

Investigating the application and efficacy of interventions to prevent muscle enhancement drug use.

Rationale

Evidence in the UK suggests that use of anabolic steroids and other muscle enhancing substances is increasing amongst the general population. The association between these substances, and other drugs used for performance enhancement, with professional sports is long-established and there are established anti-doping initiatives aimed at reducing use of these substances in the field of professional sports. For professional athletes decisions to use any drug for performance enhancement is likely to include consideration of material, financial and social benefits; legal and social sanctions; and moral and ethical issues that are specific to professional sport. Consequently, behaviour change interventions are likely to require a very different focus when aimed at the general population.

Use of these substances is associated with a variety of negative outcomes including physical, psychological and behavioural harms. To design effective behaviour change interventions to reduce use of muscle enhancement drugs it is important to identify not only examples of interventions that may be effective, but the mechanisms through which they work. This review will identify and synthesise the available evidence on the provision of interventions to prevent or reduce use of muscle enhancement drugs amongst the general population. It will identify the characteristics and theoretical basis that interventions are based upon and their association with intervention effectiveness.

Review questions

1. What interventions have been undertaken to prevent, or reduce use of, muscle enhancement drug use in the general population?
2. What are the characteristics of these interventions and what behaviour change techniques are they based upon?
3. What are the theoretical bases underpinning interventions and how have theories been selected and utilised?
4. How are intervention characteristics and behaviour change theories or techniques associated with intervention effectiveness?

Inclusion/ Exclusion criteria

Population

Studies including populations such as young people, gym users, competitive and non-competitive bodybuilders and those involved in training to increase strength or muscle, gay men, prisoners, amateur athletes and individuals accessing drug services will be eligible for inclusion. The review will include evidence on all individuals at all stages of muscle enhancement drug use including before initiation, occasional users and long-term users.

Intervention and controls

Any intervention designed to prevent or reduce the use of muscle enhancing substances will be considered for inclusion. These will include interventions set within a range of settings such as, but not limited to, schools and other education settings, gyms and sports clubs, criminal justice settings and drugs services. Wider drugs prevention interventions will be considered for inclusion, but only where outcomes relating to muscle enhancing drugs are included.

Interventions targeting professional sportsmen or women will not be included in this review due to the anticipated limited applicability of these initiatives to the general population. Interventions that aim to improve health (e.g. interventions to improve body image) that do not aim to reduce the use of, or report on outcomes relating to, muscle enhancing drugs will be excluded.

Interventions will be compared to any alternative intervention or no intervention comparisons.

Outcomes

To be eligible for inclusion in the review, articles will report the primary review outcome of intervention impact on the use of muscle enhancing drugs. This may include the prevalence, frequency, cessation, initiation or injection of drug use, or intentions or attitudes regarding drug use. Secondary outcomes will include knowledge of muscle enhancing drugs and outcomes relating to participants body image/ body satisfaction; harm reducing behaviours and the uptake of alternative strategies to muscle enhancement drug use. Additionally, outcomes such as resistance skills, negotiation skills and social support will be included where they are linked with muscle enhancing drug use.

Design

Any studies with a comparison group will be considered for inclusion. This may include randomised controlled trials, cohort studies, case-control studies, and controlled before and after studies.

Search strategy

A comprehensive search strategy will be developed to search within the bibliographic databases MEDLINE, PsycINFO, sports discus, the Social Science Citation Index and Conference Proceedings Citation Index, and the Cochrane Library. Searches will be restricted to studies published since January 1995. Key terms will be developed in the context of review inclusion criteria relating to anabolic steroids, settings, and outcomes. The search terms will be developed based upon the review inclusion criteria:

Search concept	Search terms
Participants/ context	School, education Body building, weight training, weight lifting, resistance training, power lifting Sport, athletic, fitness, gym Prison, jail, detention centre, prisoner, offender Gay, homosexual, LGBT Addiction to exercise/ training/ physical activity Muscle dysmorphia
Outcomes	Anabolic steroids, anabolic androgenic steroids, IPEDs, PIEDs, PEDs, Performance enhancing drugs/ substances

	Muscle enhancing drugs/ substances Doping
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The reference lists of included articles will be scanned to identify any potentially relevant articles not picked up through the database search. Additionally, searches for grey literature will be carried out in the publication lists of key organisations including the Advisory Council on the Misuse of Drugs, US Anti-Doping Agency, UK Anti-Doping, Druginfo (Australian Alcohol and Drug Foundation) and the US National Institute on Drug Abuse; and through consultation with topic experts.

Following the initial search, a targeted search for articles supplementary to included articles will be carried out. This will increase the opportunity to identify methodological and theoretical detail relating to the interventions in included articles. This will include citation searching and searching using author or programme names relating to articles included in the review.

Titles and abstracts of articles identified through the literature search will be downloaded into EndNote and assessed against the review inclusion and exclusion criteria. For articles assessed as being potentially relevant at the title and abstract screening stage, full text articles will be downloaded and assessed again against inclusions and exclusion criteria. At both title and abstract and full text screening, all studies will be reviewed by one researcher with a random sample of at least 10% independently reviewed by a second researcher.

Assessment of methodological quality

All included studies will be assessed using criteria set out in the Effective Public Health Practice Project quality assessment tool (Effective Public Health Practice Project (EPHPP), 2009) by one researcher. This tool has been judged to be suitable for use in systematic reviews of effectiveness, and can be used to assess the quality of randomised controlled trials (RCTs), quasi-experimental studies and uncontrolled studies (Jackson and Waters, 2005). A second researcher will independently review a random sample of at least 10%.

Data extraction

Data will be extracted from articles included in the review into a pre-designed form in Microsoft Access by one researcher with a random sample of at least 10% independently reviewed by a second researcher. Data to be extracted includes details of participants, baseline data, the analytical approach and study outcomes. Data relating to the characteristics of interventions to be extracted will include intervention content; duration, length and frequency; setting; delivery method and deliverer details. Relating to the theoretical bases of interventions it will be recorded whether any specific theories have been utilised relating to intervention development and delivery, using the coding scheme developed by Michie and Prestwich (2010). Behaviour change techniques applied in the interventions identified will be identified and grouped according to Michie and colleagues' (2013) Behaviour Change Technique Taxonomy.

Synthesis

The results of data extraction and quality assessment will be presented in structured tables and as a narrative summary. Intervention characteristics, the identified theoretical bases for interventions and the behaviour change techniques the interventions applied will be summarised in structured tables. Intervention effectiveness relating to review outcomes will

be presented, and explored in the context of intervention characteristics and techniques, and theoretical bases. Meta-analysis of findings will be considered if appropriate data is identified, with sub groups to be analysed including commonly utilised theories and behaviour change techniques, and intervention mode of delivery. The aim will be to examine the impact of intervention characteristics on intervention effect sizes to inform the recommendations regarding the development and characteristics of future behaviour change interventions.

Review team

Person	Role
Geoff Bates	Lead the development and production of the review including all parts of the review process
Lisa Jones	Provide methodological advice and support on the development and direction of the review; contribute to synthesis of evidence; review drafts of the review
Jim McVeigh	Support the identification of evidence and contribute to the development of conclusions and recommendations; review drafts of the review
David Tod	Contribute to the development of conclusions and recommendations; review drafts of the review
Conan Leavey	Contribute to the development of conclusions and recommendations; review drafts of the review
Lisa Newson	Contribute to the development of conclusions and recommendations; review drafts of the review
Emma Begley	Contribute to study selection, data extraction and assessment of study quality; review drafts of the review

Search strategy (MEDLINE EbscoHost)

	Search Terms	# results
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 1995-2016; Human	4,646