different perspectives.

The two evidence review studies were a significant part of this research, yet their inclusion does not necessarily sit within the mixed or multimethod study designs as they are traditionally described. Both reviews were predominantly qualitative in the approach to synthesising the evidence. The systematic review in study 1 sought evidence on the effectiveness of AAS interventions and therefore included studies based upon quantitative methods, while the literature included in study 2 was predominantly based on qualitative and survey methods. While methodologies have been developed for undertaking systematic reviews based upon mixed methods (Pearson et al., 2015), mixed method or multimethod study designs are typically discussed in the context of undertaking primary research. However, as demonstrated in figure 1, during this research multiple methods were applied in a sequential process with the findings of studies driving the approach and focus of subsequent studies.

An advantage of the pragmatic approach and sequential methodological framework used was that the researcher was able to be reactive throughout the study. Sequential designs enable researchers to respond proactively to emerging results that were not anticipated and are therefore particularly useful where the researcher has not decided on how the research will progress at the start (Plano Clark and Badiee, 2010). Much of the research design was not predetermined and changed as the study progressed. Throughout the research, a series of current tools and guidance were used to support the development of studies and the reporting of results to ensure transparency of the approaches and methods used.

## Changes to the research design

Initially it was planned to use the findings from study 1 to identify effective intervention approaches and this would lead towards the development of an intervention targeting people who use AAS. To support this it was provisionally intended to undertake a second systematic review exploring experiences of steroid use and then a study using Q methodology (McKeown and Thomas, 2013) to identify what factors are important in users' choices. However, the research changed substantially during the first systematic review (study 1), undertaken in response to objective 1. One of the findings from this related to the limited number of settings and populations that intervention providers have considered when trying to influence steroid use. This raised the importance of considering other environments and people that may be important in this decision-making and the subsequent development of the socioecological framework (study 2) as a priority to inform intervention development. Amongst the different studies included in the systematic review, the range of ideas selected to inform intervention development and what these interventions aim to achieve indicated that many different factors were potentially important. Reflecting on this and the other evidence included in these first two studies led to conclusions that the evidence base was undeveloped and included substantial gaps that needed to be addressed before any specific intervention could be addressed if it was to be effective. In particular, it appeared unclear what the priorities for any interventions should be or, in other words, what interventions with this population should actually be trying to achieve and what factors need to be addressed to achieve these aims. These reflections led to the formation of research objectives 2, 3 and 4.

The shift in the research towards consideration of how a wide range of influences across the socioecological spectrum influences AAS choices happened concurrently to the researcher's learning and interest in the BCW approach. Both these approaches emphasise the need to consider the bigger picture when thinking about how to bring about changes in any behaviour and led to the development of an interest in complex

systems thinking<sup>4</sup> and its importance in developing interventions (Hawe et al., 2009). This had a significant impact on the direction of this work and eventually led to the development of the conceptual map at the end of the research. The focus of the BCW guidance on understanding behaviour in order to change and influence it were particularly relevant to the position the researcher found themselves in after the systematic review. The authors emphasise that too frequently interventions are based upon the personal opinions or experiences of those developing them, rather than thorough understanding of the behaviour in question based upon evidence (Michie et al., 2014). This resonated with findings from the systematic review carried out in this research that highlighted a lack of theory and evidence used in the development of AAS interventions and a lack of recognition for the wider socioecological influences upon AAS use. The original plan for the research to develop an intervention no longer seemed feasible. There seemed to be many potential options, but a lack of evidence to support any one option over another, which the researcher had concluded was a limitation of the interventions already evaluated. There did not appear to be clarity on exactly what outcomes any intervention should be looking to achieve and with whom, what behaviours should be targeted as part of this process and in what ways they need to change.

The question of what such an intervention should actually be trying to change was a particularly important influence on the direction of the research. The systematic review identified that interventions evaluated to date were mainly of a preventative nature with school-based athletes, and in a sports context outright prevention is justified by the zero tolerance attitude to doping and performance enhancement. A harm reduction approach appears greatly at odds with such an attitude. In a public health context and when applied to the general population there seemed to be more scope for harm reduction work with AAS users, but there remained a lack of evidence to support an

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<sup>4</sup> Systems represent a number of interacting components that are directly or indirectly connected to one another. Applying this approach to understanding a behaviour leads to understanding that rather than being isolated and distinct, all behaviours are influenced by other factors such as behaviours, individuals and environments. Consequently, it is important to understand the system rather than only individual components within it. This has clear implications for those developing behaviour change interventions. Further discussion and definition of this systems approach and how it applies to AAS use and intervention development is provided in chapter 3.

intervention of this nature or specifically what it should look to achieve. Additionally, the interventions identified offered little clarity about what prevention interventions needed to focus on and change in order to reduce initiation. It was concluded therefore that more work to understand and define what AAS interventions are needed for and should be looking to achieve in a public health context was needed before effective approaches could be developed. As the research progressed, the need and opportunity for interventions based on reducing harm and discontinuing AAS use became more defined and justified. On prevention however, the picture remained less clear and consequently the research became increasingly focussed on those already using AAS rather than preventing initiation.

There are several further examples of how the sequential framework was important in the development of the study and how studies were integrated with each other. The robust examination of the literature in both evidence reviews (studies 1 and 2) helped to identify the evidence gaps and research needs that led to the development of the remaining research in this study. The sampling approach to identify stakeholders to be interviewed (study 3) was informed by the socioecological framework developed (study 2), with participants targeted in part to represent the potential environments that people who use AAS experience and are influenced in. Findings from study 2 were also used as prompts during stakeholder interviews (study 3) and in the development of the semi-structured interview schedule for interviews with people who use AAS (study 4). The final stage in the research reflected the priorities identified during the studies, which led to the development of objective 5. Findings from the separate studies were used in the creation of the conceptual map of information provision and surrounding discussion and identification of how information provision could be improved.

## Chapter 2: A systematic review of the behaviour change strategies used in interventions aiming to influence use of AAS

### Rationale and outline

That interventions to influence use of AAS are required has long been recognised (Council on Scientific Affairs, 1988, Nutter, 1993). The rationale for such interventions has included for health reasons and from a sporting perspective to reduce cheating and ensure fair play. Over the past 30 years, a number of studies have evaluated attempts to influence decision-making relating to AAS, which provide a useful starting point when looking to understand what influences users and what types of interventions targeting them are likely to be effective. Beyond exploring whether these interventions have been effective at achieving their goals, understanding which messages and intervention components work, or do not work, with this population will provide valuable evidence to understand how to influence their decisions. Over the past decade, developments in the field of behaviour change science support researchers to unpick interventions and to systematically examine their components (Michie and Prestwich, 2010, Michie et al., 2013, Michie et al., 2011). For interventions to be effective, appropriate behaviour change mechanisms must be identified and the application of theory in their development is recommended to guide this (Craig et al., 2008). Examining the components and the application of theory in interventions provides insight into the nature of these interventions and it may be possible to identify approaches that are likely to be effective or ineffective.

While useful summaries of the evidence base exist, previous examinations of this literature have focussed on prevention approaches only (Backhouse et al., 2014, Bahrke, 2012) and not considered those who are already users. Additionally, they have not examined the content of these interventions and there are a number of recent evaluations of relevant interventions published since these reviews. This systematic review therefore aimed to address these gaps by analysing interventions that have sought to prevent use of AAS, or to reduce use or harms amongst those already using them. Comprehensive searches in bibliographic databases, supplemented by reviewing key websites and reference lists of relevant works, identified 14 interventions that met

review inclusion criteria. Interventions were predominantly preventative and delivered within school sport settings, but targeted a wide range of mediating factors. Interventions were generally educational in nature, but prevention efforts with components in addition to information provision alone appeared more promising. Interventions for populations other than young athletes are needed to reduce demand and to reduce harms amongst users. In addition to the scarcity of evidence, the findings are also limited by the methodological weaknesses of studies. Future interventions should be developed, implemented and reported with reference to current guidance to develop the evidence base.

## Methods

### Aims

The review aimed to systematically identify the behaviour change strategies applied in interventions that have sought to prevent or reduce use of AAS, or reduce associated harms. This included the characteristics and components of interventions and their settings and target populations, and the utilisation of theory in intervention development, delivery and evaluation. Additionally the review aimed to identify whether particular behaviour change strategies are associated with reducing use or harms.

### Validity and quality

Although there are many types of systematic reviews, they are characterised by a need for transparency and rigorous methods (Gough et al., 2017). Consequently, efforts were made to ensure rigour in this review. Protocols outlining the purpose and methods of a review are an important first step in undertaking a systematic review (Moher et al., 2009, Gough et al., 2017). A full protocol was developed and registered on the PROSPERO International Register of Systematic Reviews (ID CRD42016051204), an online resource to share review protocols for health related projects. The protocol was registered prior to the review beginning and is available via PROSPERO at [www.crd.york.ac.uk/prospere/display\\_record.php?RecordID=51204](http://www.crd.york.ac.uk/prospere/display_record.php?RecordID=51204)). The protocol described the search strategy, inclusion criteria, processes for selecting and evaluating

studies, and analysis approach. A range of guidance is available to support the production of high quality reviews, which typically set out a number of discrete processes to follow. There is great overlap between the different guidelines, which typically include the same steps, but may be tailored towards different types of reviews (for example, reviews of randomised controlled trials, qualitative evidence, mixed methods). Guidance from the Cochrane Collaboration is appropriate for reviews that deal with questions of effectiveness (Higgins and Green, 2011), but most applicable to a narrow set of study designs. Scoping searches for this review confirmed expectations of a small evidence base and studies of mixed design and quality. The Joanna Briggs Institute (JBI) Method for Systematic Review Research (Aromataris and Munn, 2017) is suitable for reviews that look to include a range of study designs (Godfrey and Harrison, 2015), so was suitable to guide this review.

Additionally, two tools were used during the production of the review. Firstly, the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Aromataris and Munn, 2017), a tool to appraise systematic reviews using 11 criteria, was referred to during the review to ensure validity and reliability of methods. Secondly, the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) checklist, which aims to support reviewers write up their reviews and report adequate detail on all important aspects of the review (Moher et al., 2009), was used during the writing up process. The completed PRISMA checklist for this review is provided in appendix 1. Finally, training on identifying behaviour change techniques and functions was undertaken prior to beginning the review through the behaviour change taxonomy training website (<http://www.bct-taxonomy.com/>), developed by the authors of these tools.

The approach to undertaking the review and decisions on key aspects such as the search strategy, inclusion criteria and analysis approach was supported by discussion and feedback from supervisors. A researcher with experience and knowledge relating to AAS and interests in psychology and behaviour change was invited to join the review team and supported the review by acting as 'second reviewer' on study selection and data extraction (including the identification of behaviour change techniques and intervention

function) on a sample of the studies. This was carried out in accordance with the guidance described above to reduce risk of bias and human error. An article based upon the review was submitted to the Journal of Health Psychology (Bates et al., 2017a) and feedback from peer reviewers was used in the production of the review. Much of this chapter replicates the text of the published article. Although this text is taken directly from the article, it has not been put in quotations to support the readability of the chapter. The article was written by the researcher who wrote this thesis, with the other authors' inputs coming in the study design stage and/or limited to commenting on drafts of the article. Confirmation of author input is provided in appendix 2.

### Search strategy

A comprehensive search for relevant studies was undertaken in December 2016 in the following databases: the Cochrane Library, MEDLINE, PsycINFO, Sports Discus, the Social Science Citation Index and Conference Proceedings Citation Index. Search strategies were developed based on combinations of free text and controlled vocabulary terms adapted to each database but included variations of: *anabolic steroid, performance enhancing, doping, muscle enhancing, IPED, PIED, PED, sport, athletes, gym, fitness, school, bodybuilding, weight training and prison*. Initially a search strategy was developed to search in MEDLINE and this was adapted for searching in other databases. The MEDLINE search strategy is provided in Appendix 3. Further, steps were undertaken to identify any additional articles not picked up during database searching, including 'grey' literature. This included reviewing the publication lists of organisations including the Advisory Council on the Misuse of Drugs, US Anti-Doping Agency, UK Anti-Doping, Druginfo and the US National Institute on Drug Abuse, as well as the bibliographies of key literature reviews relevant to this review (Backhouse et al., 2014, Petróczi et al., 2014, Bahrke, 2012), and of included articles.

### Inclusion criteria and study selection

Studies published from 1990-2016 were eligible for inclusion to include the time period since early calls for AAS prevention interventions (Council on Scientific Affairs, 1988, Nutter, 1993). Inclusion criteria were controlled studies of interventions that aimed to reduce use of drugs taken to enhance muscularity, performance or appearance, or to

reduce harms or improve health in users. This included studies focussing on the use of steroids specifically, but also studies that applied broader terms to the substances they focussed on such as 'performance enhancing drugs', or 'doping'. These terms are strongly associated with AAS, but can also include other drugs used alone or alongside these, so are referred to here under the umbrella of IPEDs. Universal interventions and those targeted to any populations including, but not restricted to, young people, gym users, bodybuilders, athletes and men who have sex with men were eligible for inclusion. Studies were included where an intervention was compared with no intervention or a control intervention, and outcomes relating to the use of IPEDs or intentions, attitudes, norms or knowledge relating to IPED use, were reported.

The researcher screened titles and abstracts of all identified articles, with a sample of 10% screened independently by a second reviewer with experience in systematic review and IPED research to determine eligibility for inclusion against the pre-determined criteria. The full text of articles included at this stage were downloaded and screened for eligibility in the same way. Reviewer agreement on inclusion and exclusion was 100% on the samples screened by the second reviewer at both stages.

#### Data extraction and quality assessment

The methodological quality of studies was assessed using criteria set out in the Effective Public Health Practice Project (EPHPP) quality assessment tool (Thomas et al., 2004). This tool is appropriate to use in systematic reviews of effectiveness interventions evaluated using a range of methodologies (Deeks et al., 2003, Jackson and Waters, 2005). Study strengths and weaknesses were considered alongside the discussion of findings. The data extraction process was developed to gather as much information as possible on the nature of interventions. Data relating to study design, population and methodology, intervention characteristics, study outcomes and process outcomes were extracted using a form in Microsoft Access designed for this review. All data extraction and quality assessment was checked by the same second reviewer who had screened a sample of studies. Discrepancies at all stages were resolved through discussion.

## Identification of behaviour change strategies

In addition to understanding whether interventions have been effective, the review aimed to identify the behaviour change strategies applied within these interventions and whether these were linked with effectiveness. Three tools developed to unpick the content and development of interventions were used: The Behaviour Change Taxonomy (Michie et al., 2015), BCW (Michie et al., 2011) and Theory Coding Tool (Michie and Prestwich, 2010). All three have been used in systematic reviews to identify the content of interventions and their theoretical development. Using these tools supported understanding of what the interventions identified in this review aimed to do, their theoretical underpinnings and development, and what was actually delivered.

The theoretical basis of interventions were examined using the Theory Coding Tool (Michie and Prestwich, 2010) designed to identify the extent to which theory is used in the development, implementation and evaluation of interventions. Behaviour change techniques (BCTs) were grouped according to the revised Behaviour Change Technique Taxonomy (Michie et al., 2013), a hierarchically structured taxonomy of 93 BCTs. BCTs are defined as the smallest components of an intervention and were recorded when explicitly reported by article authors (Behaviour Change Technique Taxonomy v1). The Taxonomy has been applied in systematic reviews to identify BCTs associated with effective approaches designed to influence a variety of behaviours including obesity management, physical activity, sexual health, alcohol use and cardiac rehabilitation (Martin et al., 2013, Burns et al., 2016, Heron et al., 2016, Prestwich et al., 2016, Bird et al., 2013). To help understand behaviour change strategies the BCW (Michie et al., 2011) was used to identify the behaviour change function(s) in each intervention. The tool includes nine distinct functions that interventions can perform in order to change behaviour (education, persuasion, incentivisation, coercion, training, restriction, environmental restructuring, modelling and enablement). Where further information on intervention content was required, authors of studies published since 2000 were contacted. Five of six authors contacted responded with additional information not included in published articles.

## Analysis

Results relating to identification of behaviour change approaches, theoretical constructs and behaviour change techniques are presented in structured tables and as a narrative summary. Findings relating to intervention effectiveness on relevant outcomes are summarised in tables. For the outcome of intervention impact on IPED use, effect sizes are reported and where not available in articles these were calculated where possible. Due to a combination of factors including variation between studies in design, intervention approach and outcome measures, meta-analysis was not appropriate to examine intervention effectiveness.

## Results

After deduplication, 12,857 articles were identified through database and supplementary searches. The study selection process is summarised in Figure 2, with 23 articles eligible for inclusion in the review. These 23 articles covered 17 studies that evaluated 14 distinct interventions (two interventions were evaluated at pilot and full study stage, and one intervention was trialled and evaluated with two populations).

### Summary of identified studies

The characteristics of the 14 interventions are summarised in table 1. The interventions were predominantly delivered in educational settings to young athletes and preventative in nature. They commonly sought to influence behaviour by providing messages about IPEDs and associated harms. A range of other approaches were applied usually alongside IPED education including the development of skills and knowledge to encourage healthy alternatives to IPED use, wider health promotion, changing of appearance norms, the development of positive morals and values, and drug testing. Only 2 of 14 interventions were delivered outside of educational settings, one that targeted adolescents in the community (Nilsson et al., 2004, Nilsson et al., 2001) and one that targeted adolescent and adult gym users (Jalilian et al., 2011). This gym-based study was the only one that included a substantial proportion of users, although even in this case the vast majority of participants (approx. 80%) were non-users. Further details

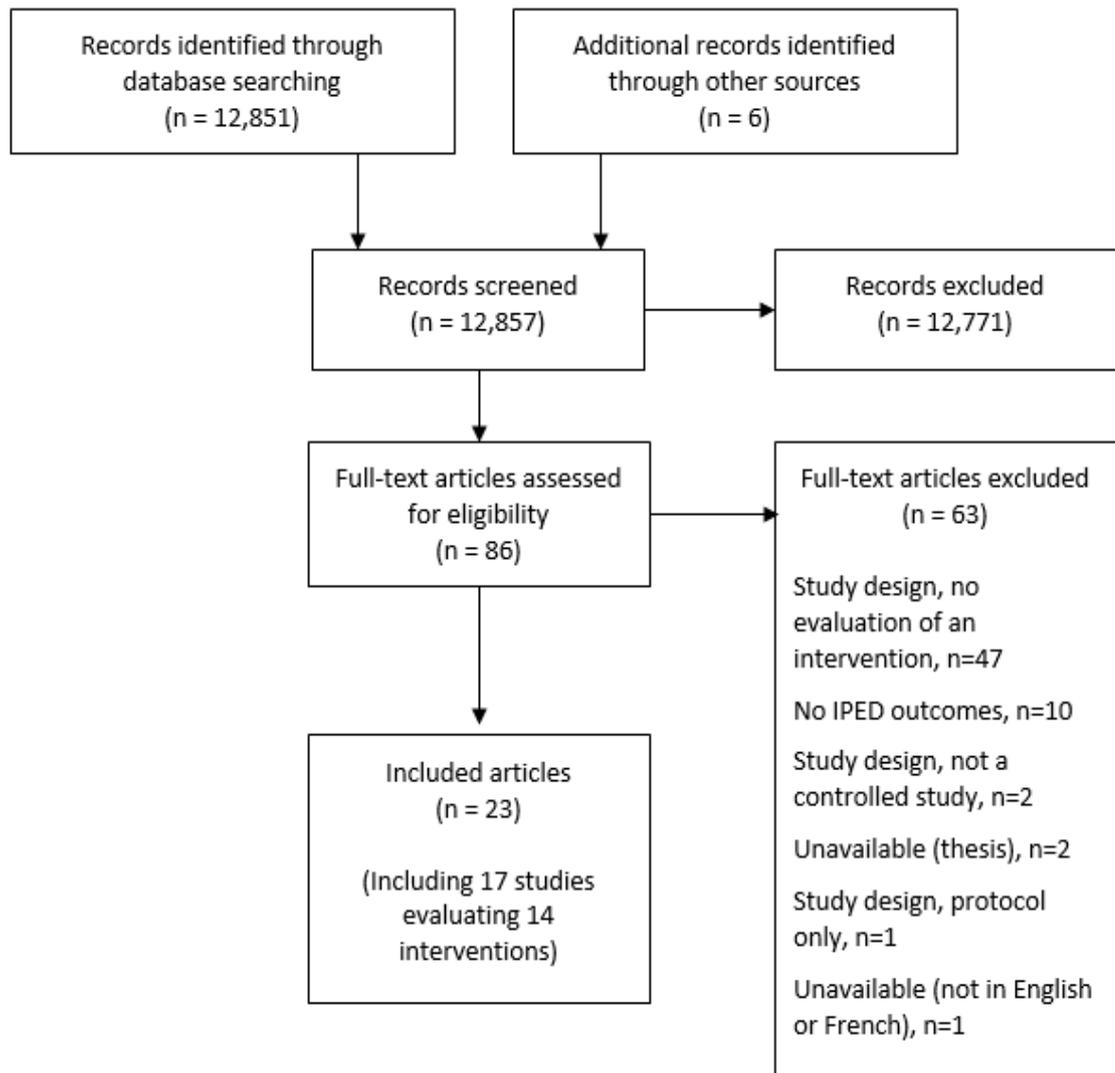
on intervention characteristics that were useful in understanding the nature and delivery of interventions are summarised in appendix 4.

In 11 of 14 interventions, the primary aim was to reduce use of, or risk factors for, IPED use. In addition, ATHENA (Elliot et al., 2004) was a health promotion intervention aiming to reduce disordered eating and IPED use; and both a university-based drug education programme (Tricker and Connolly, 1996) and the SATURN programme (Goldberg et al., 2003, Goldberg et al., 2007) aimed to reduce substance use (including IPEDs) amongst student athletes. The ATHENA and ATLAS programmes were evaluated at short- and long-term follow up (two and one years respectively) and the German anti-doping intervention (Wippert and Fließner, 2016) was evaluated up to two years following the intervention. All other studies included follow up at 3 months following intervention completion or less.

#### Summary of study quality

Overall ratings of study quality are presented in Table 1 with full details of the findings from the quality assessment process available in appendix 5. Overall, three studies were rated strong, five studies were rated moderate and nine studies were rated weak using the EPHPP tool. Across the studies, common areas of weakness were withdrawals and drop outs, particularly across studies that recruited from school sports teams; and potential for selection bias, typically as a result of a lack of reporting relating to how many potential participants agreed to take part in the study. Further, in seven studies important differences between groups identified at baseline measurements were not reported or addressed.

Figure 2: Flow of studies through the review



**Table 1: Summary of included articles**

<b>Intervention description (Control group)</b>	<b>Citation(s) (Country)</b>	<b>Participants and setting</b>	<b>Design (sample size)</b>	<b>Quality rating</b>	<b>IPED Outcomes (follow up length)</b>	<b>Summary of results</b>
Anti-doping culture promotion (General health education)	Barkoukis et al., 2016 (Greece)	Male and female adolescents at school	RCT (218)	Moderate	Doping attitudes; Perceived prevalence of doping in professional athletes (Post-intervention)	No intervention impact on doping attitudes, or perceived prevalence of doping amongst athletes in Greece.
Online doping ethical decision making training (Usual education; no intervention)	Elbe & Brandt, 2016 (Germany)	Male adolescent athletes at school	CBA (69)	Weak	Doping attitudes (Post-intervention)	Slight increase in undesirable attitudes towards doping following ethical training, although attitudes remained negative towards doping.
ATHENA: health promotion intervention (Information pamphlet)	Elliot et al., 2004, 2006, 2008; Ranby et al., 2009 (USA)	Female adolescent athletes at school	RCT (928)	Moderate	Use of body shaping substances; AAS intentions, knowledge & norms; Body image (Post-intervention, 2 years)	At short-term evaluation ATHENA had a positive effect on initiation of body shaping substances, but there was no long-term effect. Intentions to use AAS and creatine were reduced compared to the control group at long-term evaluation. Short-term knowledge of AAS effects increased compared to controls, but perceptions of peers' use of IPEDs and coach and peer attitudes to body weight were mixed across 8 measures. At long-term evaluation ATHENA participants favoured a heavier body shape compared to controls.

<b>Intervention description (Control group)</b>	<b>Citation(s) (Country)</b>	<b>Participants and setting</b>	<b>Design (sample size)</b>	<b>Quality rating</b>	<b>IPED Outcomes (follow up length)</b>	<b>Summary of results</b>
Brief educational intervention with handout (Handout only; no intervention)	Goldberg et al., 1990 (USA)	Male adolescent athletes at school	RCT (190)	Weak	AAS attitudes & knowledge (2 weeks)	Attitudes towards AAS improved slightly in all groups. Knowledge of AAS adverse effects increased compared to handout only controls on 3/13 measures and to no intervention controls on 6/13 measures.
Brief educational intervention with handout; Fear based education intervention with handout (No intervention)	Goldberg et al., 1991 (USA)	Male adolescent athletes at school	RCT (192)	Weak	AAS attitudes, belief in negative consequences of AAS use (2 weeks)	No impact of the balanced or fear based education on attitudes towards personal AAS use across 7 measures. Greater belief in adverse effects for participants who received the balanced intervention compared to fear based education or control groups. No change in belief in adverse effects amongst the fear based education group.
ATLAS (Pilot): steroid education and nutrition and strength training (No intervention)	Goldberg et al., 1996a (USA)	Male adolescent athletes at school	CBA (120)	Weak	AAS intentions & attitudes; Ability to resist AAS offers (Post-intervention)	Compared to controls intention to use AAS was reduced slightly on 2 measures. Impact on attitudes and beliefs about AAS and AAS norms were mixed across measures and ability to resist drugs did not change. Perception of body image and knowledge about AAS effects and alternatives were improved compared to controls.

Intervention description (Control group)	Citation(s) (Country)	Participants and setting	Design (sample size)	Quality rating	IPED Outcomes (follow up length)	Summary of results
ATLAS: steroid education and nutrition and strength training (Information pamphlet)	Goldberg et al., 1996b; 2000; Mackinnon 2001 (USA)	Male adolescent athletes at school	RCT (3,207)	Strong	Use of AAS; AAS attitudes, intentions, knowledge & norms; body image; ability to resist AAS offers (Post-intervention, 1 year)	There were fewer new incidences of AAS use and lower intentions to use amongst ATLAS participants compared to controls at end of season and 1 year follow up. Attitudes and knowledge regarding AAS favoured ATLAS participants at both times. Impacts on normative beliefs and perceptions about others' AAS attitudes were mixed. Short-term benefits for drug resistance skills were not maintained at 1-year evaluation.
SATURN: random drug testing programme (No intervention)	Goldberg et al., 2003 (Pilot) (USA)	Male adolescent athletes at school	CBA (276)	Weak	Ergogenic drug use (including AAS); drug attitudes & norms (Post-intervention)	There was no effect on initiation of ergogenic drugs. There was a small reduction in past month use in both groups. SATURN participants were more likely to have undesirable perceptions of others' drug use and attitudes, beliefs about drug consequences and drug testing and greater risk taking.
	Goldberg et al., 2007 (Full study) (USA)	Male adolescent athletes at school	RCT (1,396)	Moderate	Drug use (including AAS), drug attitudes & norms (Post-intervention)	There was no impact on past month drug use, but past year use was lower for SATURN participants on 2 of 4 time points. SATURN participants were more likely to have undesirable perceptions of others' attitudes to drug use and drug testing, and a greater desire to take risks than controls.

<b>Intervention description (Control group)</b>	<b>Citation(s) (Country)</b>	<b>Participants and setting</b>	<b>Design (sample size)</b>	<b>Quality rating</b>	<b>IPED Outcomes (follow up length)</b>	<b>Summary of results</b>
AAS education (No intervention)	Jalilian et al., 2008 (Iran)	Male adolescent and adult community gym members	RCT (120)	Moderate	Use of AAS; AAS intentions, attitudes, norms & knowledge (Post-intervention)	AAS use was reduced in both groups, but by a greater amount amongst the intervention group. Intentions to use AAS were reduced in the intervention group only. Attitudes and knowledge about AAS changed in a favourable direction in both groups, but changes were greater in the intervention group. There was no impact on subjective norms.
Health education intervention (No intervention)	Laure & Lecerf, 1999 (France)	Male and female adolescent athletes at school	CBA (287)	Weak	Attitudes & beliefs about doping (3 months)	Impacts were mixed with the intervention having a positive impact on some of the 35 measures amongst the intervention group and no impact on other measures.
Health education intervention (Information provision; no intervention)	Laure & Lecerf, 2002 (France)	Male and female adolescent athletes at school	CBA (379)	Moderate	Attitudes & beliefs about doping (3 months)	Across 35 measures education intervention participants had reduced risk factors and increased protective factors for doping compared to information only and no intervention controls. There was no impact of the information only intervention compared to controls.
Appearance and social norms focussed program (Not applicable)	Nilsson et al., 2001, 2004 (Sweden)	Male adolescents in the community	CCS (345)	Weak	Use of AAS: tablets, injection (Post-intervention)	The proportions of participants using injectable and oral AAS were reduced in the community following the intervention for injectable AAS (1.9% reduction) and oral AS (1.3% reduction)

Intervention description (Control group)	Citation(s) (Country)	Participants and setting	Design (sample size)	Quality rating	IPED Outcomes (follow up length)	Summary of results
Hercules: anti-doping education alone or with strength training (No intervention)	Sagoe et al., 2016 (Norway)	Male and female adolescents at school	RCT (202)	Strong	AAS intentions & knowledge; doping attitudes Satisfaction with appearance; ability to resist AAS offers (Post-intervention)	Intentions to use AAS increased slightly following the education & training intervention, but there were no significant differences compared to education alone or control groups. There was no intervention impact on attitudes towards doping, ability to reject AAS offers or appearance satisfaction, but knowledge about AAS and AAS consequences increased following both education and training, and education alone, interventions.
AAS education (Not reported)	Trenhaile et al., 1997 (USA)	Male pre-adolescent athletes at school	RCT (35)	Strong	AAS attitudes & knowledge; self esteem; peer resistance (Post-intervention)	Attitudes and knowledge about AAS were improved following the intervention and changed favourably compared with controls. No intervention impact reported on esteem or peer resistance.
Drug education (No intervention)	Tricker & Connolly 1996 (USA)	Male and female adolescent athletes at University	CBA (635)	Weak	AAS intentions & attitudes; drug knowledge (Post-intervention)	Intervention participants had lower intentions to use AAS on 1/3 measures and more desirable attitudes about AAS on 2/2 measures than controls. No intervention impact on knowledge about performance enhancing drugs or other substances.

<b>Intervention description (Control group)</b>	<b>Citation(s) (Country)</b>	<b>Participants and setting</b>	<b>Design (sample size)</b>	<b>Quality rating</b>	<b>IPED Outcomes (follow up length)</b>	<b>Summary of results</b>
Anti-doping activities + curriculum (Curriculum only)	Wippert & Fleißer 2016 (Germany)	Male adolescent athletes at school	CS (213)	Weak	Doping knowledge (Up to 2 years)	Knowledge about doping was greater amongst those who received the anti-doping activities in addition to regular curriculum

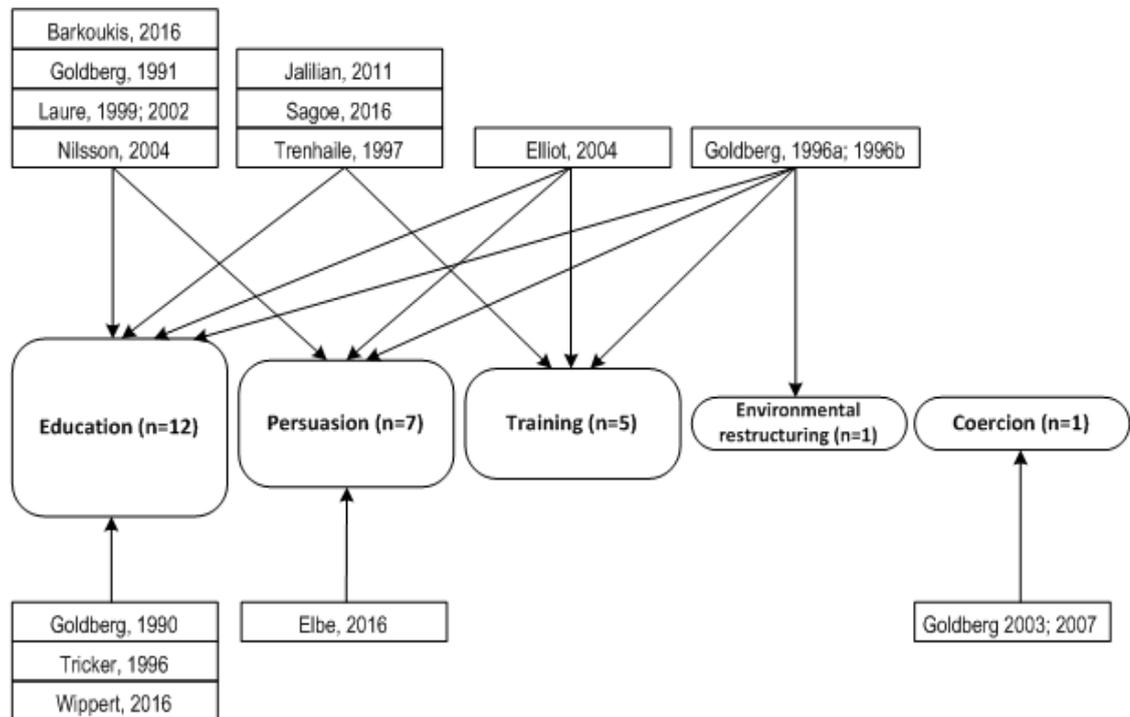
RCT=Randomised controlled trial. CCS = Cohort cross sectional study. CS=Cross sectional study. CBA=Controlled before and after study. AAS=Anabolic steroids.

Amongst nine studies that reported random allocation to groups, in only one study was the method of randomisation described (Elliot et al., 2004). There were few reports of any process evaluation and consequently it was typically impossible to determine to what extent the intervention was delivered as intended or was received by participants allocated to receive it, or if there was any contamination between groups. Across studies there was no attempt reported to blind participants, intervention deliverers or researchers to allocated conditions, although due to the nature of the interventions this would have been difficult and it is quite rare in equivalent public health interventions of a similar nature. This assessment of quality suggests that generally the evidence base is methodologically fairly weak and that, with exceptions, interventions to influence AAS use have not typically been evaluated using robust and reliable methodologies. Therefore caution must be used when interpreting results and considering the implications of these.

#### **Behaviour change strategies**

Five of the nine intervention functions in the BCW (Michie et al., 2011) were identified across the studies in different combinations, presented in figure 3. These interventions applied predominantly educational strategies to influence IPED use and risk factors. The most frequently identified functions were education (12 of 14 interventions), persuasion (7 of 14 interventions) and training (5 of 14 interventions) in different combinations. Training elements of interventions included information about weight training techniques (n=4) and skills to resist IPEDs (n=3). Two interventions included exercise sessions where weight lifting techniques were demonstrated and practiced in addition to an educational programme (Goldberg et al., 1996b, Goldberg et al., 1996a, Sagoe et al., 2016).

**Figure 3: Intervention functions**



Across the interventions, 18 BCTs were identified (range 1 to 7), applied in many different combinations as presented in Table 2. Identification of BCTs was often difficult due to brief and imprecise reporting of interventions. Therefore it is possible that further BCTs were applied that could not be verified here. The most frequently identified BCTs involved information provision ('Information on social and environmental consequences', n=9; 'Information about health consequences', n=8), followed by 'Instruction on how to perform the behaviour' (n=5), reflecting the educational function of interventions identified. Smaller numbers of studies additionally included BCTs to influence social norms (such as the use of credible sources to deliver talks, information about others' perceptions about AAS use) or self-regulating behaviour (such as goal setting, and self-monitoring). Most studies included between two and four BCTs, with more than four BCTs identified in only the ATLAS (Goldberg et al., 1996b, Goldberg et al., 1996a) and ATHENA (Elliot et al., 2004) programmes.

Interventions with multiple intervention functions and those that included higher numbers of BCTs tended to be associated with more encouraging results. More

promising studies appeared likely to include a combination of education through information provision about IPEDs with components designed to develop skills, change social norms, or encourage goal setting. Two interventions associated with reductions in IPED use (Elliot et al., 2004, Nilsson et al., 2004) were the only interventions where participants received information on other people's perceptions about healthy behaviours ('Information about others' approval'). Interventions associated with increases in undesirable attitudes (Elbe and Brand, 2016, Goldberg et al., 2003, Goldberg et al., 2007) and perceived norms (Goldberg et al., 2003, Goldberg et al., 2007) were studies for which just one BCT was identified, and were not educational.

The theory coding tool (Michie and Prestwich, 2010) was applied to all papers. Generally theoretical constructs were poorly reported. The theoretical bases of six interventions were identified with specific theories including ethical reasoning theory (Elbe and Brand, 2016), the theory of planned behaviour (TPB) (Jalilian et al., 2011), social learning theory (SLT) (Goldberg et al., 1996b, Goldberg et al., 1996a) and a combination of SLT and the health belief model (Sagoe et al., 2016). In the mediation analysis of ATHENA, models of behaviour including the TPB, social cognitive theory and the information, motivation, behaviour model were described (Ranby et al., 2009). Although no specific theories were described, the Greek anti-doping education intervention (Barkoukis et al., 2016) was based upon establishing social norms and sporting values. For all other studies, no theoretical bases were described, and it was therefore not possible to determine whether relevant constructs were used in the development or evaluation of interventions. The rationale or theoretical bases for control groups were not described in any study.

**Table 2: Behaviour change techniques applied**

Study	Goal setting (behaviour)	Self- monitoring	Instruction on how to perform the behaviour	Information about health consequences	Saliency of consequences	Information about social & environmental consequences	Demonstration of behaviour	Information about others' approval	Behaviour al practice/ rehearsal	Behaviour substitution	Credible source	Restructuring the physical environment	Framing/ reframing	Punishment
1				√		√				√				
2													√	
3	√	√	√			√		√	√				√	
4				√										
5				√	√	√								
6	√		√	√		√	√		√			√		
7														√
8			√	√						√	√			
9						√	√							
10				√	√	√		√						
11			√	√		√			√					
12	√		√	√										
13						√				√	√			
14						√					√			

1=Barkoukis et al. (2016). 2=Elbe & Brand (2016). 3=Elliot et al. (2004). 4=Goldberg et al. (1990). 5=Goldberg et al. (1991). 6=Goldberg et al. (1996a; 1996b). 7=Goldberg et al. (2003; 2007). 8=Jalilian et al. (2011). 9=Laure & Lecerf (1999; 2002). 10=Nilsson et al. (2001; 2004). 11=Sagoe et al. (2016). 12=Trenhaile et al. (1997). 13=Tricker & Connolly (1996). 14=Wippert & Fleißer (2016).

There was evidence for the six studies where a theoretical basis was identified that theory had been used to develop intervention techniques. All six studies measured theory relevant constructs at evaluation, and in four studies (Goldberg et al., 1996b, Sagoe et al., 2016, Jalilian et al., 2011, Barkoukis et al., 2016) outcomes were discussed, to at least some extent, in relation to theory. The ATLAS intervention had the most explicit links between theory and intervention development and evaluation, and mediation analysis further explored theoretical constructs underpinning the intervention (MacKinnon et al., 2001).

### **Intervention effectiveness**

Evaluations of 5/15 interventions measured changes in IPED use, summarised in Table 3. Potential to reduce use was limited by low numbers of users at baseline and short-term follow-up and, although positive intervention effects on IPED use were reported, effect sizes (where available) were small. Evaluation of the only intervention targeting adults alongside adolescents in a gym reported a reduction in AAS use, but findings were limited by small sample size and short-term follow up (Jalilian et al., 2011). Evaluation of a community wide programme indicated that use of AAS may have reduced slightly (Nilsson et al., 2004), but findings were limited by the cross-sectional study design. There were also indications that the ATLAS and ATHENA interventions had positive impacts on IPED use. Short-term evaluation of ATHENA (Elliot et al., 2004) indicated fewer new users of 'body shaping drugs' amongst girls who received the intervention. However, this measure included supplements as well as AAS, and there was no effect of the intervention on the similar long-term outcome of 'steroid and creatine use' (Ranby et al., 2009). Use of AAS increased slightly following the ATLAS intervention, but at a lower rate than amongst controls (Goldberg et al., 1996b). Numbers reporting AAS use were low throughout the evaluation however and the differences between groups were not statistically significant.

Evaluation of the pilot study of random drug testing in a small sample of school athletes was suggested to have had a positive impact upon past month IPED use (Goldberg et al., 2003). However, there was no impact on new users and evaluation of the pilot and

**Table 3: Changes in IPED use**

Citation(s) Study design	Outcome (follow up time)	Sample size		Measure	Pre-intervention		Post-intervention		Summary
		I	C		I	C	I	C	
Elliot et al., 2004; Ranby et al., 2009 (ATHENA) RCT	Initiation of body shaping drug use (post-season)	457	471		Not reported	Not reported	Not reported	Not reported	Lower initiation of body shaping substances, including AAS, amongst ATHENA students, risk ratio =1.55 (1.03, 1.21)
	Steroid and creatine use (2 years)	406	411	Mean (SD)	Not reported	Not reported	0.02 (0.2)	0.02 (0.2)	No impact on steroid or creatine use compared to controls, beta coefficient =0.001.
Goldberg et al., 1996b; 2000 (ATLAS) RCT	Lifetime AAS use (post-season)	1,145	1,317	%	1.0	1.5	1.5	2.5	Lifetime use of AAS increased at a lower rate amongst ATLAS students following the intervention compared to control at both time points (Effect size not calculable).
	Lifetime AAS use (post-season)	591	700	%	1.0	1.5	1.7	3.4	
Goldberg et al., 2003 (SATURN) CBA	New use ergogenic drugs (post- season)	62	95	Mean (SD)	0.00	0.00	0.11 (0.31)	0.10 (0.30)	The SATURN intervention had no effect on initiation of ergogenic drugs, Cohen's $d=$ 0.03 (-0.28, 0.36).
	Past month use ergogenic drugs (post-season)			Mean (SD)	0.05 (0.22)	0.05 (0.22)	0.03 (0.18)	0.11 (0.32)	Reduction in past month use of ergogenic drugs amongst SATURN participants Cohen's $d=$ -0.30 (-0.62, -0.02).

Citation(s) Study design	Outcome (follow up time)	Sample size		Measure	Pre-intervention		Post-intervention		Summary
Jalilian et al., 2011 (AS education intervention) RCT	AAS use (2 months)	60	60	%	18.3	21.7	10.0	18.3	Use of AAS was reduced in both groups, but there was a greater increase amongst those who received the intervention, Cohen's <i>d</i> = -0.39; CI -0.98, 0.20.
Nilsson et al., 2001; 2004 (appearance norms-based intervention) CCS	Oral AAS use (2 years) <sup>1</sup>	450	332	%	6.6		4.7		The proportions of participants using injectable and oral AAS were reduced in the community following the intervention (Effect size not calculable).
	Injectable AAS use (2 years) <sup>1</sup>	450	340	%	2.4		1.1		

RCT=randomised controlled trial. CBA=controlled before and after study. CCS=cross sectional cohort study. I=intervention group. C=control group. AAS=anabolic steroids. RCT=randomised controlled trial. CCS=cohort cross sectional. CS=cross sectional. SD=standard deviation. NR=not reported in article. d=cohen's d. RR=risk ratio. <sup>1</sup>Data is reported separately for 16 and 17 year olds in the cited articles and combined here.

follow up studies suggested risk factors increased (Goldberg et al., 2003, Goldberg et al., 2007). Across studies, other outcomes commonly assessed included intentions to use IPEDs, and a range of measures of attitudes, knowledge and subjective norms (as summarised in Table 1). Knowledge of IPEDs was generally improved following interventions; however, impact was less clear on intentions, attitudes and subjective norms with small changes in the desired direction on some measures.

#### Intervention fidelity in delivery

Evaluation of ATHENA identified that, on average, teams included 81% of intended intervention content in each session (Elliot et al., 2004). In no other studies was any indication of intervention fidelity reported. As such, it was not possible to determine whether interventions were delivered or received in the intended manner, or using the BCTs and strategies identified.

#### Discussion

This review examined the nature and findings of interventions that have sought to reduce use of, or harms associated with, AAS over more than two decades. In 1996 the authors of one of these interventions noted that in comparison to other substances, there had been little research into AAS prevention (Goldberg et al., 1996a). Over twenty years later, during which time concerns about prevalence and harms outside of sport have become more widely discussed and a substantial amount of research examining the topic has taken place (McVeigh and Begley, 2016), the findings of this review suggest that this statement still holds true. While there is a growing body of evidence regarding aetiology, epidemiology and related harms, it would appear that little is known on how to influence use of these substances or bring about changes in behaviour, particularly outside of sporting environments. While typically underpinned by the need to provide information, prevention interventions have been tested that attempt to induce change in AAS or other IPED use through targeting many different behavioural risk and protective factors, such as focussing on ethics and values, harms, healthy alternatives, body image and social norms. Since the studies in the 1990s by Goldberg and colleagues, these interventions do not generally appear to have built upon what has preceded them

and the evidence therefore largely consists of a series of 'one off' interventions that vary greatly in focus. There is no indication of the coherent development of a body of evidence since the first studies investigating AAS prevention, and consequently there are no clear messages emerging on what approaches are likely to be effective or ineffective.

Providing reliable information to influence choices has clearly been considered an important need by those developing interventions in this area. These interventions have typically tried to influence young people before they initiate use and prevalence was very low across studies, limiting the potential to demonstrate effectiveness with short-term follow-up measures. Additionally, while school years may be associated with onset of use for a minority of users, initiation has more frequently been reported from 20-30 years of age (Pope et al., 2014a, Sagoe et al., 2014a), an age that interventions have very rarely targeted. As young people move from school into new environments, they are likely to be exposed to different opportunities, social expectations and pressures, which may affect motivation and factors that influence their decisions. Here interventions were based almost exclusively within educational settings and provide little insight into how to provide information or otherwise intervene with intentions to reduce use amongst, or provide support to, people in other environments such as health services, fitness settings or local communities.

While it is feasible that interventions associated with effects on potential mediators may have positive impacts on future use, further testing of key theoretical concepts in experimental situations is required. For interventions with the stated aim of changing AAS or other IPED use, it is important that this outcome be measured. While secondary outcomes such as body image perceptions or social norms may be important and are therefore worthy of including, many potentially important factors may influence choices relating to AAS. Therefore, improvements in, for example, body image perception or positive group norms may not be an indication that the intervention has influenced use. Additionally, the studies here were generally based on the idea that people will make rational decisions, and therefore that increasing motivation to avoid AAS and pursue healthy alternatives will reduce use. However, decisions about health and behaviour are

not always rational and based upon a simple assessment of costs and benefits. Recent theories of motivation and decision making such as PRIME theory (West, 2006) and the Prototype-Willingness Model (Gerrard et al., 2008) emphasise the importance of factors beyond ones beliefs and values such as external social factors and internal urges and needs. This suggests that more consideration of the nature of information provision is required where the intention is to influence behaviour and choices.

### Research implications

Interventions to date have focussed predominantly on young athletes. There remains a need to develop effective interventions to respond to use in both professional and amateur sport, and the lack of studies evaluating interventions in these environments outside of schools suggests that any current approaches need to be evaluated using robust study designs. The evidence on prevention or the provision of information, support or other interventions to those already using AAS outside of the sporting domain is lacking. Interventions are required in response to use of IPEDs, particularly AAS, to enhance muscularity and appearance for non-sporting reasons. These interventions will likely require different strategies than those targeting athletes hoping to improve sporting performance and therefore the strategies applied within school sport settings may not be transferable to the wider population. For example, recent interventions that focus on influencing ethical decisions (Elbe and Brand, 2016) and creating a sense of fair play and morality (Barkoukis et al., 2016) make sense in the context of competitive sport, but seem less important outside of this environment. Evidence is needed not just on what factors interventions should focus on, but what exactly they want to achieve. Amongst sporting organisations the emphasis of policies in this area lies on developing and supporting a zero tolerance approach to doping, with efforts to identify and take action against athletes caught using AAS or any of a substantial number of banned substances (WADA, 2017).

It is less clear what the aims of interventions outside elite sport should be, or what the needs are of those who use them. Therefore, evidence is needed on what interventions should be trying to achieve with users based upon assessment of their needs and gaps in the current provision of support and services. It should also be noted

that despite the broad search terms applied in this review very little evidence on IPEDs other than AAS was identified, indicating that research on approaches to tackle issues relating to misuse of drugs used alone or alongside AAS, such as melanotan and fat burning drugs, is lacking. To inform future interventions, research is required to increase understanding on which factors influence AAS decision-making amongst different populations. For example, although limited through its cross-sectional design, a community-based intervention included in this review sought to establish norms around steroids and appearance, and was associated with small reductions in use (Nilsson et al., 2004). It identified that social norms and peer expectations are significant factors influencing use then future interventions should test how to target these constructs. A substantial body of literature exists that has explored motivations for AAS use and the experiences of men using these substances, yet there is a lack of models or frameworks bringing this information together to support understanding of decision making in important environments, and for intervention development.

#### Methodological and reporting limitations

It was intended to examine intervention effectiveness in the context of BCTs and theory applied and interventions that appeared more promising typically included higher numbers of BCTs and multiple intervention functions. Establishing norms regarding others' perceptions of AAS use, a concept further supported by mediation analyses of ATHENA and ATLAS interventions (Ranby et al., 2009, MacKinnon et al., 2001), and including an element of skills training, either weight training or imparting resistance skills alongside educational components, may be promising approaches. However while some BCTs appeared to be associated with more effective interventions, interpretation of these findings was often made difficult by ambiguous or brief descriptions of intervention content and components. Consequently, caution is needed when interpreting findings regarding intervention approaches that appeared more promising. A limitation of this review may be the application of recent tools to identify BCTs and theory application, as it is recognised that studies published before new guidance and tools were available may be less likely to meet these standards. However, use of these tools enabled the examination of studies in a consistent manner and identification of

strengths and weaknesses of the evidence base. It is likely that additional BCTs were applied in these interventions that could not be identified with sufficient confidence.

The weakness of the evidence base is not just a reflection of the scarcity of evaluated interventions, but of their reporting. Since the publication of the earliest articles included within this review, a range of tools, guidance and checklists have been developed to support the development, delivery and reporting of interventions (Michie et al., 2013, Hoffmann et al., 2014, Des Jarlais et al., 2004). The development, delivery and evaluation of future interventions should be grounded in theory (Craig et al., 2008, Glanz and Bishop, 2010) and reporting should enable the reader to identify how and why the interventions were designed, and which mediating variables were targeted. Additionally, reporting of intervention fidelity, participant understanding of interventions and detail regarding comparison conditions was largely missing in the studies included in this review. Intervention fidelity can act as a moderating factor on why interventions are effective or ineffective and should be evaluated and reported (Bartholomew and Mullen, 2011, Gearing et al., 2011). It is recognised that authors are restricted in the amount of information they can provide in articles, but can make supporting information such as protocols and manuals freely accessible elsewhere (Abraham et al., 2014). This will increase transparency, understanding of what has been implemented and replicability. Only through the accumulation of replicable and well-reported interventions will a meaningful and rich evidence base emerge.

## Conclusion

This review highlights that despite the substantial increase in research around AAS over the past three decades, and identification of use outside of professional sport, there is little evidence on how to prevent or reduce use, or provide support to people using AAS. What evidence there is comes predominantly from a set of stand-alone interventions delivered to school-based athletes that focus on a wide range of mediating factors. There is a clear need to respond to the very different issues of use outside of sporting environments. In addition to prevention, evidence is needed on how to provide support or intervene in different environments and with adult populations. For example, approaches to influence men who have already started using AAS or who have been

using for a long period of time. Increasing understanding on factors that influence choices and establishing consensus on the support needs of users that interventions can respond to is needed. Finally, a more consistent and rigorous approach to the development and reporting of interventions, with reference to the tools and guidance developed over the past decade in the field of behaviour change science, is required to establish the evidence base in this area.

**Box 1: Additional studies published since completion of the review**

Following the completion of this review in May 2017, three further studies have been published that would have met the review inclusion criteria. All three were of a preventative nature, targeted adolescents and delivered in schools. One study from Italy evaluated an intervention designed to improve media literacy (Lucidi et al., 2017) and one study from Spain evaluated an educational programme based on WADA principles (Medina et al., 2019), despite presenting the study in the context of preventing use outside of sporting contexts. One study from Australia replicated the ATLAS program with non-athletes (Yager et al., 2018). A fourth study published in 2018 appears relevant, but would not have been included in the review as it is available in Farsi only, with only the abstract available in English (Asr et al., 2018).

While these studies add to the range of approaches that interventions have employed, their inclusion would not have changed the implications and conclusions in this review, particularly given the similarity in setting and population to other approaches already considered. None of the three evaluated impact on any IPED use, presumably due to the age of participants. These additional studies add to the evidence base on IPED prevention, but do not support the development of a clearer picture in terms of what types of approaches are likely to be effective at reducing use. Additionally they do not address the other gaps identified here, such as interventions to reduce harms amongst users.

