Project title	Image and Performance Enhancing Drugs (IPEDs): Assessment of available intelligence and research gaps to inform intervention evaluation.
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Background	The use of image and performance enhancing drugs (IPEDs), in particular the self-directed use of anabolic androgenic steroids (AAS) and associated drugs, is now a global phenomenon with significant public health implications. Globally, there have been increases in the use of these drugs within the general population with particular concerns regarding the physical effects of AAS on the cardiovascular system, hepatic system, and the brain; psychological effects such as dependence and aggression; risks associated with injecting; blood borne virus transmission; and how the underground manufacture of IPEDs leads to poor quality, unsterile products with unpredictable effects. There is growing recognition of the impact of IPEDs, with the need to minimise the potential harms and to support the cessation of use, however, there is a lack of evidence to support the development of interventions. The UK is in an unique position in relation to AAS and associated IPEDs. As Class C drugs under the Misuse of Drugs Act (1971) there are significant penalties for supply offences but personal possession has not been criminalised, a deliberate strategy to promote health service engagement. Furthermore, the network of needle and syringe provision (NSP) established in the 1980s is now utilised by large number of people who inject IPEDs.
Plain English Summary	The purpose of this research was to develop our knowledge and understanding of the issue of IPED use in the UK and to support the forthcoming commissioned research: *"What interventions are effective and cost effective to prevent and reduce the health harms caused by the use of IPEDs?".* To achieve this purpose, with the support and guidance of the Public Expert Advisory Board, we delivered four research work packages (WPs): ***WP1)*** *What is the extent of AAS use in the UK and are there regional variations?* We analysed a range of available datasets and conducted a survey consisting of three rounds with a panel of 55 experts with diverse backgrounds and expertise. The panel concluded that there are regional variations in use of AAS, with higher levels of use in Wales and the North East and North West of England. There are also geographical variations in the levels of engagement with needle and syringe programme, ranging between 25% and 45% of men who inject AAS

	in some regions of the UK, compared to 40% and 60% in others. The panel estimated that between 15% and 25% of men who use AAS only use oral products, and there was strong agreement that the number of women using AAS was relatively low, accounting for only 5% of the total population of people using AAS. The majority of the panel members felt that an estimated range for the number of men aged 15-64 who use AAS between 328,000 and 687,000 was reasonable. However, it was not possible to estimate what the total number of people who use IPEDs and there was also uncertainty regarding the extent of AAS use in the London region and Northern Ireland. **WP2)** *What is the current focus of IPEDs research in the UK?* A scoping review of the UK IPED literature identified 87 relevant academic publications, with nearly half (41 publications) focussing on public health (including harm reduction). The varied motivations and characteristics of people who use IPEDs featured in over a third of the publications, highlighting risk behaviours including the additional use of psychoactive drugs. A common theme throughout the literature was the need to actively engage with people who use IPEDs, in both conducting meaningful research and in the development of health-related interventions. No evaluations of effective interventions were identified. ***WP3)*** *What are the services and interventions for IPED users in the UK?* The research team contacted major UK substance use service providers, practitioners on Anabolic Steroids UK Network and searched available service listings (e.g., Talk to Frank, Scottish Drug Forum) to identify services that offer specific interventions for people who use (or are contemplating the use of) IPEDs. Only 35 services were identified in the United Kingdom; 24 in England, eight in Scotland, and three in Wales (no services were identified in Northern Ireland). The most-frequently provided IPED-specific service was the provision of specialist information and the availability of staff with specialist IPED-related knowledge. Additional services included a small number of dedicated clinics, the availability of health monitoring and the delivery of outreach services. Several services highlighted the impact of the COVID-19 pandemic on IPED clinics and outreach services and the intention to recommence service provision in the future. ***WP4)*** *What are the key factors that may influence the harmful use of IPEDs?