## Chapter 3: An evidence-based socioecological framework to understand men's use of AAS and inform interventions.

### Rationale and outline.

An important step in informing behaviour change interventions is thinking about all the potential behaviours and factors that interventions could target and different opportunities for delivering them. Stage 2 in the BCW framework, 'Select the target behaviour', recognises that all behaviours exist as part of, and are therefore affected by, a system of related behaviours, individuals and stimuli (Michie et al., 2014). The BCW suggests considering all the relevant options that could address the identified problem in order to select a behaviour to target through intervention rather than just those that appear most logical or obvious. To do this it is necessary to consider a wide range factors that influence AAS use.

Findings in study 1 indicate that interventions in this field to date have predominantly focussed on individuals and have largely ignored the influences of external factors. Research into men's use of AAS over the past three decades has, however, identified many factors that contribute to decision-making in this area. There is though a lack of theoretical frameworks to synthesise this research and guide practice, such as interventions to change use or provide support to users, and consequently researchers may not consider the importance of potentially significant factors. Further, interventions have generally been implemented in school, and predominantly school sport, settings. Other environments need to be considered, particularly for interventions that aim to influence people who are already using rather than preventing uptake.

To address these gaps a socioecological framework is presented based upon the international literature examining steroid use, the majority of which was identified from three recently published systematic reviews. This framework proposes that use of AAS is the result of the interaction of a range of factors at the individual, social network, institutional, community and societal levels that are likely to change over time and with experience. Viewed through this framework it is clear that AAS use can be a complex behaviour with many influential environments and relationships, impacting on a diverse

population in different ways and at different times. The implications of findings for engaging with, and providing information to, users and delivering further interventions are discussed, such as the identification of important transition times and influencing norms within social groups and communities. Important environments that appear influential on AAS choices and that may be important settings or routes for interventions are identified. The approach is informed and inspired by socioecological theory and a systems approach to support the understanding of complex behaviours.

## Socioecological models

In order to understand a behaviour it is important to recognise that it does not exist in isolation, but is part of a wider system of intra- and inter-personal beliefs, behaviours, contexts and cultures (Michie et al., 2014). Like many other theories of behaviour, the socioecological model recognises the influence of personal characteristics and immediate social influences, but also emphasises the role of wider physical, social and cultural factors. It has been used to increase understanding of a range of behaviours such as inter-partner violence (Smith Slep et al., 2014), food choices (Moore et al., 2013, Townsend and Foster, 2013), sedentary behaviour (O'donoghue et al., 2016) and alcohol consumption (Gruenewald et al., 2014). It is useful for understanding complex behaviours with many alternative explanations, drivers and influences.

The socioecological model places individuals within complex physical and social systems. It suggests that health and behaviour are a consequence of interactions between these individuals and their immediate and distal environments and experiences (Stokols, 1992, Bronfenbrenner, 1986). This is important because to develop effective interventions researchers should consider both individuals and the complex systems and environments in which they operate, and the interactions that occur between them (Sniehotta et al., 2017). The socioecological framework suggests interventions need to address multiple levels in order to achieve sustained behaviour change (Sallis and Owen, 2015). However, it appears that behavioural interventions have generally tended to focus solely on individual and intrapersonal factors and rarely sought to influence community, institutional and societal level factors (Golden and Earp, 2012). The same can also be said with AAS interventions, which have tended to focus on changing

individuals' knowledge, attitudes, perceptions and skills and been largely ineffective at influencing use (Bates et al., 2017a). These interventions have not typically targeted other levels in the socioecological framework, yet, as explored in this chapter, research has identified that AAS decision making is influenced by a range of social, environmental and societal factors. This is not to say that individual level factors are not important, but that they alone do not predict behaviours and decisions. For example, some individuals live in communities where masculine values, characterised by factors such as muscularity, physical strength or traditional male roles, are highly valued (Dolan, 2011). For these people such community level factors may be powerful motivators. If interventions target individual factors and ignore the wider contexts and environments that these individuals experience then it should not be surprising if they are not effective. Viewing AAS through a socioecological lens will help ensure that researchers consider all these important factors.

### Complex systems thinking and anabolic steroids

A socioecological framework places individuals at the centre of a system where multiple levels of factors influence the behaviour. Researchers seeking to understand health behaviours are becoming increasingly aware of the importance of exploring these wider systems in which individuals exist (Peters, 2014, Hawe et al., 2009). Systems represent a group of interrelating and interacting components that directly or indirectly influence each other under the assumption that a behaviour does not exist in isolation. Within complex systems various components exist that represent sub-systems with clearly defined boundaries. For example, if we are interested in understanding people in one city's use of green space then we can explore the city as a complex system of green infrastructure with components such as major parks, streets, trees, wetland areas and buildings. Sub-systems exist within these components. For example, in one park there may be sports facilities, woodland, a pond, and so on.

The complex systems approach is concerned with examining the relationships between components that make up a system to improve understanding on how these components influence each other and bring about changes. A key principle is the idea that everything within a system is connected with everything else, and therefore no part

of the system is completely independent (Lee et al., 2017). A change to one component will have an effect on others. This has clear implications for interventions that are looking to change one component, particularly as relationships in a system are characterised by non-linearity (De Savigny and Adam, 2009). As explored in chapter 2, researchers have often assumed that by increasing knowledge about the risks of using AAS people will make 'healthy' choices not to use them. However, there may be other factors beyond the individual and their knowledge, skills and preferences that influence behaviour. It is important to recognise this bigger picture to understand and influence individuals. Further, by understanding how systems operate it is possible to anticipate how they will react to changes and to respond to and alleviate negative responses (De Savigny and Adam, 2009).

#### Why is AAS appropriate for a systems approach?

Systems thinking has often been applied to health care systems, but can also be applied to complex behaviours and outcomes where there are multiple relevant components and social networks. In the UK, the approach has been applied to support the response to increasing rates of obesity with the development of a complex obesity systems map illustrating the relationships between over 100 components that together determine obesity for individuals or groups of individuals (Vandenbroeck et al., 2007). Similarly as to with eating behaviours, research has identified that drug use is a complex behaviour that can be effected by many variables across the socioecological domains, but has infrequently been considered in the context of systems thinking.

Harold Holder proposed a systems approach to prevention of alcohol-related problems through restructuring communities and drinking environments (Holder, 2006, Holder, 2001). The approach recognised the need to consider variables such as economic factors, the availability of alcohol, legal regulations and social and cultural norms as contributing to alcohol consumption and the development of alcohol problems, and as part of any prevention efforts. A systems approach has been applied in the UK to drug use in the context of understanding factors that promote or inhibit recovery from problematic drug use (Daddow and Broome, 2010), but generally research to understand or change drug use behaviours has not been carried out in this way. In their

article exploring obesity, Lee and colleagues (Lee et al., 2017) identify several factors that establish obesity as a systems problem that requires a systems approach in response. These include: a global scope, heterogeneous patterns, wide-ranging impacts, lack of a single cause, and the failure of single solutions. While AAS use does of course not compare to obesity in terms of the numbers of people involved, the complex causes and consequences, and complex patterns of use characterised by variations between different subpopulations throughout the world, suggests that it meets these criteria.

### **Study aims**

The aim of this study was to synthesise quantitative and qualitative research examining experiences and beliefs about AAS to present use through a socioecological framework. Frameworks of this nature have been successfully applied to understand and guide policy relating to a variety of behaviours such as violence (Smith Slep et al., 2014), physical activity (Elder et al., 2007) and smoking (Corbett, 2001) where, as with AAS, decisions may be effected by factors at different levels. Discussing the different influences on use, and how these influences interact to effect choices, will support the development and implementation of interventions such as those that aim to reduce use or to provide support to users.

### **Methods and approach**

The aim of the literature search was not to identify every piece of relevant literature as in a systematic review, but to identify a substantial body of evidence through which to develop the framework. To ensure rigour however, the search was based upon three recently published systematic reviews that sought to identify literature relevant to the research question in this study (Brennan et al., 2016, Nicholls et al., 2017, Sagoe et al., 2014a). Evidence from studies of all methodological designs were eligible to be included within the framework. This included studies predominantly based upon interviews and surveys that focused on any population or setting (such as, but not restricted to bodybuilders, gym members, elite or non-elite athletes, prisoners, young people) and considered use in any non-medical context. The reference lists of studies included within the three reviews were then examined to identify additional relevant studies. Citation

searching with these same references was carried out to identify recently published articles. Additionally, seven experts in the field who have undertaken research on AAS were contacted and asked for texts that they thought were particularly interesting or useful for understanding influences on choices. Through these methods, a substantial amount of literature was identified.

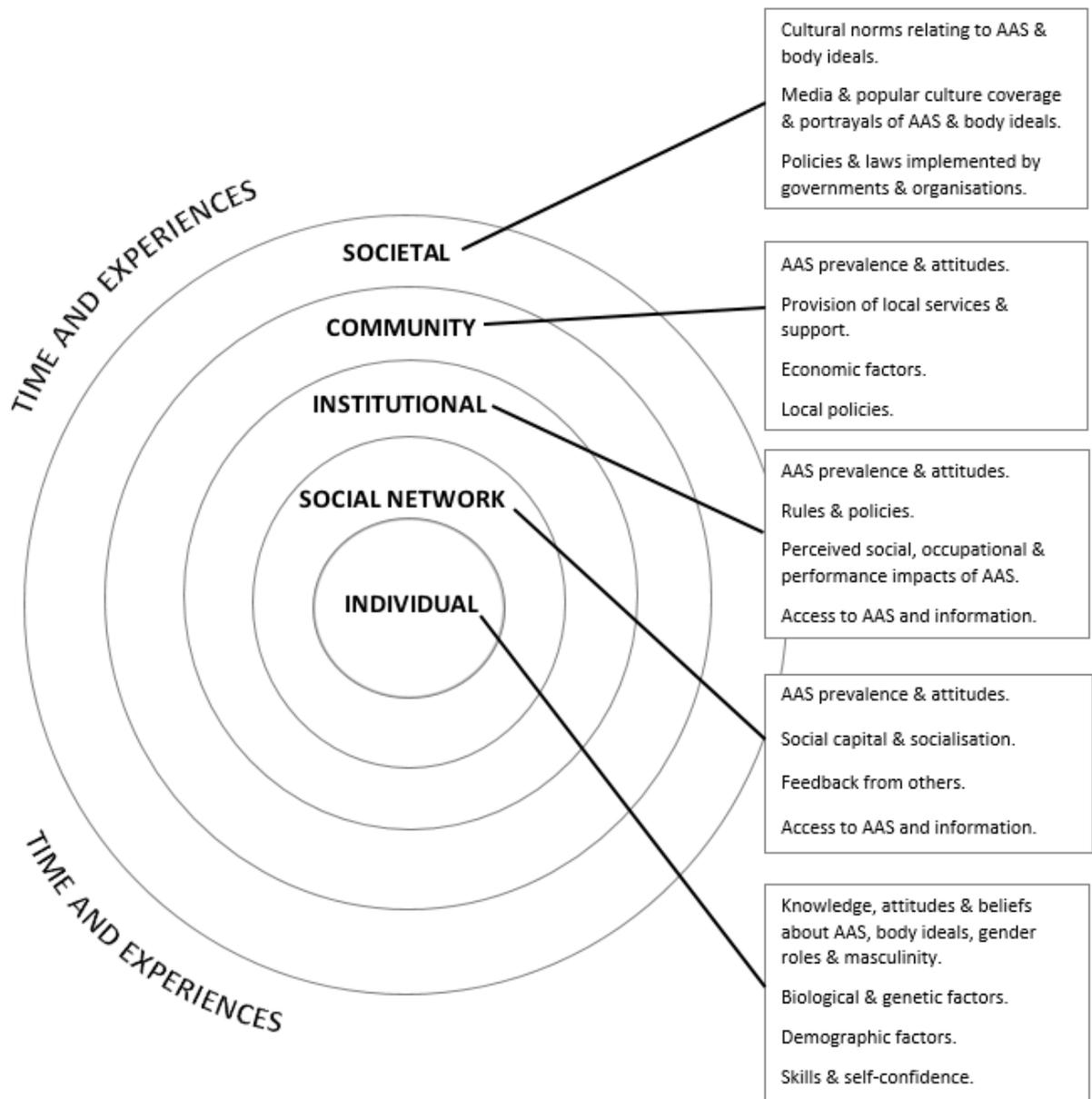
The concept for the study was presented to behaviour change specialists and health psychologists on a behaviour change training course hosted by University College London in August 2017. The researcher was assigned a mentor throughout the week's course with whom the study was discussed. Feedback from the mentor and other facilitators were used to help shape the study. A PhD student who had experience of working with, and undertaking research with, people who use AAS acted as a 'critical friend'. In research, critical friends can contribute to understanding of study findings. They can offer alternative explanations to interpretations and conclusions from the perspective of somebody more distant to the data than the researcher and using their own experiences and understandings relating to the phenomenon of interest (Coghlan and Brydon-Miller, 2014). The critical friend reviewed study findings and provided feedback on these through two discussions, held after the initial analysis was complete and after findings were written up. Finally, an article based upon the study was published in the *Journal of Drugs: Education, Prevention and Policy* (Bates et al., 2018). Through the peer review process, feedback from reviewers regarding the presentation of findings in the graphic framework and clarity of the methods used were helpful in production of the article and this chapter. This chapter is based upon this article, and, as in chapter 2, in sections the text of the published article is reproduced here, but has not been put in quotations for reasons of readability. The text in the article was written by the researcher who wrote this thesis, with the other authors' input coming through supporting study design and/ or limited to commenting on drafts of the article. Confirmation of author input for the published article is provided in appendix 6.

## Findings

Identified articles were reviewed and where findings related to causes or influences on AAS use (including those relating to initiation, continuation and cessation) were identified, these were extracted. These factors were grouped together thematically and then organised using a socioecological framework. The framework, presented in figure 4, presents use of AAS as the result of the interaction between factors in the different socioecological levels. This includes the users' biological and demographic characteristics, beliefs and experiences; the norms, attitudes and pressures in their social networks and relationships; the institutions and environments where these social relationships occur; the characteristics of the communities they experience; and the norms and policies of the wider society these influences exist within. Relevant theoretical concepts and evidence from outside the AAS evidence base was brought into the discussion of the framework alongside the evidence identified in this study to provide context to findings within each layer of the framework.

The factors identified as influencing use are presented here through the levels in the framework. The originator of the theory of ecological systems, Urie Bronfenbrenner, updated his model to include what he termed the 'chronosystem' to allow for the influences of time and environments that individuals experience at different points in their life (Bronfenbrenner, 1986). To understand use it must be accepted that individuals will move in and out of different leisure environments, workplaces, social networks and communities over their lifetime. At many important transition points in their life (e.g., starting a career, entering higher education), individuals will be exposed to new influences in new settings and these can all effect their choices. Therefore, within each level in the framework the impact of time and experiences is recognised.

Figure 4: A socioecological framework for understanding AAS use



## Individual level

Prevention interventions in this area have typically focused on changing individual level factors (Bates et al., 2017a) and evidence suggests that attitudes, beliefs and personal traits do contribute to AAS decisions. Recent work has sought to develop a typology of male users based around their individual characteristics (Christiansen et al., 2016). The typology includes four ideal types, but recognises that there is much further variation in characteristics and approaches to use. Beliefs about appearance and AAS (Bloodworth et al., 2012, Judge et al., 2012, Lucidi et al., 2008) and their use by others (Woolf et al., 2014) have been identified as important and attitudes are likely to be reinforced or changed through personal experience over time. It is commonly identified that individuals may initiate use to overcome perceived genetic physical limitations (Van Hout and Kean, 2015, Kimergård, 2014, Grogan et al., 2006, Hanley Santos and Coomber, 2017). This suggests that biological factors such as muscularity and body shape that can be achieved through natural and chemical means, as well as the body's response to AAS, will influence decision-making.

It has also been suggested that some individuals may be more susceptible to AAS dependence due to biological characteristics. For example, variations relating to the neuroendocrine system and neurotransmitter mechanisms may increase or reduce vulnerability to severe withdrawal symptoms following discontinuation (Kanayama et al., 2009a). Certain demographic factors have also been associated with use, which is more prominent amongst males, and while initiation occurs within a wide age range it is most likely between 20 and 30 (Sagoe et al., 2014a, Pope et al., 2014a). Factors such as high drive for muscularity or muscle dysmorphia (Jampel et al., 2016, Zelli et al., 2010a), holding masculine values (Keane, 2005), valuing traditional male roles (Kanayama et al., 2006) and low levels of self-esteem (Blank et al., 2016, Nicholls et al., 2014) have been associated with increased likelihood of use. Other personal factors identified include a history of abuse or bullying (Petrocelli et al., 2008, Dennington et al., 2008), the tendency for risk taking behaviours (Pedersen and Wichstrøm, 2001, DuRant et al., 1995) and moral disengagement (Mallia et al., 2016, Judge et al., 2012). The socioecological framework recognises the significance of these individual level factors,

but suggests that they become more important in, and can be influenced by, certain environmental and social contexts.

### Social network level

The evidence points towards the importance on use of relationships and social networks in many different environments. Mixing with other users can be influential through normalising and providing access to AAS (Boardley and Grix, 2014, Dennington et al., 2008, Maycock and Howat, 2005), and facilitating the diffusion of information (Maycock and Howat, 2005, Kimergård, 2014, Grogan et al., 2006). Similarly, the increased acceptability of, and positive attitudes towards, AAS by significant others (Lucidi et al., 2008, Zelli et al., 2010b), and, for athletes in their support team such as coaches, trainers and medical staff (Hoffman et al., 2008, Stilger and Yesalis, 1999, Nicholls et al., 2014, Madigan et al., 2016) are likely to impact on use. Pressure from peers (Midgley et al., 1999, Wroble et al., 2002) as well as perceived pressure to use in order to compete with peers who are already doing so may also encourage uptake and continued use (Canadian Centre for Ethics in Sport, 1992, Olrich and Ewing, 1999, Grogan et al., 2006, Petrocelli et al., 2008).

A substantial body of evidence points towards the importance of the social benefits from AAS use as contributing towards behaviour. The desire to fit in and gain approval is likely therefore to be important in initiation, while positive reinforcement and a sense of belonging may drive continued use. Work exploring the experiences of users has consistently identified social recognition and peer approval as important benefits from the physique gains achieved with the help of AAS (Dennington et al., 2008, Olrich and Ewing, 1999, Olrich, 1999, Petrocelli et al., 2008, Hanley Santos and Coomber, 2017, Kimergård, 2014, Ravn and Coffey, 2016). Researchers have documented the importance of socialisation associated with use amongst groups such as bodybuilders (Maycock and Howat, 2005, Maycock and Howat, 2007) and doormen (Monaghan, 2003). The influence of others from networks of users extends beyond their substance use into lifestyle and behaviour (Maycock and Howat, 2007, Fussell, 1991). Additionally, a shared perception of safety regarding risky practices may support increased risk taking in these environments (Kimergård and McVeigh, 2014a). Comparisons can be made with

the 'risk environments' theorised for other groups who use drugs where belonging to a group with similar values and beliefs helps rationalise risk and make it acceptable (Rhodes, 2009, Rhodes, 1997).

The association between use and enhanced social status and belonging has also been identified in online communities (Smith and Stewart, 2012). The growth of the internet has increased the amount of related information produced and access to this, which may enhance feelings of capability and safety amongst users (Kimergård, 2014) and make available information that previously would have been predominantly transferred within sub cultures. Online forums are popular amongst many users and facilitate the sharing of experiences and information (Smith and Stewart, 2012). Further, steroids are easily purchased online from a number of websites (McBride et al., 2016).

#### Institutional level

Social environments and organisations are settings where important information is disseminated, interactions occur and relationships develop that are particularly influential on use. Participation in competitive or non-competitive weight training and sports where strength and physique are important are risk factors (Nicholls et al., 2017) and gym and sporting environments are perhaps most frequently discussed in relation to AAS. Where use is common, the acceptability (Boardley and Grix, 2014, Dennington et al., 2008) and normalisation (Grogan et al., 2006, Hanley Santos and Coomber, 2017, Boardley and Grix, 2014, Dennington et al., 2008) of this appears to facilitate use in others and provides access to suppliers and information providers. Environments and institutions where use is seen as normal, acceptable (by both users and non-users) and beneficial may be conducive to initiating and continuing use. Individuals who otherwise would not have considered starting to use, for example a young person entering a gym or competitive sporting environment, may find peers having a significant impact upon their AAS choices.

'Normalisation' effects have also been identified in the workplace (Hanley Santos and Coomber, 2017). Occupational use has been discussed relating to professions such as police officers (Hoberman, 2017, Hoberman, 2015, Turvey and Crowder, 2015),

doormen (Maycock, 1999, Maycock and Howat, 2007, Midgley et al., 2001, Monaghan, 2003) and army personnel (Hoberman, 2017). This may help to achieve the strength and size perceived to be important for dealing with risky scenarios and to achieve the physique expected by employers and colleagues. Similarly, in prison environments prisoners may feel that projecting strength is important for reasons of safety, with this population identified as one of the most 'at risk' groups for using AAS (Sagoe et al., 2014b). Within certain environments, the perceived benefits may outweigh any perceived risks in a way that might not occur outside of that context.

### Community level

Individuals and institutions should be considered within the context of the communities they exist within. Cohen and colleagues (Cohen et al., 2000) identified four categories of structural factors within communities that influence health behaviours including i) the availability of consumer products, ii) physical structures, iii) social structures and iv) cultural messages. According to Cohen's model, the enforcement of policies and laws, access to environments and institutions conducive to or accepting of AAS, community norms about and prevalence of use and access to healthcare services impact upon steroid choices of the local population.

Access to and prevalence of environments such as those discussed in the institutional level will vary between communities. Examples may include the increased prevalence of 'hard-core' bodybuilding gyms or manual occupations in more deprived or working class areas. Further, manual occupations have been linked with masculine and physical cultures and traditional male roles (Nixon, 2009, Dolan, 2011). These masculine values are evident at the community level and can be reinforced amongst boys from an early age (Evans et al., 2011) and in more working class communities may particularly be associated with toughness and success (Dolan, 2011). The relationship between use and socioeconomic status is not straightforward, however: Users are more likely to be employed than those who use other illicit drugs and rates of educational achievement, employment and income amongst users have been demonstrated to be comparable or better than average (Cohen et al., 2007, Westerman et al., 2016). Purchasing AAS along with nutritional supplements and other substances often used concurrently to further

enhance physique or manage side effects (Sagoe et al., 2015) for long periods of time, along with additional costs such as gym membership and equipment, indicates that a commitment to the bodybuilding lifestyle can be expensive.

The availability of appropriate healthcare services and the level of engagement between health professionals and the local population of users will influence health seeking behaviours, information provision and treatment opportunities. In countries such as the UK and Australia NSPs are a common source of injecting equipment (Kimergård and McVeigh, 2014b, Dunn et al., 2016) and with use associated with a range of acute and chronic adverse effects (including those associated with needle sharing), healthcare access is clearly important. However many users may be reluctant to engage with healthcare services (Zahnow et al., 2017) and report concerns about stigma, knowledge and attitudes of health professionals that may reduce contact (Dunn et al., 2016). Men with strong masculine values may be reluctant to engage with the healthcare system (Courtenay, 2000, Springer and Mouzon, 2011). Further, where healthcare coverage is inadequate this can have adverse health effects for AAS users (Griffiths et al., 2017).

#### Societal level

At this final level factors are included that together generate the societies that users exist within, and promotes norms and expectations regarding body image, gender stereotypes and use. These concepts have been explored extensively by Harrison Pope and colleagues. They suggest that increases in body insecurity and desire to increase muscularity amongst males in many parts of the world over the past decades reflect Western societal expectations regarding the male physique and unrealistic body ideals that AAS may help to reach towards (Pope et al., 2000). Pope suggests this is reflected in portrayals of strong men, such as the increasingly muscular physiques of male action heroes and children's toys. Research with users has suggested that some were influenced by images and portrayals of AAS and muscular physiques in media such as men's and fitness magazines (Dennington et al., 2008) and social media (Van Hout and Kean, 2015), and prevalence is higher worldwide in regions where muscularity is associated with masculine values (Sagoe et al., 2014b). It is clear however that most men who are exposed to such images and ideals will not go on to use AAS and it is important

to consider why these portrayals resonate with some individuals but not with others. This may reflect the interacting influences of other factors explored in this framework such as values and beliefs regarding muscularity, masculinity and AAS inherent in communities and individuals.

The role of media and cultural influences may be in promoting muscular and lean body ideals, rather than explicitly AAS, and different forms of media exposure have been associated with attitudes and expectations relating to muscularity and body dissatisfaction. For example, exposure to increasingly muscular and lean images of male characters in video games has been linked to body and muscle dissatisfaction and more muscular body ideals (Barlett et al., 2008, Harrison and Bond, 2007, Agliata and Tantleff-Dunn, 2004). Similarly, depictions of men on television and film are typically more muscular and lean than the average man (Lin, 1998, Morrison and Halton, 2009, Dallesasse and Kluck, 2013) and time spent watching television has been associated with increased drive for muscularity (Cramblitt and Pritchard, 2013). When individuals feel unable to match these body standards reinforced through cultural representations of the male physique they may be more likely to consider AAS. Indeed, prevalence amongst western in comparison to Eastern cultures is indication of the importance of these cultural factors (Kanayama and Pope, 2011). A recent study identified a positive correlation between the level of news coverage regarding AAS use amongst athletes and celebrities and public interest in AAS in Peru, as measured through internet searches (Avilez et al., 2017). This raises the question of how the public responds to media coverage of high profile cases of AAS use and prevalence in the general population. It is possible that increased coverage establishes perceptions of normality and acceptability, and behavioural theories have long pointed to the influence that belief about the prevalence of a behaviour holds.

Finally, there are many examples of policies that can influence AAS use. Most sporting organisations ban AAS alongside other IPEDs (WADA, 2017), with drug testing policies commonly implemented for elite athletes as part of efforts to reduce use. These are seen as a deterrent by some athletes but not others (Overbye, 2017) and some may seek alternative IPEDs not identified through testing procedures or exploit exemption policies

allowed for those with legitimate medical conditions (Harper and Donnor, 2017). The effectiveness of these policies may be influenced by factors within other levels in this framework such as attitudes of individuals and their significant others towards drug testing and consequences of being caught. Governments can influence the availability and acceptability of AAS through laws, which vary by country. For example, in the UK personal possession is legal while supplying to others is an offence and there are restrictions on importing AAS purchased outside of the UK or online. In comparison, in the USA possession is illegal, unless prescribed. The commissioning and funding of services or materials designed to educate or to reduce harm associated with AAS, such as clinics, NSPs, or information websites and hotlines are examples of public policies that may influence AAS use and related behaviour.

## Discussion

This framework helps us understand the association between use and a range of factors that change over time as users experience new environments and develop new relationships and social networks. Further, this study provides a framework through which to view routes for interventions to influence behaviour and outcomes related to AAS use. As illustrated here however there are many other potential environments beyond schools (which interventions to date have typically been delivered in) worthy of attention, and other influencing factors to consider when planning such interventions. For example there may be merit in changing knowledge and beliefs about body norms and AAS, but efforts that fail to also recognise the importance of the role of individuals in the wider systems, for example social networks and the environments these networks are formed and interact in, are unlikely to achieve sustained benefits. Conversely, individual processes remain important to target and focusing on the wider systemic levels without considering individuals and their behaviours is also likely to lead to ineffective interventions (Sniehotta et al., 2017). For complex behaviours with competing or complimentary influences interventions should address multiple socioecological levels to be effective (Sallis and Owen, 2015) and this framework will be useful for identifying potential behaviours and factors to target.

## Implications

Throughout this chapter, examples are provided that demonstrate how levels in the framework interact and help to explain why some factors may influence some individuals more than others at different times. A key concept underpinning the framework is the influence of time and experiences. It is expected that as individuals age and experience critical life events and new environments the factors that influence their decision making explored within this ecological framework will change. The timing for interventions will be important and approaches delivered at important transition times, such as upon entering environments, such as a gym or place of work where AAS are perceived to be beneficial or normalised, or following injury or an adverse health outcome associated with AAS use, may be more likely to have a preventative or habit breaking impact.

Certain factors appear particularly influential across multiple levels in the framework. Perceived normalisation and acceptability of AAS amongst social groups in different environments and communities appears to facilitate initiation and continued use and exposure to norms regarding related concepts such as masculinity and muscularity also appear important. Establishing healthy and desirable norms amongst groups and communities or correcting false descriptive norms about prevalence may therefore be beneficial. Related to this, the role of significant others (for example peers, competitors or colleagues) as information providers, motivators and in reinforcing behaviour and the desire to achieve recognition and social capital appears influential in a range of environments. The influence of other users is clear, and suggests that peers and influential others could have a positive role in delivering harm reducing and health promoting information to others in their networks and environments. More research on the dynamics of the social networks of users and their environments and investigating the diffusion of information within them may help understanding of how these relationships might be utilised. However, it remains important to consider these social networks in the context of the complex systems that users operate within. Decisions are not the result of any one level of the system alone (De Savigny and Adam, 2009) and using this framework to explore factors across the different socioecological levels, and

their interaction, will help ensure that those looking to understand use or develop interventions account for this complexity.

According to the BCW, it is important to consider a wide range of potential behaviours that interventions could feasibly target in order to address a problem (Michie et al., 2014). This socioecological framework supports this process by identifying exposures known to influence use. Additionally while this study does not attempt to map a system of influences on AAS choices, it contributes towards increasing understanding of this system by identifying important relevant components. A number of environments are identified as influencing decisions relating to AAS such as gyms and sports clubs, workplaces, prisons, and healthcare services, which represent components in this broader system.

### Limitations

While a broad range of factors influencing AAS use have been identified, the relative strength of these factors at different times and for different populations is unclear. Studies to date have tended to explore potential predictors and causes of use without seeking to compare these and future research could seek to quantify this to support interventions to focus on the most appropriate influencing factors for specific populations. Much of the evidence-base included here focussed on one socioecological level and in many cases the studies were looking to identify the association between use and a specific factor, for example exposure to media portrayals or social norms. It seems likely that in such studies, other potential important factors might have been overlooked.

Although a substantial amount of evidence has been considered, it is likely that as the evidence base develops further the framework will require modification. People who use AAS represent a diverse population with different motivations, experiences and backgrounds. A recently developed typology of users (Christiansen et al., 2016) increases understanding of the types of individuals who use these substances and suggests that there is substantial variation in their characteristics, motives and approach to their AAS use. Therefore it is likely that the factors that influence decision making

within this diverse population will vary greatly also. Using the typology and this framework together to identify which factors are more influential for different groups may help to continue recent progress in increasing understanding of use and informing the responses of health professionals and policy makers.

For example, the majority of research in this field focuses on factors relating to the initiation of AAS and there is less investigation of later decisions such as changes in use, transitioning from oral to injectable use and cessation. Much of the research has focused on athletes, bodybuilders and strength training environments and may not represent many of this diverse population. While the amount of research into users has increased greatly in recent years (McVeigh and Begley, 2016) it would appear that little evidence is available for many subgroups amongst this broad population. Therefore, the framework is perhaps quite generalised and subgroups for whom less research is available, for example gay men, older men and those in prison environments may not be represented in this framework. Females also take AAS, but it cannot be assumed that they do so for the same reasons as men.

## Conclusion

Using an ecological approach, this framework suggests that use of AAS is the result of the interaction of many factors at the individual, social network, institutional, community and societal levels that are likely to change over time. Increasing understanding of use in this way will support the development of effective interventions designed to prevent or reduce use and provide support to users. The influences of peers, social networks and norms about AAS, muscularity and masculinity, particularly in the context of environments where AAS are associated with success or social rewards, appear worthy of attention for those designing interventions aiming to influence choices. The findings suggest that several environments may be important and influential for users and that research is needed to increase understanding of how these different environments and social networks can be used in the delivery of positive messages and support.

## Chapter 4: Identifying priorities to improve health and manage risk amongst men who use AAS. Provision of information and support.

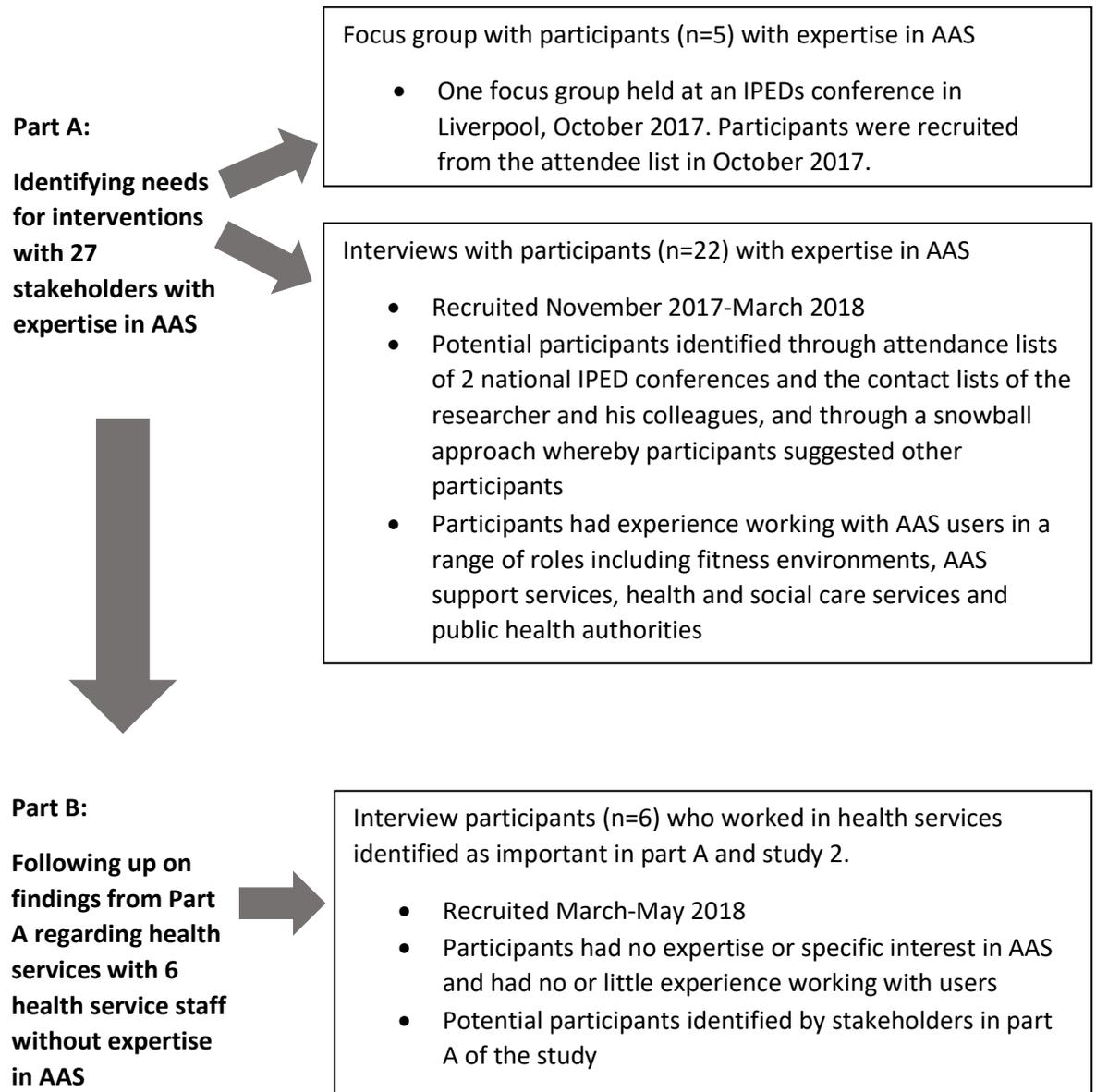
### Rationale and outline.

The widespread use of AAS and the increasing availability of evidence pointing towards a range of related harms, risky behaviours and negative health outcomes for users justifies the need for interventions. In the UK, users are recognised as a priority group in the Government's 2017 Drugs Strategy (HM Government, 2017) but there is insufficient formal guidance to inform the provision of services and interventions beyond the provision of injecting equipment (National Institute for Health and Care Excellence, 2014). Further, there is a lack of empirical evidence internationally to inform the provision of support services to this group (Bates et al., 2014) or any other types of interventions. While a substantial amount of research has examined AAS use in terms of motivations and influences, research has rarely explored what interventions are needed for, or likely to be effective with, this group. In order to develop effective interventions it is first necessary to clearly define and specify the behaviours or outcomes that are to be targeted. According to the BCW (Michie et al., 2014), this requires clarity and precision about the problem that is to be addressed regarding the population, the behaviour itself and the intervention.

This study therefore aimed to identify consensus on what the priorities are for interventions in response to widespread use and increasing evidence of risky behaviours and health harms amongst AAS using populations. Further, the study aimed to generate ideas for interventions in response to these priorities. The study was split across two stages. The main part of this study (part A) involved stakeholders with a range of expertise and experience relating to AAS. Following this stage, a second part of the study (part B) followed up some specific ideas coming out of the first stage with a smaller group of stakeholders with specialist knowledge and experience relating to these points. In total, 33 stakeholders with a wide range of experience relating to AAS were asked to take part through one focus group and largely unstructured interviews and encouraged to discuss their ideas based upon their experiences and expertise. The recruitment of participants through the study is summarised in figure 5. A range of priorities was

identified under three overarching themes: Opportunities to provide information and support, improving engagement, and choices and behaviours. The first two of these themes are discussed in this chapter.

*Figure 5: Summary of study 3 participants*



## Part A – the views of stakeholders with expertise in AAS

### Recruitment

The inclusion criteria for participants were that they had worked with users in any capacity. While users were eligible to take part, in this case their expertise was primarily sought in relation to their experiences of working with other users. The focus therefore was on recruiting individuals who were involved in planning or delivering health or leisure services or information provision for users. It was important to include participants from different environments and different perspectives to identify priorities that related to as much of the AAS using population as possible. Identification of participants was supported through the development of the socioecological framework to identify influences on users, which identified settings and services where users commonly access and seek advice or support. Participants were identified and recruited through (i) attendance lists of two conferences focussing on use of IPEDs in a public health context that the researcher had been involved with, (ii) a snowball approach where participants and colleagues were asked to recommend any individuals who they felt would be appropriate to take part, which continued throughout the study. Potential participants were contacted by email or telephone and the purpose of the study, and why they were being asked to take part, was explained.

### Data collection

The researcher had undertaken a number of research projects relating to AAS use and health service provision as part of, and prior to, this PhD before starting this study, and therefore had a number of preconceptions and expectations relating to the study aims. To avoid superimposing these preconceptions onto participants, an inductive approach was undertaken, which has been commonly used in research relating to health and social sciences (Thomas, 2006). The idea that research can be purely inductive and that researchers collect and analyse data with no knowledge or expectations appears questionable (Kennedy and Thornberg, 2018) and it is recognised that the inductive approach in this study was unlikely to completely overcome the issue of prior knowledge impacting on findings. Indeed when discussing the inductive approach, Thomas (Thomas, 2006) states that “it is inevitable that findings are shaped by the assumptions

and experiences of the evaluators conducting the study and carrying out the data analyses” (p.240), but recognises the usefulness in this for making decisions about what data is important. Therefore while this study was not intended to be an example of ‘pure’ induction, adopting this approach to data collection and analysis aimed to minimise the impact of the researchers’ preconceptions and to allow the generation of new ideas in line with Strauss and Corbin’s (Strauss and Corbin, 1998) definition: “The researcher begins with an area of study and allows the theory to emerge from the data” (p.12). Unstructured interviews are suitable for research where participants are to be asked open-ended questions to explore their perceptions relating to the research topic (Firmin, 2008). Through this inductive approach, the study aimed to understand the perceptions of stakeholders and the unstructured interview structure was chosen to support participants to bring up topics perceived to be relevant and important rather than topics the researcher presumed to be so.

The first five participants were invited to take part in a focus group held at an IPED research event hosted by LJMU. The focus group format was utilised to stimulate discussion and establish any initial points of consensus. Subsequently, all remaining participants were invited to take part through an interview. Where practical, face-to-face interviews were arranged, but because participants were based in a range of geographical locations interviews on skype or telephone were offered. Immediately prior to each interview, the aims of the study were reaffirmed and consent was gained to record the conversations. To help them prepare for the interview, participants were informed in advance that they would be asked about what they thought were key priorities to address in order to improve health and reduce risk amongst users. This broad question was used to initiate discussion at the start of each interview, after which the interviews followed an unstructured format and no pre-determined interview schedule was used.

While this unstructured format was used throughout the study, where participants discussed topics that had been raised previously, they were encouraged to provide more information or to follow up on specific points. For example, participants commonly discussed that general practitioner (GP) knowledge and understanding of AAS is often

inadequate leading to unsatisfactory experiences when users visit their doctor. Therefore, if subsequent participants identified GPs as having an important role, they were asked to reflect on the perceptions of participants who had preceded them in the study and whether this matched their own experiences. Additionally, if the participant had a specialist interest or expertise that would give them particular insight into a topic raised by others then this was discussed. For example, some participants suggested that one setting to deliver interventions could be sexual health services so a participant whose role included commissioning such services was specifically asked for their reactions to this idea. To support this, interview transcription was completed shortly after each interview and transcripts read thoroughly, with notes made on potential themes and topics to follow up with other participants.

This approach to data collection therefore allowed the research to initially identify a broad range of perceptions in response to the research question. By following up on themes with subsequent participants, while still allowing them to lead the discussions according to what they felt were the important areas to address, it was possible to get feedback on ideas and further develop these themes. This was important not only to act as a check upon the researcher's interpretation of the data, but also to explore whether participants agreed with what others had suggested or if they had different perceptions and experiences.

## Analysis

The inductive approach continued during analysis, with the emphasis on generating themes from the raw data collected rather than using any pre-determined coding or theoretical framework. Thematic analysis was a pragmatic choice as the analysis approach. Reflecting the aims of the study, it was chosen to support the identification of areas of consensus (and conflict) between participants regarding intervention needs through the development of themes based on the stakeholder responses. Additionally, it was hoped to collect a substantial amount of data to represent the views of a range of stakeholders, and thematic analysis is useful for identifying commonality in large datasets (King, 2004). It has frequently been used in health research and is particularly useful for applied research where study findings need to be conveyed to non-academic

audiences (Braun and Clarke, 2014). A key part of this research was following up findings with further participants and therefore it was important that findings could be easily communicated.

Braun and Clarke's six-step guidance for undertaking thematic analysis (Braun and Clarke, 2006) was followed to guide the analysis process in both qualitative studies. This guidance is used in the fields of psychology and health by researchers looking to undertake thematic analysis and has been cited over 40,000 times. The flexibility of the approach was a key advantage as the guidance could be adapted for the different parts of the study with the change from inductive to deductive collection and analysis of data. The authors highlight that their form of thematic guidance is suitable for both data and theory-driven forms of analysis (Clarke and Braun, 2017). The steps in the thematic analysis are described here, with the corresponding phases in the guidance developed by Braun and Clark (2006) indicated. While the analysis is described in a linear format here, in reality this was an iterative process where phases overlapped and were returned to throughout the analysis.

#### *Familiarisation with data (Phase 1)*

All audio recordings were transcribed in full. Transcriptions were read following this process with notes made. These notes were primarily used to act as prompts for subsequent interviews as potential questions to follow up with and to reflect on what worked and what did not work during interviews. The transcriptions were returned to throughout the analysis as part of the process of checking codes and themes in the context of the wider data set they had been identified within.

#### *Generating initial codes and searching for themes (Phases 2 & 3)*

An inductive data-driven approach was applied during coding to enable identification of any priorities in response to the research question. As such, an open coding approach was utilised and no coding framework was developed. Data was systematically coded within each transcript with a code identified for all data. Therefore, any data that related to priorities to address amongst users and ideas for potential interventions, improvements or changes that could be implemented in response to these needs were

assigned a code. This initial long list of codes was reviewed and similar or overlapping codes were combined to give 113 codes, grouped together into 17 preliminary themes. These initial codes and themes are presented in appendix 7. Finally, all data for each code was extracted from transcriptions into an excel file, and collated by preliminary category and code.

#### *Theme development (Phases 4 & 5)*

Once codes from all interviews had been identified and grouped into initial themes, these were examined more closely and refined, and sub themes developed. A mind map was created to support the development of themes and their presentation. A full version of this, from which the themes presented here were developed, is presented in appendix 8<sup>5</sup>, with summaries presented as thematic maps in the results section. Themes and sub themes were developed and refined, which involved revisiting the transcripts to check extracts and coding in the context of the wider interviews.

#### *Study validity and credibility*

The two qualitative studies in this thesis were both informed and guided by Tracy's *Eight "Big Tent" universal criteria for excellent qualitative research* criteria (Tracy, 2010). Denzin coined the term 'big tent' in response to the dismissal of qualitative research by some authorities and decision makers in favour of quantitative and experimental research designs (Denzin, 2008). Recognising that qualitative researchers would be better off coming together and recognising the value that all types of qualitative research offer than arguing with each other, Denzin called for a 'bigger tent' in which to include these different paradigms. Considering the range of methods and approaches as one however raises some issues when assessing the rigor of a study. Indeed, some researchers have argued against developing criteria to judge qualitative research. Rather than arguing against the idea of judging research quality, these researchers proposition that there is no one way to measure the quality of qualitative research (Bochner, 2000, Guba and Lincoln, 2005) due to the range and diversity of methodologies that exist. Therefore, they suggest that no predetermined criteria can be

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<sup>5</sup> The thematic map presented in appendix 8 includes all three themes presented here in chapter 4 and in chapter 5, and their subthemes.

appropriate to judge quality (Rolfe, 2006, Sandelowski and Barroso, 2002). Other researchers however recognise that while there is great diversity within them, all qualitative methods have common features and that robustness and rigour must be assessed if research studies are to be reviewed and used effectively (Dixon-Woods et al., 2004, Tracy, 2010, Tracy and Hinrichs, 2017).

Numerous guidance exists through which to develop and assess quality in qualitative research. Rather than offer fixed criteria to firmly guide researchers conducting qualitative research, *Eight "Big Tent" criteria for qualitative research (Tracy, 2010)* offers flexible universal criteria for all qualitative research types to support high quality research. The 'Big Tent' criteria state that high quality research is characterised by i) worthy topic, ii) rich rigor, iii) sincerity, iv) credibility, v) resonance, vi) significant contribution, vii) ethics and viii) meaningful coherence. Tracy distinguishes between the methods that researchers use and the end goals of the research, which she describes as the universal hallmarks of good quality research. By doing this, it is possible to create criteria for these end goals that can be applied in studies using any of the wide range of paradigms and methods that exist within qualitative research (Tracy and Hinrichs, 2017). Therefore while Tracy's work supports a criteriological approach whereby the rigour of any qualitative research can be assessed through universal and predetermined criteria (Sparkes and Smith, 2009, Garratt and Hodkinson, 1998), it recognises the methodological and epistemological variations within the complex qualitative research community. Further information on each of the eight 'Big Tent' criteria is provided in appendix 9, along with a description of how quality was ensured in the two qualitative studies in this thesis in response to these criteria. The criteria are cited over 2,500 times in a range of methodological books, qualitative studies and discussion articles. However, while it was used as a way to promote trustworthiness and rigor in these studies, it is recognised that this approach is not without critique. For example, while supporting the use of universal criteria, Gordon and Petterson (2013) expressed concern that ethical considerations should not be in its own discrete criteria, but should be reflected throughout and theoretical frameworks must be made explicit.

Other researchers may still question the usefulness of applying universal criteria in qualitative research. Smith and McGannon describe that universal criteria for qualitative research are “inherently problematic” (pg 14) due to their exclusionary nature and impact upon knowledge production and creativity, and raise issue with how the criteria are often applied (Smith and McGannon, 2017). They suggest that where the *Eight ‘big tent’ criteria* are used to guide work, researchers must follow all eight of the criteria, as failure to do so undermines the apparent universality of the approach. Smith and McGannon claim that researchers commonly do not demonstrate all eight criteria or take into account the range of approaches highlighted by Tracy to achieve these standards (Smith and McGannon, 2017). Considering these comments, all eight criteria were considered<sup>6</sup>. To ensure that this work was underpinned by rigour, participants reflected on findings from prior participants during their interviews and the ‘critical friend’ discussed in chapter 3 also performed the same role during the qualitative studies. Study progress was discussed at two times during data collection and analysis, and feedback was provided on the generation and structure of themes.

The consolidated criteria for reporting qualitative research (COREQ) checklist (Tong et al., 2007) was used to guide the development and reporting of the study. The checklist aims to support transparency in the reporting of research undertaken through interviews and focus groups and to enhance the rigour and credibility of such studies. The COREQ checklist recognises many factors that may be associated with potential bias under three domains: Research team and reflexivity; study design; and analysis and findings. Considering and providing detail on these factors both helps the reader interpret the study findings and the author to plan and on reflect on their study. For both qualitative studies, COREQ was used to inform the development of study methods and reporting and the completed checklist is provided in appendix 10.

### Ethical considerations

The primary ethical concerns with these interviews related to confidentiality and anonymity, as out of a relatively small pool of experts relating to AAS, it may have been

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<sup>6</sup> This applies to both the study currently under discussion and the second qualitative study in this thesis (study 4)

possible to identify participants by reference to their location or employment. It was recognised that participants might disclose sensitive information such as their experiences working with service users and their opinions on service users, colleagues, current practices and the law. Additionally, while users were not targeted in the study it was likely that some of the sample would be current or past steroid users given their interest and expertise in this. Although they would not be asked about their own use in this study unless they themselves brought it up, it was recognised this might be disclosed. Steps were undertaken therefore to ensure participants were anonymised. All reference to locations or specific services mentioned were removed and generic descriptions of job roles were used, as in some cases, it may have been possible to identify participants by their job titles. These measures may have limited the research slightly as it was consequently, for example, not possible to identify specific services that might serve as examples of good practice or identify whether any issues were prominent or otherwise in any geographical regions. Additionally, on the participant information sheet advice was included for any participants with concerns about their own steroid use.

Ethical approval was obtained to undertake this study from the LJMU Ethics Committee in September 2017 (reference: 17PBH047).

## Results

### Description of the sample

In total, 30 individuals were approached to take part in the work. One focus group with five participants and 22 individual interviews were carried out; one individual was unable to participate because of illness and two did not respond to the invitation. All participants had expertise relating to AAS and experience working or commissioning services for users. This included 11 participants who worked in substance use services or specialist IPED clinics; six participants within public health authorities who had been involved with commissioning and delivery of substance use, pharmacy and sexual health services; three participants who owned or managed a gym; three fitness trainers; two academics who undertake research in the field; one probation officer and one GP. Of the 27 participants, eight disclosed that they used, or had formerly used, AAS. As the

focus of the study was on exploring participants' perceptions based upon their work and experiences with other users, participants are referred to in the discussion of findings in the context of their role rather than any personal use.

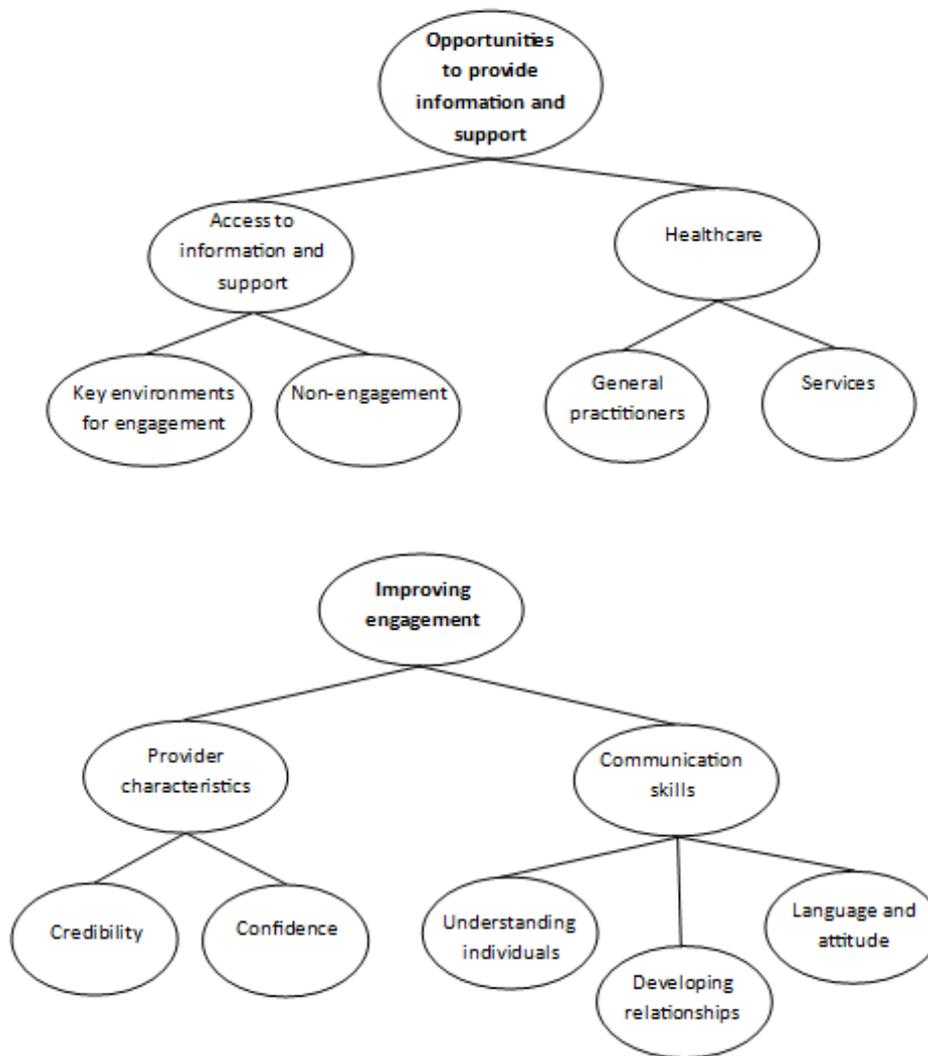
### Themes identified

Three overarching themes were identified through the thematic analysis process, summarised in box 2. In this chapter, the findings and implications of themes 1 and 2 are discussed while theme 3 is discussed in chapter 5. Themes 1 and 2 together represent priorities to address to improve the potential for effective interactions between intervention providers and users where support, information provision and other interventions can be provided. They are summarised in a thematic map, presented in figure 6. Theme 3 is focussed on what these interactions should try to ultimately achieve in terms of influencing the choices and subsequent behaviours of users that are associated with poor health outcomes and increased risk.

#### Box 2: Summary of themes identified in study 3

<b>Theme 1</b>	<b>Opportunities to provide information and support</b>  Opportunities for intervention providers to engage with, and provide information and support to, users.
<b>Theme 2</b>	<b>Improving engagement</b>  Factors influencing engagement and communication between healthcare providers and users.
<b>Theme 3</b>	<b>Choices and behaviours</b>  The choices and behaviours of users that interventions should try to influence, and potential approaches to achieve this.

Figure 6: Thematic map for themes 1 and 2



## Theme 1: Opportunities to provide information and support

### Access to information and support

A recurring topic throughout this study was that a key problem facing users is around the accessibility of information and support. Specifically it was commonly stated that they frequently lack access to reliable sources of information, and are open to influence by sources perceived as less reliable. One participant expressed this as:

*“People are coming to me to ask these questions because they have nowhere else to go. They don’t feel there is anyone that they can talk to and ask questions. And that’s a crying shame, a crying shame, and it can mean they end up listening to all sorts of bad advice from people who you don’t really want to be advising them”. Participant 13, gym owner.*

Consequently, many of the priorities identified were related to increasing and making the most of opportunities to provide information and support to users. Throughout this overarching theme the need to increase opportunities to engage with users was explored, but within this key groups were identified who were unlikely to currently receive any support or harm reduction messages from a health professional related to their substance use. This included people in the community who do not engage with substance use services, as well as specific settings where AAS use may be a particular concern due to a culture of AAS use and those that are hard to reach for service providers.

### *Non-engagement with health professionals*

A key priority identified was reaching users who are not in contact with any health services. Concerns that this represented a large proportion of this population were discussed in the context of perceptions that individuals do not see the value in attending substance use services and that increasing numbers are purchasing injecting equipment online or from friends, negating their need to access services. Consequently, opportunities to interact and intervene with these individuals were expected to be very infrequent. The reasons for purchasing equipment online may vary, but the ease and anonymity of doing so are likely to be attractive to many. Indeed, as suggested by two participants, as well as equipment some individuals will purchase their drugs online and

seek information this way, further reducing their interaction with potential peer information providers as well as health services.

*“More and more people are buying their equipment online rather in services so they’re never going to be asked any questions, they’re never going to have these conversations that we’d hope they’d be having, no one is going to pick up if there is a problem”.* Participant 12, outreach worker.

*“There is active avoidance amongst some of these guys of any contact whatsoever, so they can buy the drugs online meaning they don’t have to speak to a dealer so that’s one barrier gone. They can buy their needles online or get a mate to pick them up some. They can go online to find out everything they need to know, allegedly”.* Participant 16, commissioner.

*“If they’re not coming into any services or going to exchanges<sup>7</sup> then how you going to intervene, or make sure they receive any support that they may need?”* Participant 1, substance use worker.

Within these discussions there was a general feeling therefore that users are likely to need advice and support from health professionals or other experts in the field. Some participants however pointed out that not everyone may need or benefit from contact with services and may not be causing themselves harm with their AAS use and related behaviours. Others however felt that while some users will not believe that they would benefit from engaging with service providers, the reality may be different and benefits might go beyond providing support with an immediate problem or advice on AAS. Holding a self-image of good health, low risk, being in control, and consequently not requiring any support recurred throughout the interviews. Expectations regarding the aims of support services, such as if users anticipate being expected to discontinue AAS use or that staff will have a negative attitude towards them, were also anticipated to reduce likelihood of attendance.

*“I do think it’s important to remember that not all these guys are going to need any help. I see it more as thinking how we can be there for those who want someone to talk with or have questions. I think if we start to make assumptions that everyone needs our help, it’s a problem, it’s almost arrogant”.* Participant 11, public health commissioner.

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<sup>7</sup>Needle and syringe programmes are commonly referred to as needle ‘exchanges’. People who inject drugs can return used needles and ‘exchange’ these for new ones.

*“They might not think that they need to speak to anybody or that they are doing anything that might be causing them harm, and maybe at that time they’re not, but that can change. There can be underlying issues maybe, or they might think they’re okay but actually, when you drill down, that’s not actually the case. Participant 2, substance use worker.*

#### *Key environments for engagement*

A substantial barrier to providing information and support to users is that within this population exists hard to reach sub-groups who avoid, or are unaware of, relevant health services, and rarely interact with health professionals. Therefore, providing services may be insufficient to engage with many users and intervention providers can look at providing outreach or promoting services in settings where users are commonly located. Beyond this, the role of key individuals within social networks and important settings as information and intervention providers can be explored. Participants perceived that the attitudes and shared experiences of friends and other key individuals were important influences upon others in terms of their own attitudes towards engaging with support services.

*“It’s amazing how much credence they’ll give to what their mates say, what the other guys at the gym say. If they hear that you shouldn’t go to a service because they’ll judge you and they don’t know anything anyway then that sticks and it becomes accepted wisdom”. Participant 12, outreach worker.*

#### Gyms

Gyms are strongly associated with AAS culture and participants commonly identified these environments as promoting and facilitating AAS use, and therefore as an ideal setting to promote services targeting this population and base outreach clinics. Supplying AAS in many gyms was perceived to be common and there was collective agreement that AAS was perceived as normal and acceptable in these environments. Approaches to tackle this were difficult and unclear, but discussed as desirable. Participants shared their experiences from the perspectives of owner, employee and gym users of how the gym can be a conducive setting for AAS where the prevailing messages may downplay risks and encourage use.

*“I’ve used steroids and, you know, they’re more readily available in gyms than anything, it’s part of a culture. And when something is available and you know, the norm, it’s easy to do it”.* Participant 2, substance use worker.

*“You join a gym, start training, then you start using and then you get big. That’s fine, that’s normal, everyone does it... that’s the message you get when you’re in there. I think that’s the attitude for lots of people. It’s become so open”.* Participant 15, personal trainer.

*“When they join a gym they’re probably already thinking about doing it, some of them, and there is nothing there that will put them off – quite the opposite. And if they’re not thinking about it at that point then there’s a high chance they will be after being around the gym where it’s so common”.* Participant 13, gym owner & outreach worker.

Discussion of the gym frequently focussed on the potential for engagement between these settings and substance use services to increase access for gym users to good advice and health professionals. For example, reflecting on those users who do not engage with any health services one participant stated:

*“We know that, for one reason or another, lots of these guys who are taking steroids are never going to go to a needle exchange let alone have a conversation with a specialist about their use, but we know that almost all of them are going to be using a gym. If you want to reach these guys, if you identify a gym locally that might be open to you coming in, it’s a logical place to do that”.* Participant 3, substance use worker.

Gym owners were frequently identified as both barriers and facilitators for service engagement and desirable information provision. They, alongside established members of gyms and staff were portrayed as influencing decisions and behaviours amongst gym members and therefore were seen by some as potential providers of positive messages, or encouraging use of services. Recognising that information and advice is already being disseminated within gyms, or more widely the range of networks that users have, supports the potential for approaches that would look to use these networks to influence decision making in a positive way. Where key individuals within important networks or environments engage with health care, they can potentially be used to connect and pass information to others who are not themselves engaging.

*“It’s trying to engage with these gym owners, educating them to say you know what, be mindful that these are young lads, they don’t really know what they’re doing... tell them that if there is someone who is thinking about it to come and see us if they have questions, don’t just sell them everything and tell them to get on with it. It might be hard, but your potential reach is massive compared to how many people you’ll get coming to you in your exchange off their own back”.* Participant 8, substance use worker.

*“You can’t stop them from talking to each other in those kind of communities so maybe better than trying to stop it is to get involved with it and try and improve the sort of information that is being passed on. So not to stop the network, because the network is actually really useful, but having some sort of sense check to control the information a bit”.* Participant 10, public health commissioner.

The feasibility of gym owner engagement was debated and the response is likely to vary greatly between different owners, with some supportive of approaches to improve the health of their members and others reluctant to engage with services. The motivation for owners to engage with services and potentially provide positive messages may conflict with their role in some cases supplying AAS, and with the need to promote a positive image of their gym. Participants shared their experiences of discussions with gym owners and the complex relationship between owners, members and AAS.

*“If they recognise it is an issue for health and wellbeing, and they’re interested in that, they might support services. If they don’t really care, or they don’t think it is their place to be part of prevention then they probably won’t engage with it. They’re in the health and fitness industry but still, that doesn’t mean they actually have the best interests of the public or their customers at heart.* Participant 7, public health practitioner.

*“The owners are often the suppliers. It’s not that they don’t care, it’s money in their pocket. One I know says he wishes they didn’t take so much because he wishes they wouldn’t get hurt, but at the same time, that is what is keeping the roof over his head”.* Participant 13, gym owner & outreach worker.

*“Some of the dealers and the gym owners are really good, I’ve seen it where they won’t sell it to them if they think they don’t need them, the steroids, or if they think they’re not getting other parts right, like when they’ll tell the lads they need to train more and they need to eat right and stuff like that”.* Participant 8, substance use worker.

Those who worked in substance use services reported frustrating experiences of trying to engage with gyms, although examples of successes were also provided.

While AAS may be normalised within many gyms, that does not imply that owners, particularly in chain or local authority gyms, will openly recognise that or wish to draw attention to AAS as an issue in that setting. Issues relating to trust and unwillingness to be associated with substance use services amongst gym management were commonly reported. Relationships between services and influential people within a gym were perceived to be helpful for building trust with gym staff and members, but establishing understanding with gym owners about the purpose of any service and developing that relationship can be difficult. Where staff are not experienced with fitness training this may add further perceived or real barriers to engaging with gyms, and therefore identifying an individual who overlaps the service and gym environments and can support that relationship and clarify that the focus of services is on harm reduction and health can be helpful. Having too much reliance on an individual however can cause problems should that person no longer be available.

*“I tried to contact the owner and get him on board with us, talk to us about that, but he wouldn’t even speak to me. He thought I was from the newspapers, he was very suspicious of me”.* Participant 23, pharmacy substance use service commissioner.

*“If you're not from that gym world or you don't know the owner or staff already it can be difficult. They're going to be suspicious of you. If there's someone who uses your service who also uses that gym, someone who is known at the gym, use them. That definitely would be helpful for convincing the gym about you”.* Participant 13, gym owner & outreach worker.

*“Anyone with a bit of influence, they might be able to speak with the manager and promote your service for you. It seems to come better if there is a bit of an intermediary who can make it clear that you are about harm reduction and worth engaging with”* Participant 24, substance use worker.

Promoting services as broader men’s health services rather than AAS or IPEDs specifically was identified as beneficial with participants from both fitness and health settings supporting this approach. Offering health advice around issues such as sexual health, fitness and nutrition may be more appealing and socially acceptable for some men to attend than a clinic promoted as about AAS specifically. This may also be a more effective way of developing links with, or delivering outreach services in, gyms as owners

may find a men's health clinic or similar more appealing to promote or allow onsite as opposed to a service that directly refers to AAS.

*"Don't go in saying you want to talk about steroids or needles, that's going to put the guy running the place and the guys in the gym off you."* Participant 18, gym owner.

*"That's how we got in the door with all the gyms we work with. We said we wouldn't advertise a needle exchange, we wouldn't advertise anything to do with steroids or IPEDs but we'd go in with a sexual health focus only".* Participant 26, substance use worker.

*"I frame it in terms of a health project rather than being explicitly about steroids – I think that could be very off putting both for an individual and for a gym owner. Some will just not want to know if you go in talking about steroids".* Participant 12, outreach worker.

#### *At risk groups*

Beyond fitness settings a smaller number of participants highlighted other settings where they felt it was important to improve access to support. Both prison and armed forces settings were discussed in the context of environments where increasing strength and muscularity are likely to be desirable, yet access to appropriate services may be very limited. There was concern about injecting and lack of access to NSPs and harm reduction advice, and participants emphasised the importance of ensuring access to injecting equipment and information. However, approaches to tackle or even quantify the extent of this problem may be difficult due to the hidden nature of substance use in these environments.

*"There is an anti-needle exchange culture in these prisons and if someone is going from using on the outside to inside then they may be going from low risk to high risk in terms of transmission".* Participant 4, General practitioner.

*"It's like 'put a bit of beef on, look a bit tougher' while they're inside. It's about the short term not the long-term, so what if there's a bit of a risk?"* Participant 1, substance use worker.

*"It's the army too, that's another one. Armed forces. But good luck getting anywhere with that... we know what's happening, but it's a closed shop. It's not that different to that prison population in that it's a high pressure setting, there's a perception that you need to be tough, to be strong, can't show weakness. And here's something that can help you do that".* Participant 15, personal trainer.

## Healthcare settings

### *Services and clinics*

It is therefore important that services that are catering for users are meeting the needs of, and are accessible to, this population. The value of clinics designed specifically for AAS, or more broadly IPED, users was frequently raised. It was suggested that such services are likely to be more appealing and accessible to users in comparison to traditional substance use services or NSPs, and have staff with expertise in AAS who can discuss a wider range of issues and offer a wider range of interventions. Traditional substance use services were seen as less attractive to users in comparison due to perceptions about staff, stigma and other substance users. These findings resonate with previous studies that have examined the experiences of this population in such settings (Zahnow et al., 2017, Dunn et al., 2014, Kimergård and McVeigh, 2014b).

*“The ideal scenario is that every town with a high amount of IPED use has its own specialist service. I don't think anyone would disagree with that because you have the expertise, credibility, it's a more attractive service for steroid users, you have more time with them, you can do more interventions”.* Participant 3, substance use worker.

Specialist IPED support clinics were discussed by some service providers as settings to offer blood testing for health markers such as cholesterol, liver function and testosterone. This was portrayed as being attractive to users and increasing the likelihood of their attendance, and therefore increasing opportunities for engagement and harm reduction. Blood testing was portrayed as enabling provision of personalised feedback on health, which was commonly identified as a valuable tool to engage with clients about health harms. However, some participants recognised that offering these services is dependent on factors such as funding and the availability of staff with expertise in the field. It was recognised that restrictions on resources limited the possibility of such services in many areas where IPEDs are not necessarily seen as a priority area in comparison to other public health concerns. Additionally, while clinics were discussed in very positive terms, it should be recognised that there is a lack of any evidence supporting their effectiveness.

*“There is less and less money for services like ours. I don’t think they’re seen as a priority compared to other injecting drug users because they’re not as visual a problem”* Participant 26, substance use worker.

*“I think any type of service where you are reliant on specialist knowledge that most people in that field don’t have, it won’t work everywhere. That’s not to say it isn’t worth thinking about, but getting funding is one thing, and actually setting up and running a good service is another. What happens when that person leaves?”* Participant 16, commissioner.

While services dedicated to IPEDs were perceived to be popular and a way to increase engagement, increasing opportunities to engage with this population in other health care settings was a widely discussed need. As one participant stated:

*“I fully support the idea of creating a steroid service, but I’m under no illusions that everyone will come to it. Some will, we can see that from other similar places that people will travel for a good service, it can be popular, but lots of potential clients won’t think to come, so even if you have a dedicated service then that won’t solve the problem”.* Participant 24, substance use worker.

Many participants raised the need to make the most of all opportunities that health professionals, in particular those working in substance use services and NSP settings, have to engage and deliver information. Key to this point was the suggestion that because interactions between health professionals and users can be infrequent, no opportunity should be wasted. Therefore when clients attend services in relation to their substance use it is important that this contact is built upon, but some participants expressed concern that these opportunities were at risk of being missed or interactions were not always positive.

*“And when a young person does go to their doctor, or drugs service, or wherever they go, because they want to discuss these things we need to make sure that this leads to a beneficial outcome. It might be the only chance to discuss these issues with them and to intervene because if they feel ignored or that their issues were not listened to, or identified, then they might not go back again”.* Participant 7, public health practitioner

*“I think rather than specific clinics we have to upskill people who are going to come into contact with steroid users as part of the jobs. It’s not going to solve the problem of reaching these hidden ones but... it’s a start. In pharmacies certainly, probably some drug treatment clinics where they have needle exchanges I don’t think they always make the most of opportunities with steroid users”.* Participant 16, commissioner.

In many pharmacy NSPs people who use steroids make up a significant proportion of the overall client group. Participants frequently pointed towards pharmacies as an opportunity to engage with this population, but felt that currently interactions in these settings were limited in the provision of information and support. Pharmacies were discussed as settings for quick interactions with typically minimal harm reduction work or engagement, which was seen as an approach that perhaps suited both service providers and customers. One explanation for the popularity of pharmacy NSPs may be that many users prefer this quick interaction and lack of engagement, however where there is little attempt at engagement this could be an opportunity missed to identify where support may be needed, deliver harm reduction messages or signpost to further support.

*“I get a bit frustrated when I hear that a steroid user has been into a pharmacy and they've not been asked any questions about their steroid use, injecting, if they're worried about anything. It seems like a clear opportunity missed to potentially do some good”.* Participant 26, substance use worker.

*“I've used the pharmacy exchanges around here. I always got the impression they wanted it to be as quick as possible, next customer. That suits me so I'm not complaining”.* Participant 14, personal trainer.

*“It's been quite evident to me that on one hand you have a client group that don't really want to engage or feel comfortable having an open discussion and on the other hand you have the staff who also don't really feel comfortable, or confident to do it either”.* Participant 23, pharmacy commissioner.

Some participants felt that opportunities needed to be capitalised on in health care settings where individuals are already well engaged with providers. Reflecting that opportunities to engage with this population are limited and that resources to deliver new or specialist services are also limited, where users are accessing health care such as young people's, walk-in, or sexual health services these encounters could potentially be utilised to deliver important messages. However, some participants described potential barriers to this. For example, there are likely to be restrictions such as with staff capabilities and service resources that will limit the support that can be offered to users in these settings. The nature of interventions in these different settings would vary and need to take into account the expertise of the relevant health care providers. For any

approach to be feasible it would likely need to fit within existing models of service and require minimal additional training or time to implement.

*“My feeling is that you don’t have that many interactions with this client group. They don’t come into services that often and so your opportunities to engage are fairly limited. Where you have that chance to ask a couple of quick questions, gage if they perhaps need any further support, then ideally you don’t want that wasted”* Participant 24, substance use worker.

*“One of the things that I believe strongly is that there are wasted opportunities currently. So I am thinking how can we make a bit more of the interactions that are already happening? Where there are steroid users coming in to services, whether that be a needle and syringe programme, a sexual health clinic, or somewhere else, are there some questions that can be asked routinely for example”.* Participant 10, commissioner.

*“I wonder if they’re speaking with anyone else about this sort of thing, and if not then is it a case that people like me could do more, but it’s just a step too far for us at the moment. It begins to be a steroid advice thing and I don’t know whether we’re the right people to do that because we don’t really know about it”.* Participant 21, sexual health commissioner.

Signposting users to support services was identified as a fairly simple potential role for health care providers that would not be demanding upon them, but could have a positive impact by increasing access to services. Beyond this, asking some quick questions about clients’ AAS use and health could gage whether further support was needed at that time, raise issues to reflect on later and establish the provider as a source of help and support if required without being intrusive. This would not necessarily require great understanding and knowledge of AAS and therefore was seen as suitable for health professionals with a range of expertise.

*“I could see one or two standard screening questions when a young steroid user goes to see a sexual health nurse, or a needle and syringe programme, their GP. So nothing that will be a burden, but enough to get a sense of whether there is anything they should be doing more of or if they should refer them on somewhere for more help”.* Participant 16, commissioner.

#### *General practitioners*

A frequently raised issue involved the response by GPs to AAS use and related harms amongst their patients. Similar barriers to engagement and provision of appropriate

care were identified with GPs as other health care providers. As with the response in pharmacies, the issue may be both GPs not having sufficient understanding or confidence to raise and treat issues related to AAS, and users not wanting to engage with their GP about their substance use. It was frequently suggested that gaps in knowledge and understanding about AAS and those who use these substances may lead to GPs not identifying AAS use in patients. For example while GPs have excellent knowledge about health factors such as liver function and mental wellbeing, they may not link this with AAS and therefore any advice or treatment for that issue may be lacking. Further, opportunities to ask appropriate follow up questions and to influence decision-making will be missed if AAS use is not identified or questioned.

*“I’d say that 95% of GPs would not know what to do with it if they came across steroid use. And they know that – both the users and the GPs, and neither has any confidence or any willingness to engage with each other as a result”.* Participant 2, substance use worker.

A common concern was that where GPs identify AAS or it is disclosed to them then the response to it and to any health problems is often unsuitable, with a focus typically on cessation rather than further support or treatment.

*“My GP told me that steroids don't work so don't bother with them. I just said "thank you" and walked out. I know that's literally false. How can you offer advice on something you know nothing about?”* Participant 14, personal trainer.

*“They know so much about the health problems themselves, but I think the problem is that they don’t pick up that anabolic steroids are involved a lot of the time. They are good at treating symptoms but not necessarily the root causes of these symptoms”.* Participant 13, gym owner and outreach worker.

Similarly to with staff in other healthcare services, there was not an expectation that GPs should have expertise in AAS, rather sufficient knowledge to identify possible use and ask appropriate questions and awareness of related harms. Specific health issues that were perceived to be commonly mistreated included mental health after cessation and concerns about fertility and libido, with a lack of involvement from endocrinologists with patients for whom issues related to testosterone were identified. Raising awareness and improving recognition of AAS and related harms amongst GPs may help to improve the response in primary care.

*“I wouldn’t expect them to be an expert in steroids but you’d hope they’d know a little bit so they can provide the appropriate health care”.* Participant 26, substance use worker.

*“There is a massive gap, a really massive gap involving endocrinologists in this process, when you’re working with somebody for a good period of time, they’re not using anything at all, and their testosterone and their hormones are shot to pot. There needs to be some sort of specialist engagement at that time and that doesn’t happen”.* Participant 3, substance use worker.

Participants drew on their own experiences and those disclosed to them in services by others to give examples of negative interactions with GPs and where they felt GP response had been insufficient. A common theme of these was a dismissive attitude regarding AAS from GPs that can be a barrier to engagement. A patient who asks their GP for advice about AAS but gets a very negative response that they perceive conveys a lack of understanding may be unlikely to listen to any advice or avoid returning if they require further support. A further complication appears to be the reluctance of some users to go to their GP or disclose information, limiting the possibility of useful interactions and increasing the likelihood of harms being untreated. They may feel uncomfortable discussing substance use with the GP, anticipate an unsatisfying interaction or it may conflict with their ideals about health and help seeking.

*“A lot of doctors will try to stop you in your tracks and advise you not to do it. They don’t advise you on how to do it correctly, or what to use safely. It’s just ‘don’t do it’”.* Participant 19, gym owner.

*“I think he was a bit worried, having second thoughts about it all and so went to his GP and said he was using steroids, he’s a bit worried about it, and he said she laughed at him... said that he didn’t look like he used steroids, said he was too skinny”.* Participant 27, substance use worker.

*“I do say go and see your GP, but they’re all like, leave it I’ll be alright in a few weeks, it will go away. Typical blokes, like shrug it off”.* Participant 18, gym owner.

Alternatively, it was suggested that another barrier to treatment is that poor knowledge about AAS harms amongst users may lead to thinking that their AAS use is not relevant to any health conditions they see their GP about.

*“They don’t mention steroid use to the GP, not because they’re hiding it but because they don’t understand that it might be relevant after 6 months off. So they’ll tell the GP ‘I’m feeling really low, I’m struggling to get myself out of bed in the morning, I’ve fallen out with my partner, I’m not interested in sex, I’m struggling to get an erection’ or whatever, and they’ll get a prescription for anti-depressants, or for Viagra if needed”*. Participant 2, substance use worker.

Finally, participants who worked in substance use services commonly discussed difficulties engaging with GPs. This was discussed as part of efforts to respond to negative experiences reported by clients and to raise awareness of AAS and related issues amongst local GPs, and to encourage signposting to services. Some service providers had reached out to local practices and tried to build links, but had very little response. While there was commonly an appreciation that GPs were busy and had many priorities, the process was seen as time consuming, difficult and frustrating.

*“I spent time calling and writing to several local GP surgeries. Guess how many responses I had? One out of 16, and that didn't go anywhere because when I followed up again I never heard back”*. Participant 25, substance use worker.

## Theme 2: Improving engagement and communication in services

This theme was based upon the notion that as well as increasing opportunities to engage with users, the quality and nature of these interactions is important. The potential for messages to be delivered that will influence decisions and behaviour depends on many factors, and participants raised a range of considerations that they felt to be important contributors to effective interactions. Central to this was the concept that how information is delivered and the skills and credibility of the person delivering it will have a significant impact upon whether it is listened to, understood and ultimately makes any difference. Generally, findings here related to healthcare settings and interactions between service providers and service users, and participants who emphasised the importance of communication and relationships were those with experience in these settings.

Several factors were felt to be important to increase potential engagement and to maximise the chances of influencing clients in health services through effective communication of messages. Recurrent messages underlying this theme was the recognition that users may be wary to engage with health professionals and reluctant to

discuss their substance use, and that communicating risks and ideas that may conflict with their preconceptions and behaviours can be very challenging.

## Provider characteristics

### *Credibility and knowledge*

A frequent point raised concerned the importance of credibility in service providers in the eyes of users. Credibility is inextricably linked with the type of intervention or information being provided. For example, in a specialist IPED clinic offering expertise in AAS and the wider field, what makes that provider credible will be different from the credibility a member of staff in a sexual health service would require to discuss issues relating to injecting, sexual behaviour and testing for BBVs. Having a muscular physique and a strength training background were seen by some as useful for engagement, but less important than knowledge and understanding. Some participants working in substance use settings reported that in their experience their lack of gym and fitness background did not inhibit engagement. Further it's possible that the association between AAS and traditional male roles and values may indeed prevent engagement on some topics where both provider and client are from that masculine environment.

*"If you don't know your stuff they probably won't take you seriously. I'm not from that background, I don't go to a gym, but I don't think that matters as much as knowing a bit about it. I think they'll talk to me about things they wouldn't speak with a big tough looking guy about".* Participant 9, substance use worker.

*"I've not had a sense that because I'm not a user and I don't go to the gym I'm not someone they would speak to... I don't think it's a problem, but I think people sometimes presume it will be".* Participant 8, substance use worker.

Knowledge about AAS was generally agreed to be an important factor in giving a provider credibility and the development of conversations. Concerns were frequently raised about the level of knowledge about AAS amongst service providers and their ability to communicate effectively with clients and identify where further support is required. Insufficient knowledge was seen as a barrier to engagement in substance use services as inappropriate questions or advice may lead to that client not opening up at that time or returning to that service.

*“I don’t think there is a great deal of knowledge in services about anabolic steroids or any IPEDs really, not from what I’ve seen. It is just a bit outside what they have been trained in and what they probably really know about”.* Participant 12, outreach worker.

*“For some people it’s going to be harder because if you don’t have that knowledge then how can you get through to people, how do you know what to talk about or how. I wouldn’t listen to someone who didn’t know the basics of what I was doing, I just wouldn’t care what they thought”.* Participant 17, personal trainer.

Rather than having expertise of all aspects of AAS and associated factors, service providers need some understanding of the basics relating to this form of substance use to a point where they can converse confidently about the topic and ask appropriate questions. Participants indicated that clients would not expect all service providers in health care settings to be topic experts and would be responsive to questions for further explanation and seeking to understand their substance use. Further they would not need extensive knowledge of types of AAS, dosages, post-cycle therapies<sup>8</sup> (PCT) or fitness topics to engage. More important perhaps would be knowing what questions to ask and communication skills.

*“It’s not about trying to show that you’re an expert because I don’t think that there are many experts in this field. I think you can have a lot of knowledge but it’s about asking “why are using that peptide alongside that one, is it for appetite? Or what is it?” and then they’ll start talking to you. If you show an interest then people quite like to talk with you”.* Participant 24, substance use worker.

*“Outside of your IPED specific services I wouldn’t expect people to know all the ins and outs and have real expertise, but if you want these guys to trust them and open up to them or whatever, then they need a sort of baseline knowledge. Just enough to ask the right questions”.* Participant 2, substance use worker.

### *Confidence*

There was a general sense that outside of specialist IPED workers confidence to engage with users was lacking in comparison to working with other substance users and this may relate to knowledge gaps. If a service provider does not feel they have the skills and

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<sup>8</sup> Post cycle therapy refers to the use of drugs during the ‘off cycle’ period to attempt to restore natural testosterone functioning, which is suppressed by the use of AAS.

knowledge to engage effectively then they may be less likely to try. In services where interactions with users are infrequent, staff will have little experience in working with this client group so opportunities to gain confidence are limited. Further an individual accessing a service in relation to their AAS use is more likely to be physically fit and healthy and see their substance use as a positive and health improving activity than other clients. This might impact on the relationship between provider and client, particularly when the client is more likely to be the expert of the two, and make it more difficult for the provider to feel they can lead the conversation and offer advice.

*“Most of the staff are very experienced with working with psychoactive drug injectors but they lack knowledge and experience working with the IPED population so therefore very little is engagement done. So even when someone visits the drop in, which they do occasionally, they wouldn’t engage with them because they don’t feel confident to do so”.* Participant 23, pharmacy commissioner.

*“I think that some of them don’t find it very easy to have those discussions with these lads... they’re not their normal client and, let’s be honest here, they’re not all that easy to talk to. They can be very wary of talking about their substance use, particularly to people who they don’t know or don’t think will understand”.* Participant 27, substance use worker.

*“There are a lot of staff here who see these big, muscular guys who are using steroids and have good diets and training, straight away they see themselves as not being the expert. Which doesn’t really make sense because they’re all really confident about speaking to people who are a heroin user, but there is something about steroids and the way that people portray their usage and not wanting to stop or get help”.* Pharmacy 24, substance use worker.

Health professionals are less likely to have experience with, or training to work with, users of AAS than other substances. If those without expertise in this area are to have a greater role in engaging with this population then they will require some support. Training requirements clearly vary according to the anticipated role, but some participants suggested that increasing basic knowledge about AAS and confidence to engage with users should be a priority and would not necessarily be complex or in depth.

*“I don’t think it requires any real complex or in depth training or anything to get an understanding of these things. Within drugs services and exchanges I think it’s about having the confidence to apply what they’re good at to a different client group as much as anything else”.* Participant 5, academic.

*“It shouldn't be a big ask to expect a bit of understanding and awareness. Any training could be quite straightforward, get the main points across. Job done”.* Participant 13, gym owner and outreach worker.

## Communication skills

### *Language and attitudes*

Language and terminology was important to several participants because it demonstrated familiarity with AAS culture. Where providers use terminology unfamiliar to service users or do not understand common terms this was seen to increase barriers to engagement. For example, several participants recalled examples of users being asked questions such as ‘what drug do you use?’ leading to disengagement in services by someone who may not see themselves as a ‘drug user’.

*“I think they need to be able to explain things as simply as possible as well, which I don't think people are always very good at. The guys will just switch off if someone starts making things complicated, using scientific words, terms that aren't used normally”.* Participant 12, outreach worker.

*“With these guys if you ask them ‘what drug?’ they look at you like you're an idiot because they don't see themselves as using a drug... so you have to frame it more about recognising that they're probably using IPEDs so you can say, you know, ‘is it steroids you're injecting... what ones?’ and see if they know”.* Participant 20, substance use worker.

Moralistic or judgemental language and attitudes about AAS use were seen as particularly counterproductive to engage with users who do not see their substance use as problematic or unhealthy. It was commonly suggested that if a service user feels that a provider has a clearly negative attitude then this will be a substantial barrier to generating discussion and communicating messages. Further, it may act as a barrier to future engagement or service attendance.

*“If you have this moralising approach you're not going to get anywhere. If you're coming across like “steroids are bad, you shouldn't take them” it's going to get people's backs up straight away and you're losing them straight away. They're not going to listen to you, and they probably won't come back. Lots of them have experienced this and it kind of sums up what they think people in services are going to be like”.* Participant 1, substance use worker.

*“Show that you're interested, don't be moralistic about it. Don't be saying ‘oh but you shouldn't do that’, at least not until you've got their trust a bit. Listen to*

*them, active listening... and keep asking 'why' when they tell you something because a lot of the time that's what opens up a conversation".* Participant 9, substance use worker.

#### *Developing relationships*

Being aware of these factors and of appropriate questions and language to use are important for developing rapport with users. It was recognised that many users are reluctant to engage with service providers or have negative expectations regarding provider attitudes and ability to offer support. Participants talked about breaking down these barriers through conversation. Showing an interest and asking service users to expand on their beliefs and behaviours were seen as useful approaches to stimulate discussion and to identify risks. This was viewed as encouraging users to share their expertise and demonstrating interest in them and their substance use rather than openly challenging them and being confrontational.

*"I find asking 'why' a lot is useful... so like 'okay you're using that three times a week... why?' 'Where did you buy that...Why? Do you think that's safe?' I try not to put my own opinions over too much or come across as too know it all, but show I'm interested, question them without getting their backs up".* Participant 20, substance use worker.

*"When I ask some of them about why they're doing it and what they want to get out of it, and push them to be precise, it sometimes unravels a bit".* Participant 13, gym owner and outreach worker.

Participants sometimes linked these points with the issues relating to credibility and knowledge. In particular, by asking the right questions and using the right language providers can build trust and relationships with a service user that facilitates the delivery of information and support. Positive outcomes from interactions were seen as most likely when relationships are formed through open discussion. One participant summed this up by saying:

*"If you talk to them in the right way then they'll listen to you. So not kind of just imposing your sort of attitudes or trying to ask them too many direct and personal questions, trying to keep them in an open conversation rather than specific questions. Once they realise that you know what you're on about and you've engaged them in conversation then they can listen".* Participant 8, substance use worker.

Once the initial barriers have been overcome, it was felt that providers will then be in a better position to offer advice and influence service users through alternative perspectives or appropriate harm reduction or motivational messages. As many users may infrequently access services in relation to their AAS use and service settings may not be conducive to lengthy or private discussion, developing these provider-client relationships can be difficult. Several participants however shared their experiences of clients being willing to talk with and open up to them. For many users they may not commonly be asked questions about, for example, their worries or aspects of physical or mental health and they may welcome the chance to discuss these issues with someone who takes an interest in them and they feel that they can trust.

*“The amount of men you get, big guys like doormen, bouncers, security... you start asking them the right questions and they start out pouring with information, personal things. I think they’ve literally never had the chance to talk about it before, and when they feel like they have got that chance then sometimes it comes out”.* Participant 9, substance use worker.

#### *Understanding individuals*

Being able to make information seem real to individuals may help to communicate risks and influence decisions. As discussed in theme 1, having resources to undertake blood tests and feedback findings to service users is not only attractive to users but provides opportunity for engagement. Where it is not possible to offer blood tests however some participants suggested trying to help service users to apply risk, health and social scenarios to their own lives and those with whom they have important relationships. To do this, providers need to understand service users and their motivations, which is likely to come only through engagement. Several participants discussed that it was unlikely that any one universal message would be effective in all cases, recognising the diversity amongst users. Seeking to understand what is motivating them and influencing their decisions is likely to help providers in developing meaningful messages.

*“It’s about recognising what matters to an individual, what are the switches that need to be flicked with this individual. No one approach will work with everyone”.* Participant 6, academic.

*“They all have different motivations and causes. I try and understand if there are underlying causes or what is making them tick. I think you need to if you want*

*to give them advice, or change their minds on anything because it's not like one size fits all".* Participant 25, substance use worker.

## Part B – Follow up interviews

### Rationale and aim

Participants in part A discussed their perceptions regarding many environments. The idea of increasing engagement and information provision in services that users attend, such as NSPs, substance use services and sexual health services, was commonly seen as important and participants identified what they thought were the potential barriers and facilitators for this. Much of the discussions focussed on the characteristics and approaches of service providers who do not have expertise in AAS or work in specialist services, and the practical issues of engaging with users in these settings. Therefore, to further understanding on these issues, follow up interviews with a small number of stakeholders who do not have expertise in AAS, but work in relevant healthcare services were carried out.

The aim of this part of the study was to seek reflections on findings identified in part A from participants who do not have specific expertise in AAS. The potential benefits of this were i) acting as 'member reflections' (Smith and McGannon, 2017) on findings, ii) identifying any further barriers and facilitators to the ideas generated in part A, and iii) generating further ideas in response to the overall aims of this study.

### Methodology

The inclusion criteria for this part of the study was health professionals who do not have expertise or a particular interest in AAS, but work in the environments identified in part A as being potentially important settings for the delivery of relevant interventions. Participants were identified using a snowball approach where participants in part A were asked to recommend potential participants for part B who they thought would be interested in taking part and able to follow up on the issues discussed in part A. In response to the findings from part A, health care providers operating in pharmacies offering NSPs, substance use or addiction services, young people's services and sexual health services were targeted.

Semi-structured interviews were carried out over the telephone. Participants were informed that they would be asked for their perceptions on ideas and findings from the first part of the study, focussing mainly on providing support for users in the settings that participants had expertise in, and the barriers and facilitators for this. A semi-structured interview schedule was drawn up that followed up on key relevant themes from part A of this study (presented in appendix 11). The schedule was adapted for the different roles that participants had. For example, where the participant worked in a sexual health setting the interview included questions that specifically followed up on ideas from part A relating to that setting. The interviews ranged in length from 20-45 minutes. Analysis of study data followed generally the same procedures for the approach to thematic analysis (Braun and Clarke, 2006) as described in part A. However to reflect the more deductive approach in this stage of the study the analysis approach was adapted. Data were firstly coded under initial categories relating to the interview topics (Service role; Barriers and facilitators; Engagement; Increasing access; Other) and then sorted through the analysis into structured themes.

## Findings

Six further participants were recruited in this part of the study, all of whom were staff within healthcare services. This included two pharmacy needle NSP workers; one youth and sexual health outreach worker, one sexual health consultant, and two practitioners based within substance use services. All six participants had experience working with users, but no particular interest or expertise in this and were more experienced working with people using other substances or with other health needs. Two additional potential participants were approached. One pharmacy NSP worker did not reply to the invitation and an alternative participant was identified in their place, and one substance use practitioner recommended their colleague participate in their place (who become one of the participants).

Themes identified related closely to the categories used in the coding process. As the interviews followed a quite structured approach to ensure that the important points from part A were reflected upon, this was not surprising. Three overarching themes

were identified: i) Role in providing healthcare to users, ii) Staff characteristics, and iii) Engagement.

## Role in providing healthcare to users

### *Service scope and staff roles*

A reoccurring point throughout these interviews was that while interventions and support should be provided to users in healthcare services, this would have to be within the topic and skill scope of the service. For example, the four participants based in pharmacy or substance use NSPs discussed that they saw their role primarily being providing harm reduction related to injecting and BBVs regardless of which type of substance the client injected. These participants discussed how they felt these topics were within their remit and that raising these issues with users ought to take place in any NSP setting. They provided examples of why injecting-related support was required from their experiences with clients showing naivety or poor knowledge in this area.

*“You’ll get things like about what needles to use and you can tell them which ones and why, and they’ll still opt for the other ones because that’s what someone has told them”.* Participant 30, substance use practitioner.

*“Some of them are clueless about what needles to use for different places, and they wonder why it hurts or they’re finding it difficult. You have to talk them through this stuff. I ask if they ever have pain and a lot of them say yes but that they think that means it is working, not that they’re doing something wrong”.* Participant 32, pharmacy NSP worker.

However, participants agreed that it is likely that staff may not always try and discuss these issues with users presenting in NSPs. In part one of the study, participants shared their perceptions that there were missed opportunities for engaging with users and identifying harm and risk in health services and the experiences of participants in this part of the study appear to corroborate this. They shared experiences of working in or visiting NSPs where interactions had been limited and there had been little or no attempt to engage with clients about their substance use.

*“Where I was working previously, it was much more minimal than where I am now. They’d come in, say what they wanted, you’d give it to them and they’d be on their way”.* Participant 32, pharmacy NSP worker.

*“I’ve been into needle exchanges and asked them about injecting, injecting injuries, safer injecting for people who use all sorts of drugs, not just steroids, and they don’t do anything with them, you’d think they should be doing something or at least referring them, but often there is nothing”.* Participant 28. Young persons and sexual health outreach worker.

In terms of the types of support that should be offered, participants agreed that providing advice specific to AAS, such as relating to dosage or cycles, was generally beyond their remit and capabilities. For staff in sexual health services, this might extend to injecting advice as well. All participants emphasised that anything specific to AAS use or that fell outside of the normal scope of the service, for example sexual health or BBVs in sexual health services, was unlikely to be the focus of any intervention in that setting.

*“We know very little knowledge so we don’t do much beyond the basic injecting stuff, not through lack of willing but lack of the right knowledge if I’m honest with you”.* Participant 30, substance use practitioner.

If healthcare professionals do encounter users who they feel require some support that for reasons relating to expertise, capacity or setting they are unable to provide themselves then they can signpost that person to a more suitable service. Participants in the first part of the study identified that users may not be engaging with any relevant services and where they are identified in other settings, signposting could help to increase awareness and use of services. Participants in this part of the study agreed that this felt within their remit. Indeed, the primary role for healthcare professionals outside of services designed for substance users may be identifying users and then referring them on to relevant support where appropriate.

*I think from my point of view where I see sexual health playing a part is identifying steroid or IPED use and signposting to relevant services. Because if these people are not speaking to anyone about their steroid use when they would benefit from doing just that, then I think we can support that.* Participant 31, sexual health consultant.

*“If they ask something that we don’t know then we tell them to go there (a local drug treatment service) and ask. We give them the address and the opening hours, it’s on the poster we have.* Participant 33, pharmacy NSP worker.

However, participants identified barriers to signposting. Steroid clinics are scarce and users are most likely to be signposted to drug treatment services for support beyond

provision of injecting equipment. However, there may be a possibility that staff in non-substance related settings will be unaware of treatment services or their potential role in working with this population. Further, while the two participants from treatment settings shared their experiences of working with users, they expressed concerns that this was not always the case and that consequently signposting might not always be useful.

*“They might not think of us (a drug treatment service) as a place to send steroid users”.* Participant 29, substance use practitioner.

*“I would do (signpost someone) if I had reason to, but I’m not sure what the appropriate place would be”.* Participant 32, sexual health consultant.

*“We know though that in some treatment services they're not really prepared to do much with steroid users, so if that's where they are being referred to then I don't know how helpful that is really ever going to be”.* Participant 30, substance use practitioner.

An additional barrier to effective signposting or other intervention is if the individual is not recognised as requiring support. Participants expressed this in terms of lacking awareness that someone is using AAS in services where substance use may not be discussed, but also where engagement was not sufficient. If staff do not have sufficient expertise to recognise issues that might require support or engagement is limited, then it is unlikely that needs will be identified.

*“You don’t hear much about steroid use, it’s not a question we would ask as routine in sexual health. I think it probably gets missed a bit, bit of a lack of recognising them... they’re not all big bodybuilding types are they, but that’s not that well known always, lots of staff will have that assumption”.* Participant 28, Young persons and sexual health outreach worker.

*“I'm guessing I wouldn't pick up on a lot of potential issues because I don't know what they are. If they said something direct about a problem they were having or a question they needed help with then I would know they needed help in that case, but if not then it's possible I just wouldn't think of it at all”.* Participant 33, pharmacy needle NSP worker.

*“The main area that we can do more with is identifying where there might be issues with IPED use and then making sure we respond to that in one way or another. I expect a lot of the time it gets overlooked because we don't know what we're looking for”.* Participant 31, sexual health consultant.

### *Time constraints*

Staff may have the capability to deliver appropriate support to users, but in services outside of substance use settings time restrictions are likely to be a factor. Participants felt that staff in pharmacy and sexual health services have an increasing amount of responsibilities in response to a range of health conditions of which AAS is only one example. This has consequences for the amount of time they are able to spend learning about and delivering interventions related to any one topic with a client. Any potential role they would have with users would need to take the need for brief interactions and competing pressures into account. For example, signposting to relevant services as discussed previously was felt to be appropriate and realistic, while learning about all different types of AAS to advise on AAS regimens was not. While all participants raised these points relating to time limits and competing pressures, it was also perceived that in the majority of cases users will not require further support. If staff can quickly identify which clients may require more help and which do not then in most cases there will be no need for interactions to be time consuming.

*“It’s a capacity issue as well as obviously a knowledge issue. Even if I knew the answers to all these things, I can’t do much in a three minute transaction, they need to go somewhere where there is more time to do that”.* Participant 33, pharmacy needle NSP worker.

*“There is a lot already being asked of sexual health because people have realised that certain groups such as young people, particularly young males, are simply more likely to go to see their sexual health clinic out of necessity than many other health services”.* Participant 30, sexual health consultant.

*“I think there’s a perception that it will be a huge time demand, but if it’s only the ones that need help that you spend time with, it’s only going to be the odd one probably”.* Participant 29, substance use practitioner.

### **Staff characteristics**

The issue of staff expertise was a common theme relating not just to signposting but more generally to the ability to potentially engage with and provide support and interventions to users. The findings broadly reflect the perceptions of participants in the first part of the study and related to credibility, knowledge, skills and motivation. Participants felt that while they did not have expertise in AAS and it was in some cases

unrealistic to expect this of healthcare staff likely to encounter users, they did not require great expertise specific to this form of substance use to fulfil the role that they perceived their services to have. In order to provide healthcare to users, participants suggested that staff needed credibility and confidence to hold discussions and develop rapport in a topic that they do not have great knowledge in. Issues relating to credibility were very similar to those raised by participants in part one of the study about staff without expertise. Participants here discussed concerns that due to their inexperience relating to AAS, users may not be interested in or respect any advice they had to give or want to discuss their AAS use with them. Having confidence to initiate discussions about AAS and related behaviours may be associated with concerns about knowledge or credibility and therefore increasing skills and knowledge as well as confidence is likely to be beneficial.

*“You don’t need to know exactly what steroids they’re injecting into whichever muscle, you just need to know about safer injecting practices into the muscle and about sexual health, things like that. In any needle exchange they should be confident doing that, so maybe it’s reframing these things that is needed”.* Participant 29, substance use practitioner.

Participants in substance use services and NSPs shared their experiences of working with users who they perceived to be reluctant to attend services and engaging with staff. If staff do hold such perceptions or have presumptions about users, their choices and their health then they may be less motivated to provide suitable healthcare. For example, if perceived that users are not seen as a priority because they do not want support or AAS are not problematic then this can have a demotivating effect on staff.

*“There’s sometimes the perception that there is nothing wrong with doing it so we can just let them get on with it, it’s fine, it’s legal and loads of people are doing it. But also there’s this idea that if you’re stupid enough to do it then again, fine, get on with it, on you go because it’s seen a bit differently to things like heroin and cocaine where everyone is aware of the potential for not just health problems for the person doing it but also problems for others so through crime, violence, everything like that”.* Participant 30, substance use practitioner.

*“I think with pharmacies from the people there I’ve spoken about this with it’s probably a mixture of confidence, not seeing that it’s important and therefore a good use of their time, and just not having the time”.* Participant 29, substance use practitioner.

*“Sometimes it feels a bit like why are we bothering. They don’t want to be having that conversations, we don’t either really”*. Participant 33, pharmacy needle NSP worker.

## Engagement

### *Engaging with people who use AAS*

In part one of the study, participants commonly identified language and terminology as key factors in engaging with users. These were identified by four participants as both barriers to, and facilitators of, engagement in different settings. Staff’s inexperience and lack of knowledge relating to AAS may include terminology, which may have an impact on their ability to engage with clients. It was suggested that some staff may be aware of terms but not feel confident to use them or be concerned that incorrect use of terminology would lead to reduced credibility.

*“I wouldn’t necessarily know what to say, maybe performance enhancing or image enhancing, doping in a sports context. I don’t know, and that’s one of the first problems... I would have thought that was fairly typical amongst people working in sexual health services because it’s not what we have expertise in generally”*. Participant 31, sexual health consultant.

*“There is a confidence issue I think with being comfortable using some of these terms that are unfamiliar but, also, it’s knowing what the right terms are”*. Participant 32, pharmacy NSP worker.

The importance of asking questions to encourage engagement and the development of positive relationships was identified in part one of the study. Participants here suggested that their lack of expertise about AAS and their use of terminology and language with clients may limit the ability to ask the right questions. Further, they recognised the importance of helping clients feel comfortable in the service to increase engagement and future use of services, but it was suggested that these issues relating to terminology and knowledge amongst some staff might limit this. Consequently, these were felt as important issues to address with staff to improve their ability to engage with users.

*“I think one thing we would like a bit of help with is about what things to say and what to avoid. It’s a bit of a minefield probably and there must be things I would imagine that we might be able to phrase better, to ask in a way that might be more conducive to making these men feel more at home, more comfortable talking with us”*. Participant 33, pharmacy NSP worker.

*“I think we would benefit greatly by learning about what’s the language of steroid users and what language can we then use in clinics to try and identify these things that we need to respond to. That would be part of any training that we would be interested in I would imagine”.* Participant 31, sexual health consultant.

#### *Settings not conducive to engagement*

Participants in part one discussed that developing positive relationships and rapport with users was an important part of helping them to feel comfortable in the service and in leading to fruitful conversations. This was recognised as important by participants here, who felt that developing rapport can be difficult however in different types of services. This was discussed in the context of having limited time with clients and due to the anonymous and drop in nature of many services where appointments are not required, relationships will not be built up over time with repeat interactions between individual members of staff and clients. Further to this, the nature and set up of many NSP services may not be conducive to open conversations and relaxing clients.

*“I think a big challenge for any of us is how to develop that relationship with that person in a limited time and probably in an environment where they’re not that comfortable being open and honest”.* Participant 28, young people and sexual health outreach worker.

*“I think sometimes that some of them want to ask more questions but hold back for some reason, probably because they don’t feel that comfortable talking to me in a pharmacy”.* Participant 33, pharmacy NSP worker.

*“You’re stood up, it’s a fairly small room and there’s a glass barrier between you and them, you don’t have the time to build a huge rapport or anything. And you don’t have the opportunity for follow up because unless they enter any sort of treatment then the next time they come back, chances are they’ll see someone completely different, so you don’t have that sort of relationship that builds up over time where they start to trust you”.* Participant 29, substance use practitioner.

Approaches to improve engagement, help clients feel comfortable and increase trust were discussed and were very similar to those raised by participants relating to asking questions, making clients feel comfortable and developing positive relationships in the first part of the study. Here, participants frequently discussed these issues in the context

of limitations through staff expertise and service characteristics discussed above. Importantly, as participants suggested in part one of the study, there was agreement that staff did not need great expertise to ask some quick questions that would help to break down potential barriers and help clients feel comfortable and able to raise any issues or ask their own questions. Instead, as suggested in part one, asking general questions and showing an interest in clients and their lifestyles will be within the capabilities of all staff. Asking these quick questions may also help staff to identify AAS use in non-substance use settings. Other important points included having a positive, friendly and non-judgemental approach and avoiding coming across as negative or confrontational.

*“I ask a couple of questions, just things like have you done this before and do they need any information at all. Usually of course they say no, they just want to get out of there, but some of them, particularly the ones who haven’t been before or maybe I imagine are new to it they might ask a question. We do try and get them to feel like they can ask us questions”. Participant 33, pharmacy NSP worker.*

*“Just be friendly, be interested in them. Treat them like you would anyone else. Some of them say things like “we thought you were going to lecture us” so that’s something to avoid obviously, we don’t do that but if they think you’re being negative or trying to get them to do something different then I don’t think they’d stick around or come back”. Participant 32, pharmacy NSP worker.*

Participants in substance use and pharmacy settings felt that one of their main roles with users was to help clients feel that the environment was one that they could return to and discuss any problems or concerns that they had at a future date. The amount of questions and discussion, and what that might lead to, is likely to vary by service type and the nature of any support identified as required. For example, in a substance use service staff are more likely to be able to continue a conversation about a persons’ AAS regimen than staff in a sexual health service who instead might identify the need to make a referral.