* A range of stakeholders including specialist practitioners, academics, public health professionals, policymakers, gym owners, and people who used IPEDs were recruited. They worked with the research team in workshops and interviews to produce a systems map illustrating the influences on harmful image and performance enhancing drug use https://www.anabolicsteroids.org.uk/influences-on-harmful-image-and-performance-enhancing-drug-use/. This exercise demonstrates the complexity of influencing issues related to the harmful use of IPEDs, with many influential factors acting on IPED users in different settings and at different times. The impact of these factors will vary according to individual characteristics such as risk appetite, beliefs, priorities, cognitive skills, and sense of identity. It highlights how we can think about these factors as part of a connected system rather than separate issues to be addressed individually through interventions. **Conclusion** This research has completed the first stage in gaining an understanding of the extent of AAS use at a national as well as regional level. This will provide the basis for further comprehensive IPED prevalence work as well as the preliminary work for evaluating the impact of interventions. Together the findings from the work packages suggest that new approaches to engage with people who use IPEDs are required, and a wider range of interventions need to be developed in addition to those that are already provided. In addition to targeting current IPED

	users, the study suggests that early prevention work as part of wider health and social education should form part of the response. While the UK has a comprehensive network of both pharmacy-based and agency-based services that are accessed by IPED users, there is a lack of specialist service provision, which may be the reason for significant numbers of IPED injectors not engaging with these services. Furthermore, there is a proportion of IPED users who do not inject and therefore are unlikely to engage with these services regardless of the services they offer. The delivery of services and interventions is complicated by the variety that exists in the IPED community and the lack of evidence to guide them. We need well-designed evaluations of existing and new interventions and services to understand their impacts and how they can best be delivered. These evaluations need to take into account the complexity of IPED use and the significant variation in the characteristics of those who use IPEDs and the experiences they have.
Scientific Summary	**Objective and methods** There is a need to answer the research question *"What interventions are effective and cost effective to prevent and reduce the health harms caused by the use of IPEDs?".* To support this research, a programme of four research work packages (WPs) was undertaken with an additional WP focussing on the dissemination of findings: **WP1)** *Estimate the extent and distribution of AAS use in the UK:* Referred to as ASSESS (Anabolic Androgenic Steroid Use Population Size Estimation: First Stage Study), this study aimed to improve understanding on the extent of IPED use in the UK by firstly producing a range of estimates based on available datasets and secondly gaining consensus through a Delphi-study with 55 experts. Findings indicated complexity amongst the AAS community, for example regional variations in AAS use, including higher levels in Wales, and the North West and North East of England, and a sizable minority (15-25%) only consume AAS orally. It indicated that between 25-40% of men injecting AAS use NSPs, but again with regional variation. The two most plausible estimates of a likely range for number of men (aged 15-64 years) who use AAS were: • between 328,000 and 687,000, preferred by 59% of panel, or • between 289,000 and 569,000, preferred by 35%. **WP2)** *Map the current UK IPED academic literature:* A scoping review was undertaken to identify published work in the UK from 2016-2021 relating to IPED use. Data were extracted from 87 sources comprising a range of methodologies. The most common focus of research was on public health and harm reduction (47%) and epidemiology (39%), exploring characteristics of users with further publications focusing on motivations for use and risk behaviours. No effectiveness evaluations relating to prevention, treatment, harm reduction or support for cessation of IPED use were identified. **WP3)** *Map the current interventions targeting IPED users in the UK:* Information on 35 services offering interventions specific to IPED use across the UK was identified from major UK substance use services (Change, Grow, Live; Turning Point; We Are With You; Humankind) relating to IPED service provision, supplemented from publicly available websites (e.g., Talk to Frank, Scottish Drug Forum) and practitioners on the Anabolic Steroids UK Forum. Twenty-four services were in England, eight in Scotland, and three in Wales; no services were identified in Northern Ireland. The most common interventions were the provision of specialist information (89%) and availability of staff with specialist knowledge (71%). Five services had "IPED champions" to raise awareness and knowledge within their organisation, while other services provided specific staff training. The COVID-19 pandemic was reported as having disproportionately impacted on the delivery of both clinics and outreach services.