*“Throwing in things like what’s your eating like, how often are you in the gym, it just waylays those fears or perceptions that they’re doing something that’s on the sly and they don’t want to talk about it. You can make it easy for them to talk about it and make them feel more comfortable in there”. Participant 30, substance use practitioner.*

*“You could ask one or two questions and then within your own knowledge either give them some advice or trigger a referral to someone who can do more, like the drug treatment service”.* Participant 28, young persons and sexual health outreach worker.

## Discussion

The findings presented here represent stakeholder consensus on a range of priorities for providing healthcare, information and support through which to influence behaviour and improve health outcomes in users. Ideas for addressing these primarily involved increasing information and support for users to support a range of decisions relating to AAS use, as well as improving healthcare provision to this population.

It appears likely from this and previous work that many users do not currently engage, or engage effectively, with substance use practitioners or any health professionals in relation to their substance use and related health needs (Zahnw et al., 2017). Further, they may not have access to reliable information or support. If many users do not encounter intervention providers, or providers are not able to engage or communicate effectively then messages to reduce harms and change AAS use will not reach them. If we recognise that users represent a diverse population, there is unlikely to be one approach that will reach everyone. It may be helpful to start thinking about some of the different groups of users relating to their approach to information and support. For example participants here discussed that there are men who already attend services, amongst whom some who may or may not want and need better engagement and support in these settings. There are also those who use some or a combination of other sources such as friends, forums, websites, dealers and other users (Pope et al., 2004, Hanley Santos and Coomber, 2017, Kimergård and McVeigh, 2014a, Maycock and Howat, 2005). It is likely that not everyone who uses AAS will want, need or benefit from any support or improved information provision. However, clear targets identified in this study were to increase access to information and support in order to convey important messages and influence decision-making to those that either seek or do not have access to reliable information, and those who would benefit from it.

It may be likely that for many individuals they will never engage with substance use services regardless of their availability and opportunities to engage with and deliver

interventions to users are likely to be limited. This has some clear implications. Firstly, where users present in any health service it provides an opportunity to deliver appropriate messages to them relating to their substance use. Within the healthcare system, where users encounter health professionals in settings such as pharmacies, sexual health services and young people's services it may be possible to deliver interventions at these points or signpost effectively to support services. Further, identifying other opportunities outside of healthcare to either encourage use of support services or deliver important messages will help potentially to reach more people.

Environments identified by participants in this study as being important included gyms, prisons and the armed forces where concerns were raised about the acceptability, normalisation and perceived benefits of AAS and the prevalence and diffusion of unreliable information and advice. Gyms and prisons are recognised by Public Health England (Public Health England, 2014) as settings where healthcare for users is required, but there is little evidence to support the implementation of interventions or information provision within these settings. Important influences within these settings identified here appear similar to in other environments, for example normalisation relating to AAS (Grogan et al., 2006, Hanley Santos and Coomber, 2017), exposure to information and opportunities to learn about and purchase AAS (Maycock and Howat, 2005, Dennington et al., 2008) and the reinforcing and motivating characteristics of social networks (Olrich, 1999, Olrich and Ewing, 1999, Ravn and Coffey, 2016). The role of key individuals within these settings and social groups, such as other users, gym owners and trainers, requires further exploration but potentially they could act as providers of reliable and useful information and support to people who they influence. There are many potential routes through which to achieve this to explore. Some of them will likely be more realistic, practical and effective than others, but it is only by broadening thinking on possible intervention routes that new ways to reach more people who may benefit from increased support will be identified.

## Conclusion

Within the two themes explored in this chapter, a range of needs have been identified that, if addressed, will reduce risk and risk of poor health amongst users. Much of this

chapter reflected stakeholder perceptions that many users lack access to reliable information and support and that improving this will lead ultimately lead to uptake of desirable behaviours that reduce risk of poor health. The reasons why information provision and support in general (including identification of AAS use and potential health issues, advice and intervention provision) may be lacking at present were attributed to a range of factors. This included the motivation and attitude towards engagement amongst both users and healthcare providers; the nature and characteristics of services; and the communication skills, knowledge and credibility of service providers. Improving engagement in services is likely to lead to improved information provision and delivery of support in such settings, but it remains important to recognise that many users do not engage with services or healthcare providers. Broadening thinking on the potential settings and providers of interventions may help potentially broaden their reach.

## Chapter 5: Choices and behaviours of men who use AAS

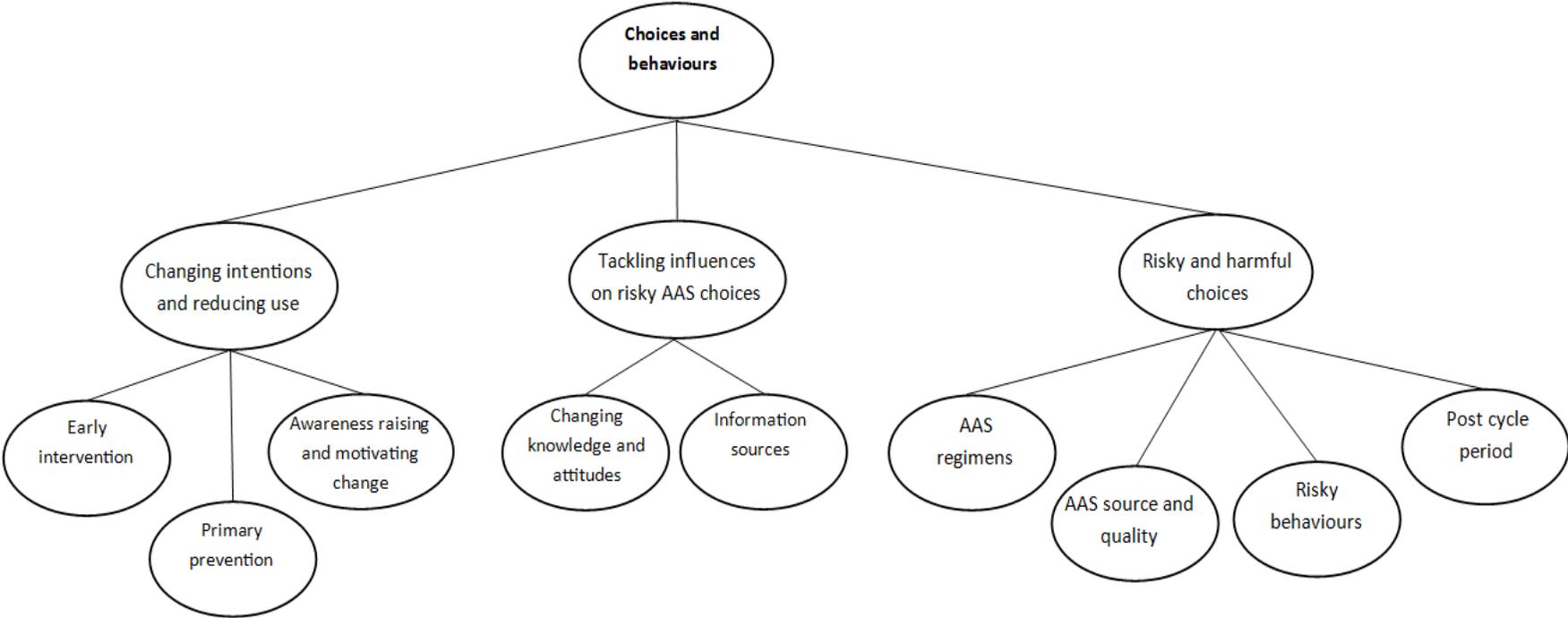
### Rationale and outline.

Chapter 4 discussed interviews with 27 stakeholders with a wide range of expertise and experience relating to AAS and people who use them. Two overarching themes were presented including opportunities to engage with, and meaningful interactions with, users in order to provide important information and messages. A third overarching theme discussed was what the information and messages provided in these interactions should be to help users manage their risk. This third theme 'choices, harm and risk' is discussed here. All 27 participants who took part in the study contributed.

### Results

Stakeholders identified common behaviours and choices amongst users they perceived to be linked with increased risk and harm. In addition, participants discussed influences on these choices such as attitudes towards risk and health, knowledge about steroids and information sources. Further, opportunities and approaches for intervention providers to change these behaviours through influencing decision-making and motivating change at different time points were identified. Key to this was that intervention goals should differ between individuals depending on motivation and experience relating to AAS. The findings are presented in a thematic map in figure 7.

Figure 7: Thematic map for theme 3



## Risky and harmful choices

Some users were identified as being more at risk than others are because of their AAS choices and related health choices. These were identified as the factors that information and interventions should seek to influence.

### *AAS regimes*

A frequently raised priority was to reduce the amounts of AAS that individuals are using. This was related to concerns about high doses over multiple AAS and other substances used over long periods of time without suitable breaks or 'off cycle' periods. Participants associated these 'risky' patterns of use with increased risks of a range of health harms. Using high amounts for long periods of time was linked to receiving bad advice, poor understanding about quantities, mirroring what others are doing and the desire to put on size quickly without prioritising or understanding long-term health risks. For many, a range of substances will be used as part of their regime and in some cases, it was described that some individuals are never off cycle, only reducing their use for short periods of time. This was linked by some with post-cycle concerns of experiencing side effects and loss of gains.

*"Steroids are an enhancement and taking the right amount can help your workout, but at the same time they are taking it and then over dosing, as in taking too much. They seem to always think that more is always better".* Participant 14, fitness trainer.

*"It's like non-stop cycles for some of them... so blast and cruising, never stopping in case they lose it. I know 100% that some of them think that if they off cycle, if they stop for a bit, that all that muscle will just fall off them and it's like a sign of weakness".* Participant 17, fitness trainer.

Health problems were frequently perceived to be occurring earlier in life than what might have previously been expected amongst people using AAS and participants associated these with using AAS from earlier ages, and particularly using high quantities. Participants commonly shared examples of concerning health problems amongst those they encountered that they associated with using AAS, although it should be noted that these conclusions were not seemingly based upon any clinical evidence. Lowering the amounts that individuals are taking therefore was seen as an important harm reduction

message, but several participants identified difficulties in communicating these messages.

*“I've noticed that when we're seeing some of these things, heart problems, liver function, they're getting younger and younger. It must be because they're starting earlier and the amount they're taking”.* Participant 3, substance use practitioner.

Participants raised the difficulty in conveying risks, for example reducing the amounts used may be unacceptable where it is perceived to reduce gains and this may override any concerns for potential health impacts. Fear of losing gains was associated with long-term use, high doses of multiple substances and discussed in the context of dependence, with some practitioners sharing accounts of clients they had encountered for whom AAS and training activities were prioritised over relationships with family and friends and work life.

*“Like with other substances where steroids become the main focus in someone's life, other parts of that life are going to suffer. We need to identify those people who haven't got that balance right”.* Participant 11, public health commissioner.

*“I think the problem may be that what we think is a big concern to them is often nothing compared to the gains they want to get. It can be quite tough getting that message through to someone who doesn't think about risks the same as what you do”.* Participant 24, substance use practitioner.

#### *Post cycle period*

In addition to potentially losing gains, where men stop using AAS they may experience a number of changes such as to mood and libido. For many users, it may only be when they stop taking these substances that they experience negative effects. Indeed, one participant noted:

*“For the vast majority of people for the time they are taking steroids, they're feeling pretty good. Everything that they don't like, it happens post-cycle”.* Participant 3, substance use practitioner.

Avoidance of these symptoms was frequently associated with regimes characterised by brief off-cycle periods or following a blast and cruise approach<sup>9</sup>. Symptoms of poor health were identified as a common cause of relapse amongst those who do try and stop, or of regimes characterised by brief off-cycle periods. In particular, concerns about mental health and mood at this time were raised in the context of a population for whom such issues may not always be well accepted or understood.

*“The last two guys I saw with real problems was when they’d come off and they were feeling so low, so awful, they really were. One said he did not want to live. There must be loads of people feeling like that. People like them just don’t have problems like that, it’s not something that gets discussed.”* Participant 2, substance use practitioner.

*“More often than not because the person is feeling so bad and so down for that long period of time, what happens is they’ll jump back on. Because jumping back on will feel like a remedy to them”.* Participant 4, General practitioner.

Promoting off cycle recovery periods and raising awareness about post-cycle health was discussed as important advice to be providing. Understanding and attitudes amongst users about PCT to reduce these negative effects after stopping AAS were perceived to be varied, but attitudes amongst participants regarding PCT varied too. Raising awareness of, and increasing access to, PCT was identified by some participants as important to support recovery and reduce health harms. However, others discussed concerns about the amount of substances that some men use and that the availability of PCT was seen as a way of mitigating the negative effects of AAS use, and therefore as a safety net to justify taking large amounts.

*“When someone is coming off it would be really great if they were told about what they might experience, about post cycle therapy as an option and how to go about doing that. I think that would reduce a lot of worry potentially and a lot of problems”.* Participant 9, substance use practitioner.

*“It’s like another barrier is gone. Some of them think that you don’t have to worry about long-term problems because PCT will sort you out, which is stupid obviously”.* Participant 7, Substance use practitioner.

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<sup>9</sup> A common cycle for some users where a smaller dose is administered for a period of weeks (the ‘Cruise’), alternated with larger doses as adopted in a normal cycle (the ‘Blast’).

### *AAS source and quality*

Some participants identified that it was important to reduce risks associated with purchasing substances of unknown quality. Service providers had little confidence in clients' knowledge about the actual substances they were using and how they might vary in strength, or about risk of contaminated products where substances are prepared outside of laboratory settings. The risk of using a contaminated or low quality product was particularly associated with purchasing AAS online. For some it may be seen as the easier option to order substances online without having to identify a source and approach them, and this may be a greater motivator than reducing risks. As discussed by some participants, where a product is believed to result in the desired gains it can be difficult to make risks seem important. Further, some participants suggested that amongst individuals who recognised the prevalence of poor quality AAS, they invariably believed that what they themselves were using was of good quality.

*"It's amazing about how people will say they are aware of all the risks and that there is a lot of rubbish out there, but they are completely confident that what they have is good stuff. They won't doubt their own source at all".* Participant 25, substance use practitioner.

*"It's probably a bit intimidating to have to go to someone and ask them if you can buy steroids from them for some of them... much simpler to click a button".* Participant 23, public health commissioner.

### *Risky behaviours*

Many participants were aware that HIV had been identified amongst this group of substance users, which was a clear priority to tackle for commissioners. Some service providers recounted examples of clients for whom hepatitis B and C had been identified and of poor awareness amongst users, who were perceived to generally associate BBVs with people who use psychoactive drugs rather than AAS. Sharing of needles amongst injectors was indeed perceived to be rare, although several participants suggested they had come across cases where this happened and provision of injecting equipment and advice regarding sharing was still seen as important. Sexual health behaviours of users were mentioned by a small number of participants in the context of BBVs. High levels of sexual activity and low rates of condom use were linked to concepts of masculinity and

poor awareness and concern of risks, suggesting that condom provision alone in services may be insufficient.

*“How many gyms do you go in where they’ve got no idea about any harms at all to do with their substance use? Like you mention HIV and they look at you blankly like ‘what, how can I possibly have that’”. Participant 1, substance use practitioner.*

*“They’re not maybe that bothered. We give out condoms and talk to them about it, but I don’t know if it’s seen as cool or the manly thing to do to use them”. Participant 26, substance use practitioner.*

Several participants suggested that BBVs were an infrequent problem in comparison with other health conditions associated with long-term use and high doses amongst clients who they encounter. Providing advice relating to sexual health and injecting practice and identifying where BBV testing was required were discussed as standard harm reduction practice, but some suggested that focussing on BBVs should not lead to other more common health harms being overlooked. Additionally, some participants discussed a sub group of individuals who engaged in a range of risky behaviours including binge drinking, psychoactive drug use and unsafe sex. It was suggested that in addition to their AAS needs their attendance in substance use services provided an opportunity to explore these other behaviours and provide relevant support.

*“In the grand scheme of things, blood borne viruses... they’re way down in terms of how likely you come across them... a couple of cases compared to the things like liver damage, testosterone levels being down”. Participant 3, substance use practitioner.*

*“Some of them, particularly the younger guys, there is a whole package of things going on that ring the alarm bells. It’s your typical group of lads who are going out and drinking a lot, cocaine, amphetamines, getting into fights, picking up girls. For lots of them the gear is just one thing that they do”. Participant 22, probation officer.*

## Tackling influences on risky AAS decision making

### *Changing knowledge and attitudes*

Amongst participants who worked directly with users there was common concern about the attitudes that younger men in particular have towards their bodies and health, and the influence of this upon their AAS decisions. This was frequently framed as the seeking

of a 'quick fix' in response to a common desire to increase muscularity promoting short-term thinking and decisions that prioritise immediate benefits over potential risks. For many new users their focus is on making substantial gains quickly and an individual highly motivated to achieve a muscular physique may perceive AAS as a short cut to achieving that goal.

*You talk to these guys in their late teens and early twenties and they're looking at something like that, what the older guys do, that as a first cycle... They can't wait, there is no tomorrow and they want to do it all now".* Participant 13, gym owner.

*"They don't have a clue what it's doing to them because they don't look it up, they don't ask questions... they don't really care, they only care about getting massive".* Participant 18, gym owner.

*"They go for a sort of shotgun approach where they take loads of something, see if it works, then up the dose because they want it to work more quickly or to see more effect".* Participant 12, substance use practitioner.

This short-term attitude towards rewards versus risk was associated with a lack of consideration for health and wellbeing, and not taking AAS seriously. This was highlighted particularly for adolescents or young men and associated with not undertaking research or seeking advice. Participants discussed the importance of supporting individuals to think about the potential long-term impacts that their choices now might have, but frequently recognised the difficulty in doing this as short-term benefits were perceived to be powerful motivators, particularly in the context of social pressures and expectations.

*"No one really cares about risks because they're young and they don't see that as real to them. It's all about the here and now, you need to get through to them about what it might mean in a few years' time... but to them, that's not as real as doing what your mates are doing and what you feel compelled to do now".* Participant 1, substance use practitioner.

Similar to attitudes, participants discussed the importance of changing knowledge to influence decisions about AAS, in particular, but not exclusively, amongst younger people and newer users. Those who had worked directly with users frequently described poor knowledge regarding the impact of AAS on the body, common harms and side effects, and substance doses and strength. Many shared experiences of working with

individuals who demonstrated a lack of understanding or awareness about their substance use, which was sometimes described as surprising and concerning. Some described examples of poor injecting practices amongst those who did not engage with health services and reiterated the need to provide support around injecting.

*“I have asked them about whether they know about how testosterone levels can be affected over time and what that means and you just get blank faces. They’re putting testosterone in to their bodies, you’d think they’d have some idea what that means”.* Participant 21, sexual health practitioner.

*“We thought they’d know a bit about health risks but no, not a hope in hell. We were quite surprised to be honest because we had a sense that they knew loads about it and were all experts but, particularly the younger guys, they had no idea about what it was doing to their bodies or what the risks were”.* Participant 10, public health commissioner.

*“A lot of them inject with the wrong needles in the wrong places. Most of the guys who come in know about injecting because they’ve been in before, so it’s easy to be blasé about it, but then someone comes in for the first time because they’re in pain or something and it’s because they’re doing it wrong, sometimes for a long time”.* Participant 25, substance use practitioner.

There was recognition that knowledge could also be very good, but this was generally portrayed as being the minority of individuals. Amongst older and more experienced users there was perceived to be generally better knowledge, but some participants did highlight that misinformation and misconceptions could be ingrained amongst these men leading to risky practices. A smaller number discussed how some users expressed disbelief that AAS could have serious impacts upon health and perceived that risks were fabricated in order to scare them. Where users believe that health risks do not exist, or can be easily avoided or managed, it may be easier for them to justify risky behaviours and more difficult to deliver convincing harm reduction messages.

*“The more you dig beneath the surface the more you realise just how little some of them know. Sometimes they’re just very naïve and inexperienced, others are very experienced but despite what they think and having that experience, they’re actually very misinformed and putting themselves at great risk”* Participant 5, academic.

*“They think it’s all made up that there were these problems. They’ve been told it’s something that was made up to scare them off using, or that it’s made up*

*because the government want to ban it and things like that. We have to try and address that".* Participant 22, probation officer.

#### *Information sources*

Both knowledge and attitudes were linked by participants to the amount of research that users, particularly younger people, were undertaking and where they were getting information. A common need identified was to promote reliable sources, information critique and questioning of source motives and biases. Different common sources including websites, peers, dealers and experienced users were discussed as often problematic, particularly when individuals do not have the skills or inclination to critique or question the source or the information, or are looking to confirm preconceptions and justify decisions. It was acknowledged that all these sources can be excellent providers of useful advice, but that they can also provide inaccurate and biased information, or messages not relevant for an individual or their circumstances. For example, participants discussed how experienced users sometimes provide advice that reflects their own experience and may not be appropriate to others. They suspected that many people can be naïve or find it difficult to question recommendations from experienced users or dealers, who may be respected and seen as an authority on the topic.

*"If you speak to a gym owner who uses steroids, or the big guys in the gym, they're going to give you information that reflects their own experiences, their own biases".* Participant 7, substance use practitioner.

*"In an ideal world they'd ask themselves about what they were being told and think about things like: one, who is telling me this and are they reliable? Two, why are they telling me this? You know, do they have my best interests at heart, really? I don't think they do that. I didn't, I just thought 'this guy is bigger than me and has been juicing'<sup>10</sup> for longer, I best do what he says".* Participant 17, fitness trainer.

The mixed quality of advice on social media and websites that many individuals access was highlighted and it was noted how easily 'bad' information is passed around online and in social groups. Within social networks information, including that which is false or potentially harmful, may be repeated and reinforced by dominant members of the group so that it becomes the norm. Social pressures to conform to what others are doing

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<sup>10</sup> A common slang term for using AAS. Some users will refer to steroids as 'juice'.

and not use smaller amounts than someone else, even amongst someone just starting out with AAS, could lead to patterns of use perceived as increasing risk, particularly where peers are poorly informed themselves.

*“They just cherry pick these websites, they cherry pick the articles and the studies that they like, that say that there is no risks or that you can do away with the risks if you’re clever”.* Participant 6, academic.

*“I think most of them get a lot of it from each other though. They do it in groups or they form groups when they start and a lot of the information just bounces around the group. And you tell me how good you think that information is likely to be, when it’s second hand information that one of them has got from God knows where?”* Participant 19, gym owner.

### Changing intentions and reducing use

As well as addressing specific risk factors and harms, participants commonly raised the need to address the overall decision to use AAS. It was recognised that individuals will vary in their motivations, decisions and readiness to change their behaviours, but that generally the most positive outcome, and the best way to reduce risk and improve health, would be that an individual decides not to use AAS. Some may be motivated or open to stopping their substance use, while others may be satisfied with their current position and not motivated to make any change. Additionally, some may be open to consider adapting or changing their practices with the intention of reducing harm, or risk of harm occurring. Consequently, the aims and goals of any interventions and interactions was seen as dependent on the individual and their circumstances. This was summarised by one participant as:

*“Without wanting to over simplify it, at the end of the day we want people to be using less. If they are going to do it then that’s their choice and that’s fine, and in that case we want them to do it as sensibly as possible and take care of themselves, but ultimately, we would want them to make that choice not to use steroids”.* Participant 15, substance use practitioner.

### *Awareness raising and motivating to make a change*

Many users visit services to acquire injecting equipment rather than for any help or advice and may not be open to making any changes at that time. In addition to providing harm reduction messages, participants used terms such as ‘planting a seed’ frequently

to convey the potential for every interaction to have an impact upon future decision-making. Participants felt that where any conversation was held about AAS it was important to get individuals thinking about key issues and that in some cases this could start the processes that may eventually lead to cessation, or less risky use.

*“If they're doing something that could be harmful then you need to take that chance you have with them and plant that seed in their mind that it might not necessarily be a good idea. They might not listen to you or accept it then, but later on, whether that's weeks or months, you've started that conversation”.*  
Participant 26, substance use practitioner.

In some cases, clients in services may ask for support to stop using AAS, or suggest that this is something they are considering. Several participants who worked in substance use services discussed their experiences of this, including being approached by clients who want to stop or appear open to the idea, particularly when they have experienced a change in their life or are less motivated than previously to use AAS. Where there is an opportunity to intervene at this point and support an individual towards ending their substance use, this was seen as important.

*“If you get the feeling from them that they might think about calling it a day then surely supporting them to do that is the best harm reduction you can do”.*  
Participant 27, substance use practitioner.

*“I think it's human nature to think about your choices and lifestyle at times like when they're settling down so you're probably more open to advice. Having kids definitely, or a new girlfriend. You get them chatting about that and then push a bit around how steroids might affect these plans.”* Participant 20, substance use practitioner.

A range of physiological and psychological side effects is associated with AAS use and when individuals experience harms this may influence their beliefs and perceptions of risk relating to their substance use. Service providers suggested that when an individual is seeking support about a side effect or is concerned about health or appearance, this may be an opportunity for engagement and intervention. Two participants who had experienced side effects themselves when using AAS commented that this effected their thinking. Both agreed that this would not be a deciding factor for everyone, but some would be more inclined to consider changing their habits and to listen to advice at such a time.

*“I think the most productive conversations where you can see them listening to you are when they’ve come to you with a problem, or you’ve identified a problem with them and they’re thinking about whether it’s all worth it. You have to make the most of that chance, build on it, you can get through to them when I guess they are feeling unsure or vulnerable”.* Participant 9, substance use practitioner.

*“The one time I thought seriously about stopping was when I had gynaecomastia. I was doing all these things to be the big man, and instead I was getting bitch tits, you know? I was panicking, and I wanted to stop, but I wanted more to keep going. I think people who are less committed, something like that would really affect them and make them think”.* Participant 14, fitness trainer.

### *Early intervention*

It was commonly expressed that intervening early when an individual is considering starting, or has recently started, using AAS can be effective for engagement, conveying risks and influencing decisions. An individual who has recently made that decision may be more interested in harm reduction information and advice. Further, at this stage individuals are more likely to make changes than after they have been using for a period of time when they may have formed habits and perceptions that are difficult to change, particularly when they start to see desired effects upon the body.

*“Someone newer to it, they’re not as embedded in that lifestyle and behaviour, they’re not as committed to it and so it’s easier for them to change their minds. And have their minds changed”.* Participant 6, academic.

*“They can see the effects in a positive way and that kind of reduces the impacts of the negative effects. But if they haven’t already seen the benefits then that gives you a chance to talk about all these other things like diet, harms, side effects”.* Participant 24, substance use practitioner.

Participants who worked in gym settings applied the idea of early intervention specifically to new starters in the gym. In that environment with the potential influences, opportunities and pressures related to AAS, initiation may be particularly likely. Therefore, this may be an opportune time to engage with these individuals before other influences are experienced and habits established.

*“Often they’re interested in juicing sometimes as soon as they start in the gym I think. They’re keen to listen to what I have to say at that stage, much more than if you catch them once they’re a couple of cycles in when they already think they’ve got it all sussed.”* Participant 17, fitness trainer.

Participants, particularly those with expertise in fitness training, commonly highlighted the possibility of delaying initiation through promoting natural methods for enhancing muscularity. For individuals who are beginning in their efforts to increase muscularity, there may be no need to use AAS in order to achieve gains that can be achieved through changes in strength training and diet. Some participants associated this with lacking understanding about the body and training, particularly amongst younger people. Many may not progress to a point where they are considering using AAS following an initial delay and it was perceived that some of the attitudes and choices identified as problematic and contributing to riskier use might be negated to some extent by this delay.

*“They need to understand their body and they need to understand that there’s probably reasons why they’re not putting on size and if that is what is they are looking for then they’ve probably got the whole training regime and diet wrong. So trying to educate them on how to eat right, train right, rest right and then maybe some of them won’t want to use steroids if they don’t need to”.* Participant 8, substance use practitioner.

*“Lots of them will only use for a cycle or two anyway, and then lose interest or get other priorities. So if you can get in there and put them off starting for a bit, they might never get round to doing it again anyway”.* Participant 2, substance use practitioner.

#### *Primary prevention*

While most of the discussion focussed on men who had already started using AAS or were considering it, several participants also raised the importance of prevention at an earlier stage. Participants who discussed this topic did so generally in the context of adolescents and often school-based programmes, but there was a lack of consensus on what any potential prevention interventions should be with many different possibilities mentioned. Some recognised that prevention was a complex topic, particularly as AAS and broader issues of appearance and body image related problems are likely to have many potential predictors and risk factors, and therefore while intervening before someone is considering using AAS would be very beneficial, it is not straightforward.

*“Ideally you’d catch them before then, before they’re even at that stage where they’re thinking about it but I think that is more complicated. There’s just so*

*many reasons why people want to get bigger or want to use steroids". Participant 14, personal trainer.*

*"I think prevention is very difficult compared to something like harm reduction which seems a bit more clear cut about what actually needs to be delivered and what will actually help people, whereas prevention is a bit more woolly I think if that makes sense? There seem to be a lot more factors to consider about when, what, how". Participant 10, Public health commissioner.*

The points raised in these discussions often moved away from AAS specifically into a broader spectrum of issues facing young people such as body image, mental health and peer pressure. In particular, participants felt that improving young people's skills in using social media and critiquing media images, improving understanding about the body, supporting positive norms and expectations about appearance, and supporting abilities to cope with pressure from peers and society would have benefits. Inherent in these discussions was a presumption that by intervening to change these factors, this would have a positive impact upon later decisions to use AAS.

*"It would be good to do something earlier on in their lives about the media and body image I think. Like which bodies are attainable are which are not, and how Photoshop and things effect what you say, and what is a realistic ideal. How to cope with the pressures that so many young people must be under to look a certain way". Participant 25, Substance use practitioner.*

*"I think we need to provide information about these technologies and how images can be manipulated, and to inform young people that many of these bodies are not naturally achieved and therefore are not something that should be seen as the norm". Participant 7, Substance use practitioner.*

While these may be important factors for interventions to focus on with young people, other participants pointed out that the variety of factors influencing AAS initiation, and the complex nature of some of these, may be difficult to overcome. They emphasised the complexity of issues that might cause AAS use and questioned whether these could be overcome without being individualised. Influences such as body dysmorphia and emotional factors might require different types of interventions. Others pointed out that drug prevention programmes have generally not been that successful in reducing use of different substances, and they were not confident that a steroid prevention programme would be any more effective. However, it was recognised that these potential

programmes could still have an impact upon the wider issues facing young people, regardless of any potential impacts upon later use of AAS.

*“There are a lot of reasons people start using steroids... what about bullying, abuse, things like that. It's not just about body image... it can be more mental disorders, body dysmorphia, confidence to go against your mates and what they're doing. I think it's very complicated and that makes these early approaches more complicated. It can be many different things and can be deep rooted and complicated psychological issues that we don't want to oversimplify”. Participant 4, General practitioner.*

*“It's about having an idea of what we're trying to prevent. Are we actually trying to prevent drug use, in this case steroid use... in which case I would suggest that looking at the history of drug prevention, we pretty quickly run out of interest and hope that it will work really”. Participant 11, Public health commissioner.*

*“Generally, drug prevention as in stopping any use of a drug has not been successful. But that doesn't mean it's not important and beneficial to work on things such as body image and peer pressure with these kids. It's about changing a culture of wanting to be something you're not, and the pressure to look a certain way. And that could have loads of benefits and for some then maybe that would include making them think again later about steroids”. Participant 16, Public health commissioner.*

Finally, there was discussion amongst a small number of participants only around prevention relating to people who play sports at an amateur level. Prevention of AAS has historically been in the context of professional sport as part of efforts to reduce ‘doping’ for performance enhancing purposes. It was discussed that authorities need to hold a similar stance on AAS and other IPEDs at the amateur level as they do for elite athletes to avoid mixed and inconsistent messages. While the participants in this study were unanimous in their support for accessible harm reduction for men who use AAS, there was recognition that in a sporting context that was likely to be less acceptable and practical, and the goal of interventions for athletes should be to prevent uptake and identify those who do take these substances.

## Discussion

The findings presented in this chapter establish harm reduction and other behaviour change needs that interventions are required to address. These are summarised in box 3.

### Box 3: Priorities for interventions to address identified in theme 3

#### **Harm reduction**

- Increase use of reliable sources of information and encourage critique of information
- Encourage and support AAS use in moderation characterised by moderate doses and cycles including periods of no use
- Support users to practice safe injecting and avoid sharing needles and other injecting equipment

#### **Reducing AAS prevalence**

- Reduce prevalence amongst young people and new starters
- Support cessation amongst those who want to stop
- Motivate long-term changes in use and attitudes and beliefs about AAS

There was general agreement regarding harm reduction needs for this population. Consensus was that the riskier AAS regimes adopted, characterised by taking high amounts over long periods of time without allowing the body time to recover, particularly by new users or younger people, may be harmful and relate to dependence and health conditions such as cardiac and fertility issues at a young age. Previous research has identified 'risky' practices amongst some users including polypharmacy (Sagoe et al., 2015), high dosages (Pope et al., 2014b, Chandler and McVeigh, 2014) and long or continuous 'on' cycles (Kanayama et al., 2009a). For those who are highly motivated to use AAS, participants in this study identified a need to therefore minimise risk through promoting use in moderation, cycles that allow the body to recover and access to good quality information sources. In reference to evidence of BBVs and injecting-relating injuries in this population, promoting good practice relating to injecting, sharing of injecting equipment and condom use were also common points of consensus. Additionally, participants identified the need to reduce AAS use, particularly amongst individuals who are adopting risky practices, and encourage cessation in

response to health harms. It is interesting to acknowledge at this stage the similarities between many of the priorities identified here and the findings of research carried out in the 1990s examining the views of gym owners on AAS users (McVeigh, 1996) and their harm reduction needs (Morrison, 1994). Certainly, concern over choices regarding dosages, cycle length, AAS sources and information sources are not new. Similarly, some of the findings in the previous chapter resonate with other studies of the same era that investigated the support that users require and what IPED services should look like (Lenehan, 1995, Morrison, 1995, Pates and Barry, 1996). Therefore while AAS use appears to have increased outside of athlete populations over the past 20 years, the issues and challenges in addressing the health harms and risks of people who use them remain in some ways similar. This could suggest that approaches to date to tackle these issues have been limited in their success if similar priorities and concerns remain prominent two decades on. This reinforces the need to develop evidence- and theory-based interventions to respond to harmful and risky AAS use in an effective way.

#### Moderation and risky use

Many of the findings can be summarised as the need to support people who are motivated to continue to use AAS to manage their risk. Developing guidance on promoting use in moderation is complicated by a number of issues however. A key influence for using AAS and against adopting risk- and harm-reducing AAS regimes was perceived in this study to be the prioritisation of quick gains in, or maintenance of, muscularity over potential health risks. This suggests that these individuals will choose options perceived to maximise rapid benefits with little regard for, or understanding of, long-term risk and this may be a barrier to adopting harm reducing strategies. They appear similar to the 'YOLO type' ('you only live once') in the typology of AAS users developed by Christiansen and colleagues, defined by impatience, poor knowledge about AAS, a lack of concern for health and risk taking (Christiansen et al., 2016, Zahnow et al., 2018). Models of health behaviour such as protection motivation theory (Prentice-Dunn and Rogers, 1986) suggest that an individuals' intention to protect themselves is partially dependent on their appraisal of both the severity and likelihood of a threat. Research suggests that motivation to take risks reflects the perceived balance of risks and rewards (Weber & Johnson, 2008; Weber, 2010), and for many users there are

powerful social and personal benefits influencing decision-making. Intervention providers will therefore need to change perceptions of risks and benefits with this group regarding their approach to AAS use.

The 'Expert' and 'Wellbeing' groups in the same typology include subgroups of users who consider themselves highly knowledgeable and attempt to manage and reduce risks or use in moderation. While some manage use with periods of 'off cycle' recovery and lower dosages (Brennan et al., 2016), the long-term risks to health from any AAS use outside medical settings are largely unknown. The extent to which AAS use in moderation will protect individuals is at present unclear, as the risks of harms associated with AAS use are not well quantified in terms of different dosages, substances or cycles. Additionally, the nature of the illicit manufacturing of most AAS means strength may vary (McVeigh and Begley, 2016), which complicates any attempts at managing risk or controlling what one is taking. Therefore, while encouraging moderation is likely to be a sensible and positive harm reduction approach, research to determine how best to define this is required.

Users are susceptible directly and indirectly to information and pressures from a range of environments and sources that together influence their AAS decisions and practices (Bates et al., 2018). Information online and from peers, dealers and other users combined with the unpredictable quality of this information, preconceptions, and skills in critiquing information all contribute to decision making and were perceived here to contribute to poor knowledge and risky AAS use. Further, exposure to information that promotes risk taking or reduces concern for harms potentially contradicts or undermines messages from healthcare providers. For example concern was identified here of naivety amongst experienced and 'Expert' types who despite their experience may be unaware of, or disbelieving of, the potential harms from their substance use. Researchers have long identified that long-term exposure to risks leads to reduced perceptions of severity and increased feelings of control, particularly where few negative consequences are experienced (Johnson and Tversky, 1983, Brown, 2005). These beliefs can be passed on to others through social networks and within environments such as gyms and can be a powerful influence on risk taking (Kimergård

and McVeigh, 2014a). As discussed in the previous chapter, a priority identified in this study was to increase the amount of reliable and appropriate information to users. Further, healthcare providers should promote to users a critical and questioning attitude to messages and information sources, and encourage them to critique their own behaviours and choices. They should therefore ensure users are aware of the potential for harm while continuing to support them to use their AAS as safely as possible. Further, they should try to motivate users to develop exit strategies and encourage reassessment of regimes and practices.

### *Motivating change*

Much of the discussion regarding changing use was similar to recommended approaches within UK guidelines for managing drug misuse and dependence, which includes discussion of behaviour change approaches (Independent Expert Working Group, 2017). Health professionals who work in drug and alcohol services therefore should be confident to work with this population and there are likely to be transferable messages. Motivation to use AAS, maintain a particular regime or adopt harm reducing strategies is likely to be dependent on many factors and different individuals at different times will be more open to making a change. Key opportunities to intervene and motivate change were identified in this study as early intervention before habits are formed, following experience of poor health or other adverse effects, and when the individual is already considering a change. In this study participants framed this in terms of 'planting a seed' or 'chipping away', with the intention of slowly changing intentions and attitudes to motivate change. Decision-making however is not necessarily rational or reflective and may be dominated by automatic processes (Marteau et al., 2012). Therefore while beliefs about risks and benefits are undoubtedly important, they will only predict a behavioural response where motivation is strong enough to overcome other drives, habits, impulses, cues and emotions (West, 2006). Motivational interventions will need to consider these factors and identify what is important to individuals if they are to be effective. For example, an individual who experiences positive social reinforcement by peers and has a strong identity as an AAS user as part of a subgroup may be resistant to change.

Users are increasingly recognised as a diverse group whose AAS use can be motivated and influenced by a wide range of potential factors (Bates et al., 2018). For example, the importance of approval and positive reinforcement from peers for users have commonly been identified by researchers (Hanley Santos and Coomber, 2017, Kimergård and McVeigh, 2014a, Olich, 1999) and the process of socialisation and self-identification as part of a group of individuals with similar motivations and lifestyles is well documented (Maycock and Howat, 2005, Maycock and Howat, 2007, Monaghan, 2003). Feelings of group belonging have long been linked with social identity and positive self-concept (Tajfel and Turner, 1979) and are likely to be powerful motivators to overcome for those attempting to stop using AAS. In this example, increasing awareness and understanding of risks and harms might be part of motivating change, but changing identity is likely to be an important part of driving and sustaining any changes to AAS use. For others, factors such as low self-esteem (Blank et al., 2016) or experiences of abuse (Petrocelli et al., 2008), or community or institutional norms, may be important predictors driving choices. Therefore, identifying which factors are significant and influential for individuals will be important when looking to motivate any change and to address through interventions. The priorities identified in this study relating to improving accessibility and availability of relevant services and improving engagement between providers and clients will be important to consider if interventions seeking to motivate change are to be implemented and effective.

### Limitations

The intervention priorities discussed here and in chapter 5 reflect the perspectives and experiences of stakeholders with a range of expertise relating to AAS and those who use them. While this included a number of current and former AAS users, further research with individuals who use AAS to explore whether these findings match their own perceptions and experiences, and how to communicate and implement the messages and interventions discussed, will provide valuable insight. This was the aim of study 4, which followed on from this study. Additionally, findings relate in the main to those people who are already attending services relating to their AAS use. It must be recognised that many users do not attend any services of this nature and may have different profiles and needs, and be exposed to different influences and messages.

Consideration is therefore required on how to increase engagement and deliver important harm reduction messages and interventions in response to the AAS and health needs of this population both in and outside of healthcare settings. A strength of the study was that the participants represented stakeholders with a range of experiences and areas of expertise and the inductive approach to data collection and analysis supported participants to express their beliefs and perceptions regarding what they felt the greatest needs that should be addressed with this population are. However, the nature of this approach meant that while 27 participants were included and a substantial and rich dataset was generated, the overall numbers taking part were relatively low. It is unclear whether the priorities identified here are representative of the perceptions of the large number of stakeholders with interests and experiences in this area. One important subtheme related to GPs and their response to AAS and men who use them, but no GPs were included in the study so it was not possible to gain insight into their perspectives on these issues. As described in the study methodology, efforts were made to ensure that participants represented important viewpoints on this topic, but it is unclear whether any other key perspectives were overlooked<sup>11</sup>.

## Conclusion

This study identifies consensus from stakeholders on priorities regarding support and interventions targeting users. The priorities include harm reduction messages and adoption of adapted practices for those who use AAS and provide a platform for the development of guidance for practitioners who work with users to deliver harm reduction messages and the development of interventions to influence AAS decision making. However, more thought and research is required into the precise nature of harm reduction messages, particularly regarding AAS use in moderation and PCT, and into the potential influences on decision making that are specific to AAS and those who use them. Further, there was consensus identified on priority areas in terms of reducing AAS use, which focussed on prevention and delaying onset of use particularly amongst younger people and supporting cessation amongst those who wish to stop. Potential

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<sup>11</sup> Further discussion of the limitations of this study and the implications of these is included in the broader discussion of limitations in chapter 7

approaches to bring about the desired choices were identified and will be explored further, supported by the reflections and perceptions relating to these findings by users. It is clear from the evidence base that the priorities identified in this study are not all new ones, but are in fact similar to concerns raised over 20 years ago. This suggests that approaches to date to respond to these concerns, primarily through the provision of clinics targeting AAS users, NSPs and drug treatment services have not been that successful at influencing choices amongst this broad group of substance users. This reinforces the need to broaden thinking and consider other ways to influence and provide information to this population.

## Chapter 6: User perspectives on priorities and provision of support and healthcare

### Rationale and outline

The aim of this study was to continue to identify priorities and opportunities for interventions from the perspective of users. In particular, it was proposed to enable users to reflect on the perceptions of other stakeholders. Semi-structured interviews were carried out with 12 users, who were asked questions exploring key themes from the previous study. Through a deductive thematic analysis, four themes were identified: i) health and risk, ii) information provision and support; iii) support services; and iv) GPs. Generally, findings supported those from the previous studies relating to priorities for improving provision of information and support and reducing risky patterns of AAS use. There was a greater emphasis on the need to improve the response to AAS amongst GPs, but less of an emphasis on the importance of support services, although similar barriers to accessing and engagement in such settings were identified.

### Methods

#### Participants and recruitment

Participants in this study were all AAS users in the UK. Recruitment took place through two methods: firstly, users who had participated in a national IPED survey and consented to be contacted regarding future research studies were emailed and asked if they would like to participate. This included a total of 31 individuals. Secondly, a snowball approach was utilised where stakeholders from study 3 and participants in this study were asked to identify potential participants. Where these individuals provided consent, their contact details were passed to the researcher and they were subsequently invited to participate. To include a wide range of perspectives and needs again, men with different amounts of experience with AAS were sought. The focus of much research with users previously has been on bodybuilders and more experienced users, so stakeholders were particularly encouraged to identify any younger and less experienced users.

## Data collection

The progression to a more structured interview format throughout study 3 continued in study 4 with semi-structured interviews used. This reflected the change in emphasis from identifying ideas to following up on them. Therefore, interview schedules were prepared to ensure that important topics were covered and key findings from study 3 were followed up on. Questions related to users' beliefs towards undertaking research and knowledge about steroids; information sources; experiences of and attitudes towards support services and health professionals; experiences of and perceptions about the influences of gym environments, other users and significant others; and perceptions about risk and risky use in themselves and others. To support these interviews, 12 statements summarising the views of participants in the previous study were drawn up, which were identified during the initial analysis of this data. The interview schedule and the supporting statements are presented in appendix 12. All participants were read the first statement and asked for their thoughts on this to stimulate conversation at the start of the interview. The remaining 11 statements were used alongside the relevant question where the interview covered that topic. Some participants talked extensively on some topics and some interviews covered topics not on the interview schedule. While all interviews covered all topics therefore, not all participants were asked all of the questions.

## Data analysis

Analysis was carried out following the same processes as described for study 3, and again followed the thematic approach outlined by Braun and Clarke (Braun and Clarke, 2006). However, the thematic analysis followed a more theoretical and deductive approach (Braun and Clarke, 2006), similar to in part B of study 3 following the shift from unstructured to semi-structured interviews. Therefore, only data that was relevant to the research aims was fully coded with other data given the code 'off topic'. Initially, data was coded under categories corresponding to the interview questions and then arranged into a thematic map following closer scrutiny.

## Ethical considerations

While the interviews focussed on specific topics coming out of the previous study rather than topics likely to be particularly sensitive or upsetting, participants were asked to reflect on their experiences and generally around their steroid use. Therefore, it was inevitable that conversations at times would include discussion of their personal history, health and concerns and reflections on their choices. It was not anticipated that this would lead to any upset, but at the start of each interview participants were told that they could take a break from, or end, the conversation at any time and that they did not need to discuss any issues that they did not want to. The participant information sheet given to all participants included advice if they had any concerns about their substance use. Steps were undertaken to ensure the anonymity and confidentiality of participants, similar to as with stakeholders. Where specific services, individuals and places were identified by name, all identifiable information was removed in transcripts. This was also important to assure the anonymity of services, health professionals and other users who were discussed. Job roles were reported using general terms and locations and names of work and study places and sports teams were removed. While participants did not generally appear concerned about these issues of confidentiality, several did seek reassurances as to the purpose of the work before they would agree to interview. In particular they were concerned that their data would be misinterpreted and misreported and that the researcher was seeking to generate sensationalist publications that would increase the scrutiny on AAS and those that use them. Common questions received were clarifying study aims, whether the researcher was a journalist, and what his opinions were on the legal status of steroids. In all these cases, conversations over email were held and where the researcher clarified these points and provided examples of his previous work in this area. The majority of participants who expressed these concerns subsequently completed an interview.

Ethical approval to undertake this study was granted by the LJMU Ethics Committee in February 2018 (reference: 18/PHI/002).

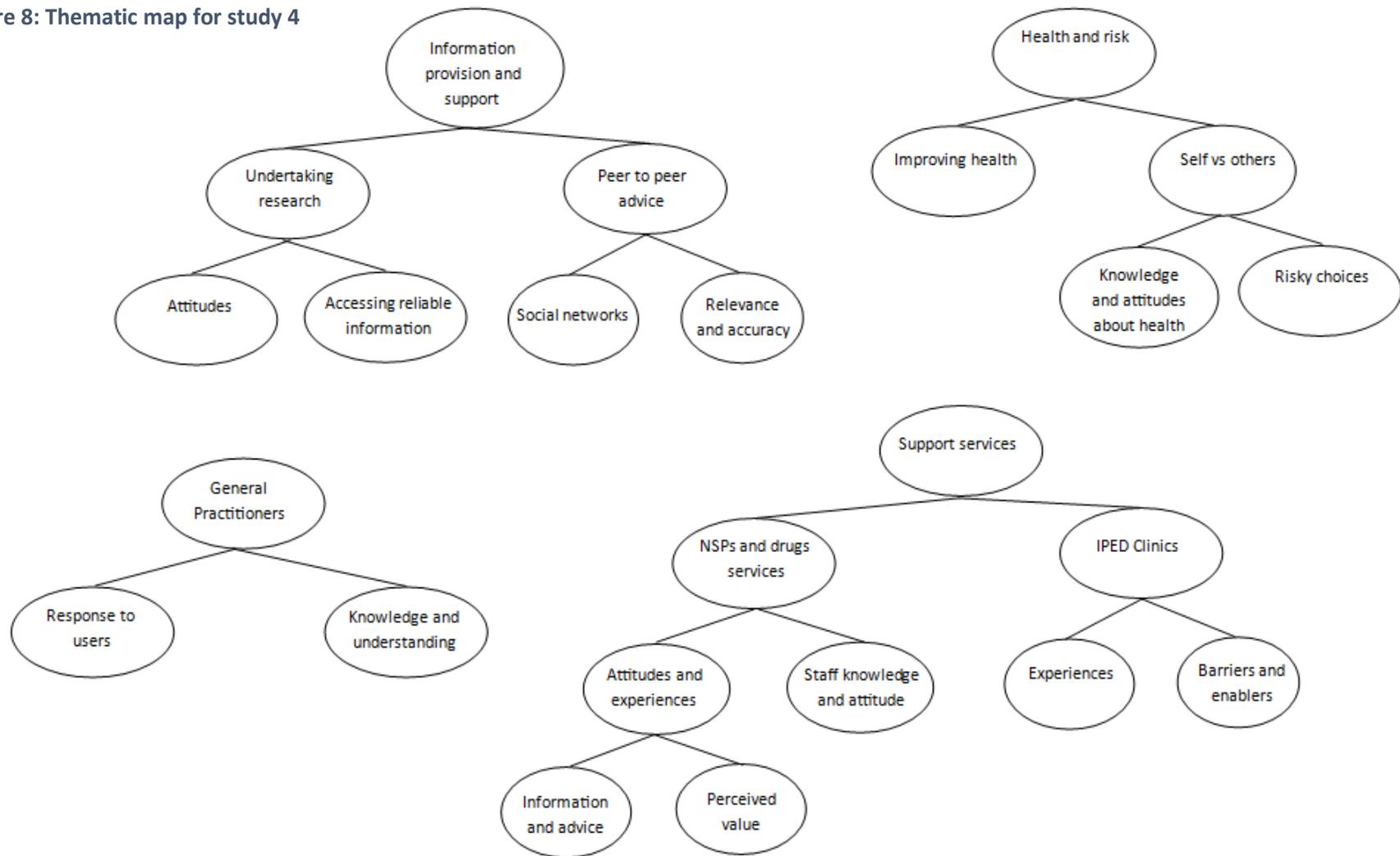
## Results

Semi-structured interviews were carried out with 12 individuals, lasting 33-70 minutes. Five of these participants responded to the recruitment email and a further seven were identified through the snowball approach via participants from this study and study 3. An additional five users expressed interest in participating following the recruitment email and six users were identified by others as being interested. However, these 11 individuals did not take part for reasons including being users of other IPEDs but not AAS (n=3) deciding they did not want to participate in a research study (n=2), not having the time (n=1), and communication ending without a reason being given (n=5).

Participants were asked their age and how long they had used steroids. The sample ranged in age from 20 to 48 years (mean, 29.5, median 26.5). Experience was defined as length of time since first using steroids, which ranged from five months to 27 years (mean 6, median 3.5). Over half (7/12) of the sample had used over a period of between three and six years, mostly without a substantial break in that period. Two participants were very experienced, having first used steroids 19 and 27 years ago, both including periods of non-use, while three participants were new users, being within their first year. The study did not aim to explore motivations for use, but to give context to findings and stimulate conversation participants were asked to describe their reasons for training (and using steroids) and what they did for a living. Three of the sample were students and the rest were in full time employment including roles as a personal trainer (n=2), manual labourer (n=2) and prison officer (n=1). The remaining four participants described other professional roles. Three participants discussed their participation in amateur sports and two more described their intentions to compete as bodybuilders in the future. For the remainder, their use and training was discussed in the context of health, fitness and appearance with the exception of two participants who had concerns about low testosterone. The sample therefore included a range of ages, experience and motivations.

Through the thematic analysis, data was organised into four themes: i) health and risk, ii) information provision and support; iii) support services; and iv) General practitioners.

Figure 8: Thematic map for study 4



A thematic map providing an overview of these themes and subthemes is presented in figure 8.

### Health and risk

While this study did not aim to explore participants' AAS regimens or determine their own level of risk, through the discussions it was apparent that the sample represented different AAS attitudes and practices. There were examples of practice that might be described as

increasing risk, such as those who described long cycles and use of many different substances, but generally participants own patterns of use were described as being relatively low risk. The attitudes towards risk amongst themselves and others was summed up by participant 6, who stated:

*"I wouldn't say I'm at risk. I'd like to think that I'm doing good for my health by doing this, that's what it's all about. I know what I'm doing and I know how to do it well. It's the ignorance about it all that is risky, lads who don't know what they're doing and then doing stupid things".* Participant 6.

Several emphasised that they believed their own use was beneficial for them and enabled them to be healthy.

*"Using steroids doesn't make you healthy but if you're eating well and training well, and using steroids wisely, then it can be a good thing. If you don't do it wisely then that's when you have a problem".* Participant 2.

Regardless of their personal patterns of use, many participants agreed with concerns about patterns of use amongst many men using AAS. Examples given suggested that some, particularly younger ones, are frequently making choices relating to AAS that increase risk with the amounts that others were using and cycle lengths particular points of concern. Generally however there was little indication that participants had concern about their own use. There were exceptions to this amongst some more experienced participants who reflected on their experiences and suggested that they regretted their decision to start using AAS and pointed at choices they had made previously that they now felt were naïve and risky. This was reflected in the advice that they gave to others

whom they had somewhat negative attitudes about and criticised for not practicing 'sensible' or moderate use. Despite their regrets, they continued to use however.

*"When I tell them how much I'm using, they're surprised because they've been told to do a lot more than that so that's what they're doing. I think they see it as the more they do the bigger they'll be, like it's magic". Participant 9.*

*"My advice is always the same and that is just not to start you know, because for me it was "I'll just do one cycle" and there never is just one cycle. Some of them, it's one never ending cycle for years and years. I don't think they think it through before they start, not at all". Participant 4.*

For these more experienced users they appeared to empathise with those who they were critical of, and recognised that they had a similar attitude when younger and had engaged in riskier practices. For example, participant 2 compared their own attitudes to users younger than them and described their approach to information and attitude about risk:

*"When I started, I was 18, I buried my head in the sand about it all. I didn't want to know about anything apart from was it going to help me bigger and stronger? I know that some people tried to tell me not to do it, to wait or just not do it at all and they gave me reasons but I did not want to know, not interested. If there were reasons not to do it then I didn't want to hear them because it was so important to me and I had already decided what to do". Participant 2.*

A typical description of attitudes prominent amongst men using AAS was given by participant 9, and was similar to those described by stakeholders in the previous study:

*"They want to hear that going on juice is going to be safe and it's going to get them where they want to be and it's going to be a bed of roses. They want the body and they want it easy, and they want it now. I know that because it's what they tell me. They want something to just sort them out, no hassle. They want it easy". Participant 9.*

Similarly to previous findings, a range of examples were given to demonstrate the ways that knowledge and attitudes amongst other users was undesirable. This included a lack of understanding around how AAS work, optimal practices and injecting, and health in the post-cycle period; the desire for quick changes in muscularity; seeking easy options to achieving body goals; using products of unknown or dubious quality; and not taking the time to research and understand what they are doing. These factors were again

linked with risky patterns of AAS use and not fully engaging in other parts of the lifestyle such as with diet and training to the extent that participants felt was required to justify using AAS and to achieve the desired benefits.

#### Support and information provision

Similarly to the previous study, knowledge gaps and risky choices were often discussed in the context of undertaking research and of the accessibility and reliability of information and support. There were mixed attitudes towards the need to do research, although typically participants appeared to value information seeking and emphasised its importance particularly when first starting out. Developing understanding and expertise were commonly seen as important for achieving goals and reducing the likelihood of negative outcomes such as making unwise choices, being susceptible to bad advice, causing harm to health and being ripped off by dealers.

*“You should do your research and if you don’t then you shouldn’t be surprised if it doesn’t work out for you I think or if you do yourself more damage than good”.*  
Participant 5.

Perhaps unsurprisingly therefore some participants emphasised how seriously they took research and took pride in their own level of understanding, and this could be used as a measure to criticise others for. In particular, research was valued as part of the decision making process when starting to use AAS, but also beyond that point with more experienced users indicating that they still value new information. This was tied in with the idea of understanding what one is doing, which was portrayed as a key difference between those who were using sensibly and those who were potentially more at risk.

*“I read all the information when I started off and about how everything should be used and in what way.... That’s the really concerning thing as far as I’m concerned for lots of them, there just isn’t any attempt to do the research and understand what it is they’re doing”.* Participant 4.

*“I’m still learning, everyone can learn something, and the guys on there (online forums) some of them have a lot of knowledge and experience that they share and you can pick up little tips and bits and pieces from them about how to improve what you’re doing. If you’re putting things into your body then you should take the time to learn about it and understand it yourself, I don’t get why*

*you wouldn't do that, you can't just sail through life waiting for others to tell you what's what". Participant 10.*

However, not all participants were so interested in seeking information and improving their own knowledge and understanding. For some developing understanding may be less important and they are content with a level of knowledge that enables them to achieve their goals. There may be a reliance on others to provide essential information and a lack of motivation to undertake research as demonstrated through the following discussions, firstly:

*Participant 7: "I know that some people want to know everything but I'm happy doing what I'm doing. Someone will tell me if there's anything I need to know I suppose".*

*Interviewer: "So you're not that interested in reading up about it, improving your own knowledge?"*

*Participant 7: "It's interesting but there's only so much I want to know, you know? I always say to him (a friend) he does the reading so I don't have to. It's not that I'm not interested but, I think, what I want to know is what should I take and how often. Other than that, no, I don't need to know every detail like some do, no problem with that if that's what you want to do with your time, but I'm not a details man".*

Secondly:

*Participant 12: "I think it's different for different people. Some want to know everything about it and they'll do loads of reading because they want to understand it. And then you have the opposite where they just want to be told what to do and they're the ones that are I suppose you could say vulnerable to some of the bad advice that floats around, particularly from the lads who are shifting it".*

*Interviewer: "So you mean some of the dealers are giving bad advice, and some people are maybe just taking that at face value?"*

*Participant 12: "Yeah some of them, the shiftier ones, they'll take advantage of what they see as being ignorant. I think some of them find it funny or like they deserve it cos they don't know any better. It's sort of like teaching them a lesson and it helps them to make a bit more money".*

Dealers were amongst a range of key individuals identified as being influential on the attitudes and choices of people who use AAS. Discussions here were very similar to those

with stakeholders and reflected how information and advice, both perceived as being 'good' and 'bad', reaches users via other users including dealers, friends and other people known to the individual. Perhaps unsurprisingly the gym was again identified as a key environment where individuals can be influenced by other users including those they see regularly in that setting who may or may not have the knowledge and skills to provide useful and reliable support. Within social groups clearly a lot of information sharing goes on which some participants discussed in a positive way.

*"Lots of guys have their stacks and they're doing different combinations, so they'll tell you about what works and what doesn't, how to counter sides, how to get lean as well as big. I always listen because you never know what might be useful later on down the road".* Participant 12, discussing a group of peers at his gym.

*"He (knows it all because he's been around it for a long time so he'll sit with you and work out what you need and when you need to do it. To someone like me who doesn't know a lot about these things really that's been great".* Participant 8, discussing his dealer.

If one of the needs of people who use AAS is to have access to information and advice then clearly there are potential advantages of this peer-to-peer support. However, participants shared many examples of how this knowledge sharing and advice can be problematic due to the information being provided and the susceptibility of some users to misinformation or advice that may not lead to desirable choices. Generally, this resonated with stakeholder perspectives and the evidence presented in the socioecological framework. For example, participants discussed how the stereotypical 'big guy in the gym' might have attitudes that lead to advice that does not support the idea of using in moderation, yet they often have a receptive audience for their advice and may, whether they intend to or otherwise, be influential information providers.

*"I'd say about 90% of the time, their advice is awful. Definitely, it's that high. It's usually they have an old school mentality of just sitting in the gym for hours on end doing pointless exercises. They're just there all the time, so everyone knows them and they will talk to people about it because they've got nothing else to talk about because they live in the gym. They believe you should do as much gear as possible when that's not necessary".* Participant 5.

*"The big guys will just attract other people who want to look like them, or at least want to get a lot bigger and they think they must know best because*

*they're the biggest ones. Some people will just presume these big guys know best, and often they really don't, and they'll listen to them".* Participant 9.

Similarly, within friendship groups this may also occur with more experienced users being seen as sources of advice and information being passed around the group that may influence others. This extract from the interview with participant 11 reflecting on their friendship group illustrates how this can advice can be influential in potentially positive ways:

*"We do keep each other grounded I think because if someone is talking about doing something like running lots of different ones at the same time or really hammering it then we'll chat about that usually and they'll come around. That's why it's good having a group when there's one or two of us with heads screwed on who won't let everyone get carried away and start abusing it like you see other people do".* Participant 11.

On a similar theme the same participant described how information was shared in their group of friends, where one person did a lot of research and then passed it on to others who were less motivated to increase their knowledge. Several examples were given in this study that indicated the trust that individuals have for their friends and in the information they provide and the reliance on the information provider having good understanding themselves.

*"I've got one mate who knows a lot about everything, if you want to know something he's a good bet to know the answer. We call him the encyclopaedia because he's got all the facts. He reads a lot of stuff, like scientific stuff and books. He says that he does the research so that we don't all have to, but really without him I don't think we'd really be that bothered. I don't really bother looking at it".* Participant 11.

Other examples however were given indicating that undesirable habits and misinformation can be passed around peer groups and that frequent discussion can reinforce motivation to use and perceptions of normalisation. While the advice provided may not necessarily be appropriate or ultimately beneficial for the recipient, this is not to say that these individuals aim to cause harm or give out 'bad' advice to peers or other users they encounter (although as highlighted above, it was suggested that some dealers may be motivated to mislead naïve users). It is perhaps more likely that they base their advice upon their own perceptions and experiences and may not necessarily have the

understanding or motivation to modify this to reflect the needs of different individuals. The complex sub cultures and social structures within environments such as gyms and peer groups may have an impact upon the nature of advice and opinions shared and how this is used.

*“He’s (another user at the gym) kind of the go to man about all this stuff, he asked me about what I’m doing, about my cycle. So I told him and straight away he’s like “only four weeks D-bol? Are you a man or not?”, that sort of stuff. It’s macho shit, kind of I take more than you so I’m better than you... stupid”.* Participant 8.

*“There are people out there who do have good intentions but they’re only talking from what they know, based on either what’s happened to them, what they’ve experienced, or what someone else has told them and they don’t know anything about you. It’s hard to put yourself in someone else’s shoes, I think it’s quite hard to, you know, give objective advice. That’s not just on websites, that’s people in gyms, dealers, your pals, anyone really”.* Participant 3.

*“It’s not like anyone really says to people go and use it, it’s great, do it, so it’s not like they’re promoting it in that way, but they definitely give off, they put a positive spin on it for sure. It’s all about justifying it and justifying yourself as working hard in the gym, putting the time in, being in control of everything”.* Participant 2.

Where there is undesirable advice and information being given out to people who are perhaps naïve and open to influence, there is the potential for harm. An extract from one participant illustrated this where he described an interaction he had with another user:

Participant 4: *“He had a piece of paper with everything written down about how much to do and when he should be taking it. He didn’t know what some of it meant, because obviously somebody else had written it all down for him so you have this situation where here is a lad, 18 years old or so, and he’s got all these vials and pins and a big list of what to be taking, but he doesn’t understand any of it. And some of the amounts were really, really high.*

Interviewer: *“And he would just have followed this, because someone else had told him that was what he should do?”*

Participant 4: *Yeah. Some of these lads starting out, I expect they are quite vulnerable and open to influence... I was, and so were some of the others I knew. It’s only later when you look back on it that you realise it, at the time you just want to be like them, you don’t really question it”.*

Beyond the motivation to do research and interest in improving knowledge there may be issues with accessing and understanding reliable information. Similarly to stakeholders in study 3, participants here discussed how it can be difficult to determine what advice is good and what is unreliable, biased or not appropriate to the individual and their circumstances. Seeking information may increase the likelihood of someone receiving advice and modifying their choices as a result, but their abilities to understand that advice, to critique it and apply it to their own situation will all have an impact on how it is used. The sheer amount of advice available through a range of sources was highlighted as being both useful and problematic as while it increases the accessibility of information for people who may benefit from it, it also makes it more difficult to find the 'right', and increases the likelihood of finding the 'wrong', information. The individual's motivation to understand the issue is likely to be important. Some discussed this in the context of websites and chat forums:

*"The thing is though that yeah there is some useful information out there but it's not that easy to find. It's not accessible really".* Participant 5.

*"You can always find information that you wanna read. If you're buying a new phone you'll only read the reviews that say the ones you like are good, you won't read the ones that slag it off. It's the same with steroids, people will believe all sorts of nonsense if it's what they want to hear. When I speak to people and say things like about have they looked up about what they're doing, they'll quite often say yes and that it's right, it's what they've been recommended. They don't know any better so they don't question that".* Participant 9.

Several examples were provided of times that participants had sought or been given advice through online forums and websites, and opinions on these as reliable sources were mixed. Some participants suggested that they valued academic literature, which they perceived to be reliable and trustworthy. However, it was also noted that this literature could be difficult to understand due to scientific language and frequent use of unfamiliar terminology and it seems possible that this evidence may be misinterpreted or 'lost in translation' in some cases. Participant 5 indicated in this extract that he valued the academic literature, but that while they personally felt able to interpret it, this was not the case for everyone:

*Participant 5: "I'm fortunate in that I did a degree and I guess I'm used to reading academic stuff but it can be quite complicated and lots of guys won't want to read that and they won't really understand it"*

Interviewer: *"So there's good information there, but it's not that accessible?"*

*Participant 5: "What they do is they'll quote you studies that they think show something, but actually when you look at it it's not what they think. And that's because they've looked at it and not understood it or someone else has told them about it or they've read it online and that person hasn't understood it, or they've taken it out of context".*

In all of these examples therefore, the issues relating to information and advice provision were quite complex and indicated a range of important factors to address. Accessibility to information and support, both reliable and otherwise, in a range of formats and settings appears important and is complicated by the motivations, skills and knowledge of the person providing it and the person seeking or receiving it. Additionally the nature of, and social and cultural influences within, the setting or group where information is provided is likely to be important and influence the content and interpretation of the messages.

### Support services

In the UK, healthcare targeting people who use AAS is mainly delivered through substance use services and pharmacy-based NSPs that provide a variety of interventions and support for people who use a range of drugs. Further, a small number of clinics specifically target people who use AAS or other IPEDs that are attached to more generic substance use services or delivered or promoted in outreach settings, typically gyms.

There was less consensus here about the value of support services. It appeared that experiences of visiting services differed greatly and the level of support and information provision, staff attitudes and knowledge, and engagement between staff and client varied in different locations. As might be expected, clinics specifically targeting people who use AAS were discussed most favourably amongst those who had accessed one. Positive experiences were discussed in the context of feeling accepted by knowledgeable staff, receiving useful information and advice, having the opportunity to openly discuss matters relating to their AAS use, and being offered blood tests. NSPs or other substance

use services outside of specific IPED clinics were typically discussed similarly to one another and in often directly contrasting terms to these clinics. Generally these were thought of as places to acquire injecting equipment rather than to access any other support, which matched with what some users wanted and needed. Some participants indicated though that because they were able and happy to buy their own equipment, there was no need for them to go to services. Experiences when accessing these services typically resonated with stakeholder perceptions and concerns and reinforced the needs identified previously in this research to improve engagement and delivery of support in these settings. For example, participant 9 compared his experiences at a drug treatment service when he had first started using AAS with later experiences in a clinic setting:

*“I didn’t have a great experience there, it was the opposite of the clinic here where it’s completely open and accepting of you, there it was quite negative and more about them telling you why you shouldn’t be doing it, that sort of thing”.*  
Participant 9.

This was fairly typical of participants in this study. Amongst those who had negative perceptions of such services, the attitudes of staff were often perceived to be quite negative and judgemental regarding people who use AAS. A reason why this group do not use healthcare services has been suggested to be concerns about stigma and this was tied in with implications from staff in services that using AAS is a ‘bad’ choice or where the individual is implied to not know or care about the health implications. Where they anticipated that they would be criticised for their choices or treated as though they have done something wrong this was poorly received.

*“They’re (staff) not going to be like ‘it’s great that you’re using’ are they? It’s boring to be honest, I’ve heard it before. Why should I go somewhere to be told that stuff? Literally no one gets anything out of that”.* Participant 1.

For some, feeling judged in services was part of generally not feeling comfortable accessing them. These participants expressed that they did not feel that they belonged or were welcome there and examples were given of how people who use steroids are perhaps not seen as an important client or customer compared with people who use other substances.

*“He (member of staff) did say I'd been a bit of a silly boy and that I wouldn't be doing it again would I. As if it was all one silly mistake. I didn't think much of that, I found it quite patronising and like the sort of thing they might say to, I don't know, someone who had done something really stupid not something that loads of other people do, and are fine with”.* Participant 8.

*“You just don't get the feeling that they don't actually want you to be there, they don't want to have to deal with us”.* Participant 11.

Not feeling comfortable accessing these services was not solely attributed to staff however. People who use AAS may have concerns about their place in services traditionally associated with injecting drug users and other forms of substance use. Some of the discussions in this study reflected this and continued narratives established in previous research regarding attitudes towards people who use other drugs and having to associate with them and concern about stigma and being seen in services.

*“No one said anything but it's not people I really want to be seen with, it's not exactly hidden away so people can see you go in and out”.* Participant 12.

*“People are there doing their shopping and I'm walking past them with a pack of needles, it wasn't ideal, everyone knows what is going on there. Even the pharmacy, loads of my friends won't go to a local one because they don't want anyone to see them walking out of there with their needles, they'd rather go to one a bit further away”.* Participant 2.

However not all participants had negative experiences and a small number emphasised that they found staff pleasant, interested in them and useful and that services had been worth attending when they had felt respected and valued. For others, the experience was somewhat neutral and neither better nor worse than expected. Staff knowledge about AAS contributed to expectations and attitudes towards services and it is clear that for some, expectations of poor understanding is a barrier to attendance. Several participants expressed frustration at what they saw as basic gaps in knowledge amongst staff they had encountered in services. This extract where one participant recounted their experiences of receiving misinformation from staff in a pharmacy NSP illustrates that poor knowledge can lead to advice that could lead someone towards potentially unhealthy choices or disengagement from using services in the future:

Participant 4: *“The worker proceeded to tell me ‘well you need spoons because your steroids get mixed up in a spoon’. And I was like ‘what are you talking about’? I’m the most mild mannered person but that staggered me”.*

Interviewer: *“Oh, wow, I haven’t heard that one before”.*

Participant 4: *“I thought it was unbelievable. If they want us to use these sort of places then they need to have the simple stuff down. It’s like day 1 levels of knowledge, surely”.*

Interviewer: *“I guess you don’t want someone trying to give out advice if they don’t know anything about it”.*

Participant 4: *“If you don’t know about it then don’t try and give advice because there’s a good chance you’re giving out bad advice. I’ve had some really terrible, bad advice in these sorts of services. I’ve had workers telling me that steroids don’t work, which is ridiculous. I’ve been told that using steroids means I’m going to be violent towards others. What else... just ignorant comments and advice, I was advised by a young man when I went to pick up my pins that orals are safer and better for you than injecting, I have been told outright to stop doing it because it’s bad for me”.*

The frequency of bad advice being given out is unclear however and in many cases participants who had attended services reported that they were not given any advice or information while they were there. This resonates with concerns expressed in the previous chapters that opportunities for health professionals to provide information and support may often be missed. However, it is likely that some users will not see the benefits of accessing services or from interacting with staff. Indeed, for some participants service attendance was portrayed simply as a means to acquire injecting equipment rather than to seek or be given any information or discuss their health or AAS use. Anything beyond this equipment transaction was seen as unnecessary and unwanted by some users. Therefore while they were often critical of service providers, this did not necessarily lead to calls to improve engagement in services. This extract from the interview with one participant highlights this disinterest in support services:

*Participant 7: “I don’t really know what they could tell me or help me with, I don’t need any help and if I did then why would I go to someone who probably doesn’t know the first thing about steroids or have any interest in doing anything apart from getting me to stop?”*

Interviewer: *“What do you mean that you don’t need help?”*

Participant 7: *“I mean I’m okay, me personally, my fitness is important and I’m not doing anything that means that I need someone to help me get my shit together. Some people do, I get that, but I don’t, I’m not doing anything bad for me”.*

These ideas tie in with other discussions of health and risk throughout the interviews. Here they are linked with not attending services because if one does not feel that their behaviours are putting them at any risk then motivation to seek contact with a health professional may be low. Where this is combined with negative feelings regarding what to expect from services, it seems unlikely that they will access services.

*“A lot of the guys think, they think that they’ll have a go at them. That’s their concern, they want to carry on doing what they’re doing but they think that if they go to a service, or a doctor, they’re going to have a go at them and tell them not to do it. Add to that the fact they don’t think there’s anything that they would actually gain from going along then why would they?”* Participant 9.

Beyond not seeing the benefits of attending a service, a small minority of participants alluded to potential negative outcomes from users accessing services and suggested avoiding services as a way to avoid drawing Government attention to AAS as a problem.

*“It’s like a way of justifying demonising steroids if they can show that it’s, like, a massive problem. So I always say to people don’t go to the exchanges, don’t give them any data that they can use to make it illegal, it’s class C at the moment so it’s not illegal to have it only to supply it, we want to keep it that way and that means staying under the radar”.* Participant 10.

## General practitioners

### *User experiences with general practitioners*

Participants were asked about their perceptions and experiences with GPs relating to any support, information or treatment they had sought relating to their AAS use or any related health concerns. A range of experiences were described that in some cases, but not all, followed a similar narrative to previous findings in this research. The most frequent comments were that a common GP response to someone who uses AAS is that they should just stop using, which was seen as an indication of lacking understanding

about AAS and those who use them. Participants reported their own experiences of this and hearing about it from others and it was always discussed in a negative context. Particularly prominent was the perception that 'stopping' was seen by GPs as the solution to a range of concerns and medical issues when it was identified that the individual used AAS, rather than treating any symptoms or further investigation of the problem.

*"I've spoken to two GPs and both of them just told me to stop taking steroids. That was it really. The first one was after I'd first started and I'd taken some dianabol for about six weeks and I was getting some pain in my liver and my kidneys which I am quite confident was nothing to do with the dianabol but was actually all the protein I was taking. But they just said stop taking them. And when I went back and saw a different GP when I had the pain from injecting that was it again, just stop taking them".* Participant 5.

*"It was really frustrating, all they could see were the steroids as the cause and like the solution too, as in stop taking them and that will solve everything".* Participant 2.

However, some participants described interactions that are more positive. These experiences are important to note as they demonstrate that not only do GPs in some cases provide positive support for men who use AAS, but the consultations can lead to benefits for the patient. For example, GP signposting a participant that led to repeated engagement with a steroids clinic and information provision that led to a participant undertaking further research about the impact of long-term AAS use on testosterone levels.

*"I could have no complaints whatsoever. I had been told that a doctor doesn't listen to you and isn't interested in finding out what your reasons are and if they're any good basically, but that wasn't my experience. And when I went back, he recommended that I come see the fellas at the clinic, so whether someone had told him or he'd looked it up himself I don't know, but I'm forever grateful for him for doing that for me".* Participant 2.

For these participants, it appeared important that their GP listened to them and tried to understand their perspective regardless of whether they approved of or supported the decision to use AAS. It was acceptable that the GP question this decision and offer an alternative perspective in a non-judgemental manner that didn't come across as overly

negative or patronising. They did not expect their GP to approve, but to ultimately accept their decision and provide appropriate healthcare as they would to any patient.

*“I’ve got a really good GP now and they’ve always been really good to me. They obviously say you shouldn’t be doing this, but they also understand that I’ve made that decision so they’re not judgemental or really critical, they listen”.* Participant 2.

*“She was ok, nice about it. She basically said ‘have you really thought about this, have you looked into the, you know, side effects and stuff?’ and I think she could see that I hadn’t just decided to do it on a whim and I was serious about it so she didn’t give me a hard time”.* Participant 8.

This was in direct contrast with those who had negative experiences with GPs whose responses had largely focussed on the need to stop using AAS and who were described as coming across as judgemental and unwilling to listen or consider looking beyond AAS as the cause of any health problems. For example, one participant stated:

*“She didn’t want to know about it. It wound me up if I’m honest with you cos I was there trying to say I’ve got this problem but as soon as she heard steroids it was like, nope, can’t help you, you just need to get off it and you’ll be ok”.* Participant 1.

As this quote suggests, such experiences can have negative impacts upon patients and many expressed similar frustration at how they perceived their GP to respond to them and not understand their use of AAS. In particular, those who felt this way expressed that going to the GP in relation to AAS was a ‘waste of time’ and it was clear this might affect their decisions to visit a GP in the future. These perceptions were acquired not just through personal experiences but through the accounts and advice of others. Some participants indicated that they had advised, and been advised by others, about the value of visiting their GP in relation to AAS where these negative experiences were passed on.

*“I’m not going to stop so if that’s all you have to say then... yeah, what’s the point in listening to you?”* Participant 1.

*“Everyone who says anything about going to a doctor about something to do with juicing has only bad things to say about it, and don’t bother”.* Participant 9.

*“They ask you stupid questions and they don’t understand you. My mate was going to speak to his GP when he was starting it and I told him not to bother... they don’t get it. He can do his own research and find out everything without the hassle, without the stupid questions”.* Participant 6.

Participants generally attributed these experiences to a lack of knowledge and understanding about AAS amongst GPs and a negative attitude towards them. For example, not understanding their own perceptions that AAS use was not harmful and expecting that people like themselves would be willing to just discontinue. This was suggested not only to be unnecessary advice that could be harmful, but as symptomatic of an ignorance about the role that AAS play in their efforts to be healthy. Examples of perceived misinformation and bad advice were provided that were felt to demonstrate this lack of a basic understanding. Although these participants suggested they largely ignored this advice, they expressed concern that others might follow bad advice with adverse consequences.

*“I can tell you one thing he did say, which was that steroids don’t work... he actually said ‘they don’t work anyway so you don’t need to do that’. I was like ‘I can think of a few people who would say otherwise and if you’re telling me that they’ve got that way naturally then I’m not having that!’”.* Participant 8.

*“Sometimes you just feel like maybe if they had a little bit of better knowledge about these things then it might stop some of the harmful advice. Like telling someone to stop, well that’s not always that easy. You could have told me to stop and I might have wanted to, but I know how I’m going to feel if I do”.* Participant 5.

*“Some people are listening to their doctor and if they’re told to come off them and they have no knowledge about what that’s going to be like or what they can do to help with that then it’s obvious what’s going to happen, they’ll crash”.* Participant 2.

## Discussion

In general, findings were similar to the perspectives of stakeholders. This chapter adds to the evidence supporting priorities to address, including:

- Provision of reliable and relevant information and support.
- Engagement between users and GPs, and the response of GPs to users and their health needs.

- Strategies to support users to manage risk in response to risky patterns of AAS use as displayed by some users.

User perspectives were similar to other stakeholders in this research regarding sources of advice and information from other users in a range of settings and health professionals that can be problematic. Again, poor advice and a lack of concern for undertaking research or critiquing information was linked with decisions that increase risk of harm. While there was a perceived gap in the provision of reliable and relevant support for many users, a notable difference compared to other stakeholders included that users put less emphasis on the need to increase user access to support services in response to this. While there were examples of positive and negative experiences of service use and criticism of the attitudes and knowledge of some service providers, there was little discussion about improving communication and engagement as being important. Whether improving engagement within services might help to change these negative attitudes towards services that many users had is not possible to say, but if these attitudes are the consequence of negative experiences then it seems feasible. The different experiences and attitudes expressed by users in this research supports the need to recognise that this is a heterogeneous population. Different attitudes identified towards undertaking research and seeking support and regarding one's risk and health appear consistent with the constructs in Christiansen's typology (Christiansen et al., 2016). To be successful, the response to the needs identified is unlikely therefore to be a 'one size fits all' approach. Instead, it needs to recognise that different users will be influenced by and seek different forms of information and support in different environments. The variation in experiences, particularly relating to support services, also indicates that there may be much variation between different locations and specific services.

#### **Barriers and enablers to accessing services**

The findings relating to support services discussed here were considered alongside those within previous chapters to identify enablers and barriers to service attendance. These factors were mapped to constructs in the COM-B model (Michie et al., 2011) and presented in table 4. According to the model, all behaviours are the result of having

capability (C), opportunity (O) and motivation (M) to undertake that behaviour. Where one component is missing, the behaviour will be less likely to occur. Using this model is helpful therefore when looking to develop an intervention because, through what the authors term the ‘behavioural analysis’, what needs to change and be addressed in order to bring about a change in the behaviour of interest (in this case uptake of support services) is identified. The model is designed to support the design of interventions in a systematic process based upon this behavioural analysis (Michie et al., 2014).

**Table 4: Enablers and barriers to attending services, mapped to COM-B constructs**

COM-B component		Factor influencing service attendance
<b>Capability</b> (Psychological and physical capacity to attend services)	<i>Psychological</i>	<ul style="list-style-type: none"> <li>• Awareness that the service exists</li> <li>• Knowledge of opening hours, location</li> <li>• Understanding of the aims of the service</li> <li>• Understanding of what the service offers</li> </ul>
	<i>Physical</i>	<ul style="list-style-type: none"> <li>• Service availability locally</li> <li>• Service opening hours, waiting times, location</li> </ul>
<b>Opportunity</b> (Physical and social factors external to the individual relevant to service attendance)	<i>Social</i>	<ul style="list-style-type: none"> <li>• Peer norms relating to support seeking and engaging with health professionals</li> <li>• Peer norms regarding risk and health</li> <li>• Perceptions about stigma from attending services</li> <li>• Peer experiences of services</li> </ul>
<b>Motivation</b> (Automatic and reflective processes that direct decisions to attend services)	<i>Reflective</i>	<ul style="list-style-type: none"> <li>• Expectation of benefits from attending</li> <li>• Expectation of staff knowledge and attitude</li> <li>• Beliefs about risks and consequences of AAS use</li> <li>• Beliefs about own health</li> </ul>
	<i>Automatic</i>	<ul style="list-style-type: none"> <li>• Help seeking as a sign of weakness</li> </ul>

A range of factors was identified as being relevant to uptake of support services. While availability and awareness about services are clearly important, these findings indicate that increasing these factors alone will be insufficient in many cases. In other words, funding a service and telling people about it is only part of what is needed. Social opportunity and reflective motivation appear the most important components to address. Beliefs and expectations about the purpose of a service and the attitude of staff appear particularly influential, for example anticipating that choices will be criticised and that the focus will be on discontinuing use. Further, users may not understand the

benefits of attendance or consider potential benefits as meaningful or important, particularly where the individual considers themselves healthy and their AAS use low-risk. Therefore, attempts to increase uptake will need to address this through clarifying service purpose and staff attitudes, as well as what to expect such as the types of support or interventions on offer. Social factors such as norms within social networks towards engaging with health professionals about AAS and group attitudes towards AAS in terms of risk and health are perhaps more complex. Providing clarification around what will take place in services may help to address these issues and change norms, as well as through using influential members within networks as role models.

### Improving engagement between users and healthcare professionals

Once the individual engages with a service for the first time it is up to staff there to ensure that the experience is positive and to motivate continued engagement. There is evidence from providers here and previous work that people who use AAS access NSPs in the UK and in increasing numbers over the past two decades (Kimergård and McVeigh, 2014b, ACMD, 2010b, McVeigh and Begley, 2016) (although the proportion who do so is unknown). For those who do engage a related priority to increasing use of support studies is to improve the quality of their experience and the interactions between users and service providers. In particular, concerns about users having negative experiences in services and the lack of positive relationships with staff were expressed by participants of all perspectives in this research and expected to inhibit effective provision of information and support. Recommendations from Public Health England suggest that provision of NSPs to this population should be based on NICE guidance (Public Health England, 2014). The guidance resonates with the findings of this research. It suggests for example providing supportive and non-judgemental environments, accurate information sources, services such as health checks and dietary advice, harm reduction and injecting advice; offering vaccination for hepatitis B; discussing other forms of drug and alcohol use and establishing links with local gyms and providing outreach services through these (Public Health England, 2014). There are also prompts for staff knowledge and skills relating to information and support provision, intervention delivery and signposting. The evidence in this study suggests that in many cases, there are gaps in service delivery relating to these issues. There was recognition in particular

of the importance of improving credibility of information providers and improving communication and developing positive relationships between providers and users.

#### *General practitioners*

Much of the discussion with users around health professionals was dominated by experiences with and perceptions about GPs. These closely matched those given by stakeholders, although users gave perhaps a greater importance to this area and clearly felt strongly about what they perceived to be a significant gap in health care provision. Identifying that users have negative experiences with GPs is nothing new. Monaghan's ethnographic work in the 1990s with bodybuilders explored this theme in detail with findings relating to doctors' perceived lack of knowledge and understanding in comparison to that of users and negative attitudes towards users and AAS (Monaghan, 1999). More recent work has identified similar experiences amongst users (Zahnow et al., 2017).

The findings from this research regarding health services including NSPs, substance use services and GPs are similar to other studies within the limited evidence-base that have explored this area. Previous research has consistently identified that many people who use AAS appear reluctant to engage with health professionals despite the association between use and experiencing adverse health effects (Zahnow et al., 2017, Pope et al., 2004, Bates and McVeigh, 2016, Hope et al., 2014). People who use AAS may be reluctant to access healthcare services due to perceptions of poor knowledge or negative attitudes amongst staff (Zahnow et al., 2017, Dunn et al., 2014) and feelings of stigma and the association with being identified as a drug user (Brennan et al., 2016, Kimergård and McVeigh, 2014b, Zahnow et al., 2017, Maycock and Howat, 2005). Relating to going to a GP specifically, a substantial barrier to discussing or disclosing AAS use was the expectation that any health problems would be overlooked and the focus of the GP's response would be on their substance use itself. This matched the experiences of many participants in the studies who felt strongly about being advised to 'stop using' by someone who they perceived did not understand them or their AAS use. While a small amount of evidence as highlighted above is available from the user perspective, there is very little research into the perspective of the GP. One study with

a small sample identified that GPs and other health specialists may exhibit stigma towards users and view them negatively in comparison to other substance users or non-substance users (Yu et al., 2015), but further research is needed into the perceptions and experiences of GPs relating to AAS and users. Increasing understanding about AAS and those who use them within primary care and raising awareness of associated health risks, particularly relating to post-cycle health, is needed. Although GPs will not routinely receive training relating to AAS, there is recognition that support is required with examples of guidance, advice and training available that target GPs and other health professionals (Brooks et al., 2016, Human Enhancement Drugs Network, 2017, Public Health Wales, 2018). However, ways to increase the number of health professionals exposed to such support need further investigation, as well as specifying the nature of this support.

#### Reducing harm and risk

While there was general agreement with stakeholders' perceptions that some users are putting themselves at risk of harm through their choices, such as high doses and long cycles, and short-term approach to increasing muscularity, it was notable that participants consistently distanced their own current use from this. Similarly to in previous research, users frequently indicated that their steroid use was risk free (Kimergård, 2014) and instead, it was other users, and in particular younger users, who were frequently identified as being more likely to make risky choices and viewed critically. The suggestion that one's own use is controlled and healthy and it is others who should change was common. Indeed, some experienced users stated that their main response to others who asked for their advice was simply not to start using, but did not indicate that they were intending to stop using themselves. That individuals sometimes underestimate their own risk of harm in comparison to others is well established and has been identified relating to health behaviours such as smoking (Weinstein et al., 2005), diet (Raats and Sparks, 1995) and alcohol consumption (Dillard et al., 2009). This phenomenon of unrealistic optimism may at least partially explain why some users see their own use as less problematic than others do and why they are unconcerned about potential harms. Having control through knowledge and experience is clearly important to many users and a common perception here was that therefore

those who do not have this (i.e. who do not do research, are misinformed or new to using) are at risk and should make a change.

It is interesting to explore that, as noted in the previous study, some more experienced users stated that they had made similar choices when younger or starting using AAS to those whom they were now critical. It was only through their own experiences that they had changed their attitudes and practices through a trial and error approach informed by what was effective against their aims and any side effects or negative impacts. Concerns about knowledge and attitudes amongst young users are not new (McVeigh, 1996) and it seems feasible that new users are simply more likely to be naïve and adopt risky AAS regimes than more experienced users. Therefore rather than younger or new users increasing their risk in comparison to previous generations, this may simply be a continuation of the same problem, but potentially on a greater scale if prevalence has increased. Greater use of support services to acquire injecting equipment (McVeigh and Begley, 2016, McVeigh et al., 2003) and increased research into and interest in AAS use and male body image (McVeigh and Begley, 2016, Kanayama and Pope, 2017) are likely to have contributed to greater awareness of users in the 21<sup>st</sup> century. Therefore, awareness of risky patterns of use will also have increased amongst health professionals. If true, the implication shifts from identifying why a perceived change has happened to why approaches to date have not been able to adequately address this.

#### Brief and motivational interventions

A theme throughout this research related to responding to a perceived increased in prevalence through efforts to prevent initiation, early intervention, and encouraging and supporting cessation amongst longer-term users. Early intervention with new users was the area where the clearest picture emerged in terms of what this might look like through brief and opportunistic interventions. Brief interventions are recommended in the UK as an approach to engage with young substance users who are not in contact with any drugs services (National Institute for Health and Care Excellence, 2007). Typically, they are delivered opportunistically to prevent initiation of, or promote changes relating to, a range of substances and are delivered in settings including schools, universities, work places, primary care and health services (Stockings et al., 2016). While

there is evidence supporting their use to prevent alcohol consumption (Hennessy and Tanner-Smith, 2015), brief interventions for young people however have generally not been associated with preventative effects for other substances (Stockings et al., 2016, Bates et al., 2017b). However this evidence is generally based on school- or healthcare-based interventions and there is a lack of research examining the impact of brief interventions delivered in key environments, such as for AAS the gym. The processes described previously relating to gym staff delivering key messages to users could be adapted with prevention in mind. For example, targeted brief motivational interventions delivered during gym inductions where the individual appears at risk of starting AAS. Findings from this research indicate that young people may be susceptible to prevention and harm reduction messages at this stage, but the nature and details of any such motivational intervention needs further research and clarification.

Ideas expressed here mainly related to promoting alternative methods of enhancing muscle and changing perceptions of risk and harm. Some interventions have at least in part based upon the idea of promoting 'healthy' alternatives to using steroids to modify appearance (e.g. (Sagoe et al., 2016, Goldberg et al., 1996a). It is possible that the inclusion of elements such as skills in weights training and knowledge about supplements in prevention interventions will possibly, and unwittingly, contribute to a desire to change appearance and normalise enhancement of muscularity in young people who had not previously thought to do so. However, amongst boys and young men who are already showing an interest in using steroids, such as those joining gyms discussed by gym managers and trainers in this research, supporting them to delay this and to enhance their physique through their training and diet first appear sensible as part of more targeted prevention efforts.

Service providers highlighted that, for them, a key reason to engage with established users was to get them thinking about their long-term use and eventually stopping. That treatments for AAS use disorders are required has been established (Pope and Kanayama, 2015), but there is a lack of evidence however on intervention approaches to support cessation and withdrawal from AAS use. Additionally there remains little guidance to support health professionals despite the increasing evidence available on a

range of physiological and psychological health harms associated with AAS use (Pope et al., 2014b). It is beyond the scope of this research to recommend interventions of this nature, but services providers felt that 'planting a seed' and slowly changing attitudes of users over time was an important approach.

#### *Health and wellbeing following cessation*

In the past decade, researchers have discussed AAS dependence and withdrawal (Kanayama et al., 2009a, Kanayama et al., 2009b, Kanayama et al., 2008), which needs to be a significant factor when considering options for cessation interventions. Those who stop using AAS may require support regarding post-cycle health issues and this was a large part of the discussions around priorities to address in this research and will need to be addressed as part of cessation efforts. Participants highlighted this an important time and, for many, the first time that adverse effects will be experienced. Following cessation some men will suffer symptoms such as low mood and loss of libido associated with hypogonadism (Gen et al., 2015, Rasmussen et al., 2016). Experiencing these symptoms, or concern about them, may be a cause of AAS re-initiation or continued use to mitigate their impacts (Kanayama et al., 2009a). Where symptoms are experienced, they may require treatment. A further motivation for long-term use for some users was to prevent loss of benefits attributed to AAS, similar to identified in previous research (Dennington et al., 2008, Olrich, 1999, Hanley Santos and Coomber, 2017). In addition to providing information and support about potential health problems, interventions to encourage longer breaks between cycles and cessation could therefore include the formation of plans to minimise anticipated losses through natural means. Similarly, for those who are initiating AAS use promote suitable natural approaches as an alternative to using AAS, particularly with younger men. Further exploration of this issue, including input from those with expertise in the fitness industry and nutrition, is required. For some users, PCT to minimise anticipated losses or to mitigate adverse symptoms is an important part of their IPED cycle and providing access to PCT has been suggested to be a harm reduction approach (Griffiths et al., 2017), as well as by some participants in this study. However, the ethics and practicalities for healthcare providers of promoting the use of a range of additional substances that may have to be purchased through the illicit market and present similar issues regarding unknown quality, strength and potential

harms as those discussed here already requires further consideration and debate. Additionally there were some inconsistencies between participants' views on when and if PCT should be recommended and used. However, improving knowledge and awareness about post cycle health is tied in with priorities here relating to encouraging use in moderation and reducing AAS use.

## Conclusion

The results of this study further support the identification of priorities to address to improve health and reduce risk amongst users and the responses to these. When considered alongside conclusions from the other studies in this research, some consensus and clear areas to focus on are apparent. While there is great variation in the attitudes and practices of users, the overwhelming impression is that many users would benefit from access to reliable and relevant information and support. While AAS support services are valued by some users, findings across the research indicates that other approaches are needed to reach others, possibly the majority. Common sources of information appear mixed in quality and relevance and if users are most commonly getting support from their peers and other users, and if this is linked with risky choices, then it should be explored whether this support can be improved.

This study highlighted again the potential for health harms associated with use and that current healthcare provision is not always meeting the needs of users. Where users have concerns about their health or substance use then they should be accessing and receiving appropriate healthcare. Developing interventions to increase access to health professionals will be an important step and should be based upon an understanding of why they do or do not use support services. Interventions will in particular need to address concerns about the aims of services and attitudes of staff. It needs to be recognised however that these concerns are often based upon experiences and information from others, and may not always be unrealistic. Therefore, improvements in engagement between users and health professionals including staff in support services and GPs are needed if risks to health are to be identified and challenged and, where necessary, harms are to be treated.

## Chapter 7: Discussion

Four overarching priority areas have been identified through this research that if addressed will improve health outcomes amongst men who use AAS and help them to manage the risks associated with their use (presented in box 4). The priorities reflect points of consensus from the two qualitative studies with stakeholders and men who use AAS. A number of potential intervention approaches in response to these needs were identified in the two qualitative and two literature-based studies. A range of harm reduction needs for users were identified as well as ways to reduce overall prevalence (priorities 3 and 4). To address these needs, increasing provision of, and access to, relevant and reliable information and support is required (priorities 1 and 2). To have the desired impact, these messages need to be disseminated in a way that can reach those that need it and by individuals who are credible, trusted and influential.

This is not an exhaustive list of priorities and other needs and potential responses were identified. However, there was less consensus on these or they represented specific subgroups. For example, within prison environments issues relating to the provision of injecting equipment, opportunities to intervene and conduct BBV testing appear concerning. Interventions in such a setting are likely to involve overcoming different challenges to those addressing these same priorities in the general population. A further example is in a sporting context where there is a greater emphasis on prevention, as the ideas relating to supporting users to manage risk are not compatible with the zero tolerance approach to AAS.

### Looking beyond support services to respond to the identified priorities

The discussion around increasing access to relevant and reliable support was frequently held in the context of AAS support services. It is perhaps not surprising that many stakeholders identified increasing engagement with support services as key to providing harm reduction and behaviour change efforts. A key element of the harm reduction model adopted in the UK since the 1980s in response to drug use has been on increasing and maintaining engagement between those at risk and health professionals so as to influence their behaviours (Ashton and Seymour, 2010, Stimson, 2007).

#### Box 4: Summary of priorities identified

##### **1. Increase access to relevant and reliable information and support**

- Improve dissemination of relevant and reliable information to users
- Support users to improve critique of information sources and access to reliable sources
- Increase user uptake of support services

##### **2. Improve engagement between users and health professionals**

- Increase recognition of AAS use and related health harms amongst health professionals
- Improve engagement between users and staff in support services
- Improve engagement between GPs and users; support GPs to identify and respond to AAS harm

##### **3. Support users to manage their risk**

- Discourage risky AAS use characterised by high doses, long periods of continuous use with no or only short 'off cycle' periods, and use of products of unknown quality.
- Support users to practice safe injecting; provide injecting equipment and support safe sex.

##### **4. Reduce prevalence of AAS**

- Support cessation amongst those who want to stop and support post-cycle health.
- Motivate long-term changes in AAS use amongst users who are not planning to stop.
- Reduce motivation and desire to use AAS, particularly amongst young people; delay initiation of use and encourage alternative approaches to changing physique.

Throughout the UK, support available to AAS users is likely to be through NSP and treatment facilities in pharmacies and substance use services and there is clear evidence of use of such services by users (McVeigh and Begley, 2016). However many other users do not access them. For example, evidence of common practices of secondary distribution of injecting equipment amongst users indicates that large proportions of this group may have no contact with services (Glass et al., 2019). For many participants in the current study, providing clinics specifically for steroid users was perceived to be the optimal way to provide support. Such clinics have long been suggested as ways to reach this population with harm reduction messages and health care (Morrison, 1994, O'Connor, 1995, Korkia and Stimson, 1994). These clinics are relatively rare and are

typically driven by individuals with a particular interest in, or experience with, AAS and related health and fitness issues. They vary greatly in terms of what is offered (Kimergård and McVeigh, 2014b) and this may reflect the attitudes and skills of the provider. Where such services exist, promoting and signposting to them appears an attractive option, but it must be recognised that such locations are the exception rather than the norm and many users may not be interested in or see the value in accessing support services. Additionally, the lack of funding and resources available for local authorities to tackle use and harms limits the potential to provide specialist services and there is no indication that funding for such services will increase in the future.

Further to this, the needs identified here resonate strongly with those identified in research over two decades previous (McVeigh, 1996, Pates and Barry, 1996, Korkia and Stimson, 1994), despite the establishment of many specialist clinics in the UK and substantial growth in the number of users accessing NSPs in that time (McVeigh and Begley, 2016). In this same time, concerns about AAS prevalence and risk increasing practices linked with health harms have grown too. There is no evidence that prevalence is declining while risky practices are continuing and many (and possibly the majority of) users are not accessing support services. This suggests that the service-based response is insufficient and a different additional response is therefore required to react to the priorities identified in box 4.

There is indication in the studies here that some services have the potential to positively influence choices, but experiences of and attitudes towards services varies greatly. The extent to which interactions with health professionals can influence users is unclear, for example there was no indication that users in this research had considered stopping using AAS following discussions with providers. As far back as 1995 it was identified that steroid clinics need to demonstrate that through the services they provide they can bring about changes in behaviour (Morrison, 1995). There remains however no evidence to date beyond anecdotal accounts to demonstrate that services (including pharmacy NSPs, substance use services or AAS clinics) are effective in influencing AAS choices or changing behaviours. Targeting steroid users in support services alone is unlikely to be enough to respond to the priorities identified here. It appears unlikely that interventions

to encourage steroid cessation, reduce amounts being taken or increase information provision will consistently be delivered in such settings, or have the desired impact, due to the limitations of this environment and engagement that takes place between users and staff. Further, as a high proportion of users may never visit services they will not be exposed to these interventions. Even regarding the intention to reduce BBV transmission through NSPs, it is difficult to assert whether such services have helped to avert an epidemic of BBVs amongst the steroid using population (and beyond), or have failed to stop transmission or behaviour changes. Either way, there is a need for critical examination of these services to understand their impact and inform their development.

Interventions therefore need to go beyond provision of support services if they are to reach the majority of users and respond effectively to the risks and harms associated with AAS use. We need to recognise therefore that support services are only one aspect of a potential system of support, information and influence for users and therefore if we want to bring about changes in their choices then we need to look beyond these services alone. If we accept that users are not a homogenous group, but in reality include a range of different experiences, motivations, influences and perspectives on health and risk (Zahnow et al., 2018, Christiansen et al., 2016) then it should not be surprising that there is no single approach that will reach or be suitable for everyone. Concerns identified in this research commonly related to the dissemination of information and advice of varying reliability and relevance to those receiving it outside of services and the influence this may have upon subsequent choices and norms relating to AAS, body image and risk that exist within peer groups and social settings. In addition to provision of support services, providing interventions that improve the effective dissemination of reliable and relevant information and support within users' social networks and influential environments may therefore be an important approach.

### A map of information and support

To support identification of a response to these priorities, a map relating to AAS information and support has been developed (figures 9-11). Based upon a 'complex systems' approach and the socioecological framework, and informed by the four studies presented here, the map is designed to support identification of opportunities to bring

change in AAS use and routes through which to deliver interventions. This represents, to the researcher's knowledge, the first attempt to map the support available to users and the first attempt to apply a systems approach in the context of AAS use. Six major components that individuals interact within are identified (figure 9). These contain within them sources of information and support available to men in the UK general population who use AAS.

While recognising that there is great variation amongst this population, the map is intended to represent a hypothetical typical user. Therefore, the system mapped here is restricted to components that such an individual is able to interact with and have some control over. Further, components represent the environments and individuals through which interventions are currently, or can potentially be, delivered in response to the priorities identified. Each component therefore represents a separate subsystem in this larger system and contains a number of potential change agents, who are the individuals responsible for the dissemination of information and provision of support and advice. While the components represent distinct entities, they are connected to and interact with other components. Information and support delivered within one component can therefore influence other areas. This is significant because while an intervention might focus on bringing about change within a network for example, any local health and AAS support services can still influence this change and benefit from it. This therefore not only demonstrates the complexity involved in AAS choices with competing influences from multiple sources, but also the potential for a range of routes through which to increase and improve provision of information and support.