	WP4) *Analyse and present the major influences on IPED users' decision-making:* A systems mapping exercise was adopted to gain understanding of the complex inter-related factors that influence decision-making resulting in harmful IPED use. Seventeen stakeholders (practitioners; academics; policymakers; and people with lived experience of AAS use) attended a two-stage workshop with the research team to develop a dynamic systems map anabolicsteroids.org.uk/influences-on-harmful-image-and-performance-enhancing-drug-use/ that illustrated the complexity of harmful IPED use. This process was supplemented by four qualitative interviews with people who used IPEDs. The map included 51 factors identified as influencing harmful IPED use across the socioecological spectrum, forming nine themes (identity; cognitive processes; beliefs about risk and harm; health and wellbeing; social environment; beliefs about healthcare; health professionals; services and interventions; the IPEDs market) and the connections between them. **Conclusion** This research represents the first stage of developing a comprehensive understanding of IPED use in the UK and highlights the complexity of the issue and gaps in the current public health response to IPED use. ASSESS has provided a plausible estimate of between 328,000 and 687,000 men currently using AAS, significantly higher than those previously generated by household surveys, and highlighted the geographical variations with concentrations of use in the North of England and Wales. There are large numbers of people who inject AAS attending NSPs, however engagement is sporadic and there are potentially high numbers of people who are not engaged with any services. We urgently need evaluations of existing interventions, and new interventions addressing a wider range of harms to better guide intervention and service delivery. An appreciation of the complexities of this issue and the varied interrelated factors provides a framework for how we may look to influence decision making and behaviours, identify the effectiveness of interventions and ultimately promote health by reducing the harmful use of IPEDs. **Funding** This research has been supported by National Institute for Health Research (NIHR) Public Health Research Programme grant Ref. 132730.
Study aims, objectives and research question	The overarching aim of this research was to develop the evidence base to support forthcoming commissioned research: *"What interventions are effective and cost effective to prevent and reduce the health harms caused by the use of IPEDs?"* To achieve this, four objectives were identified, each with a specific work package: WP1) To estimate the extent and distribution of AAS use in the UK. WP2) To map and the current UK IPED academic literature. WP3) To map the current interventions targeting IPED users in the UK. WP4) To analyse and present the major influences on IPED users' decision-making.
Methods	**WP1)** Referred to as ASSESS (Anabolic Androgenic Steroid Use Population Size Estimation: First Stage Study), this Work Package aimed to improve understanding of the extent of IPED use in the UK by producing a plausible 'likely range' within which the AAS using population size lies. Estimates were calculated from existing datasets: *Crime Survey for England & Wales*; needle & syringe programmes (NSPs); *National IPEDInfo Survey; Crimestoppers data*; and injecting equipment sales figures. A Delphi panel of 55 individuals with relevant expertise/knowledge was convened comprising: specialist healthcare and public health professionals; service managers; relevant fitness industry representatives; AAS academics/researchers; and importantly, those with personal experience of the use and culture associated with AAS. Three surveys

	were conducted (Dec 2020 – June 2021), to refine initial estimates and to gain consensus regarding the extent and distribution of AAS in the UK. **WP2)** A scoping review was conducted to identify published work relating to IPED use in the United Kingdom. A comprehensive search strategy was developed for relevant bibliographic databases: Web of Science; MEDLINE; Science Direct; PsycINFO; SPORTDiscus; CINHAL Plus; PubMed; Google Scholar, and Google, supported by an iterative citation searching process. This was complemented by two rounds of data collection from ASUK academics https://www.anabolicsteroids.org.uk/academics-anabolic-steroids-uk-asuk/. Research conducted by UK academics or within the UK was eligible, if published during 2016 to 2021 inclusive. From initial results of 4,882 outputs, deduplication and multiple screening resulted in 87 sources from which data were extracted relating to aim and method, population, key findings, implications for policy and practice, and identified research gaps. **WP3)** Major UK substance use services (Change, Grow, Live; Turning Point; We Are With You; Humankind) were contacted and asked for data relating to services that provided specific interventions for people who use (or are contemplating the use of) IPEDs. This was complemented with data from publicly available websites (e.g., Talk to Frank, Scottish Drug Forum) and through directly contacting practitioners on Anabolic Steroids UK Network https://www.anabolicsteroids.org.uk/practitioners-asuk-anabolic-steroids-uk/. **WP4)** To identify the wide range of factors that influence decision-making about IPED use, in particular harmful use, and to gain an understanding of their complex relationships, a systems mapping approach was adopted. A range of participants were recruited including practitioners, academics, public health professionals, policymakers, and people who used IPEDs. Seventeen stakeholders participated in the two workshops and four interviews were carried out with additional people who used IPEDs. Participants identified and discussed the factors that influence IPED users' decision-making and contribute to harmful use, the connections between these factors and designed the systems map with the research team.