Figure 9: A map of AAS information and support to users in the community

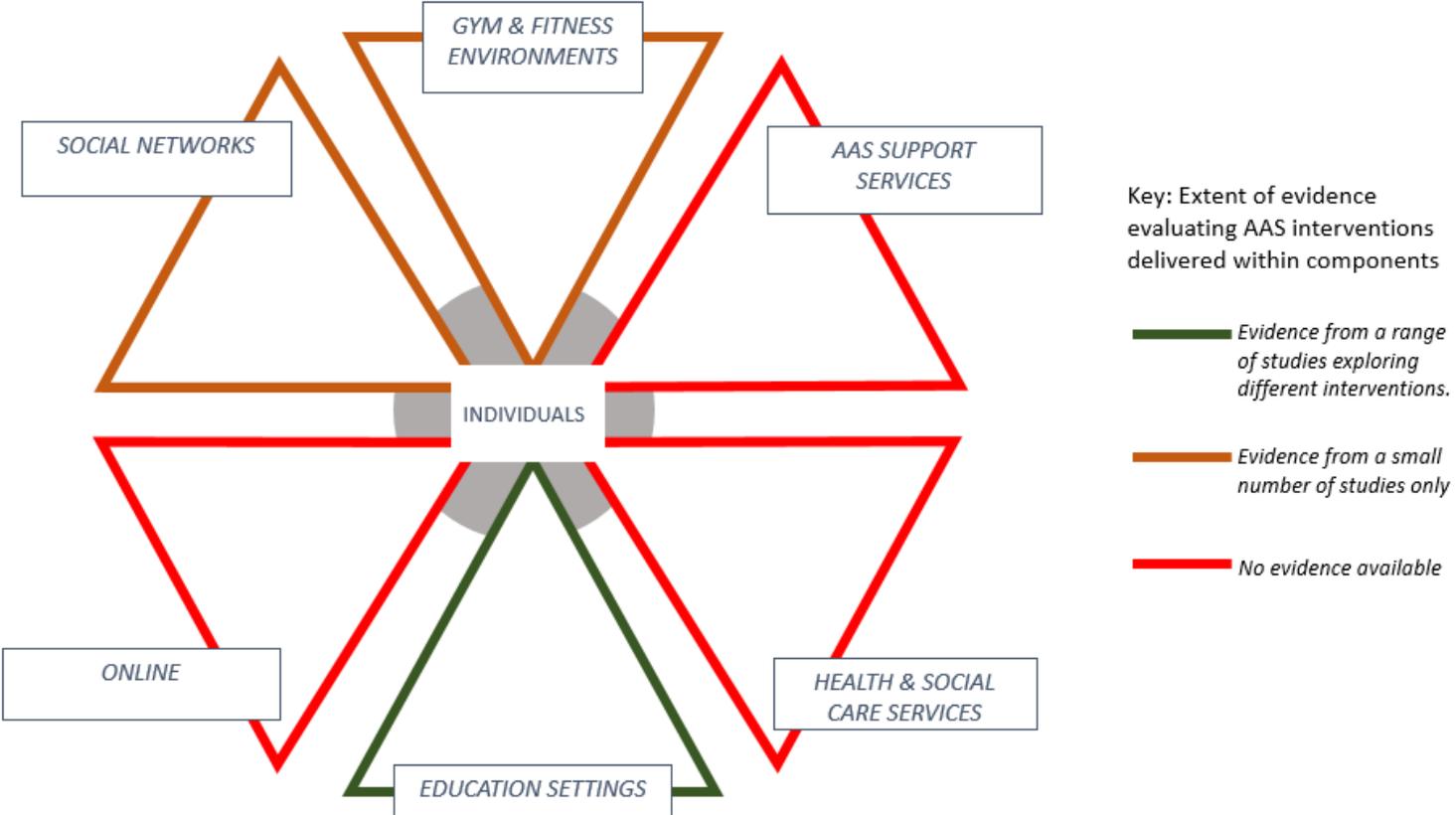


Figure 10: Key actors who disseminate information and provide support

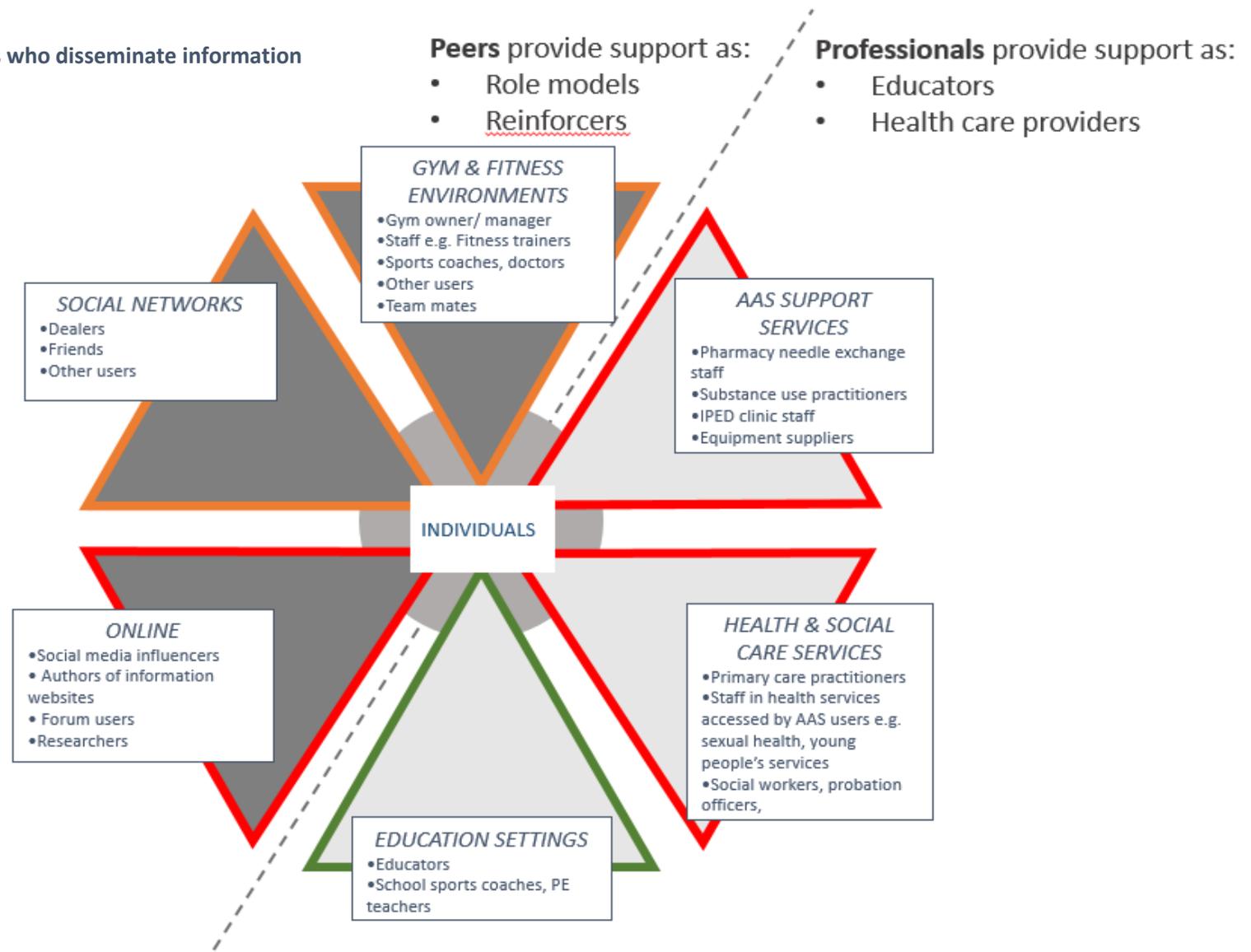
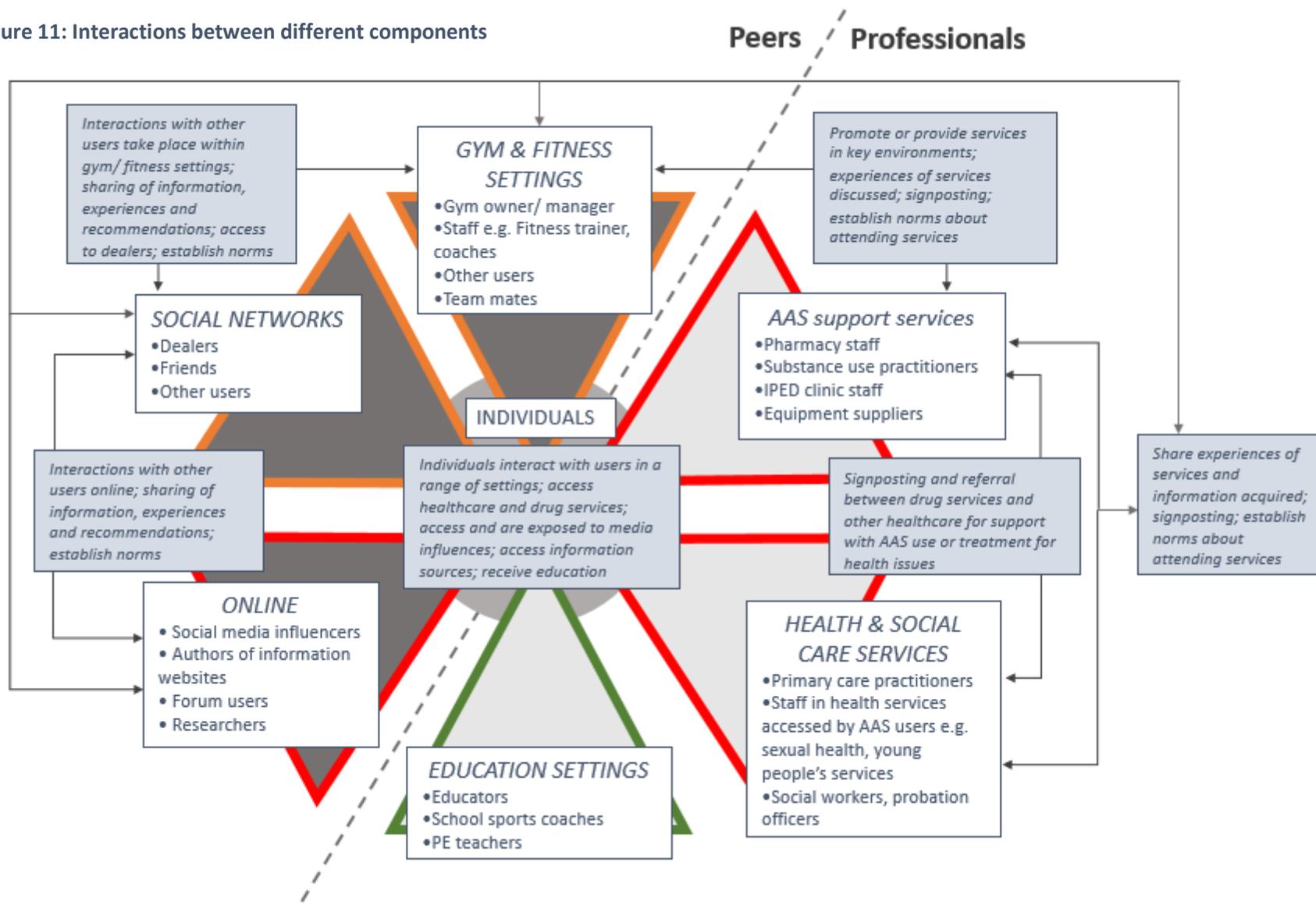


Figure 11: Interactions between different components



## Influences from outside this system

As identified in the socioecological framework, a range of societal factors may influence AAS choices. These largely sit outside the boundaries of this proposed system, but their impact upon it, and consequently the individuals within it, should not be overlooked. For example, background influences such as government and sporting authority policies and laws, representations of muscularity in magazines and films, and discussion about steroids in the media all support the development and maintenance of cultural and social norms within the components included in the map. Additionally, there are specific 'risk environments' outlined in the socioecological framework such as prisons, the armed forces and employment in roles such as security officer or doorman that some users will experience. As these represent components that most users will not have the opportunity to interact in, or will do so at specific points in time only, they are not included within the map. For those that do experience them however they may be important, and they are connected with the components in the map through the individuals that move from one component to another. For example, someone who exits prison may introduce ideas into their social networks in the community, and vice versa.

## A system of agents across different components with individuals at the centre

Within each component, a number of key agents are identified (figure 10). People who use AAS are the primary agents in the system and make decisions about their own use. Research however suggests that these choices are influenced by (to varying degrees) the behaviours of a range of other agents who users interact with in different environments and times. Together, these agents therefore compete with and complement each other as they influence choices and ultimately behaviours through their interactions with one another, which combine to produce effects that are different from the effect of any individual component in isolation (Luke and Stamatakis, 2012). The relationships and interactions in and between different important settings in any system are therefore important to examine (Hawe et al., 2009). These agents can be divided into two broad groups: professionals and peers. Professionals include health educators and providers and their roles may be well defined through their job. Peers include friends and a variety of other users including those who may be perceived as role models and experts,

amongst whom motivations and intentions vary greatly and whose role is less predictable. Their experiences and advice may be more likely to be respected and valued by users so their influence is therefore greater. However, their support is less likely to be motivated by a desire to reduce risk and public health harms than professionals, and more likely influenced by personal bias and past experiences. Identifying individuals who can sit within both groups (i.e. who have a role as peer and professional) and support interventions from both perspectives is therefore likely to be particularly beneficial.

Interactions are dependent upon many factors including an individual's motivation to seek and share information and support, the extent and nature of their social networks and their access to, and motivation to engage with, influential environments and health services. Additionally their personal characteristics such as age, past experiences, beliefs and occupation and the community they live in will influence their interactions with the agents in other components and consequently their AAS choices. Importantly these interactions are not constant or static. Individuals and their choices change over time and so do the influencing factors that drive them. Because of this complexity therefore, a specific intervention targeting one influence at one time is unlikely to address the identified needs.

#### Components interact with one another and change over time

Underpinning the concept of complex systems thinking is the idea that different agents, environments and influences relevant to any behaviour are interconnected as part of larger structures and that agents may have multiple relationships at the same time (Atun, 2012, Rosas, 2017). The ways that the components in this map interact with one another is presented in figure 11. This helps us to understand how messages can be disseminated and the subsequent effects of interventions based within one component on other components in this map. These consequences can be positive or negative in their impact and intended or unintended. For example, a user who accesses a pharmacy NSP may be given information that is intended to reduce the amounts that they are using. Theoretically, they may pass this information on to other users in their social networks, who may in turn modify their own doses or pass the information on to others in the gym that they use. This would be a positive if perhaps unintended consequence

of information provision in the pharmacy. Alternatively, if the interaction in the NSP is not a positive or successful one then this individual may inform other users in their networks of this and advise them not to go there, which could lead to reduced attendance.

Thinking about these consequences can be helpful for deciding which interventions to prioritise and what to address within them. Resources and opportunities for implementing interventions of any type are likely to be limited and this encourages intervention developers to look beyond just how effective any one potential intervention is likely to be. The authors of the BCW method suggest assessing potential interventions against four criteria: i) the likely impact, ii) ease of implementation, iii) likely spill over, iv) ease of measurement (Michie et al., 2014). For example if an intervention is likely to be difficult to implement then, regardless of the potential benefits it has, it is unlikely to be an optimal approach to pursue. Interventions that have impacts beyond the settings or individuals they initially focus on can have broader positive or negative impacts.

#### Components and the strength of supporting evidence

The map is based upon evidence gained through the studies presented here and in previous research. However, it is clear that there are many gaps in our understanding currently. To understand the limitations and to guide future research efforts, the strength of the evidence relevant to each subsystem including the delivery of interventions and influence of agents within them must be considered. The strength of available evidence on interventions delivered within the components is highlighted in the map and overall again reiterates the paucity of intervention evaluations in this area. A more substantial evidence base exists on the characteristics of users and the nature of their AAS use, but overall, and even in components where the evidence is strongest, research has focussed overwhelmingly on a specific subgroup of AAS users, namely those loosely defined as bodybuilders (either competitive or amateur). In particular, studies have been undertaken with users who would consider themselves experienced, informed and serious about AAS and associated behaviours. In the context of Christiansen's typology (Christiansen et al., 2016), the research is dominated by the

experiences and perceptions of the 'Expert' type and there remains a lack of evidence relating to other subgroups, as well as the possibility of unidentified groups.

### *Education system*

Internationally a number of school-based programs with a focus on AAS prevention have been implemented and evaluated within classroom and sports team settings (Bates et al., 2017a). However, AAS interventions of any nature are not something that children or young people (in the UK or internationally) will routinely experience during their education. It does not form part of typical substance use programmes and while related issues such as body image and eating disorders are recommended as part of UK personal, social and health education (PSHE) (Personal Social Health Education Association, 2018), information about AAS is likely to be, at best, extremely limited. There is irony in that it does however represent the component with the most evidence on interventions delivered within it. Indeed, the vast majority of available evidence on interventions designed to influence AAS choices have been delivered within schools, but these have little applicability to the experiences of most men who initiate AAS use in adulthood. Further, the appropriateness and effectiveness of AAS interventions delivered to young people at school age is unclear.

Consequently, the inclusion of education settings as a component is debatable. It arguably represents a potential component rather than one that has a significant impact upon users currently and there is little interaction with other components. However, when considering options for prevention interventions, schools and other education settings provide access to large numbers of young people. Where PSHE covers related topics such as healthy eating, physical activity and appearance, there may be opportunity to develop protective factors for AAS including critical evaluation and resilience skills. During physical education and school sport, teachers and coaches may also have the opportunity to establish healthy attitudes and expectations about appearance and performance. Interventions within education settings are likely therefore to be of a preventative nature with the focus on establishing positive norms and delaying the onset of AAS use, rather than providing support for users.

### *AAS support services*

If users have experienced any type of formal intervention, it is likely to have been within a drug treatment service or pharmacy NSP setting. In the UK, the focus of the public health response to AAS and other IPED use has reflected the approach to other drug use since the 1980s and has been to try to increase engagement between users and health professionals in such services, primarily to increase the provision of injecting equipment (Stimson, 2007). Despite the continued focus on this approach as stated in the most recent UK Drug Strategy (HM Government, 2017) and guidance for drugs interventions (Independent Expert Working Group, 2017) this is an under researched area and there is a lack of evidence on intervention provision through these services. While a limited body of research has explored factors such as attitudes towards attending services and barriers to engaging with health professionals in a range of settings, there is no evidence on, for example, the impact of information provision and advice from staff or leaflets on reducing use or cessation. Although there is evidence of substantial numbers of users accessing NSPs (McVeigh and Begley, 2016), even the provision of injecting equipment itself has not been adequately explored for us to be confident of its impact or factors affecting effectiveness. These gaps in the evidence apply to all such support services, including pharmacy NSPs, drug treatment settings and specialist IPED clinics. Additionally, there are private clinics available that charge for services such as blood test profiles, blood-borne virus screening and other health checks and information for which no evidence on their impact is available.

### *Health & social care and criminal justice services*

It is clear that a range of health and social care providers interact with people who use AAS, but their potential as intervention providers to affect AAS and health choices amongst users is largely unknown. Similarly to substance use services, a small amount of studies have looked at user attitudes and experiences with GPs and other health professionals (Zahnow et al., 2017, Pope et al., 2004). Participants in this research suggested that health providers in such settings who encounter users could have a role in delivering harm reduction messages or supporting use of support services. There was evidence that staff in settings such as sexual health, probation and young people's

services may have conversations about steroids with users and that some users will look for support from health professionals, in particular GPs. However, formal interventions to influence users have not been tested in these environments. For example, research has not explored the potential benefits of signposting users identified in health services to AAS support services or GPs' or sexual health workers' provision of harm reduction information. It is likely that interventions delivered within these settings would focus on signposting users to support services or delivering harm reduction within the remit of that service. For example, BBV testing and promoting safe sex in a sexual health setting.

#### *Users' social networks*

There is evidence from a range of research studies of the importance of key agents within a typical steroid user's social network on users' knowledge, attitudes and choices relating to AAS, related behaviours and health (Kimergård, 2014, Maycock and Howat, 2005, Grogan et al., 2006). This includes their dealer, their friends who use AAS, other users they encounter in their communities, work environments, sports teams and social lives and, perhaps the people most commonly highlighted as important, more experienced users they encounter in their gym. Unwittingly or not, these individuals can become role models and provide an example to aspire to. For example, users follow advice from others on what steroids and ancillary substances to take and the details of their cycle and are motivated by norms relating to steroids within their networks. Considering this, it is perhaps surprising that very little research has explored approaches to influence social networks of AAS users. Nilsson and colleagues' community-based studies in Sweden (Nilsson et al., 2004, Nilsson et al., 2001) that sought to change acceptability and norms relating to AAS use amongst young people are an exception to this. Additionally, no research has been carried out to explore whether and how individuals within these networks can be used as intervention providers, specifically by providing support and information.

#### *Online sources and virtual communities*

Users' interactions with social media and the ways that these influence their choices and attitudes has not been thoroughly researched. However, we know that many users

access and participate in online communities and follow social media influencers. Analyses of online forums dedicated to bodybuilding, fitness or steroids demonstrate how users (and potential users) can easily encounter and share accounts of personal experiences, attitudes and recommendations (Andreasson and Johansson, 2016a, Andreasson and Johansson, 2016b, Smith and Stewart, 2012). While members of these virtual communities may not necessarily be in favour of AAS use, users who seek information about AAS are likely to be exposed to discussions debating and promoting AAS and to find support from knowledgeable others for adopting risky practices (Andreasson and Johansson, 2016b). It is likely that processes that are at least similar to those within offline networks will take place within these online networks and it appears from this research that resources such as social media posts, websites and forum discussions are being used by some users as sources of information and support. In addition to information shared by users, this can also include information provided by health or government authorities and academics. For example, research papers were a common source of information for some participants in this research. That information of this nature can be seen as attractive is promising, and increasing understanding of how and where to communicate evidence and research findings to users may help to improve its reach and impact with users. A recent prevention initiative involved increasing media literacy skills to reduce susceptibility to misinformation about AAS (Lucidi et al., 2017) demonstrated that there is awareness about the potential for media sources to influence AAS choices. However, there is no evidence exploring how to provide interventions using social media or any online sources currently. Increasing understanding of how virtual communities operate and how information is disseminated and acted upon online will be an important part of potentially utilising these environments to deliver interventions.

#### *Gym & fitness environments*

As with social networks, research has consistently highlighted the influence of sports and fitness settings and the people within them on users, but there is again a lack of research exploring the potential for interventions to be delivered in these environments. The evidence base on interventions to influence or change use is limited currently to one off interventions in Iran (Jalilian et al., 2011, Asr et al., 2018). Efforts to reduce use

have been introduced this century in places including Belgium and the Scandinavian countries, where recreational users in gyms have been subjected to 'anti-doping' measures and testing in practices traditionally associated with attempts to tackle use in elite athletes (van de Ven, 2016). The impacts of such efforts are unclear and no formal evaluations have been published, although it has been questioned whether such policies can create drug free environments and may be counterproductive in efforts to improve health (Thualagant, 2015, Christiansen and Bojsen-Møller, 2012). Some participants in this research alluded to examples of harm reduction and health promotion efforts within gyms in the UK and efforts to build relationships between support services and gyms, but there is a lack of empirical evidence to understand the impact of these. The normalisation of use in fitness environments needs defining further, but efforts to reduce this and the development of more desirable norms associated with steroid use and physique are topics for researchers to consider. Additionally, approaches to improve the relationships between support services and gyms requires further research. Stakeholders identified this as important to achieve to enable effective signposting and potentially delivery of interventions within gyms, but approaches to overcome the barriers that clearly exist have not been explored.

### **Interventions to increase access to support and information**

The proposed map supports identification of different routes to implement interventions and assessment of the impacts that these can have. In figure 12, behaviours by key agents identified through this research that might be relevant for the provision of support and information to users are mapped to different components in the map. This demonstrates the complexity involved with any user potentially exposed to multiple competing influences and information sources at different times and in different environments. All these behaviours represent possible targets for interventions that aim to increase the provision of relevant and reliable information and support to users and demonstrate that there are many options beyond interventions delivered in support services alone. There are overlaps between different components with agents in these potentially performing the same behaviours. It would of course not be feasible to develop an intervention that includes all these potential



targets and the appropriateness of each will vary in different locations. Further, they are not all likely to be realistic or easy to implement and potential effectiveness will vary. However, considering a wide range of potentially relevant possibilities helps to ensure that options are not overlooked. The BCW guide (Michie et al., 2011) advises applying four criteria to identify which behaviours from the options available to target in an intervention. The criteria include i) likely impact, ii) ease of implementation, iii) likely spillover and iv) ease of measurement and applying these supports identification of targets that are likely to be realistic and have the greatest impact. Issues relating to implementation and measurement will likely vary greatly according to local systems already in place and local context. For example, if a positive relationship exists with a gym owner then interventions in that gym are likely to be more achievable than where there is no such relationship or there is hostility, which will require additional work to address.

The map is particularly useful for assessing potential spillover (both positive and negative) through the links between different components. Targeting behaviours that may have the greatest positive knock on effects, for example those of agents with the most influence, can be particularly beneficial. A key theme throughout this research has been the importance of social networks of AAS users influencing users' choices and practices. While this has generally been discussed in quite a negative way as explaining how and why risk- and harm-increasing attitudes and practices are spread and undertaken, it also provides a route to respond to the priorities established here that tackles the influences upon AAS choices across the socioecological levels. A small proportion of studies within the systematic review in chapter 2 included components linked with changing social norms, although due to the limitations of the evidence base already discussed it was difficult to determine any association with behaviour change. As demonstrated in the map, inducing changes at the social network level may offer a way to potentially reach and influence large numbers of users.

#### **Beyond support services: influencing change through social networks**

Efforts to influence decisions by AAS users need to consider the important social and community contexts that will influence choices. Network interventions, which seek to

use social networks to bring about behaviour change and produce social influence (Valente, 2012), may be a method to reach users including those not engaging with services. The potential for peers acting within social networks to provide education and social support and to act as role models in efforts to tackle health related issues is well established, in particular to reach underserved communities or respond to health needs that health care providers cannot fully address at critical times (Dickson-Gomez et al., 2006, Simoni et al., 2011). Peer-based interventions are valued as approaches to increase self-efficacy, provide social support and education, and change norms within social groups (Simoni et al., 2011).

Network interventions have been used in response to many different health needs including childhood obesity (Stock et al., 2007), HIV (Dickson-Gomez et al., 2006) and adolescent substance use (Valente et al., 2007). They have been prominently used relating to HIV including with people who inject drugs (PWID). In one example of a network intervention targeting substance users, the Risk Avoidance Partnership (RAP) project (Weeks et al., 2009, Li et al., 2012) sought to change the social context in which heroin and cocaine users operated in to reduce risk of HIV transmission by changing risky practices and increasing prevention efforts. The project was a two-stage intervention where peer advocates received a harm reduction and health enhancement intervention and training, and then delivered these same messages to those in their social networks and communities. The map proposed here and the socioecological framework developed in study 2 highlight the competing and interacting influences upon AAS from across the ecological spectrum and interventions that can impact upon multiple ecological levels are therefore likely to be particularly beneficial. Evaluation of the RAP project suggests that positive changes at the individual, social network and community levels can be brought about through such an approach (Weeks et al., 2009).

An advantage of involving peers is the potential to eventually reach large numbers of AAS users through the social networks of these men. Peers can access and provide interventions in settings that health care providers are likely to have difficulty accessing and gaining trust in (Simoni et al., 2011). One clear example of this relating to AAS is the gym setting and the difficulty that service providers can have engaging with gym staff as

part of attempts to reach users. Diffusion of innovation theory demonstrates the potential for new information or practice to spread over time through a social system via an initial small number of individuals with large interpersonal networks (Rogers, 1995). The theory emphasises that those with higher status in a social system and who sit in the centre of the various social networks within it, defined as opinion leaders, are likely to have the greatest influence and have a significant role in the diffusion of information (Rogers, 1995). Those who link different groups within social networks may be particularly important (Valente, 2012). Amongst AAS users, those frequently characterised as ‘the big guy in the gym’ as well as gym owners and dealers seem likely to represent these opinion leaders and therefore may be particularly valuable to recruit as agents of change. The credibility of these potential peer providers is one key advantage. Theories such as dynamic social impact theory and diffusion of innovations theory suggest that individuals who belong to the same group as those whose behaviour they are looking to change are more likely to have credibility and exert influence (Latané, 1996, Nowak et al., 1990, Rogers, 1995). Additionally, they can demonstrate the benefits from making the choices that they are hoping to influence in others. For example, peers can theoretically provide examples of useful support they have received in services or demonstrate a muscular and desirable physique despite adopting less ‘risky’ AAS practices.

Through this, as well as promoting support services if available we can seek to change norms within settings such as gyms or sports environments. Within ‘risk environments’ where a range of influences combine to promote, support and facilitate AAS use, changing norms and the culture that exists may be challenging but ultimately crucial to promote healthy and harm-reducing choices. Where trusted, credible and influential information providers are adopting and recommending a position or practice, others within that social system are more likely to do so as well (Rogers, 2003). It appears that many ‘opinion leaders’ in AAS social systems value discussing AAS and related issues with others who they encounter. Given that people like to come across to others as being knowledgeable and worthy of respect by sharing information that they believe is interesting and useful (Berger, 2014, Cappella et al., 2015), it is perhaps unsurprising that this is commonplace. Additionally, evidence throughout the studies here point to

how AAS-related information acquired through a trusted source can spread within users' social networks. If these opinion leaders can be influenced so that the information they provide reflects the priorities identified, it therefore follows that this positive information might spread in a similar way. Through effective information and support provision, interventions can therefore seek to tackle a range of needs, such as increasing adoption of harm reducing strategies, bring about reductions in AAS use and increasing use of support services.

It will be important to further increase understanding of the dynamics in AAS user social networks and key environments in order to design and implement effective peer-based network interventions. More research examining the relationships within users' networks and how information is disseminated and received will support this. However, an approach similar to the RAP project (Weeks et al., 2009) appears promising. For example involving users in service delivery or identifying key individuals who can act as agents of change within a community (in a gym, for example) and training them to provide messages to others in their networks. These individuals can bridge the divide between 'peers' and 'professionals' identified in the map so as well as acting as role models they can provide reliable support that discourages risky use and aims to improve health. The evidence presented throughout this research suggests that some individuals already take on this role and working with them to develop clear messages in response to the needs established in this research will ensure that advice and information is appropriate. Increasing the number of agents of change in a community may increase the potential for effective interventions (Li et al., 2012).

Beyond local communities, networks extend through electronic communication such as social media and forums and, although relationships may differ compared to traditional face-to-face communication (Valente, 2012), the use of such social media by users as information sources suggests these networks are important. There is potential for these messages to ultimately reach many users through different routes and, over time, change norms in these networks and subcultures. A second example of how networks are already used, and in a positive way, is through secondary distribution of injecting equipment. Some users will collect large amounts of equipment during visits to NSPs

and then sell or give these to others in their networks (Glass et al., 2019) and examples in this research were given of users who collected equipment on behalf of, or from, friends. A potential downside to this is that users do not get the information or advice that they could receive from service providers if collecting equipment in person. Those involved with secondary distribution could distribute written information or pass on important messages during these interactions along with injecting equipment, and be supported to provide equipment to more users in their networks. However, while examples were given in this research of how users can be influenced by the advice of others, it could be speculated that if it is not information that those receiving it would value or see as matching their aims or preconceptions, then it might not be acted on.

It was tentatively concluded in the systematic review in chapter 2 that educational approaches based solely on information provision may not be effective at changing AAS behaviours. The broad approaches discussed here go beyond just providing information, but look to change norms with social networks and important environments, with consideration to who is providing this support and how. Identifying key individuals within specific sites who can act as 'opinion leaders' and agents of change will be important. The precise nature of the messages they will provide requires further research and will need to be adapted to local needs, but the proposed options listed in figure 12 reflect the broad harm reduction priorities established in this research. It is likely that barriers to these individuals acting as positive influencers and providing these messages will need to be addressed. For example while they may be very knowledgeable, the advice they give may not always be relevant or appropriate to the recipient or in line with the priorities identified here. Supporting these individuals through increasing their motivation to establish norms to manage risk and promote healthy choices and to work with health professionals is likely to be important. Attitudes and barriers towards providing certain messages will vary according to the individual's circumstances and experiences, as explored throughout these studies.

#### **Increasing access to support services where appropriate**

While recognising the limitations of support services in responding to the needs of users, increasing users' access to available services remains an attractive option. While there

are a lack of formal evaluations to demonstrate it, needle and syringe programmes can provide users who attend them with injecting equipment and, where engagement between users and staff is good, harm reduction advice around injecting and sexual health. Therefore, increasing access to services to continue efforts to minimise risk of BBVs and injecting related injuries, and to increase contact between users and health professionals, may have benefits (particularly when users have concerns about their health or AAS use and where settings are equipped to provide support services through knowledgeable, credible and motivated staff). Where it is identified that service uptake is low or there are concerns about BBVs, interventions to increase uptake of services may be required.

In addition to providing injecting equipment and advice relating to injecting and BBVs, where services are staffed by providers that have the necessary expertise, confidence, motivation and resources to respond to other needs these can be a resource for information and support. Despite the lack of evidence on the effectiveness of support services (beyond distribution of injecting equipment) and examples of reluctance to engage with health professionals and negative experiences in services, there were examples given in this study of interactions that had positive outcomes for the AAS choices and practices of users. Therefore, increasing access to local support services could have positive outcomes for users and in locations where it is identified that many users are not accessing services, this is a clear option for an intervention to address.

The support service to be targeted will depend on what is available locally, which varies throughout the UK. Where a specialist IPEDs clinic is available this is likely to be the most appropriate option, but as these clinics are relatively rare, the best options will frequently be pharmacy NSPs or substance use services. NICE guidance for NSPs recommends that level 2 and 3 programmes<sup>12</sup> used by IPED users should provide 'specialist services' for this population including advice about side effects and alternatives to IPED use, as well as referral to sexual and mental health services and

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<sup>12</sup> In the UK, needle and syringe programmes are defined as being one of three levels of service. Level 1 includes services where injecting equipment either loose or in packs with written harm reduction information. Level 2 includes 'pick and mix' injecting equipment plus health promotion advice. Level 3 includes level 2 provision plus provision of or referral to specialist services (NICE, 2014).

specialist clinics if available locally (National Institute for Health and Care Excellence, 2014).

Using the proposed map, a range of behaviours by key agents are identified that might be relevant in encouraging attendance at support services (figure 13). Any intervention with this aim will need to consider common barriers and enablers for service attendance, as identified in chapter 6 (table 4) and the potential behaviours identified in figure 13 are based upon these. To have a greater impact and target multiple factors identified as important interventions will likely need to go beyond signposting alone. In particular, they should include clarification of the aims of services and the benefits of service attendance. Identifying a long list of relevant options that might be the focus of an intervention is useful to ensure that all potential opportunities to bring about the intended change are considered. However, clearly it would not be feasible or necessary for any intervention to attempt to incorporate all of them.

Applying the four criteria developed by Michie and colleagues (Michie et al., 2014) to assess which behaviours to target supports two approaches including i) encouraging use of support services through the network approach and ii) staff in health and social care services promoting support services to users they encounter. Within these two approaches, seven specific behaviours identified in figure 13 appear promising. The extent to which these specific behaviours met the four criteria is provided in appendix 13. Where users are accessing specific local health services then an intervention that focuses on signposting from these services to support services as available could be attractive, as specified in box 5.

**Box 5: Specificities of an intervention to increase engagement with AAS support services**

**Promoting AAS support services**

Who?

*Staff working in health/ social care services who encounter men who use AAS*

What do they need to do differently?

*Signpost to AAS support services and promote by providing information on service aims and the benefits of attending*

When and where do they need to do it?

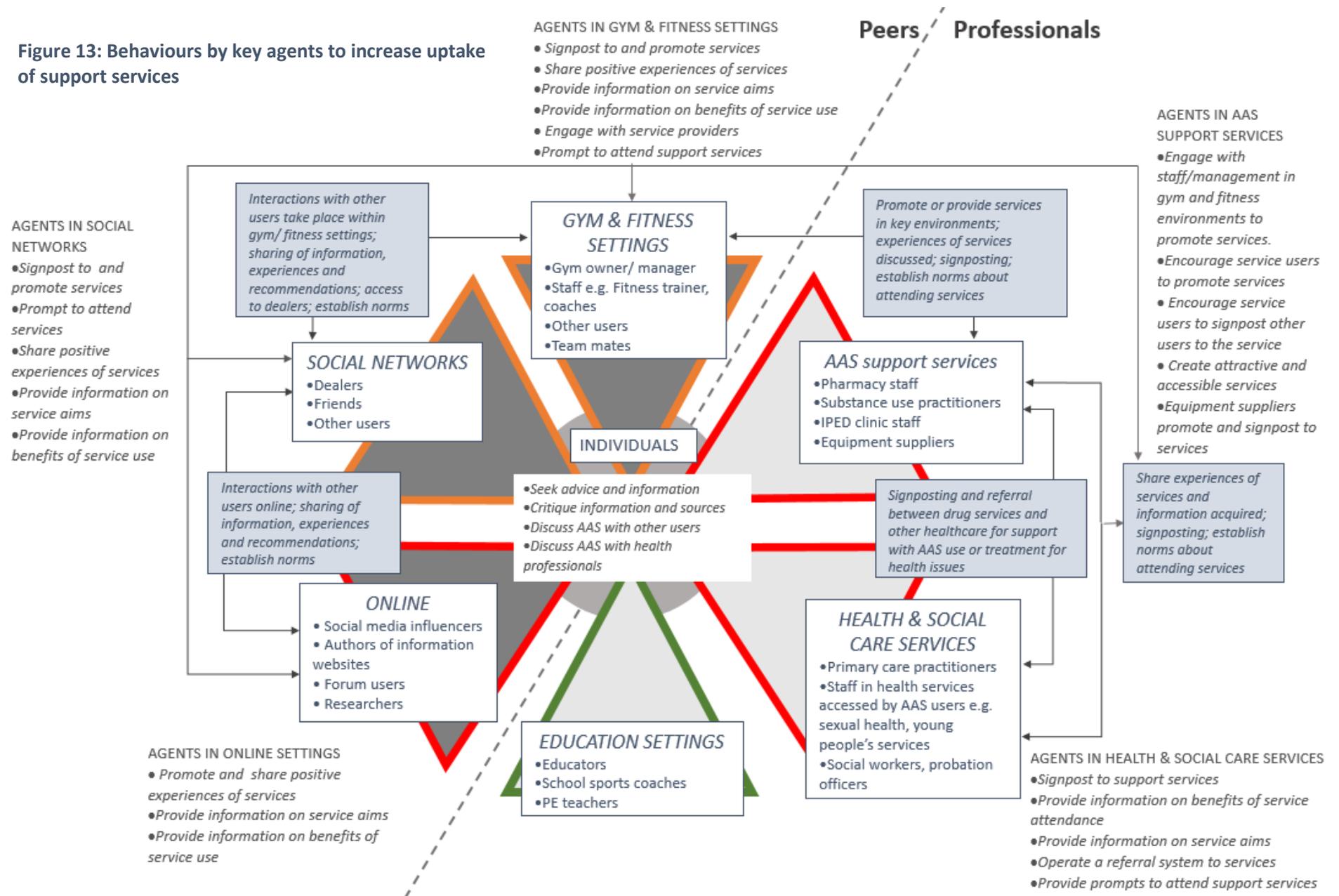
*During appointments/ discussions with men who use AAS when they visit the service*

How often do they need to do it?

*Every time they identify AAS use in a client*

According to the COM-B model of behaviour change (Michie et al., 2011); staff will need the capability, opportunity and motivation to promote support services to users. This is likely to vary greatly by service and therefore what needs to change to implement this intervention will differ according to the specificities of the services and staff in question. However, evidence presented within the studies here suggests that generally the issues as presented in table 5 will likely need to be addressed.

**Figure 13: Behaviours by key agents to increase uptake of support services**



**Table 5: Supporting health service staff to signpost effectively to AAS support services**

<b>COM-B component</b>		<b>Factor influencing effective signposting</b>
<b>Capability</b> (Psychological and physical capacity)	<i>Psychological</i>	<ul style="list-style-type: none"> <li>• Knowledge about support services (location, times)</li> <li>• Knowledge about scope of support services</li> <li>• Identification of AAS use amongst clients</li> <li>• Skills to raise AAS use and engage with clients</li> </ul>
<b>Opportunity</b> (Physical and social factors external to the individual)	<i>Physical</i>	<ul style="list-style-type: none"> <li>• Limits of existing systems (may prevent formal referral)</li> <li>• Time as a barrier</li> </ul>
	<i>Social</i>	<ul style="list-style-type: none"> <li>• Norms in the service regarding support for AAS users</li> <li>• Scope of the service</li> </ul>
<b>Motivation</b> (Automatic and reflective processes)	<i>Reflective</i>	<ul style="list-style-type: none"> <li>• Expectation of the benefits of signposting</li> <li>• Confidence engaging with AAS users</li> </ul>

An advantage of an intervention as specified in box 5 is that it should be relatively straightforward to implement in health services, have a low burden on staff and fit within current practice. Staff would not need any in depth knowledge about AAS and it could be a quick interaction. The intervention would be primarily educational to ensure that staff are aware of the scope and availability of the support service. In services accessed for reasons other than substance use, difficulty in identifying users could be tackled through a single standard screening question. A range of options can be identified to increase confidence and engagement skills where required. Communication training for health professionals that utilises role-play (Lane and Rollnick, 2007, Berkhof et al., 2011) for example has been demonstrated to be an effective approach.

In this example, a model of behaviour change has been applied to generate the foundation for an intervention that responds to an established need and is evidence-based. The evidence-base on AAS interventions is frequently characterised by approaches that have no or little theoretical grounding and where the justification and process of their development is unclear. Using frameworks such as the BCW that guide the development of behaviour change interventions in a robust and transparent process

will help to ensure that future interventions are suitable, necessary and likely to be effective. Future steps to continue the development of the proposed intervention using the same model would be identification of intervention functions and appropriate behaviour change techniques.

### Recommendations for healthcare practice

The evidence presented in this study supports some general recommendations for health professionals to improve delivery of healthcare to users. This applies to staff in AAS support services, as well as GPs and healthcare providers in other health services who work with AAS users. Participants in both qualitative studies in this research emphasised that users have concerns about being stigmatised and expectations of negative attitudes and poor understanding amongst providers related to steroid use. An important first step therefore, regardless of setting, is to ensure that healthcare providers offer supportive, non-judgemental and positive environments for AAS users, as they would for anyone else. Avoidance of language and terminology that may be stigmatising and creates barriers between users and providers appears particularly important in enabling positive relationships and the provision of advice and support.

During interactions with users healthcare providers should, generally, provide appropriate advice and harm reduction interventions, and motivate behaviour change towards cessation (as detailed in box 4 at the start of this chapter). The response will need to vary from person to person depending on their motivations, attitudes, health and experiences, as well as the skills of the provider and the opportunities for intervening that the setting they are in permits. In settings such as substance misuse services and General Practice, there may be a greater opportunity to have an in-depth conversation and to, for example, motivate change than in NSPs and other types of health services where the primary focus of the visit is not to discuss AAS or a related health need. In such settings, signposting to an appropriate support service where available is a more realistic outcome.

## Reflections on this research and limitations

### The models used to support this research

It is clear that changing behaviour is challenging, and any interventions with this aim need to be supported by a strong evidence base and deep understanding. Reflecting on the studies included in the systematic review, I felt that a limitation of these was the lack of theory and evidence underpinning the ideas being tested, and, particularly with those targeting non-athletes, potentially a lack of understanding into what actually needed to be changed and achieved. A strength of the BCW model is that it necessitates a full understanding of a problem in order to bring about change, and applying the early stages in the model has given me confidence that the recommendations made here are based upon a thorough assessment of what is needed. A difficulty of using the BCW model has been that to apply it successfully, the behaviour in question and the problem that needs addressing need to be clearly defined. Use of AAS is a broad behaviour with much variation and being specific in this way was challenging. However, it forced me to address what I had perceived to be an issue with the studies included in the systematic review and to think about exactly what it is that any intervention needs to achieve, the specifics about where and when that would be, and who the target would be. Thinking in this way will help to ensure that interventions are appropriate and based on clear needs.

The conceptual map presented here represents a broad and general picture for the typical AAS user in the UK, if such a thing can be said to exist. As highlighted throughout this research and the wider evidence base there is much variation amongst users and the communities that they live, work and socialise in. Any attempt to generalise to all men who use AAS is therefore difficult. However, this represents, to the best of my knowledge, the first attempt to apply a systems approach to understanding and influencing the choices of AAS users and the first attempt to map the support available to them. The map is intended to be useful for stakeholders looking to understand and intervene in their own communities and therefore they will need to apply their local context to it. Applying the principles of the complex systems approach helped me to make sense of the findings throughout this research and to create a tool to use to help

respond to the priorities identified. It enabled me to represent the findings from the qualitative studies in the context of the socioecological framework and the principles of the BCW model approach, supporting the identification of different opportunities for interventions beyond what just might seem obvious. In particular, this approach helped me to apply the socioecological framework to the needs identified which, although often discussed, has not frequently been applied in public health research and interventions in comparison to other theoretical models (Glanz and Bishop, 2010).

It was important to emphasise that AAS use is a complex behaviour with many competing influences, because it appeared that this has not always been well recognised by those seeking to bring about changes or reductions in use. However, the map was defined as including components that the 'typical' user can interact with and has some control over, which excluded potential components from the outer levels in the socioecological framework. Given the recognition of the cultural and societal influences upon AAS and body image attitudes (Kanayama and Pope, 2011), considering how to extend the boundaries of the map to incorporate these components would be an interesting, if challenging, process. Changing social norms and attitudes at a community or societal level is likely to be challenging and unlikely to come about through any 'one off' intervention. Instead, intervening at different points in this broad system relating to AAS use may support broader cultural changes over time. Developing systems models that include societal factors will be an important step to support the potential for interventions to have impacts at a population level (Luke and Stamatakis, 2012).

#### Heterogeneity in AAS users and the limitations of the evidence in this study

A substantial body of evidence was identified and considered in the production of the two literature-based studies in this research, which supported the identification of gaps in the evidence base for future research to address. A rich dataset was then generated through the inclusion of 45 participants across the two qualitative studies. In the first, stakeholders offered perspectives from a range of backgrounds, experiences and expertise relating to AAS and those who use them. Across the two studies a substantial amount of data were gathered and while there was some conflict, areas of consensus were established across the different perspectives regarding where intervention is

required and what approaches might be effective. For example, clear messages regarding harm reduction needs are established.

However, the findings can of course not be generalised to the needs and experiences of all users or stakeholders. The research into AAS use has been dominated by some 'types' of users, in particular athletes and professional and recreational bodybuilders and those who are experienced with these substances. As such, the evidence-base that this research utilised was generally under representative of other subgroups of users who make up large proportions of the overall population, such as gay men, prisoners, new users and older men who are using for reasons such as combatting the effects of aging. While participation in study 4 was open to all users, the sample reflected some of the same limitations as identified in previous research with users here typically reporting between three and six years of experience administering steroids. Discussions were held relating to the very early stages of use and ways to effectively engage with, and influence, users at this time, which was perceived as important. While three participants had initiated their steroid use less than one year previously and therefore offered some insight from a new user perspective, findings relating to this stage were predominantly based on participants' reflections on their previous experiences or their perceptions of others. Recruiting participants who either were considering starting or had very recently done so might have offered further perspectives and insights on this time. Similarly, discussions frequently focussed on users who were characterised as more casual with their steroid use, or who engaged in other risk behaviours. While there was variation in the sample, for example as demonstrated by the amount of research they undertook, the overall impression was of a sample that was generally informed and health conscious. Additionally, users who participated mostly had at least some experience with accessing support services and more inclusion of individuals who had not considered, or were unaware of, such services might have added an interesting perspective.

It is perhaps unsurprising that users who participate in research are typically experienced with AAS, well informed and interested in the field. Such individuals may be more interested in discussing their experiences than those who are less engaged with

this culture. Indeed, some participants in this research commented that they welcomed the opportunity to discuss the issues covered in their interview. Further, they may feel incentivised by studies, like this one, which aim to inform the development of services and to support health amongst users like themselves. During recruitment, stakeholders in study 3 were encouraged to identify new users to participate in study 4. However, while two gym owners identified potential participants who had very recently started using steroids, none of these agreed to take part. One of these gym owners contacted me to explain that they had approached these new users, but they did not feel that they had anything to say. In a follow up conversation I had with the other gym owner, he reported a similar experience and also noted that one had indicated they did not intend to use AAS beyond one cycle, so were not interested in the potential benefits of research such as this in terms of service provision and supporting health amongst users. With hindsight, I feel it would have improved this research to identify more ways to find new users and those considering initiating and to encourage them to participate.

The use of the recruitment list developed through previous studies carried out by the Public Health Institute may have contributed to this effect by seeking users who had previously taken part in research into their steroid use, although only five participants were recruited this way. Similarly, that stakeholders in study 3 were identified from lists of conference attendees and then a snowball approach where these participants identified further participants may have supported the development of a sample that was already engaged with public health research. The inclusion of perspectives from individuals who had worked and interacted with users in a wide range of settings was intended to ensure that no one perspective dominated the research, but the experiences and roles of stakeholders are likely to have influenced findings. That a theme coming out of the work was the importance of improving engagement between users and services may be unsurprising given that many of the participants worked within such settings or in broader public health roles. This may have seemed a logical response to those familiar with increasing access to services and health professionals as a key aim of harm reduction (Ashton and Seymour, 2010, Stimson, 2007). This may help to explain why there has been this long-held focus on providing AAS support services in response to use, despite the lack of evidence supporting such an approach.

## Primary prevention as a public health response to AAS

As the research developed, it became more focussed towards approaches targeting men who are already using AAS rather than primary prevention, where there was also less consensus amongst participants. While they were not necessarily positive about it, participants in the research generally expressed accepting attitudes towards steroid use. A common underlying perception was that risks and harms were manageable and that use did not have to be problematic, particularly in comparison to other health related behaviours such as physical inactivity or poor dietary choices. Reducing demand for AAS may not seem as important for those with this attitude, with the focus instead on supporting users to manage their risk and change behaviours to minimise potential harms. My own feelings about this have fluctuated during the research and I have given much consideration to the idea that use of AAS in itself may not necessarily be problematic or something that needs preventing. The steps taken to reduce the potential for my own biases to influence findings throughout the research were in part recognition of this. Through my reflections on the studies in this research, I have come to disagree with some of my participants who suggested that use 'in moderation' was not potentially problematic. This is particularly in recognition of the difficulty in controlling the quality and doses of substances purchased through the illicit market, and the growing evidence base regarding health harms and dependence. Further, through my interviews with users and stakeholders who worked with them, I have tentatively concluded that while supporting users to manage their risk is a very important aim, motivating them towards discontinuation should be a prominent part of any intervention targeting users.

That the focus of the research moved towards interventions to reduce harm and bring about cessation rather than primary prevention may again have reflected the interests and experiences of stakeholders. Including more stakeholders from education or sporting backgrounds for example may potentially have steered the research more towards prevention approaches and more consensus about what these could look like may have emerged. However, participants in studies 3 and 4 did discuss the importance of prevention amongst young people before they became interested in, or were considering, starting to use AAS. Further, some users discussed how their advice to

anyone considering it would simply be not to start, although they did not necessarily view their own use negatively. To an extent, the findings from the qualitative studies support conclusions from the systematic review of interventions regarding the need to further explore and define the aims and objectives of AAS prevention interventions. In comparison to the harm reduction and behaviour change messages identified, what primary prevention approaches might look like in terms of when and where they should take place and who should be involved with delivery was less clear. Some participants alluded to the need for school-based prevention. Much of the preventative efforts relating to other substances such as alcohol, tobacco and illicit drugs have been delivered in educational settings or to adolescents in community or family settings (Bates et al., 2017b) so this may seem a natural route to take. However, there are differences with AAS users that indicate that a different public health response for prevention may be required here. Initiation is typically during adulthood (Pope et al., 2014a, Sagoe et al., 2014a) and, as demonstrated through the consistently low prevalence of use amongst participants in studies included in the systematic review, there is little evidence of initiation amongst large numbers of schoolchildren.

Demonstrating effectiveness of any universal prevention efforts will be challenging and such interventions may not be cost-effective, as overall prevalence appears low amongst young people in comparison to substances such as cannabis, tobacco and alcohol (Kraus and Nociar, 2016). Further, many of those who do initiate in adolescence or as an adult may not engage in long-term use. There is additional complexity regarding the focus of prevention efforts. In other words, what needs to be changed in order to prevent initiation? Recognition of the variability amongst users and in what motivates and influences their steroid initiation highlights that there is unlikely to be any one prevention approach that will reduce prevalence. Stakeholders in this research suggested that for younger people, wider issues such as body image, appearance, peer norms and pressures and understanding and critique of media images are associated with AAS initiation and therefore should be the focus of interventions during adolescence. As identified in the systematic review, these factors have all been part of the small number of AAS primary prevention interventions implemented since the

1990s. However due to the substantial limitations of this evidence base, it is difficult to draw any firm conclusions about what works to prevent use.

Steroid use is commonly discussed alongside body image and eating disorders (Rohman, 2009, Olivardia et al., 2004) for which prevention interventions have frequently been based upon changing perceptions about media images, critiquing appearance ideals and increasing self-esteem (Alleva et al., 2015, Bailey et al., 2014). Such approaches may be a more cost-effective approach with measurable outcomes than tackling steroid use through steroid-specific prevention interventions. The potential benefits from effective prevention interventions therefore go beyond steroid use and more broadly include important outcomes such as wellbeing, mental health and esteem. With patterns of dependence amongst long-term users (Kanayama et al., 2009a), and similarities between disorders such as muscle dysmorphia and behavioural addictions (Foster et al., 2015), approaches may also be informed by the evidence on preventing addictive behaviours and developing resilience. The transferability of messages from these fields is worthy of further exploration, and may be more appropriate to consider than evidence from, for example, attempts to reduce IPED use amongst athletes that may apply approaches with limited relevance to the general population. Using a recent study as an example, I question the value of implementing a steroid prevention approach for non-athlete adolescents that is based upon anti-doping principles and messages (Medina et al., 2019) rather than attempting to address factors that are associated with IPED use and related health and wellbeing outcomes amongst the general population.

#### The influence of the UK harm reduction model on this study, and generalisability of findings beyond the UK context

This research focuses on exploring the public health response to AAS in the UK. Consequently, the findings are most applicable to this country, its health system, laws and, importantly, harm reduction approach to supporting substance users. The health service and harm reduction orientated model of healthcare for people who use drugs emerged in Merseyside in the 1980s primarily in response to concerns about HIV transmission amongst heroin users (Ashton and Seymour, 2010). As described previously, this 'Merseyside model' focuses on improving the health of people who use

drugs by increasing access to healthcare and supporting them to use their drugs safely, and has been widely adopted throughout the UK and beyond. While this research questions the emphasis on increasing access to services as a way of responding to the greatest needs of AAS users and offers alternative approaches, such as influencing social networks and reducing the normalisation of AAS use in fitness environments, the focus remains on supporting users to improve health and manage risk. Therefore, the context in terms of a harm reduction approach remains important. In the UK, AAS are controlled as a class C drug under the 1971 Misuse of Drugs Act. Possession is not a criminal offence, although it is illegal to manufacture, import or supply AAS, and this perhaps support a public health response that goes beyond outright prevention and identifying and penalising use.

Although many of the findings in terms of influences upon users and their needs are likely to be relevant outside the UK, the implications and opportunities for interventions may be less generalisable, particularly where legislation and underlying attitudes towards steroids amongst health authorities are different and more prohibitive. Outside the UK, particularly in the Nordic countries, there have been attempts to change the culture of steroid use within fitness environments that typically include elements of cooperation with police, implementation of 'anti-doping' principles and education on the risks and harms of steroids. Examples include the PRODIS initiative in Sweden, (Molero et al., 2016) and the Clean Fitness Centre program in Norway (Transform, 2017), amongst others. The overall intention of reducing steroid use and the normalisation of steroids in gyms in such approaches are similar to those recommended in this research, but the avenues that lead to these outcomes seem to differ greatly to those suggested here.

There is a fear amongst many steroid users in the UK that increased attention on them will lead to increased criminalisation of their substance use. Indeed, this was evident in this research with some participants raising concerns about this issue when deciding whether to participate. A concern for those hoping to work with users, as health professionals or researchers, is increased criminalisation will only serve to drive steroid use 'underground' and to reduce willingness of users to go to health professionals for

support when they need it. It is clear from this research that there are substantial barriers to users and gym owners engaging with health professionals already. It seems likely that introducing law enforcement and anti-doping principles into the picture will lead to greater suspicion and less willingness to engage and work with health authorities. Additionally, as noted in this research there is a strong dislike amongst users towards being seen as doing something inherently 'bad' or wrong, and that this can lead to disengagement.

Consequently, it seems possible that introducing policies that reinforce messages that using steroids is fundamentally wrong may have unintended consequences, for example reducing access to advice, information and to health professionals amongst those who are already using steroids. If some gyms in the UK were to adopt similar anti-doping type initiatives to those in Norway and Sweden, for example, it seems plausible that steroid users will simply move to using gyms that don't sign up to such programs. However, it is worth considering that there may also be positive impacts from these approaches, particularly in terms of reducing the exposure to pro-steroid attitudes, others users and dealers for, for example, new gym users or those who might be susceptible to initiating steroid use. This highlights why the UK's harm reduction approach towards substance use is important and has influenced this research, as the focus here is predominantly on those who already use steroids and how they can be supported to manage their risk and improve their health. The findings may be less applicable for health authorities elsewhere who are more focussed on preventing uptake, or who have a zero-tolerance approach to steroid use. However, where authorities and health professionals are seeking to support users and to reduce risks and harms amongst them, the findings of this study remain applicable.

## Chapter 8: Conclusion

This research has identified consensus on some priorities for intervention providers to address relating to men who use AAS. A clear priority was established as increasing provision of reliable and relevant support to users who are at risk of undertaking behaviours that increase their risk of poor health. While the research highlights that there is a lack of clarity on what 'moderate' AAS use entails and the difficulty of reducing harm in the context of the illicit market, interventions to discourage risky use, such as reducing doses and encouraging cycles with periods of non-use, are needed. Additionally, the need to reduce overall prevalence by reaching new users and encouraging and supporting cessation in long-term users was emphasised.

The similarity of these support needs with those from research from over 20 years ago indicates that the current substance use service-based response in the UK, based primarily upon the need to reduce risk of BBVs, is insufficient for addressing these concerns. In the context of increasing evidence about the risks to both physiological and psychological health and continued concerns about uptake, this research highlights the need to develop interventions in this area to respond to the priorities established here. This includes improving the ways that support is currently provided through healthcare and services targeting users, and increasing uptake of these services. Furthermore, it makes a clear case for identifying new methods to provide support and information to users. A conceptual map of information and support for men who use AAS has been designed as a tool to be used by stakeholders to identify options for interventions beyond those delivered within health service environments. The socioecological framework developed in this research emphasises the ways that social networks and the communities they exist within are very influential on AAS choices. This research highlights that interventions are needed that utilise these networks and environments to reach users and influence their behaviours through establishing positive norms and messages.

## Bibliography

- ABRAHAM, C., JOHNSON, B. T., DE BRUIN, M. & LUSZCZYNSKA, A. 2014. Enhancing reporting of behavior change intervention evaluations. *Journal of Acquired Immune Deficiency Syndrome*, 66 Suppl 3, S293-9.
- ACMD 2010a. Annex for the ACMD Anabolic Steroids Report, A-F. London: The Stationery Office.
- ACMD 2010b. Consideration of the Anabolic Steroids. London: The Stationery Office.
- AGLIATA, D. & TANTLEFF-DUNN, S. 2004. The impact of media exposure on males' body image. *Journal of Social and Clinical Psychology*, 23, 7-22.
- ALLEVA, J. M., SHEERAN, P., WEBB, T. L., MARTIJN, C. & MILES, E. 2015. A meta-analytic review of stand-alone interventions to improve body image. *PLoS ONE*, 10, e0139177.
- ANDREASSON, J. & JOHANSSON, T. 2016a. Gender, Fitness Doping and the Genetic Max. The Ambivalent Construction of Muscular Masculinities in an Online Community. *Social Sciences*, 5, 11.
- ANDREASSON, J. & JOHANSSON, T. 2016b. Online doping. The new self-help culture of ethnopharmacology. *Sport in Society*, 19, 957-972.
- AROMATARIS, E. & MUNN, Z. 2017. *Joanna Briggs Institute reviewer's manual* [Online]. The Joanna Briggs Institute. Available: <https://reviewersmanual.joannabriggs.org/> [Accessed April 2017].
- ASHTON, J. R. & SEYMOUR, H. 2010. Public Health and the origins of the Mersey Model of Harm Reduction. *International Journal of Drug Policy*, 21, 94-96.
- ASR, M., HEIDARI MOGHADAM, R., BASHIRIAN, S. & BARATI, M. 2018. Effectiveness of educational program based on prototype willingness model on preventing and decreasing anabolic-androgenic steroids among male bodybuilders. *Koomesh Journal of Semnan University of Medical Sciences*, 20, 179-416.
- ATUN, R. 2012. Health systems, systems thinking and innovation. *Health Policy and Planning*, 27, iv4-iv8.
- AVILEZ, J. L., ZEVALLOS-MORALES, A. & TAYPE-RONDAN, A. 2017. Use of enhancement drugs amongst athletes and television celebrities and public interest in androgenic anabolic steroids. Exploring two Peruvian cases with Google Trends. *Public Health*, 146, 29-31.
- BACKHOUSE, S. H. 2015. Anti-doping education for athletes. In: MØLLER, V., WADDINGTON, I., HOBERMAN, J. M., MØLLER, V., WADDINGTON, I. & HOBERMAN, J. M. (eds.) *Routledge handbook of drugs and sport*. New York, NY, US: Routledge/Taylor & Francis Group.
- BACKHOUSE, S. H., COLLINS, C., DEFOORT, Y., MCNAMEE, M., PARKINSON, A. & SAUER, M. 2014. Study on doping prevention: A map of legal, regulatory and prevention practice provisions in EU 28. European Commission.
- BAGGISH, A. L., WEINER, R. B., KANAYAMA, G., HUDSON, J. I., LU, M. T., HOFFMANN, U. & POPE, H. G. 2017. Cardiovascular Toxicity of Illicit Anabolic-Androgenic Steroid Use. *Circulation*, 135, 1991-2002.
- BAHRKE, M. 2012. Performance-enhancing substance misuse in sport: Risk factors and considerations for success and failure in intervention programs. *Substance Use & Misuse*, 47, 1505-1516.
- BAILEY, A. P., PARKER, A. G., COLAUTTI, L. A., HART, L. M., LIU, P. & HETRICK, S. E. 2014. Mapping the evidence for the prevention and treatment of eating disorders in young people. *Journal of Eating Disorders*, 2, 5.
- BARKOUKIS, V., KARTALI, K., LAZURAS, L. & TSORBATZOUZDIS, H. 2016. Evaluation of an anti-doping intervention for adolescents: Findings from a school-based study. *Sport Management Review*, 19, 23-34.
- BARLETT, C. P., VOWELS, C. L. & SAUCIER, D. A. 2008. Meta-analyses of the effects of media images on men's body-image concerns. *Journal of Social and Clinical Psychology*, 27, 279-310.

- BARTHOLOMEW, L. K. & MULLEN, P. D. 2011. Five roles for using theory and evidence in the design and testing of behavior change interventions. *Journal of Public Health Dentistry*, 71, S20-S33.
- BATES, G., BEGLEY, E., TOD, D., JONES, L., LEAVEY, C. & MCVEIGH, J. 2017a. A systematic review investigating the behaviour change strategies in interventions to prevent misuse of anabolic steroids. *Journal of Health Psychology*, 0, 1359105317737607.
- BATES, G., JONES, L., COCHRANE, M., PENDLEBURY, M. & SUMNALL, H. 2017b. The effectiveness of interventions related to the use of illicit drugs: prevention, harm reduction, treatment and recovery. A 'review of reviews'. Dublin: Health Research Board.
- BATES, G., JONES, L. & MCVEIGH, J. 2014. Update of NICE guidance PH18 on 'Needle and syringe programme'. PIEDs review. Liverpool: Public Health Institute.
- BATES, G. & MCVEIGH, J. 2016. Image and performance enhancing drugs - 2015 survey results. Liverpool: Centre for Public Health.
- BATES, G., TOD, D., LEAVEY, C. & MCVEIGH, J. 2018. An evidence-based socioecological framework to understand men's use of anabolic androgenic steroids and inform interventions in this area. *Drugs: Education, Prevention and Policy*, 1-9.
- BEHAVIOUR CHANGE TECHNIQUE TAXONOMY V1. *Online training* [Online]. London: University College. Available: <http://www.bct-taxonomy.com/> [Accessed December 2016].
- BERGER, J. 2014. Word of mouth and interpersonal communication: A review and directions for future research. *Journal of Consumer Psychology*, 24, 586-607.
- BERKHOF, M., VAN RIJSSEN, H. J., SCHELLART, A. J. M., ANEMA, J. R. & VAN DER BEEK, A. J. 2011. Effective training strategies for teaching communication skills to physicians: An overview of systematic reviews. *Patient Education and Counseling*, 84, 152-162.
- BHASIN, S., STORER, T. W., BERMAN, N., CALLEGARI, C., CLEVINGER, B., PHILLIPS, J., BUNNELL, T. J., TRICKER, R., SHIRAZI, A. & CASABURI, R. 1996. The Effects of Supraphysiologic Doses of Testosterone on Muscle Size and Strength in Normal Men. *New England Journal of Medicine*, 335, 1-7.
- BIRD, E., OGILVIE, D., POWELL, J., BAKER, G., MUTRIE, N. & SAHLQVIST, S. 2013. Behavior change techniques used to promote walking and cycling: A systematic review. *Health Psychology*, 32, 829-838.
- BLANK, C., SCHOBERSBERGER, W., LEICHTFRIED, V. & DUSCHEK, S. 2016. Health Psychological Constructs as Predictors of Doping Susceptibility in Adolescent Athletes. *Asian Journal of Sports Medicine*, 7, e35024.
- BLOODWORTH, A. J., PETROCZI, A., BAILEY, R., PEARCE, G. & MCNAMEE, M. J. 2012. Doping and supplementation: the attitudes of talented young athletes. *Scandinavian Journal of Medicine and Science in Sports*, 22, 293-301.
- BOARDLEY, I. D. & GRIX, J. 2014. Doping in bodybuilders: a qualitative investigation of facilitative psychosocial processes. *Qualitative Research in Sport, Exercise and Health*, 6, 422-439.
- BOCHNER, A. P. 2000. Criteria against ourselves. *Qualitative inquiry*, 6, 266-272.
- BRAUN, V. & CLARKE, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*, 3, 77-101.
- BRAUN, V. & CLARKE, V. 2014. What can "thematic analysis" offer health and wellbeing researchers? *International journal of qualitative studies on health and well-being*, 9.
- BRENNAN, R., WELLS, J. S. G. & VAN HOUT, M. C. 2016. The injecting use of image and performance-enhancing drugs (IPED) in the general population: a systematic review. *Health & Social Care in the Community*.
- BRENNAN, R., WELLS, J. S. G. & VAN HOUT, M. C. 2018. "Raw juicing" – an online study of the home manufacture of anabolic androgenic steroids (AAS) for injection in contemporary performance and image enhancement (PIED) culture. *Performance Enhancement & Health*, 6, 21-27.

- BRONFENBRENNER, U. 1986. Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22, 723-742.
- BROOKS, J. H. M., AHMAD, I. & EASTON, G. 2016. Anabolic steroid use. *BMJ*, 355.
- BROWER, K. J., BLOW, F. C., BERESFORD, T. P. & FUELING, C. 1989. Anabolic-androgenic steroid dependence. *The Journal of clinical psychiatry*.
- BROWN, S. L. 2005. Relationships between risk-taking behaviour and subsequent risk perceptions. *British Journal of Psychology*, 96, 155-64.
- BUCKLEY, W., YESALIS, C., FRIEDL, K., ANDERSON, W., STREIT, A. & WRIGHT, J. 1988. Estimated prevalence of anabolic steroids among male high school seniors. *Journal of American Medical Association*, 260, 3441-3415.
- BURNS, K., KEATING, P. & FREE, C. 2016. A systematic review of randomised control trials of sexual health interventions delivered by mobile technologies. *BMC Public Health*, 16, 778.
- CANADIAN CENTRE FOR ETHICS IN SPORT 1992. The body image study: A qualitative study of the use of performance-enhancing drugs by non-athletes.
- CAPPELLA, J. N., KIM, H. S. & ALBARRACIN, D. 2015. Selection and Transmission Processes for Information in the Emerging Media Environment: Psychological Motives and Message Characteristics. *Media Psychology*, 18, 396-424.
- CHANDLER, M. & MCVEIGH, J. 2014. Steroids and image enhancing drugs 2013 survey results. *Liverpool: LJMU Centre for Public Health*.
- CHRISTIANSEN, A. V. & BOJSEN-MØLLER, J. 2012. "Will steroids kill me if I use them once?" A qualitative analysis of inquiries submitted to the Danish anti-doping authorities. *Performance Enhancement & Health*, 1, 39-47.
- CHRISTIANSEN, A. V., VINTHER, A. S. & LIOKAFTOS, D. 2016. Outline of a typology of men's use of anabolic androgenic steroids in fitness and strength training environments. *Drugs: Education, Prevention and Policy*.
- CHRISTOU, M. A., CHRISTOU, P. A., MARKOZANNES, G., TSATSOULIS, A., MASTORAKOS, G. & TIGAS, S. 2017. Effects of Anabolic Androgenic Steroids on the Reproductive System of Athletes and Recreational Users: A Systematic Review and Meta-Analysis. *Sports Medicine*, 47, 1869-1883.
- CLARKE, V. & BRAUN, V. 2017. Thematic analysis. *The Journal of Positive Psychology*, 12, 297-298.
- COGHLAN, D. & BRYDON-MILLER, M. 2014. *Critical friend* [Online]. SAGE research methods. Available: <http://methods.sagepub.com/reference/encyclopedia-of-action-research/n81.xml> [Accessed January 2018].
- COHEN, D. A., SCRIBNER, R. A. & FARLEY, T. A. 2000. A Structural Model of Health Behavior: A Pragmatic Approach to Explain and Influence Health Behaviors at the Population Level. *Preventive Medicine*, 30, 146-154.
- COHEN, J., COLLINS, R., DARKES, J. & GWARTNEY, D. 2007. A league of their own: demographics, motivations and patterns of use of 1,955 male adult non-medical anabolic steroid users in the United States. *Journal of the International Society of Sports Nutrition*, 4, 12-12.
- CORBETT, K. K. 2001. Susceptibility of youth to tobacco: a social ecological framework for prevention. *Respiration Physiology*, 128, 103-18.
- COUNCIL ON SCIENTIFIC AFFAIRS 1988. Drug abuse in athletes: anabolic steroids and human growth hormone. *JAMA*, 259, 1703-1705.
- COURTENAY, W. H. 2000. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Social Science & Medicine*, 50, 1385-1401.
- CRAIG, P., DIEPPE, P., MACINTYRE, S., MICHIE, S., NAZARETH, I. & PETTICREW, M. 2008. Developing and evaluating complex interventions. United Kingdom: Medical Research Council.

- CRAMBLITT, B. & PRITCHARD, M. 2013. Media's influence on the drive for muscularity in undergraduates. *Eating Behaviours*, 14, 441-6.
- DADDOW, R. & BROOME, S. 2010. *Whole Person Recovery: A user-centred systems approach to problem drug use*, RSA.
- DALLESASSE, S. L. & KLUCK, A. S. 2013. Reality television and the muscular male ideal. *Body Image*, 10, 309-315.
- DE SAVIGNY, D. & ADAM, T. 2009. *Systems thinking for health systems strengthening*, World Health Organization.
- DEEKS, J. J., DINNES, J., D'AMICO, R., SOWDEN, A. J., SAKAROVITCH, C., SONG, F., PETTICREW, M. & ALTMAN, D. G. 2003. Evaluating non-randomised intervention studies. *Health Technology Assessment*, 7, iii-x, 1-173.
- DENNINGTON, V., DILLON, P., FINNEY LAMB, C. & LARANCE, B. 2008. Qualitative field study for users of performance and image enhancing drugs. Parkside, South Australia: Drug and Alcohol Services South Australia.
- DENZIN, N. K. 2008. The new paradigm dialogs and qualitative inquiry. *International Journal of Qualitative Studies in Education*, 21, 315-325.
- DES JARLAIS, D. C., LYLES, C. & CREPAZ, N. 2004. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. *American Journal of Public Health*, 94, 361-366.
- DICKSON-GOMEZ, J., WEEKS, M., MARTINEZ, M. & CONVEY, M. 2006. Times and Places: Process Evaluation of a Peer-Led HIV Prevention Intervention. *Substance Use & Misuse*, 41, 669-690.
- DILLARD, A. J., MIDBOE, A. M. & KLEIN, W. M. P. 2009. The Dark Side of Optimism: Unrealistic Optimism About Problems With Alcohol Predicts Subsequent Negative Event Experiences. *Personality and Social Psychology Bulletin*, 35, 1540-1550.
- DIXON-WOODS, M., SHAW, R. L., AGARWAL, S. & SMITH, J. A. 2004. The problem of appraising qualitative research. *Quality and Safety in Health Care*, 13, 223-225.
- DOLAN, A. 2011. 'You can't ask for a Dubonnet and lemonade!': working class masculinity and men's health practices. *Sociology of Health & Illness*, 33, 586-601.
- DUNN, M., HENSHAW, R. & MCKAY, F. H. 2016. Do performance and image enhancing drug users in regional Queensland experience difficulty accessing health services? *Drug and Alcohol Review*, 35, 377-382.
- DUNN, M., MCKAY, F. H. & IVERSEN, J. 2014. Steroid users and the unique challenge they pose to needle and syringe program workers. *Drug and Alcohol Review*, 33, 71-7.
- DURANT, R. H., ESCOBEDO, L. G. & HEATH, G. W. 1995. Anabolic-steroid use, strength training, and multiple drug use among adolescents in the United States. *Pediatrics*, 96, 23-8.
- EL OSTA, R., ALMONT, T., DILIGENT, C., HUBERT, N., ESCHWÈGE, P. & HUBERT, J. 2016. Anabolic steroids abuse and male infertility. *Basic and clinical andrology*, 26, 2-2.
- ELBE, A. M. & BRAND, R. 2016. The effect of an ethical decision-making training on young athletes' attitudes toward doping. *Ethics & Behavior*, 26, 32-44.
- ELDER, J. P., LYTLE, L., SALLIS, J. F., YOUNG, D. R., STECKLER, A., SIMONS-MORTON, D., STONE, E., JOBE, J. B., STEVENS, J., LOHMAN, T., WEBBER, L., PATE, R., SAKSVIG, B. I. & RIBISL, K. 2007. A description of the social-ecological framework used in the trial of activity for adolescent girls (TAAG). *Health Education Research*, 22, 155-65.
- ELLIOT, D., GOLDBERG, L., MOE, E. L., DEFRADESCO, C. A., DURHAM, M. B. & HIX-SMALL, H. 2004. Preventing substance use and disordered eating - Initial outcomes of the ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives) Program. *Archives of Pediatrics & Adolescent Medicine*, 158, 1043-1049.
- EVANS-BROWN, M., KIMERGARD, A. & MCVEIGH, J. 2009. Elephant in the room? The methodological implications for public health research of performance-enhancing drugs derived from the illicit market. *Drug Testing and Analysis*, 1, 323-326.

- EVANS, J., FRANK, B., OLIFFE, J. L. & GREGORY, D. 2011. Health, illness, men and masculinities (HIMM): a theoretical framework for understanding men and their health. *Journal of Men's Health*, 8, 7-15.
- FIRMIN, M. 2008. Unstructured interview. In: GIVEN, L. (ed.) *The Sage encyclopedia of qualitative research Vol 2*. Thousand Oaks: Sage.
- FOSTER, A., SHORTER, G. & GRIFFITHS, M. 2015. Muscle dysmorphia: Could it be classified as an addiction to body image? *Journal of Behavioral Addictions*, 4, 1-5.
- FRALEIGH, W. 1984. Performance-enhancing drugs in sport: The ethical issue. *Journal of the Philosophy of Sport*, 11, 23-28.
- FREDERICK, D. A., BUCHANAN, G. M., SADEHGI-AZAR, L., PEPLAU, L. A., HASELTON, M. G., BEREZOVSKAYA, A. & LIPINSKI, R. E. 2007. Desiring the muscular ideal: Men's body satisfaction in the United States, Ukraine, and Ghana. *Psychology of Men & Masculinity*, 8, 103.
- FUSSELL, S. 1991. *Muscle: The confessions of an unlikely bodybuilder*, London, Scribners.
- GARRATT, D. & HODKINSON, P. 1998. Can There Be Criteria for Selecting Research Criteria?—A Hermeneutical Analysis of an Inescapable Dilemma. *Qualitative Inquiry*, 4, 515-539.
- GEARING, R. E., EL-BASSEL, N., GHESQUIERE, A., BALDWIN, S., GILLIES, J. & NGEOW, E. 2011. Major ingredients of fidelity: A review and scientific guide to improving quality of intervention research implementation. *Clinical Psychology Review*, 31, 79-88.
- GEN, K., I., H. J., JAMES, D., STEPHANIE, I., AARON, B., RORY, W., SHALENDER, B. & G., P. H. 2015. Prolonged hypogonadism in males following withdrawal from anabolic–androgenic steroids: an under-recognized problem. *Addiction*, 110, 823-831.
- GERRARD, M., GIBBONS, F., HOULIHAN, A., STOCK, M. & POMERY, E. 2008. A dual-process approach to health risk decision making: The prototype willingness model. *Developmental Review*, 28, 29-61.
- GLANZ, K. & BISHOP, D. B. 2010. The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health*, 31, 399-418.
- GLASS, R., HOPE, V. D., NJOROGE, J., EDMUNDSON, C., SMITH, J., MCVEIGH, J., PARRY, J. & DESAI, M. 2019. Secondary distribution of injecting equipment obtained from needle and syringe programmes by people injecting image and performance enhancing drugs: England and Wales, 2012-15. *Drug and Alcohol Dependence*, 195, 40-44.
- GODFREY, C. & HARRISON, M. 2015. The Joanna Briggs Institute method for systematic review research quick reference guide. Adelaide: The Joanna Briggs Institute, Queen's University.
- GOLDBERG, L., ELLIOT, D., CLARKE, G. N., MACKINNON, D. P., MOE, E., ZOREF, L., GREEN, C., WOLF, S. L., GREFFRATH, E., MILLER, D. J. & LAPIN, A. 1996b. Effects of a multidimensional anabolic steroid prevention intervention. The Adolescents Training and Learning to Avoid Steroids (ATLAS) Program. *JAMA*, 276, 1555-1562.
- GOLDBERG, L., ELLIOT, D., MACKINNON, D. P., MOE, E. L., KUEHL, K. S., YOON, M., TAYLOR, A. & WILLIAMS, J. 2007. Outcomes of a prospective trial of student-athlete drug testing: the Student Athlete Testing Using Random Notification (SATURN) study. *The Journal Of Adolescent Health: Official Publication Of The Society For Adolescent Medicine*, 41, 421-429.
- GOLDBERG, L., ELLIOT, D. L., CLARKE, G. N., MACKINNON, D. P., ZOREF, L., MOE, E., GREEN, C. & WOLF, S. L. 1996a. The Adolescents Training and Learning to Avoid Steroids (ATLAS) prevention program - Background and results of a model intervention. *Archives of Pediatrics & Adolescent Medicine*, 150, 713-721.
- GOLDBERG, L., ELLIOT, D. L., MACKINNON, D. P., MOE, E., KUEHL, K. S., NOHRE, L. & LOCKWOOD, C. M. 2003. Drug testing athletes to prevent substance abuse: Background

- and pilot study results of the SATURN (student athlete testing using random notification) study. *Journal of Adolescent Health*, 32, 16-25.
- GOLDEN, S. D. & EARP, J. A. L. 2012. Social Ecological Approaches to Individuals and Their Contexts. *Health Education & Behavior*, 39, 364-372.
- GOUGH, D., OLIVER, S. & THOMAS, J. 2017. *An introduction to systematic reviews*, Sage.
- GRIEVE, F. G. 2007. A conceptual model of factors contributing to the development of muscle dysmorphia. *Eating Disorders*, 15, 63-80.
- GRIFFITHS, S., HENSHAW, R., MCKAY, F. H. & DUNN, M. 2017. Post-cycle therapy for performance and image enhancing drug users: A qualitative investigation. *Performance Enhancement & Health*, 5, 103-107.
- GROGAN, S., SHEPHERD, S., EVANS, R., WRIGHT, S. & HUNTER, G. 2006. Experiences of anabolic steroid use: in-depth interviews with men and women body builders. *Journal of Health Psychology*, 11.
- GRUENEWALD, P. J., REMER, L. G. & LASCALA, E. A. 2014. Testing a social ecological model of alcohol use: The California 50-city study. *Addiction*, 109, 736-745.
- GUBA, E. & LINCOLN, Y. 2005. Paradigmatic controversies, contradictions and emerging confluences. In: DENZIN, N. & LINCOLN, Y. (eds.) *The Sage handbook of qualitative research (3rd edition)*. Thousand Oaks: Sage.
- HANLEY SANTOS, G. & COOMBER, R. 2017. The risk environment of anabolic androgenic steroid users in the UK: Examining motivations, practices and accounts of use. *International Journal of Drug Policy*, 40, 35-43.
- HARMER, P. 2010. Anabolic-androgenic steroid use among young male and female athletes: Is the game to blame? *British Journal of Sports Medicine*, 44, 26-31.
- HARPER, S. & DONNOR, J. 2017. *Scandals in College Sports*, London, Routledge.
- HARRISON, K. & BOND, B. J. 2007. Gaming magazines and the drive for muscularity in preadolescent boys: A longitudinal examination. *Body Image*, 4, 269-277.
- HARTGENS, F. & KUIPERS, H. 2004. Effects of androgenic-anabolic steroids in athletes. *Sports Medicine*, 34.
- HAWE, P., SHIELL, A. & RILEY, T. 2009. Theorising interventions as events in systems. *American Journal of Community Psychology*, 43, 267-76.
- HENNESSY, E. A. & TANNER-SMITH, E. E. 2015. Effectiveness of brief school-based interventions for adolescents: a meta-analysis of alcohol use prevention programs. *Prevention Science*, 16, 463-74.
- HERON, N., KEE, F., DONNELLY, M., CARDWELL, C., TULLY, M. A. & CUPPLES, M. E. 2016. Behaviour change techniques in home-based cardiac rehabilitation: a systematic review. *British Journal of General Practice*.
- HIGGINS, J. & GREEN, S. 2011. *Cochrane handbook for systematic reviews of interventions version* [Online]. The Cochrane Collaboration. Available: [www.handbook.cochrane.org](http://www.handbook.cochrane.org) [Accessed September 2016].
- HM GOVERNMENT 2017. 2017 Drug Strategy. London: Home Office.
- HOBERMAN, J. M. 2015. Dopers in uniforms: police officers' use of anabolic steroids in the United States. In: MOLLER V, WADDINGTON I & JM, H. (eds.) *Routledge Handbook of Drugs and Sport*. Abingdon: Routledge.
- HOBERMAN, J. M. 2017. *The hidden world of police on steroids*, Austin, University of Texas Press.
- HOFFMAN, J., FAIGENBAUM, A., RATAMESS, N., ROSS, R., KANG, J. & TENEBBAUM, G. 2008. Nutritional supplementation and anabolic steroid use in adolescents. *Medicine and Science in Sport and Exercise*, 40, 15-24.
- HOFFMANN, T. C., GLASZIOU, P. P., BOUTRON, I., MILNE, R., PERERA, R., MOHER, D., ALTMAN, D. G., BARBOUR, V., MACDONALD, H., JOHNSTON, M., LAMB, S. E., DIXON-WOODS, M., MCCULLOCH, P., WYATT, J. C., CHAN, A.-W. & MICHIE, S. 2014. Better reporting of

- interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ : British Medical Journal*, 348.
- HOLDER, H. D. 2001. Prevention of alcohol problems in the 21st century: challenges and opportunities. *The American journal on addictions*, 10, 1-15.
- HOLDER, H. D. 2006. *Alcohol and the community: a systems approach to prevention*, Cambridge University Press.
- HOME OFFICE 2018. Drug misuse: Findings from the 2017/18 crime survey for England and Wales. London: Home Office.
- HOPE, V. D., HARRIS, R., MCVEIGH, J., CULLEN, K. J., SMITH, J., PARRY, J. V., DEANGELIS, D. & NCUBE, F. 2016. Risk of HIV and Hepatitis B and C Over Time Among Men Who Inject Image and Performance Enhancing Drugs in England and Wales: Results From Cross-Sectional Prevalence Surveys, 1992–2013. *Journal of Acquired Immune Deficiency Syndromes (1999)*, 71, 331-337.
- HOPE, V. D., MCVEIGH, J., MARONGIU, A., EVANS-BROWN, M., SMITH, J., KIMERGARD, A., CROXFORD, S., BEYNON, C. M., PARRY, J. V., BELLIS, M. A. & NCUBE, F. 2013. Prevalence of, and risk factors for, HIV, hepatitis B and C infections among men who inject image and performance enhancing drugs: a cross-sectional study. *BMJ Open*, 3, e003207-e003207.
- HOPE, V. D., MCVEIGH, J., MARONGIU, A., EVANS BROWN, M., SMITH, J., KIMERGÅRD, A., PARRY, J. V. & NCUBE, F. 2014. Injection site infections and injuries in men who inject image- and performance-enhancing drugs: prevalence, risks factors, and healthcare seeking. *Epidemiology and Infection*.
- HUMAN ENHANCEMENT DRUGS NETWORK. 2017. *Infographics* [Online]. Human Enhancement Drugs Network. Available: <https://humanenhancementdrugs.com/info-for-healthcare-providers/hed-visual-material/infographics/> [Accessed December 2018].
- INDEPENDENT EXPERT WORKING GROUP 2017. Drug Misuse and Dependence: UK guidelines on clinical management. London: Department of Health.
- JACKSON, N. & WATERS, E. 2005. Criteria for the systematic review of health promotion and public health interventions. *Health Promotion International*, 20, 367-74.
- JALILIAN, F., ALLAHVERDIPOUR, H., MOEINI, B. & MOGHIMBEIGI, A. 2011. Effectiveness of Anabolic Steroid Preventative Intervention among Gym Users: Applying Theory of Planned Behavior. *Health Promotion Perspectives*, 1, 32-40.
- JAMPEL, J. D., MURRAY, S. B., GRIFFITHS, S. & BLASHILL, A. J. 2016. Self-Perceived Weight and Anabolic Steroid Misuse Among US Adolescent Boys. *Journal of Adolescent Health*, 58, 397-402.
- JOHNSON, E. J. & TVERSKY, A. 1983. Affect, generalization, and the perception of risk. *Journal of personality and social psychology*, 45, 20.
- JOHNSON, M., JAY, M., SHOUP, B. & RICKER, V. 1989. Anabolic steroid use by male adolescents. *Journal of Pediatrics*, 83, 921-924.
- JOHNSON, R. B. & ONWUEGBUZIE, A. J. 2004. Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33, 14-26.
- JOHNSON, R. B., ONWUEGBUZIE, A. J. & TURNER, L. A. 2007. Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, 1, 112-133.
- JUDGE, L. W., BELLAR, D., PETERSEN, J., LUTZ, R., GILREATH, E., SIMON, L. & JUDGE, M. 2012. The attitudes and perceptions of adolescent track and field athletes toward PED use. *Performance Enhancement & Health*, 1, 75-82.
- KANAYAMA, G., BARRY, S., HUDSON, J. & POPE, H. 2006. Body image and attitudes toward male roles in anabolic-androgenic steroid users. *American Journal of Psychiatry*, 163, 697-703.
- KANAYAMA, G., BROWER, K., WOOD, R., HUDSON, J. & POPE, H. 2009a. Anabolic-androgenic steroid dependence: An emerging disorder. *Addiction*, 104, 1966-1978.

- KANAYAMA, G., BROWER, K., WOOD, R., HUDSON, J. & POPE, H. 2009b. Issues for the DSM-V: Clarifying the diagnostic criteria for anabolic-androgenic steroid dependence. *American Journal of Psychiatry*, 166, 642-645.
- KANAYAMA, G., HUDSON, J. & POPE, H. 2008. Long-term psychiatric and medical consequences of anabolic-androgenic steroid abuse: A looming public health concern? *Drug and Alcohol Dependence*, 98, 1-12.
- KANAYAMA, G. & POPE, H. 2011. Gods, men and muscle dysmorphia. *Harvard Review of Psychiatry*, 19, 95-98.
- KANAYAMA, G. & POPE, H. 2017. History and epidemiology of anabolic androgens in athletes and non-athletes. *Molecular and Cellular Endocrinology*.
- KASHKIN, K. B. & KLEBER, H. D. 1989. Hooked on hormones?: An anabolic steroid addiction hypothesis. *Jama*, 262, 3166-3170.
- KEANE, H. 2005. Diagnosing the male steroid user: drug use, body image and disordered masculinity. *Health (London)*, 9, 189-208.
- KENNEDY, B. & THORNBERG, R. 2018. Deduction, induction and abduction. In: FLICK, U. (ed.) *The SAGE handbook of qualitative data collection*. Thousand Oaks: Sage.
- KIMERGÅRD, A. 2014. A qualitative study of anabolic steroid use amongst gym users in the United Kingdom: motives, beliefs and experiences. *Journal of Substance Use*.
- KIMERGÅRD, A. & MCVEIGH, J. 2014a. Environments, risk and health harms: a qualitative investigation into the illicit use of anabolic steroids among people using harm reduction services in the UK. *BMJ Open*, 4.
- KIMERGÅRD, A. & MCVEIGH, J. 2014b. Variability and dilemmas in harm reduction for anabolic steroid users in the UK: a multi-area interview study. *Harm Reduction Journal*, 11, 19.
- KING, N. 2004. Using templates in the thematic analysis of text. In: CASSELL, C. & SYMON, G. (eds.) *Essential guide to qualitative methods in organizational research*. Thousand Oaks: Sage.
- KORKIA, P. & STIMSON, G. V. 1994. Steroids: use, users and responses. *DrugLink*, 9, 14-16.
- KRAUS, L. & NOCIAR, A. 2016. *ESPAD report 2015: results from the European school survey project on alcohol and other drugs*, European Monitoring Centre for Drugs and Drug Addiction.
- LANE, C. & ROLLNICK, S. 2007. The use of simulated patients and role-play in communication skills training: A review of the literature to August 2005. *Patient Education and Counseling*, 67, 13-20.
- LATANÉ, B. 1996. Dynamic social impact: The creation of culture by communication. *Journal of Communication*, 46, 13-25.
- LEE, B. Y., BARTSCH, S. M., MUI, Y., HAIDARI, L. A., SPIKER, M. L. & GITTELSON, J. 2017. A systems approach to obesity. *Nutrition Reviews*, 75, 94-106.
- LENEHAN, P. 1995. Anabolic steroids health issues & service provision. *RELAY*, 1, 5-7.
- LI, J., WEEKS, M. R., BORGATTI, S. P., CLAIR, S. & DICKSON-GOMEZ, J. 2012. A Social Network Approach to Demonstrate the Diffusion and Change Process of Intervention From Peer Health Advocates to the Drug Using Community. *Substance Use & Misuse*, 47, 474-490.
- LIN, C. A. 1998. Uses of Sex Appeals in Prime-Time Television Commercials. *Sex Roles*, 38, 461-475.
- LUCIDI, F., MALLIA, L., ALIVERNINI, F., CHIRICO, A., MANGANELLI, S., GALLI, F., BIASI, V. & ZELLI, A. 2017. The Effectiveness of a New School-Based Media Literacy Intervention on Adolescents' Doping Attitudes and Supplements Use. *Frontiers in psychology*, 8, 749.
- LUCIDI, F., ZELLI, A., MALLIA, L., GRANO, C., RUSSO, P. M. & VIOLANI, C. 2008. The social-cognitive mechanisms regulating adolescents' use of doping substances. *Journal of Sports Sciences*, 26, 447-56.
- LUKE, D. A. & STAMATAKIS, K. A. 2012. Systems science methods in public health: dynamics, networks, and agents. *Annual Review of Public Health*, 33, 357-76.

- MACKINNON, D. P., GOLDBERG, L., CLARKE, G. N., ELLIOTT, D. L., CHEONG, J., LAPIN, A., MOE, E. L. & KRULL, J. L. 2001. Mediating mechanisms in a program to reduce intentions to use anabolic steroids and improve exercise self-efficacy and dietary behavior. *Prevention Science*, 2, 15-28.
- MADIGAN, D. J., STOEBER, J. & PASSFIELD, L. 2016. Perfectionism and attitudes towards doping in junior athletes. *Journal of Sports Sciences*, 34, 700-706.
- MALLIA, L., LAZURAS, L., BARKOUKIS, V., BRAND, R., BAUMGARTEN, F., TSORBATZOUZDIS, H., ZELLI, A. & LUCIDI, F. 2016. Doping use in sport teams: The development and validation of measures of team-based efficacy beliefs and moral disengagement from a cross-national perspective. *Psychology of Sport and Exercise*, 25, 78-88.
- MARTEAU, T. M., HOLLANDS, G. J. & FLETCHER, P. C. 2012. Changing human behavior to prevent disease: the importance of targeting automatic processes. *Science*, 337, 1492-5.
- MARTIN, J., CHATER, A. & LORENCATTO, F. 2013. Effective behaviour change techniques in the prevention and management of childhood obesity. *International Journal of Obesity (London)*, 37, 1287-94.
- MAYCOCK, B. 1999. Factors contributing to anabolic androgenic steroid related violence. *The Journal of Performance Enhancing Drugs*, 2, 4-15.
- MAYCOCK, B. & HOWAT, P. 2005. The barriers to illegal anabolic steroid use. *Drugs: education, prevention and policy*, 12, 317-225.
- MAYCOCK, B. & HOWAT, P. 2007. Social capital: implications from an investigation of illegal anabolic steroid networks. *Health Education Research*, 22, 854-863.
- MCBRIDE, J. A., CARSON, C. C., 3RD & COWARD, M. 2016. The Availability and Acquisition of Illicit Anabolic Androgenic Steroids and Testosterone Preparations on the Internet. *American Journal of Mens Health*.
- MCKEOWN, B. & THOMAS, D. B. 2013. *Q methodology*, Sage publications.
- MCVEIGH, J. 1996. Survey of gym owners' opinions on the use of performance enhancing drugs. *Journal of Performance Enhancing Drugs*, 1, 21-24.
- MCVEIGH, J. & BEGLEY, E. 2016. Anabolic steroids in the UK: an increasing issue for public health. *Drugs: Education, Prevention and Policy*, 1-8.
- MCVEIGH, J., BEYNON, C. & BELLIS, M. A. 2003. New challenges for agency based syringe exchange schemes: analysis of 11 years of data (1991–2001) in Merseyside and Cheshire, United Kingdom. *International Journal of Drug Policy*, 14.
- MEDINA, J. Á., MARQUETA, P. M., CRUCES, A. G., BLANCO, E. O., LORENTE, V. M. & NUVIALA, A. N. 2019. Effectiveness of a school-based doping prevention programme in Spanish adolescents. *Journal of Human Sport and Exercise*.
- MICHIE, S., ATKINS, L. & WEST, R. 2014. *The behaviour change wheel. A guide to designing interventions.*, Great Britain, Silverback Publishing.
- MICHIE, S. & PRESTWICH, A. 2010. Are interventions theory-based? Development of a theory coding scheme. *Health Psychology*, 29, 1-8.
- MICHIE, S., RICHARDSON, M., JOHNSTON, M., ABRAHAM, C., FRANCIS, J., HARDEMAN, W., ECCLES, M., CANE, J. & WOOD, C. 2013. The behaviour change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behaviour Medicine*, 46, 81-95.
- MICHIE, S., VAN STRALEN, M. & WEST, R. 2011. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science*, 6, 42.
- MICHIE, S., WOOD, C. E., JOHNSTON, M., ABRAHAM, C., FRANCIS, J. J. & HARDEMAN, W. 2015. Behaviour change techniques: the development and evaluation of a taxonomic method for reporting and describing behaviour change interventions (a suite of five studies

- involving consensus methods, randomised controlled trials and analysis of qualitative data). *Health Technology Assessment*, 19, 1-188.
- MIDGLEY, S., HEATHER, N. & DAVIES, J. 1999. Dependence-Producing Potential of Anabolic-Androgenic Steroids. *Addiction Research*, 7, 539-550.
- MIDGLEY, S., HEATHER, N. & DAVIES, J. 2001. Levels of Aggression among a Group of Anabolic-Androgenic Steroid Users. *Medicine, Science and the Law*, 41, 309-314.
- MOHER, D., LIBERATI, A., TETZLAFF, J. & ALTMAN, D. G. 2009. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLOS Medicine*, 6, e1000097.
- MOLERO, Y., GRIPENBERG, J. & BAKSHI, A.-S. 2016. Effectiveness and implementation of a community-based prevention programme targeting anabolic androgenic steroid use in gyms: study protocol of a quasi-experimental control group study. *BMC sports science, medicine & rehabilitation*, 8, 36-36.
- MONAGHAN, L. 1999. Challenging medicine? Bodybuilding, drugs and risk. 21, 707-734.
- MONAGHAN, L. 2003. Danger on the doors: Bodily risk in a demonised occupation. *Health, Risk & Society*, 5, 11-31.
- MOORE, L., DE SILVA-SANIGORSKI, A. & MOORE, S. N. 2013. A socio-ecological perspective on behavioural interventions to influence food choice in schools: alternative, complementary or synergistic? *Public health nutrition*, 16, 1000-1005.
- MORRISON, C. 1994. Harm reduction with AS users: Experiences of running a well user service. *RELAY*, 1, 16.
- MORRISON, C. 1995. The cost of running a well steroid user service. *RELAY*, 1, 10-11.
- MORRISON, T. G. & HALTON, M. 2009. Buff, Tough, and Rough: Representations of Muscularity in Action Motion Pictures. *The Journal of Men's Studies*, 17, 57-74.
- MORSE, J. M. 2010a. Principles of mixed methods and multimethod research design. In: TASHAKKORI, A. & TEDDLIE, C. (eds.) *Sage handbook of mixed methods in social & behavioral research (second edition)*. Thousand Oaks: Sage.
- MORSE, J. M. 2010b. Simultaneous and sequential qualitative mixed method designs. *Qualitative Inquiry*, 16, 483-491.
- NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE. 2007. *Drug misuse in over 16s: psychosocial interventions* [Online]. National Institute for Health and Care Excellence. Available: <https://www.nice.org.uk/guidance/cg51> [Accessed December 2018].
- NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE. 2014. *Needle and syringe programmes: NICE public health guidance 52* [Online]. London: NICE. [Accessed December 2018].
- NICHOLLS, A. R., COPE, E., BAILEY, R., KOENEN, K., DUMON, D., THEODOROU, N. C., CHANAL, B., SAINT LAURENT, D., MÜLLER, D., ANDRÉS, M. P., KRISTENSEN, A. H., THOMPSON, M. A., BAUMANN, W. & LAURENT, J.-F. 2017. Children's First Experience of Taking Anabolic-Androgenic Steroids can Occur before Their 10th Birthday: A Systematic Review Identifying 9 Factors That Predicted Doping among Young People. *Frontiers in Psychology*, 8, 1015.
- NICHOLLS, A. R., PERRY, J. L., LEVY, A. R., MEIR, R., JONES, L., BAGHURST, T., SANCTUARY, C. & THOMPSON, M. A. 2014. Coach perceptions of performance enhancement in adolescence: The sport drug control model for adolescent athletes. *Performance Enhancement & Health*, 3, 93-101.
- NILSSON, S., ALLEBECK, P., MARKLUND, B., BAIG, A. & FRIDLUND, B. 2004. Evaluation of a health promotion programme to prevent the misuse of androgenic anabolic steroids among Swedish adolescents. *Health Promotion International*, 19, 61-67.
- NILSSON, S., BAIGI, A., MARKLUND, B. & FRIDLUND, B. 2001. The prevalence of the use of androgenic anabolic steroids by adolescents in a county of Sweden. *European Journal of Public Health*, 11, 195-7.

- NIXON, D. 2009. 'I Can't Put a Smiley Face On': Working-Class Masculinity, Emotional Labour and Service Work in the 'New Economy'. *Gender, Work & Organization*, 16, 300-322.
- NOWAK, A., SZAMREJ, J. & LATANÉ, B. 1990. From private attitude to public opinion: A dynamic theory of social impact. *Psychological Review*, 97, 362-376.
- NUTTER, J. Project Right Way: An anabolic steroid education program. Annual Meeting of the American Alliance for Health, Physical Education, Recreation and Dance, March 24-28 1993 Washington DC.
- O'CONNOR, S. 1995. The use of performance enhancing drugs within the Chester and Ellesmere Port district. *RELAY*, 1, 18-19.
- O'DONOGHUE, G., PERCHOUX, C., MENSAH, K., LAKERVELD, J., VAN DER PLOEG, H., BERNAARDS, C., CHASTIN, S. F., SIMON, C., O'GORMAN, D. & NAZARE, J.-A. 2016. A systematic review of correlates of sedentary behaviour in adults aged 18–65 years: a socio-ecological approach. *BMC public health*, 16, 163.
- OLIVARDIA, R., POPE, H., BOROWIECKI, J. J. & COHANE, G. H. 2004. Biceps and Body Image: The Relationship Between Muscularity and Self-Esteem, Depression, and Eating Disorder Symptoms. *Psychology of Men & Masculinity*, 5, 112-120.
- OLRICH, T. W. 1999. Perceptions Of Benefits and Losses Associated With The Use and Discontinuance Of Anabolic-Androgenic Steroids Among Male Bodybuilders. *Journal of Personal and Interpersonal Loss*, 4, 231-242.
- OLRICH, T. W. & EWING, M. E. 1999. Life on steroids: Bodybuilders describe their perceptions of the anabolic-androgenic steroid use period. *The sport psychologist*, 13, 299-312.
- OVERBYE, M. 2017. Deterrence by risk of detection? An inquiry into how elite athletes perceive the deterrent effect of the doping testing regime in their sport. *Drugs: Education, Prevention and Policy*, 24, 206-219.
- PATES, R. & BARRY, C. 1996. Steroid use in Cardiff: A problem for whom? *Journal of Performance Enhancing Drugs*, 1, 92-97.
- PEARSON, A., WHITE, H., BATH-HEXTALL, F., SALMOND, S., APOSTOLO, J. & KIRKPATRICK, P. 2015. A mixed-methods approach to systematic reviews. *International Journal of Evidence Based Healthcare*, 13, 121-31.
- PEDERSEN, W. & WICHSTRØM, L. 2001. Adolescents, Doping Agents, and Drug Use: A Community Study. *Journal of Drug Issues*, 31, 517-541.
- PEREIRA DOS SANTOS, M. A., COUTINHO DE OLIVEIRA, C. V. & SILVA, A. S. 2014. Adverse Cardiovascular Effects from the Use of Anabolic-Androgenic Steroids as Ergogenic Resources. *Substance Use & Misuse*, 49, 1132-1137.
- PETERS, D. H. 2014. The application of systems thinking in health: why use systems thinking? *Health Research Policy and Systems*, 12, 51.
- PETROCELLI, M., OBERWEIS, T. & PETROCELLI, J. 2008. Getting Huge, Getting Ripped: A Qualitative Exploration of Recreational Steroid Use. *Journal of Drug Issues*, 38, 1187-1205.
- PETRÓCZI, A., DODGE, T., BACKHOUSE, S. H. & ADESANWO, C. 2014. Review of the literature on negative health risks based interventions to guide anabolic steroid misuse prevention. *Performance Enhancement and Health*, 3, 31-44.
- PHILLIPS, K. A. & CRINO, R. D. 2001. Body dysmorphic disorder. *Current Opinion in Psychiatry*, 14, 113-118.
- PLANO CLARK, V. L. & BADIEE, M. 2010. Research questions in mixed methods research. *SAGE Handbook of mixed methods in social & behavioral research*, 275-304.
- POPE, H., GRUBER, A. J., CHOI, P., OLIVARDIA, R. & PHILLIPS, K. A. 1997. Muscle Dysmorphia: An Underrecognized Form of Body Dysmorphic Disorder. *Psychosomatics*, 38, 548-557.
- POPE, H. & KANAYAMA, G. 2015. Treatment of anabolic-androgenic steroid disorders. In: EL-GUEBALY, N., CARRA, G. & GALANTER, M. (eds.) *Textbook of Addiction Treatment: International Perspectives*. Milan: Springer.

- POPE, H., KANAYAMA, G., ATHEY, A., RYAN, E., HUDSON, J. & BAGGISH, A. 2014a. The lifetime prevalence of anabolic-androgenic steroid use and dependence in Americans: Current best estimates. *The American Journal on Addictions*, 23, 371-377.
- POPE, H., PHILLIPS, K. A. & OLIVARDIA, R. 2000. *The adonis complex: The secret crisis of male body obsession*, New York, The Free Press.
- POPE, H., WOOD, R., ROGOL, A., NYBERG, F., BOWERS, L. & SHALENDER, B. 2014b. Adverse health consequences of performance-enhancing drugs: An endocrine society scientific statement. *Endocrine Review*, 35, 341-375.
- POPE, H. G., KANAYAMA, G. & HUDSON, J. I. 2012. Risk Factors for Illicit Anabolic-Androgenic Steroid Use in Male Weightlifters: A Cross-Sectional Cohort Study. *Biological Psychiatry*, 71, 254-261.
- POPE, H. G., KANAYAMA, G., IONESCU-PIOGGIA, M. & HUDSON, J. I. 2004. Anabolic steroid users' attitudes towards physicians. *Addiction*, 99, 1189-94.
- POPE, H. G., KATZ, D. L. & HUDSON, J. I. 1993. Anorexia nervosa and "reverse anorexia" among 108 male bodybuilders. *Comprehensive Psychiatry*, 34, 406-409.
- PRENTICE-DUNN, S. & ROGERS, R. W. 1986. Protection Motivation Theory and preventive health: beyond the Health Belief Model. *Health Education Research*, 1, 153-161.
- PRESTWICH, A., KELLAR, I., CONNER, M., LAWTON, R., GARDNER, P. & TURGUT, L. 2016. Does changing social influence engender changes in alcohol intake? A meta-analysis. *Journal of Consulting Clinical Psychology*, 84, 845-860.
- PUBLIC HEALTH ENGLAND. 2014. *Services for image and performance enhancing (IPED) users: turning evidence into practice* [Online]. HM Government. Available: <https://www.gov.uk/government/publications/treating-substance-misuse-and-related-harm-turning-evidence-into-practice/services-for-image-and-performance-enhancing-drug-iped-users-turning-evidence-into-practice#fn:1> [Accessed September 2018].
- PUBLIC HEALTH WALES. 2018. *Image & Performance Enhancing Drugs. Film/videos*. [Online]. Public Health Wales. Available: [http://www.ipedinfo.co.uk/film\\_videos.php](http://www.ipedinfo.co.uk/film_videos.php) [Accessed November 2018].
- RAATS, M. M. & SPARKS, P. 1995. Unrealistic optimism about diet-related risks: implications for interventions. *Proceedings of the Nutrition Society*, 54, 737-745.
- RANBY, K. W., AIKEN, L. S., MACKINNON, D. P., ELLIOT, D. L., MOE, E. L., MCGINNIS, W. & GOLDBERG, L. 2009. A mediation analysis of the ATHENA intervention for female athletes: Prevention of athletic-enhancing substance use and unhealthy weight loss behaviors. *Journal of Pediatric Psychology*, 34, 1069-1083.
- RASMUSSEN, J. J., SELMER, C., ØSTERGREN, P. B., PEDERSEN, K. B., SCHOU, M., GUSTAFSSON, F., FABER, J., JUUL, A. & KISTORP, C. 2016. Former Abusers of Anabolic Androgenic Steroids Exhibit Decreased Testosterone Levels and Hypogonadal Symptoms Years after Cessation: A Case-Control Study. *Plos One*, 11, e0161208-e0161208.
- RAVN, S. & COFFEY, J. 2016. 'Steroids, it's so much an identity thing!' perceptions of steroid use, risk and masculine body image. *Journal of Youth Studies*, 19, 87-102.
- RHODES, T. 1997. Risk theory in epidemic times: sex, drugs and the social organisation of 'risk behaviour'. *Sociology of Health & Illness*, 19, 208-227.
- RHODES, T. 2009. Risk environments and drug harms: a social science for harm reduction approach. *International Journal of Drug Policy*, 20.
- ROGERS, E. 1995. *Diffusion of innovations. Fourth edition.*, New York, The Free Press.
- ROHMAN, L. 2009. The relationship between anabolic androgenic steroids and muscle dysmorphia: A review. *Eating Disorders*, 17, 187-199.
- ROLFE, G. 2006. Validity, trustworthiness and rigour: quality and the idea of qualitative research. *Journal of Advanced Nursing*, 53, 304-10.
- ROSAS, S. R. 2017. Systems thinking and complexity: considerations for health promoting schools. *Health Promotion International*, 32, 301-311.