Results	**WP1)** Key findings from the Delphi Panel surveys were: • Between 15% and 25% of men using AAS only do so orally • Between 25% and 45% of men who inject AAS use NSPs (but may be between 40% and 60% in some regions) • There are higher than average levels of AAS use in Wales, the North West and North East of England, average levels in Scotland, the West Midlands, and East Midlands of England, lower than average levels in the South West, East and South East of England and uncertainty regarding Greater London and Northern Ireland. • The proportion of people using AAS who were women was low (5%). • The most plausible estimates of the likely range for the number of men (aged 15-64 years) who use AAS were: • between 328,000 and 687,000, preferred by 59% of panel members, or • between 289,000 and 569,000, preferred by 35% of the panel members. Participants indicated a high level of confidence in this research approach to estimating the levels of AAS use in the UK. **WP2)** A scoping review of the UK IPED literature identified 87 relevant publications, nearly half of which (41 publications) had a focus on public health (including harm reduction). The varied motivations and characteristics of people who use IPEDs featured in over a third of the publications, highlighting risk behaviours including the additional use of psychoactive drugs. No effectiveness evaluations related to interventions (prevention, treatment, harm reduction or support for cessation of use) were published during the review period.

	WP3) In total 35 services that were providing one or more interventions aimed at preventing, delaying, and/or reducing harm from IPEDs were identified in the UK; twenty-four in England, eight in Scotland, and three in Wales (none identified in Northern Ireland). A range of interventions were identified, most commonly, the provision of specialist information. The majority of services were delivered by the major UK service providers (57%) rather than independent services. Several services reported an impact of the Covid pandemic on dedicated IPED clinics and outreach services, with the intention to recommence services in the future. Five services included IPED Champions (i.e., individuals identified to raise the profile, knowledge and understanding of IPEDs in the organisation), two services providing a training package for staff to optimise intervention delivery amongst the IPED client group, and one service offering an initial appointment detailing safer injecting techniques. **WP4)** In total, 51 factors were identified as important influences on harmful IPED use and formed the components of the system represented in the map https://www.anabolicsteroids.org.uk/influences-on-harmful-image-and-performance-enhancing-drug-use/. These were grouped into nine themes to support our understanding of the system and its presentation: identity, cognitive processes, beliefs about risk and harm, health and wellbeing, social environment, beliefs about healthcare, health professionals, services and interventions, and the IPEDs market. The map demonstrates the complexity of this system with many influential factors across the socioecological spectrum acting on IPED users in different settings and at different times. The impact of these factors will vary according to individual characteristics such as risk appetite, beliefs, priorities, cognitive skills, and sense of identity. It highlights how we can think about these factors as part of a connected system rather than separate issues to be addressed individually through interventions.
Conclusions and Recommendations	Together the findings from the four WPs provide evidence of the complexity of IPED use in the UK and the required responses to it. The geographical variations and extent of hidden populations of people who use a range of different drugs, and the range of factors across the socioecological spectrum influencing users in different ways that contribute to harmful use, complicate the provision of interventions and services on which we currently have little evidence. There are few specialist services targeting this population, for which we have a plausible estimate of prevalence at between 328,000 and 687,000 men. While large numbers of people who inject IPEDs are attending NSPs in the UK, there are many more who do not. Interventions offered are currently limited in aims and approach, and there are no effectiveness evaluations of interventions aiming to prevent or delay initiation of drug use, reduce or mitigate harms, or support cessation in the UK. To reduce harmful IPED use this study establishes the need for a range of effective methods of engagement with IPED users, for example, through assertive outreach and effective engagement with key members of the IPED communities and improving the quality of experiences when accessing generic healthcare services. It supports the need for new interventions to tackle a wider range of harms, while maintaining the prevention of blood borne virus transmission and rigorous evaluations of existing interventions that include consideration of the complexities identified in the system.