- SAGOE, D., ANDREASSEN, C. S. & PALLESEN, S. 2014a. The aetiology and trajectory of anabolic-androgenic steroid use initiation: a systematic review and synthesis of qualitative research. *Substance Abuse Treatment Prevention and Policy*, 9.
- SAGOE, D., HOLDEN, G., RISE, E. N. K., TORGERSEN, T., PAULSEN, G., KROSSHAUG, T., LAURITZEN, F. & PALLESEN, S. 2016. Doping prevention through anti-doping education and practical strength training: The Hercules program. *Performance Enhancement & Health*, 5, 24-30.
- SAGOE, D., MCVEIGH, J., BJORNEBEKK, A., ESSILFIE, M. S., ANDREASSEN, C. S. & PALLESEN, S. 2015. Polypharmacy among anabolic-androgenic steroid users: a descriptive metasynthesis. *Substance Abuse Treatment Prevention and Policy*, 10.
- SAGOE, D., MOLDE, H., ANDREASSEN, C. S., TORSHEIM, T. & PALLESEN, S. 2014b. The global epidemiology of anabolic-androgenic steroid use: a meta-analysis and meta-regression analysis. *Annals of Epidemiology*, 24, 383-398.
- SALLIS, J. & OWEN, N. 2015. Ecological models of health behavior. In: GLANZ, K., RIMER, B. K. & VISWANATH, K. (eds.) *Health Behavior: Theory, Research and Practice*. California, USA: Jossey-Bass.
- SANDELOWSKI, M. & BARROSO, J. 2002. Reading qualitative studies. *International journal of qualitative methods*, 1, 74-108.
- SIMONI, J. M., FRANKS, J. C., LEHAVOT, K. & YARD, S. S. 2011. Peer interventions to promote health: conceptual considerations. *The American journal of orthopsychiatry*, 81, 351-359.
- SMITH, A. C. & STEWART, B. 2012. Body perceptions and health behaviors in an online bodybuilding community. *Qualitative Health Research*, 22, 971-85.
- SMITH, B. & MCGANNON, K. R. 2017. Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology*, 1-21.
- SMITH SLEP, A. M., FORAN, H. M. & HEYMAN, R. E. 2014. An ecological model of intimate partner violence perpetration at different levels of severity. *Journal of Family Psychology*, 28, 470-482.
- SNIEHOTTA, F. F., ARAÚJO-SOARES, V., BROWN, J., KELLY, M. P., MICHIE, S. & WEST, R. 2017. Complex systems and individual-level approaches to population health: a false dichotomy? *The Lancet Public Health*, 2, e396-e397.
- SPARKES, A. C. & SMITH, B. 2009. Judging the quality of qualitative inquiry: Criteriology and relativism in action. *Psychology of Sport and Exercise*, 10, 491-497.
- SPRINGER, K. W. & MOUZON, D. M. 2011. "Macho Men" and Preventive Health Care: Implications for Older Men in Different Social Classes. *Journal of Health and Social Behavior*, 52, 212-227.
- STILGER, V. G. & YESALIS, C. E. 1999. Anabolic-Androgenic Steroid Use among High School Football Players. *Journal of Community Health*, 24, 131-145.
- STIMSON, G. V. 2007. "Harm Reduction - Coming of Age": A local movement with global impact. *International Journal of Drug Policy*, 18, 67-69.
- STOCK, S., MIRANDA, C., EVANS, S., PLESSIS, S., RIDLEY, J., YEH, S. & CHANOINE, J. P. 2007. Healthy Buddies: a novel, peer-led health promotion program for the prevention of obesity and eating disorders in children in elementary school. *Pediatrics*, 120, e1059-68.
- STOCKINGS, E., HALL, W. D., LYNSKEY, M., MORLEY, K. I., REAVLEY, N., STRANG, J., PATTON, G. & DEGENHARDT, L. 2016. Prevention, early intervention, harm reduction, and treatment of substance use in young people. *The Lancet Psychiatry*, 3, 280-296.
- STOKOLS, D. 1992. Establishing and maintaining healthy environments. Toward a social ecology of health promotion. *American Psychology*, 47, 6-22.
- STRAUSS, A. & CORBIN, J. M. 1998. *Basics of qualitative research: Grounded theory procedures and techniques. 2nd Edition.*, Thousand Oaks, Sage Publications, Inc.

- TAJFEL, H. & TURNER, J. C. 1979. An integrative theory of intergroup conflict. *The social psychology of intergroup relations*, 33, 74.
- TEDDLIE, C. & TASHAKKORI, A. 2010. Overview of contemporary issues in mixed methods research. In: TASHAKKORI, A. & TEDDLIE, C. (eds.) *SAGE handbook of mixed methods in social & behavioral research. 2nd edition*. Thousand Oaks: SAGE Publications, Inc.
- THIBLIN, I., GARMO, H., GARLE, M., HOLMBERG, L., BYBERG, L., MICHAËLSSON, K. & GEDEBORG, R. 2015. Anabolic steroids and cardiovascular risk: A national population-based cohort study. *Drug and Alcohol Dependence*, 152, 87-92.
- THOMAS, B. H., CILISKA, D., DOBBINS, M. & MICUCCI, S. 2004. A Process for Systematically Reviewing the Literature: Providing the Research Evidence for Public Health Nursing Interventions. *Worldviews on Evidence-Based Nursing*, 1, 176-184.
- THOMAS, D. R. 2006. A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation*, 27, 237-246.
- THUALAGANT, N. 2015. Is the regulation against potentially doped bodies in a fitness context socially sustainable? *The Journal of Transdisciplinary Environmental Studies*, 14, 76.
- TODD, T. 1987. Anabolic steroids: The gremlins of sport. *Journal of Sport History*, 14, 87-107.
- TONG, A., SAINSBURY, P. & CRAIG, J. 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, 19, 349-357.
- TOWNSEND, N. & FOSTER, C. 2013. Developing and applying a socio-ecological model to the promotion of healthy eating in the school. *Public health nutrition*, 16, 1101-1108.
- TRACY, S. & HINRICHS, M. 2017. Big Tent Criteria for Qualitative Quality. In: MATTHES, J., DAVIS, C. & POTTER, R. (eds.) *The International Encyclopedia of Communication Research Methods*. doi:10.1002/9781118901731.iecrm0016.
- TRACY, S. J. 2010. Qualitative Quality: Eight "Big-Tent" Criteria for Excellent Qualitative Research. *Qualitative Inquiry*, 16, 837-851.
- TRANSFORM. 2017. *Anti doping education for employees and members at fitness centers* [Online]. Available: <https://www.transformlearning.com/portfolio/rent-senter/> [Accessed June 2019].
- TRICKER, R. & CONNOLLY, D. 1996. Drug education and the college athlete: evaluation of a decision-making model. *Journal of Drug Education*, 26, 159-181.
- TURVEY, B. & CROWDER, S. 2015. *Anabolic steroid abuse in public safety personnel. A forensic manual*, Academic Press.
- VALENTE, T. W. 2012. Network interventions. *Science*, 337, 49-53.
- VAN DE VEN, K. 2016. 'Blurred lines': Anti-doping, national policies, and the performance and image enhancing drug (PIED) market in Belgium and The Netherlands. *Performance Enhancement & Health*, 4, 94-102.
- VAN HOUT, M. C. & KEAN, J. 2015. An exploratory study of image and performance enhancement drug use in a male British South Asian community. *International Journal of Drug Policy*, 26, 860-867.
- VANDENBROECK, I., GOOSEENS, J. & CLEMENS, M. 2007. *Foresight Tackling Obesities: Future choices - building the obesity system map* [Online]. UK Government's Foresight Programme: Government Office for Science. Available: <https://www.gov.uk/government/publications/reducing-obesity-obesity-system-map> [Accessed May 2018].
- VINTHER, A. S. & CHRISTIANSEN, A. V. 2017. Mythbusting: There is no steroid "epidemic". *Sciencenordic*.
- WADA 2017. The World Anti-Doping Code international standard prohibited list - January 2017. World Anti-Doping Agency.
- WADA 2018. World Anti-Doping Code 2015 with 2018 amendments. Montreal: World Anti-Doping Agency.

- WEEKS, M. R., CONVEY, M., DICKSON-GOMEZ, J., LI, J., RADDI, K., MARTINEZ, M. & ROBLES, E. 2009. Changing drug users' risk environments: peer health advocates as multi-level community change agents. *American journal of community psychology*, 43, 330-344.
- WEINSTEIN, N. D., MARCUS, S. E. & MOSER, R. P. 2005. Smokers' unrealistic optimism about their risk. *Tobacco Control*, 14, 55-59.
- WEST, R. 2006. *Theory of addiction*, Oxford, Blackwell.
- WESTERMAN, M. E., CHARCHENKO, C. M., ZIEGELMANN, M. J., BAILEY, G. C., NIPPOLDT, T. B. & TROST, L. 2016. Heavy Testosterone Use Among Bodybuilders: An Uncommon Cohort of Illicit Substance Users. *Mayo Clinic Proceedings*, 91, 175-182.
- WIPPERT, P. & FLIEßER, M. 2016. National doping prevention guidelines: Intent, efficacy and lessons learned—A 4-year evaluation. *Substance Abuse Treatment, Prevention, and Policy*, 11, 35.
- WOOLF, J., RIMAL, R. N. & SRIPAD, P. 2014. Understanding the influence of proximal networks on high school athletes' intentions to use androgenic anabolic steroids. *Journal of Sport Management*, 28, 8-20.
- WROBLE, R. R., GRAY, M. & RODRIGO, J. A. 2002. Anabolic steroids and preadolescent athletes: Prevalence, knowledge, and attitudes. *The Sport Journal*, 5, 1-8.
- YAGER, Z., MCLEAN, S. A. & LI, X. 2018. Body image outcomes in a replication of the ATLAS program in Australia. *Psychology of Men & Masculinity*, [Advance online publication].
- YU, J., HILDEBRANDT, T. & LANZIERI, N. 2015. Healthcare professionals' stigmatization of men with anabolic androgenic steroid use and eating disorders. *Body Image*, 15, 49-53.
- ZAHNOW, R., MCVEIGH, J., BATES, G., HOPE, V., KEAN, J., CAMPBELL, J. & SMITH, J. 2018. Identifying a typology of men who use anabolic androgenic steroids (AAS). *International Journal of Drug Policy*, 55, 105-112.
- ZAHNOW, R., MCVEIGH, J., FERRIS, J. & WINSTOCK, A. 2017. Adverse Effects, Health Service Engagement, and Service Satisfaction Among Anabolic Androgenic Steroid Users. *Contemporary Drug Problems*, 44, 69-83.
- ZELLI, A., LUCIDI, F. & MALLIA, L. 2010a. The relationships among adolescents' drive for muscularity, drive for thinness, doping attitudes, and doping intentions. *Journal of Clinical Sport Psychology*, 4, 39-52.
- ZELLI, A., MALLIA, L. & LUCIDI, F. 2010b. The contribution of interpersonal appraisals to a social-cognitive analysis of adolescents' doping use. *Psychology of Sport and Exercise*, 11, 304-311.

## Appendices

### Appendix 1 Author contribution forms for systematic review article

**Author contributions**

Use this form to specify the contribution of each author of your manuscript. A distinction is made between five types of contributions: Conceived and designed the analysis; Collected the data; Contributed data or analysis tools; Performed the analysis; Wrote the paper.

For each author of your manuscript, please indicate the types of contributions the author has made. An author may have made more than one type of contribution. Optionally, for each contribution type, you may specify the contribution of an author in more detail by providing a one-sentence statement in which the contribution is summarized. In the case of an author who contributed to performing the analysis, the author's contribution for instance could be specified in more detail as 'Performed the computer simulations', 'Performed the statistical analysis', or 'Performed the text mining analysis'.

If an author has made a contribution that is not covered by the five pre-defined contribution types, then please choose 'Other contribution' and provide a one-sentence statement summarizing the author's contribution.

**Manuscript title:** A systematic review investigating the behaviour change strategies in interventions to prevent misuse of anabolic steroids, *Journal of Health Psychology* <https://doi.org/10.1177/1359105317737607>

**Author 1:** Bates, Geoff *Bates* 07.06.2019

- Conceived and designed the analysis  
Developed the review protocol including the review aims and objectives and the methodology
- Collected the data  
Developed and undertook the literature search; screened search results; extracted data and appraised study quality
- Contributed data or analysis tools  
Identified and applied the tools used during data extraction and quality appraisal
- Performed the analysis  
Synthesised the data
- Wrote the paper  
Wrote all sections of the article and developed the tables & figures
- Other contribution  
Developed the article for publication

Author 2: Begley, Emma

*Emma Begley* 29/6/2019

- Conceived and designed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Collected the data  
Seconded reviewer for eligible papers and helped to extract data from included studies.
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Proof read the final draft
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 3: Tod, D.

*Douglas Tod* 17/6/2019

- Conceived and designed the analysis  
Contributed to early discussions through supervisions about the applicability of the model to AS use.
- Collected the data  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Commented on the first draft with regard to readability and focus. Identified and discussed potential weaknesses of the paper. Contributed to the final draft in terms of sense checking and proof reading.
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 4: Jones, L.

*Jones* 17/06/19

- Conceived and designed the analysis  
Contributed to early discussions on the plan and outline for the systematic review.
- Collected the data  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Checked the final draft and contributed suggestions on layout and content.
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 5: Leavey, C.

*Leavey* 07/06/19

- Conceived and designed the analysis  
Contributed to early discussions around focus of the systematic review objectives and the rationale behind carrying it out.
- Collected the data  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Sense checked and proof read final draft.
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 6: McVeigh

*J McVeigh 7/6/19*

- Conceived and designed the analysis**  
Contributed to early discussions around focus of the systematic review objectives and the rationale behind carrying it out.
- Collected the data**  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools**  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis**  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper**  
Commented on drafts with regard to readability and focus. Identified and discussed potential weaknesses of the paper. Contributed to the final draft in terms of sense checking.
- Other contribution**  
Specify contribution in more detail (required; no more than one sentence)

## Appendix 2 Completed PRISMA checklist

Section/topic	#	Checklist item	Reported in chapter section
<b>TITLE</b>			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title, rationale
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Full abstract included in published article. Summary provided in: rationale and outline
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known.	Rationale and outline
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Methods: aims
<b>METHODS</b>			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Methods: validity and quality
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Methods: inclusion criteria and study selection
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Methods: search strategy

<b>Section/topic</b>	<b>#</b>	<b>Checklist item</b>	<b>Reported in chapter section</b>
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix 2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Methods: inclusion criteria and study selection
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Methods: data extraction and quality assessment
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Methods: data extraction and quality assessment; Identification of behaviour change strategies
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Methods: data extraction and quality assessment
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	Not applicable
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I <sup>2</sup> ) for each meta-analysis.	Methods: analysis
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Not applicable
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Not applicable
<b>RESULTS</b>			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Results: summary of identified studies
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Results: summary of identified studies

<b>Section/topic</b>	<b>#</b>	<b>Checklist item</b>	<b>Reported in chapter section</b>
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Appendix 4
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Results: summary of identified studies; behaviour change strategies; intervention effectiveness
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Not applicable
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Not applicable
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Not applicable
<b>DISCUSSION</b>			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Results: behaviour change strategies; intervention effectiveness
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Discussion
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Discussion
<b>FUNDING</b>			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	No funding provided for this review (specified in published article)

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. 2009. PLoS Med 6(7): e1000097.

### Appendix 3 Search strategy for searching in Medline (Ebsco)

Search	Search Terms	# articles
S1	MM "Doping in sports" OR MM "Anabolic Agents"	6,889
S2	(TI (anabolic n4 steroid*) OR PED OR PEDs OR IPED* OR PIED* OR (performance N1 enhancing) OR (enhance performance) OR (performance N1 enhancement) OR (muscle enhancing) OR (muscle N1 enhancement) OR (enhance muscle*) OR (muscular N1 enhancement)) OR (AB (anabolic n4 steroid*) OR PED OR PEDs OR IPED* OR PIED* OR (performance N1 enhancing) OR (enhance performance) OR (performance N1 enhancement) OR (muscle enhancing) OR (muscle N1 enhancement) OR (enhance muscle*) OR (muscular N1 enhancement))	37,961
S3	S1 OR S2	41,747
S4	MH "Schools" OR MH "Sports+" OR MH "Youth Sports" OR MH "Athletes" OR MH "Prisons" OR MH "Weight Lifting" OR MH "Resistance Training"	187,335
S5	TI (school* OR gym* OR athlet* OR sport* OR fitness OR prison* OR offender* OR jail* OR (detention N1 (center OR centre)) OR (youth* n2 (club* OR centre* OR center* OR group*)) OR bodybuilder* OR (body N1 builder*) OR bodybuilding OR (body N1 building) OR weightlift* OR (weight* N2 train*) OR (strength* N2 train*) OR (resistance N2 train*) OR (power N2 lift*) OR gay OR homosexual OR LGBT)	158,107
S6	AB (school* OR gym* OR athlet* OR sport* OR fitness OR prison* OR offender* OR jail* OR (detention N1 (center OR centre)) OR (youth* n2 (club* OR centre* OR center* OR group*)) OR bodybuilder* OR (body N1 builder*) OR bodybuilding OR (body N1 building) OR weightlift* OR (weight* N2 train*) OR (strength* N2 train*) OR (resistance N2 train*) OR (power N2 lift*) OR gay OR homosexual OR LGBT)	314,122
S7	(TI (excess* OR addict* OR dependen*) N2 (exercise OR train* OR (physical N1 activity)) OR (musc* N1 dysmorph*)) OR (AB (excess* or addict* OR dependen*) N2 (exercise OR train* OR (physical N1 activity))))	3,217
S8	S4 OR S5 OR S6 OR S7	509,846
S9	S3 AND S8	6,465
S10	Limit: date of publication 1990-2016; Human	4,646

#### Appendix 4 Summary of intervention delivery in included studies

Citation	Intervention	Provider	Mode of delivery	Duration	Intensity	Fidelity
<i>Barkoukis et al., 2016</i>	Anti-doping culture promotion	Physical education teachers	Group	Not reported	10 x 2 hour sessions	Not reported
<i>Elbe &amp; Brand, 2016</i>	Ethical decision making training	Online	Individually accessed computer programme	3 weeks (average)	6 sessions	Not applicable
<i>Elliot et al., 2004, 2006, 2008</i> <i>Ranby et al., 2009</i>	ATHENA	Coach & peers	Group	Not reported	8 x 45 minute sessions	High
<i>Goldberg et al., 1990</i>	Brief educational intervention	Not reported	Group	Single session	1x 20 minutes plus Q&A session & handout	Not reported
<i>Goldberg et al., 1991</i>	Brief educational intervention Brief fear-based intervention	Medical students	Group	Single session	1x 20 minutes plus Q&A session & handout	Not reported
<i>Goldberg et al., 1996a; 1996b; 2000</i> <i>MacKinnon et al., 2001</i>	ATLAS	Coach, peers & research staff	Group	7 weeks	1x 50 minute classroom session & 1 weight room session per week	Not reported

<b>Citation</b>	<b>Intervention</b>	<b>Provider</b>	<b>Mode of delivery</b>	<b>Duration</b>	<b>Intensity</b>	<b>Fidelity</b>
<i>Goldberg et al., 2003; 2007</i>	SATURN	Not applicable	Not applicable	1 year	Not applicable	Not applicable
<i>Jalilian et al., 2008</i>	Anabolic steroid education	Peers	Group	Not reported	6 x 1 hour sessions; 1 x 3 hour workshop	Not reported
<i>Laure &amp; Lecerf, 1999</i>	Health education based intervention	Research team (1999); Doctor & coach (2002)	Group	Single session	1 x 2 hour session	Not reported
<i>Nilsson et al., 2001; 2004</i>	Appearance and social norms focussed program	Health workers	Group; Media	2 years	Exposure to the intervention throughout duration	Not reported
<i>Sagoe et al., 2016</i>	Hercules	Anti-doping Norway	Group	12 weeks	4 x 90 minute education sessions; 12 x weight training sessions	Not reported
<i>Trenhaile et al., 1997</i>	Anabolic steroid education	Not reported	Group	2 weeks	6 x 30 minute sessions	Not reported
<i>Tricker &amp; Connolly, 1996</i>	Drug education	Public Health official & coach	Group	10 weeks	Not reported	Not reported
<i>Wippert &amp; Fleißer, 2016</i>	Anti-doping education	National Anti-doping Association	Group	2 x 1 day	1 day information tour presence in school; 1 day seminar	Not reported

## Appendix 5 Results of study quality assessment

Quality assessment of all studies included in the review was undertaken using the Effective Public Health Practice Project quality assessment tool.

Further information on the tool is available at: <http://www.ehphp.ca/tools.html>.

<b>Citation</b>	<b>Selection bias</b>	<b>Study design</b>	<b>Confounders</b>	<b>Blinding</b>	<b>Data collection methods</b>	<b>Withdrawal &amp; drop outs</b>	<b>Global Rating</b>
<i>Barkoukis et al., 2016</i>	Moderate	Moderate	Weak	Moderate	Moderate	Strong	<b>Moderate</b>
<i>Elbe &amp; Brand, 2016</i>	Weak	Moderate	Weak	Moderate	Strong	Strong	<b>Weak</b>
<i>Elliot et al., 2004; 2006; 2008;</i> <i>Ranby et al., 2009</i>	Moderate	Strong	Strong	Moderate	Strong	Weak	<b>Moderate</b>
<i>Goldberg et al., 1990</i>	Weak	Moderate	Weak	Moderate	Weak	Weak	<b>Weak</b>
<i>Goldberg et al., 1991</i>	Weak	Moderate	Weak	Moderate	Weak	Weak	<b>Weak</b>
<i>Goldberg et al., 1996a</i>	Weak	Weak	Strong	Moderate	Strong	Weak	<b>Weak</b>
<i>Goldberg, 1996b; 2000;</i> <i>MacKinnon 2001</i>	Moderate	Moderate	Strong	Moderate	Strong	Moderate	<b>Strong</b>
<i>Goldberg et al., 2003</i>	Weak	Weak	Strong	Moderate	Strong	Weak	<b>Weak</b>

<b>Citation</b>	<b>Selection bias</b>	<b>Study design</b>	<b>Confounders</b>	<b>Blinding</b>	<b>Data collection methods</b>	<b>Withdrawal &amp; drop outs</b>	<b>Global Rating</b>
<i>Goldberg et al., 2007</i>	Moderate	Moderate	Strong	Moderate	Strong	Weak	<b>Moderate</b>
<i>Jalilian et al., 2008</i>	Moderate	Moderate	Strong	Moderate	Strong	Strong	<b>Moderate</b>
<i>Laure &amp; Lecerf, 1999</i>	Moderate	Weak	Weak	Moderate	Weak	Weak	<b>Weak</b>
<i>Laure &amp; Lecerf, 2002</i>	Moderate	Moderate	Strong	Moderate	Strong	Weak	<b>Moderate</b>
<i>Nilsson et al., 2001; 2004</i>	Strong	Weak	Weak	Moderate	Strong	Moderate	<b>Weak</b>
<i>Sagoie et al., 2016</i>	Moderate	Moderate	Moderate	Moderate	Strong	Moderate	<b>Strong</b>
<i>Trenhaile et al., 1997</i>	Moderate	Moderate	Strong	Moderate	Strong	Strong	<b>Strong</b>
<i>Tricker &amp; Connolly, 1996</i>	Weak	Weak	Strong	Moderate	Strong	Weak	<b>Weak</b>
<i>Wippert &amp; Fleißer, 2016</i>	Weak	Weak	Weak	Moderate	Weak	Moderate	<b>Weak</b>

## Appendix 6 Author contribution forms for socioecological framework article

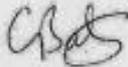
**Author contributions**

Use this form to specify the contribution of each author of your manuscript. A distinction is made between five types of contributions: Conceived and designed the analysis; Collected the data; Contributed data or analysis tools; Performed the analysis; Wrote the paper.

For each author of your manuscript, please indicate the types of contributions the author has made. An author may have made more than one type of contribution. Optionally, for each contribution type, you may specify the contribution of an author in more detail by providing a one-sentence statement in which the contribution is summarized. In the case of an author who contributed to performing the analysis, the author's contribution for instance could be specified in more detail as 'Performed the computer simulations', 'Performed the statistical analysis', or 'Performed the text mining analysis'.

If an author has made a contribution that is not covered by the five pre-defined contribution types, then please choose 'Other contribution' and provide a one-sentence statement summarizing the author's contribution.

**Manuscript title:** An evidence-based socioecological framework to understand men's use of anabolic androgenic steroids and inform interventions in this area, *Drugs: Education, Prevention and Policy* ISSN:0968-7637(Print)1465-3370(Online) Journal homepage: <http://www.tandfonline.com/loi/idep20>

**Author 1:** Bates, Geoff  07.06.2019

- Conceived and designed the analysis**  
Developed the idea for the article and the approach taken
- Collected the data**  
Designed and undertook the search for literature, collated findings
- Contributed data or analysis tools**  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis**  
Synthesised the evidence; developed the framework
- Wrote the paper**  
Wrote all sections of the article
- Other contribution**  
Developed the article for publication

Author 2: Tod, David

*David Tod* 17/26/2019

- Conceived and designed the analysis  
Contributed to early discussions through supervisions about the applicability of the model to AS use.
- Collected the data  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Commented on the first draft with regard to readability and focus. Identified and discussed potential weaknesses of the paper. Contributed to the final draft in terms of sense checking and proof reading.
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 3: Leavey, Conan

*Conan Leavey* 07/06/19

- Conceived and designed the analysis  
Contributed to early discussions through supervisions about the applicability of the model to AS use.
- Collected the data  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper  
Commented on the first draft with regard to readability and focus. Identified and discussed potential weaknesses of the paper. Contributed to the final draft in terms of sense checking and proof reading.
- Other contribution  
Specify contribution in more detail (required; no more than one sentence)

Author 4: McVeigh, J.

*J. McVeigh 7/6/19.*

- Conceived and designed the analysis**  
Contributed to early discussions through supervisions about the applicability of the model to AS use.
- Collected the data**  
Specify contribution in more detail (optional; no more than one sentence)
- Contributed data or analysis tools**  
Specify contribution in more detail (optional; no more than one sentence)
- Performed the analysis**  
Specify contribution in more detail (optional; no more than one sentence)
- Wrote the paper**  
Commented on the first draft with regard to readability and focus. Identified and discussed potential weaknesses of the paper. Contributed to the final draft in terms of sense checking and proof reading.
- Other contribution**  
Specify contribution in more detail (required; no more than one sentence)

## Appendix 7 Codes assigned during initial analysis in study 3 part A

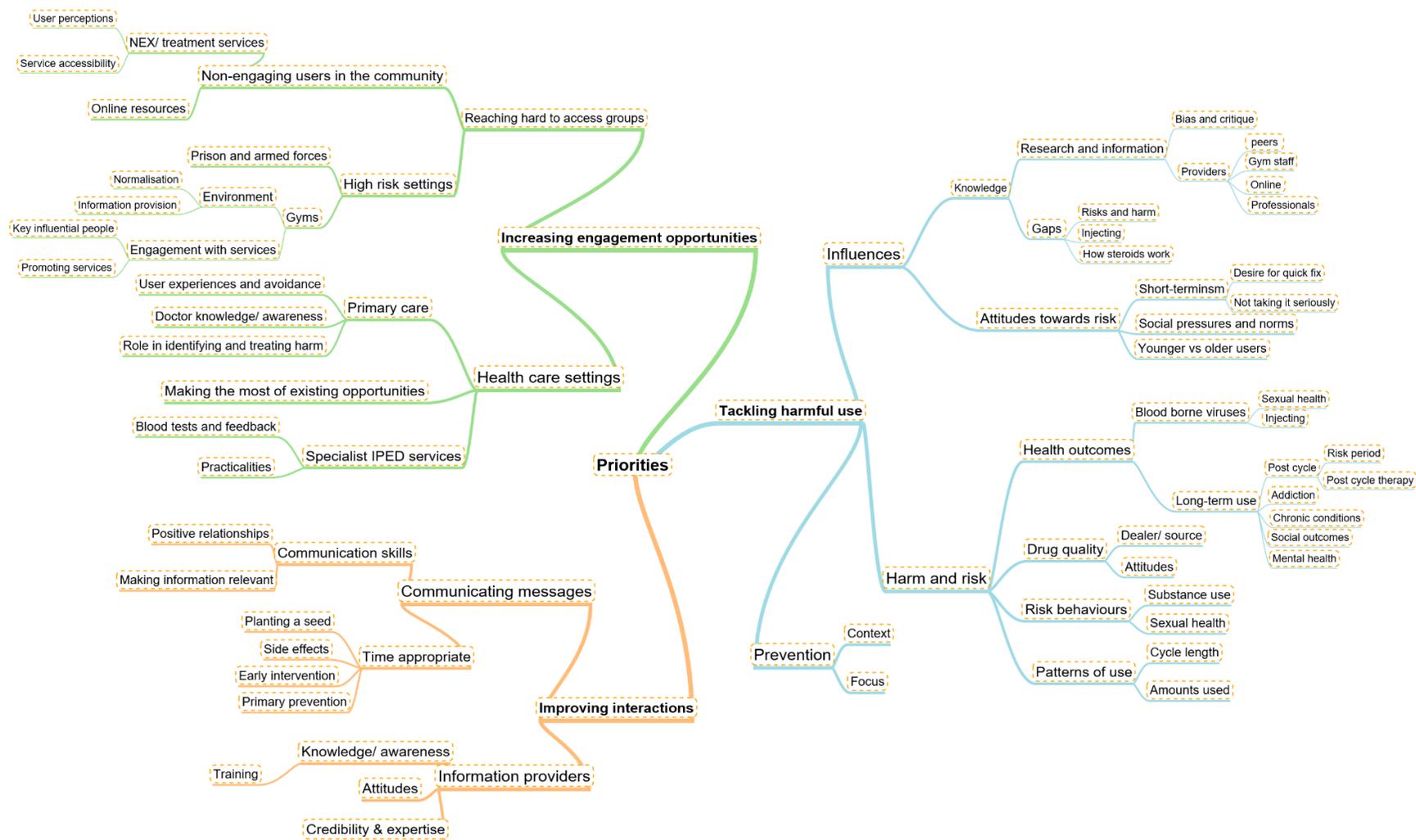
<b>Initial category</b>	<b>Code assigned</b>
Pattern of use	Cycle length
	Ex opiate users
	Increasing use amongst women
	Young people
	Large doses
	Normalisation in society
	Moderation
	Older users
	Using AAS before being ready
	Bodybuilders
Post cycle period	Post cycle as risk period
	PCT promoting harmful behaviour
	Avoiding losses
Knowledge	Health risk knowledge
	Awareness and interest in risks
	Poor knowledge leads to risk
	Nutrition and training knowledge
	Experienced users' knowledge
	AAS knowledge
	Injecting knowledge
User attitudes	Short-terminism
	Quick fix
	Concern for health
	Copying others
	Masculinity
	Not taking AAS seriously
	Pressure to use

	Unrealistic expectations
Sources of information	Peer to peer information provision
	Online information
	Dealer as information source
	Information bias and critique
	Promoting good information sources
	Information flow in networks
	Health outcomes
	BBVs
	Early onset of health problems
	Long term health consequences
	Libido
	Social consequences
Health behaviours and issues	Alcohol and AAS
	Sexual health
	Sharing needles
	Body dysmorphia
	Unhealthy pattern of behaviours
	Big guy in the gym
	Engagement skills
	Discuss wider health issues
	Make the most of every contact
	Planting a seed
	Language and terminology
	Non judgemental/ moralising
	Honesty
	Tailored feedback and information
	Opportunity to talk
Credibility of info provider	Credibility through appearance
	Importance of credibility

	Demonstrate knowledge as provider
	Don't need to be an expert
Health care professionals	Disclosing to GP
	GP knowledge
	GP and user engagement
	GP response to AAS harms
	Endocrinologist role
	HP confidence
	Training
	Service GP engagement
	Recognising users
	Screening
Support services	Resources
	Unattractive
	Accessibility
	Pharmacy staff
	Interventions
	Drug service staff
	Increasing uptake
	Use existing opportunities
	IPED clinics
Hidden populations	Non-engagers
	Online equipment purchasing
	Accessibility of services
Gyms	Educating gym owners
	Gym owner attitude
	Gym and service engagement
	Gym staff as information provider
	Normalisation in gyms
	New gym members risk

	Significance of gym setting
Risky settings	Quick fix in prison
	Lack of community follow up
	Patterns of use in prison
	NEX in prisons
	Armed forces
Drug quality	Contamination
	Online AAS purchasing
Interventions	Early intervention
	No one size fits all
	Understand individuals
	Harm reduction in sport
	Harm reduction ethics
	Side effects vulnerability
	Life changes
	Go beyond harms
	Motivate long-term change
Primary prevention	School-age
	Body image norms
	Coping skills
	Healthy alternatives
	Delay use
	Part of wider prevention
	Unclear focus
	Prevention and sport
	Prevention unrealistic

# Appendix 8 Mind map used during analysis in study 3 part A



## Appendix 9 “Big Tent” quality criteria as applied in studies 3 and 4

Criteria for quality (end goal)	Various means, practices and methods through which to achieve	How achieved or addressed
<b>Worthy topic</b>	<p>The topic of the research is</p> <ul style="list-style-type: none"> <li>• Relevant</li> <li>• Timely</li> <li>• Significant</li> <li>• Interesting</li> </ul>	<p>The justification for the research is discussed in the context of the current evidence base and the gaps in evidence identified in the first two studies in this PhD. The aims of this research reflected the findings from these studies. Interventions and support for men using AAS have been called for in response to increased AAS use in the UK and worldwide and increasing evidence of associated risks and harms for health. The research addresses a clear gap in the evidence by exploring what this support should actually be.</p>
<b>Rich rigor</b>	<p>The study uses sufficient, abundant, appropriate, and complex</p> <ul style="list-style-type: none"> <li>• Theoretical constructs</li> <li>• Data and time in the field</li> <li>• Sample(s)</li> <li>• Context(s)</li> <li>• Data collection and analysis processes</li> </ul>	<p>A number of approaches were used to ensure rigor, as described in the sections reporting the methods used in studies 3 and 4. For example: The recruitment strategy was informed by discussions with participants and designed to ensure that a range of important perspectives were included; interviews were comprehensive and typically lasted between 30 and 60 minutes; and Data analysis was undertaken according to rigorous guidance developed by Braun and Clarke (2006) on undertaking thematic analysis.</p>
<b>Sincerity</b>	<p>The study is characterized by</p> <ul style="list-style-type: none"> <li>• Self-reflexivity about subjective values, biases, and inclinations of the researcher(s)</li> <li>• Transparency about the methods and challenges</li> </ul>	<p>The COREQ criteria were used to support the reporting of methods to ensure transparency. The methods and decisions made during these studies are discussed in detail in the methods section. Consideration was given to the potential biases of the researcher and led to the initial inductive and data-driven approach for data collection and analysis being utilised to minimise these. In the introduction chapter, the pragmatic leanings of the researcher are discussed as well as the implications of these for the research.</p>

Criteria for quality (end goal)	Various means, practices and methods through which to achieve	How achieved or addressed
<b>Credibility</b>	<p>The research is marked by</p> <ul style="list-style-type: none"> <li>• Thick description, concrete detail, explication of tacit (nontextual) knowledge, and showing rather than telling</li> <li>• Triangulation or crystallization</li> <li>• Multivocality</li> <li>• Member reflections</li> </ul>	<p>The research included participants who offered different perspectives on the topic. A range of experience and expertise relating to AAS was sought to include stakeholders who had worked and engaged with people who use AAS in a variety of settings and roles, and AAS users with varying experience and of different ages. The characteristics of participants are described in the chapters. During the study, participants were asked to reflect on the study findings to that point and to offer their own insights and perceptions on these. The findings from the two studies, along with the other studies in this research, were brought together in discussion sections and the discussion chapter. These different types of data and multiple perspectives and approaches to data collection and analysis were considered together in the production of the conceptual map of information provision to provide a more in-depth understanding of how this occurs and potential approaches to improve it.</p>
<b>Resonance</b>	<p>The research influences, affects, or moves particular readers or a variety of audiences through</p> <ul style="list-style-type: none"> <li>• Aesthetic, evocative representation</li> <li>• Naturalistic generalizations</li> <li>• Transferable findings</li> </ul>	<p>Findings were written up and discussed with a ‘critical friend’ and supervisors to ensure that they are presented with sufficient clarity and the meaning and significance is clear. In both studies findings were presented alongside interpretations, which were supported by substantial extracts of the data to help the reader understand where these interpretations came from and the perspectives of participants.</p>
<b>Significant contribution</b>	<p>The research provides a significant contribution</p> <ul style="list-style-type: none"> <li>• Conceptually/theoretically</li> <li>• Practically</li> <li>• Morally</li> <li>• Methodologically</li> <li>• Heuristically</li> </ul>	<p>The implications and significance of the work were discussed with a ‘critical friend’ and supervisors. The work was designed to build upon studies 1 and 2, and to directly inform the final stage in the research. In the discussion sections, important areas for future research are highlighted, and the implications for practice and policy are discussed. The overall aim of the PhD was to inform interventions to improve health outcomes for people who use AAS so it was important that as well as extending knowledge, together the studies had clear and meaningful implications for future interventions with this aim.</p>

<b>Criteria for quality (end goal)</b>	<b>Various means, practices and methods through which to achieve</b>	<b>How achieved or addressed</b>
<b>Ethical</b>	<p>The research considers</p> <ul style="list-style-type: none"> <li>• Procedural ethics (such as human subjects)</li> <li>• Situational and culturally specific ethics</li> <li>• Relational ethics</li> <li>• Exiting ethics (leaving the scene and sharing the research)</li> </ul>	<p>The most substantial ethical issue for these studies were perceived to relate to procedural ethics. Ethical consent was sought from the LJMU ethics committee for all parts of the studies. Approval was obtained prior to each study beginning. During study 4, some participants raised concerns about how study findings would be used in the context of their concerns about how AAS are portrayed in the media and the criminalisation of AAS. This influenced consideration of how the research findings were presented, and all participants were given the opportunity to review the findings and to provide any comments.</p>
<b>Meaningful coherence</b>	<p>The study:</p> <ul style="list-style-type: none"> <li>• Achieves what it purports to be about</li> <li>• Uses methods and procedures that fit its stated goals</li> <li>• Meaningfully interconnects literature, research questions/foci, findings, and interpretations with each other</li> </ul>	<p>The detailed description of study development and processes in the presentation of methods demonstrate how the study was designed to meet the stated aims, and how the studies informed and built upon one another. The methods used are discussed and justified in these same chapters. The discussion of findings in each chapter relating to study aims and the discussion of the processes and outcomes in the overall discussion (chapter 7), and development of the conceptual map, demonstrate how the studies achieved their stated purpose.</p>

*From: Tracy SJ. Qualitative Quality: Eight "Big Tent" Criteria for Excellent Qualitative Research. 2010. Qualitative Inquiry, 16(10): 837-851.*

## Appendix 10 Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

One COREQ checklist was completed for studies 3 and 4, due to the similarities in responses on many criteria.

Item	Guide questions/description	Response
<b>Domain 1: Research team and reflexivity</b>		
<i>Personal Characteristics</i>		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	All data collection was undertaken by the PhD student
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	The research was a current PhD student with an MSc in Health Psychology who had worked as a public health researcher for 7 years prior to starting the PhD
3. Occupation	What was their occupation at the time of the study?	PhD student
4. Gender	Was the researcher male or female?	Male
5. Experience and training	What experience or training did the researcher have?	The researcher was experienced carrying out focus groups and interviews relating to substance use, experiences of health care and service provision.
<i>Relationship with participants</i>		
6. Relationship established	Was a relationship established prior to study commencement?	In both studies the researcher discussed the aims and focus of the research with all participants by email or telephone prior to data collection.
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	All participants were aware the researcher was undertaking a PhD and the purpose of the study they were taking part in. In study 4 some participants wanted reassurance as to the purpose of the research, how findings would be used, and the opinions of the researcher on criminalising steroid use before participating. Clarification on these points was provided.
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, interests in the topic	The interviewer's biases and beliefs are discussed in the thesis. The interviewer took steps to reduce the impact of their own bias and assumptions and these are described in the text.

Item	Guide questions/description	Response
<b>Domain 2: study design</b>		
<i>Theoretical framework</i>		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Study 3 followed an inductive and data driven thematic analysis approach using unstructured interviews. To follow up on these in study 4, a more structured and deductive approach was used. Full details provided in the methods sections.
<i>Participant selection</i>		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Full details of the recruitment approach are provided in the methods sections.
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Full details of the recruitment approach are provided in the methods sections.
12. Sample size	How many participants were in the study?	Study 1 included 33 participants and study 2 included 12 participants
13. Non-participation	How many people refused to participate or dropped out? Reasons?	Full details of participation and drop out are provided in the results sections.
<i>Setting</i>		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	The majority of interviews were carried out remotely on the telephone or by skype. A smaller number were carried out face to face in the participants' place of work.
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	Not generally. Some of the interviews in study 3 took place in public places, but no other people joined in the discussion.
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	The samples are described in the results sections.
<i>Data collection</i>		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Interviews were unstructured in study 3 part A. Study 3 part B and study 4 used semi-structured interviews. In study 4, questions were pilot tested with a former steroid user who participated in study 3.
18. Repeat interviews	Were repeat inter views carried out? How many?	No – one interview was carried out per participant.

<b>Item</b>	<b>Guide questions/description</b>	<b>Response</b>
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes – all interviews were audio recorded.
20. Field notes	Were field notes made during and/or after the interview or focus group?	Yes – notes were made during interviews on points to follow up. During transcription, notes were made on points to follow up with subsequent participants and on aspects of the interviews that went particularly well or badly.
21. Duration	What was the duration of the interviews or focus group?	In study 3A and 4 interviews lasted typically around 40 minutes. In study 1B, interviews lasted typically 30 minutes.
22. Data saturation	Was data saturation discussed?	No, the aim of the work was not to reach saturation as the topic was very broad. Instead, the aim was to identify consensus on the priorities identified and then for participants in study 3 part B and study 4 to reflect on these.
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	Participants were asked if they would like to review transcripts. Four users in study 4 said they would, but did not provide any comments back.
<b>Domain 3: analysis and findings</b>		
<i>Data analysis</i>		
24. Number of data coders	How many data coders coded the data?	1
25. Description of the coding tree	Did authors provide a description of the coding tree?	No coding tree was used
26. Derivation of themes	Were themes identified in advance or derived from the data?	Themes were mainly derived from the data. In study 4, they were closely linked with interview topics.
27. Software	What software, if applicable, was used to manage the data?	None. Data was sorted into themes using Excel initially.
28. Participant checking	Did participants provide feedback on the findings?	No, but participants in part B of study 3 and study 4 reflected on findings from study 3 and provided their perceptions on these. All participants were offered the opportunity to review transcripts (see 23).

<b>Item</b>	<b>Guide questions/description</b>	<b>Response</b>
<i>Reporting</i>		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Yes – quotations are provided throughout and linked to a participant.
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Findings were discussed with a 'critical friend' to identify if findings and conclusions match the data provided.
31. Clarity of major themes	Were major themes clearly presented in the findings?	Summaries of major themes are provided and then findings are presented by major theme with clear headings. Thematic maps are provided in the results.
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Discussion is provided of minor themes and conflicting responses between participants

*From: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007. 19 (6): 349 – 357.*

## Appendix 11 Semi structured interview schedule for study 3 part B

### *Interview schedule for NSP staff participant<sup>13</sup>*

- Could you tell me a bit about what your role is? What are your experiences working with people who use steroids? How often do you come across them?

#### **The role of the service regarding steroid users**

- What do you see the role of services such as yours for working with steroid users? Do you think issues around steroids use fall within your scope/remit?
- What sort of things do you talk about with someone who uses steroids?
- Would you like to do more? Do you think it would be worth doing more?
- It is suggested that often in needle exchanges, people who use steroids have a fairly quick transaction with minimal interaction and discussion. What do you think about that?
- Do you think that staff feel confident working with steroid users?

#### **Barriers and facilitators to engaging with users**

- How do you find identifying steroid use in service users?
- How do you find engaging with people who use steroids? Do you feel confident? How would you rate your knowledge?
- How do you think users feel about engaging with you about their steroids? Do they listen to you?
- Are there any other barriers to engaging with steroid users in your service?
- Have you found any useful ways to overcome these?

#### **Increasing access to support**

- How do you think you could attract more users to services like yours? How can you promote them?
- Are you linked in with support services for steroid users? Would you know where to signpost them for further support?

---

<sup>13</sup> The interview schedule was modified slightly for participants with different expertise and experience working in different settings. This enabled participants to reflect on findings from the study that were relevant to their specific setting.

## Appendix 12 Semi structured interview schedule for study 4

### User interviews – semi structured interview questions

1. Can you tell me a bit about why you train? What are your goals?
2. I'll start by reading you a statement – I would then like you tell me if you broadly agree or disagree.

#### **Statement 1**

### Knowledge and sources of information

3. Do you feel like you have good knowledge and understanding about steroids? For example what to use to get the gains that you want, and how much, health risks and so on.
4. What about other people who use steroids – do they tend to have good knowledge?  
**Statement 2, Statement 3**
5. What about the impacts of long-term use and coming off steroids – do you think people have good understanding about post cycle therapies and things like that?  
**Statement 6**
6. What do you do if you want to find something out relating to steroids - where would you look, who would you ask? How important is this to you?
7. What about other people – is research important to them? Where do they get information?  
**Statement 4**
8. Where do you buy your steroids from?  
**Statement 5**

### Health advice and support services

9. Would you speak/ have you spoken to a doctor about anything related to your steroid use? Why/ why not?
10. If a doctor asked you about steroids would you talk openly with them? Why/ why not?
11. Do you see doctors as reliable & credible sources of information about steroids? Why/ why not?  
**Statement 7, Statement 8**
12. Do you/ have you used a needle exchange? Pharmacy or drugs service? How do you find the experience?
13. There's a perception that lots of people who use steroids don't really like using exchanges or drugs services at all... do you think that's fair?  
**Statement 9**

## Gyms

14. Do you use a gym? There's a perception that steroids are quite 'normal' in many gyms. Do you agree with that? **Statement 10.**
15. Would you approach people like gym staff or trainers, or the big guys in the gym, to talk about steroids? Has that changed over time? **Statement 12.**
16. Do you think people in your gym are credible sources of information about steroids? (staff, other gym users) **Statement 12.**

## Summary statements from study 3 used during interviews

### Priorities/ needs for health services to address:

1. Steroid use in moderation is not really a problem – the focus should be on harm reduction, particularly people who are taking high amounts and doing long cycles without a proper break to let body recover. In general, messages should be about encouraging 'safe' practices – sensible doses and cycles, recovery time, PCT, safe injecting etc.
2. For some, particularly young guys, they have poor understanding about steroids and how they work, injecting sites, training and diet. They can be obsessed with making quick changes to their bodies and aren't interested in long term health, don't take steroids seriously – which can lead to unnecessary risk taking e.g. high doses. Health professionals should look to delay steroid use in people who are not ready/ do not need to use (e.g. could make natural gains, haven't done their research).
3. Perceptions and understanding about long term health harms is often (but not always) poor amongst people using steroids. Often they do not think that they are at risk themselves or do not believe in the associated harms or think they are exaggerated.
4. Lots of people get their information from friends who maybe don't have great knowledge themselves, a dealer, or the internet, and don't really question it – taking it as face value when there is a lot of bad information out there.
5. Buying steroids over the internet rather than from someone you know can be a problem – quality/ strength can vary and risk of contamination etc. Purchasing online is seen as an easy option compared to approaching a dealer for some.
6. Post cycle: improve knowledge about PCT. Some using PCT when they don't need to and some not using PCT when they would benefit, and suffering with health problems (e.g. low mood, loss of libido).

### GPs and use of health services

7. People who use steroids often haven't had good experiences talking with their GP about their steroid use or related issues – GP can have poor knowledge/understanding which can lead to unhelpful responses. Increase GP understanding and awareness about steroids and health harms to address this.
8. People who use steroids don't like to go to the GP about any side effects or concerns: they may have had negative experiences, do not think it is a 'manly' thing to do, be worried about disclosing their steroid use.
9. People who use steroids often don't like using needle exchanges in pharmacies and drug services: attitudes and poor knowledge in staff puts them off, it can be a negative experience. Need to ensure non-judgemental staff and a non-moralising approach.

### Gyms

10. Steroid use is seen as normal and acceptable in many gyms – this increases accessibility and likelihood of someone starting to use, and allows the spread of information (sometimes not good advice).
11. Increasing links between steroids services and gyms would increase access to needle exchange and advice and support, but many gym owners and gym users don't want to be associated with a 'drugs service'. Promoting services as 'men's health' services (or similar) could be more attractive.
12. People ask and listen to gym owners and bigger guys in the gym about steroids. If they could link in with services could they provide harm reduction/ and advice? They might not: want to have that role, feel comfortable/ confident to do so, want to be associated with a drugs service.

## Appendix 13 Identifying behaviours to target in an intervention to increase uptake of services

Specific behaviour	Application of criteria: i) Likely impact; ii) Ease of implementation; iii) Likely spill over; iv) Ease of measurement)	COM factors <sup>1</sup> in users relating to service access addressed
<i>Staff signpost to support services</i>	Staff in a range of health and social care services (e.g. pharmacy, sexual health, probation, social work, young people’s services) encounter users who are not engaging with support services. Challenges may be in identifying users, but where this is successful then implementation should be straightforward and there is potential that these users will then pass information on to others. Number of users signposted should be straightforward to measure.	Psychological capability (knowledge about service location, opening hours)
<i>Staff provide information on the benefits of attending support services</i>	These two behaviours are similar and could be performed alongside signposting. Signposting alone may not be enough to influence some users to attend support services and combining this with information clarifying service aims and the benefits of attending is likely to have a greater impact. Implementation is more difficult as it has more requirements such as staff time, knowledge and motivation. There may be further benefits through spill over if users are more convinced about the value of services.	Psychological capability (understanding of the aims of the service; understanding of what the service offers); Reflective motivation (Expectation of benefits from attending; expectation of staff knowledge and attitude; expectation of stigma); Physical opportunity (Belief that support services are for them)
<i>Staff provide information on the aims of support services</i>		

Specific behaviour	Application of criteria: i) Likely impact; ii) Ease of implementation; iii) Likely spill over; iv) Ease of measurement)	COM factors <sup>1</sup> in users relating to service access addressed
<i>Service users signpost other users to support services</i>	<p>Service users can potentially reach large numbers of non-engaging users through their social networks and shared key environments. Impact and spill over is therefore potentially high. Evidence suggests that users are often influenced by the opinions and recommendations of their peers, including regarding services. For service users, informing others in their networks about where services are available could be part of conversations already being held. Measuring implementation and impact may appear more difficult, but it would be possible to identify where new service users heard about a service and why they have attended by asking them when they attend.</p> <p>To enable this, service staff could support current service users to promote the service to others.</p>	<p>Psychological capability (knowledge about service location, opening hours); Physical opportunity (Belief that support services are for them); Social opportunity (culture relating to support seeking; peers attitudes towards engaging with health professionals; perceptions about stigma)</p>
<i>Service users share positive service experiences</i>	<p>These three behaviours are similar and should be deliverable alongside ‘service users signpost other users to support services’. Implementation is more difficult because it asks more of service users than signposting alone, and requires more knowledge to do so. However, the impact is likely to be greater than with signposting alone. Measuring impact would again involve identifying why new service users were attending.</p>	<p>Psychological capability (understanding of the aims of the service; understanding of what the service offers); Physical opportunity (Belief that support services are for them); Social opportunity (culture relating to support seeking; peers attitudes towards engaging with health professionals; perceptions about stigma); Reflective motivation (Expectation of benefits from attending; expectation of staff knowledge and attitude; expectation of stigma)</p>
<i>Service users provide information on the aims of services</i>		
<i>Service users provide information on the benefits of service attendance</i>		

<sup>1</sup>Factors related to capability, opportunity and motivation as defined in the COM-B model (Michie et al., 2011) and presented relating to user uptake of support services in table 4, chapter 6.