Investigating the impact of COVID-19 on performance and image enhancing drug use

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Abstract

Background

Emerging research has suggested that the COVID-19 pandemic has had some impact on substance use patterns. The aim of the study was to conduct a rapid survey to assess the impact of COVID-19 on performance and image enhancing drug (PIED) use and training, and any subsequent negative physical or mental health outcomes.

Methods

During 2020, a convenience sample of 60 PIED consumers (mean age = 26.69; 68.3% located outside Australia) completed a quantitative anonymous online survey exploring how the coronavirus pandemic impacted patterns of PIED use and associated exercise habits. The survey was administered via the Qualtrics platform and distributed online through PIED forums as well as through the investigator's networks. Participants were asked about their PIED use and exercise habits prior to and during restricted movement ‘lockdowns’.

Results

Pre-COVID, the majority of the sample opted to ‘blast-cruise’ (an initial high dose, followed by a lower maintenance dose; 71.7%, n = 43). During lockdown, (45%, n = 27) reported a change in PIED use as a result of the restrictions. In light of health concerns during COVID-19, a majority of men (60%, n = 36) did not take any extra precautions relating to their PIED use. A subgroup of men ceased using PIEDs completely (16.7%, n = 10) with the majority (80%, n = 8) of that subgroup following post-cycle therapy (PCT) of some kind.

Conclusions

This study contributes to the emerging literature of the impact of the COVID-19 pandemic on substance use, specifically PIED use among men. The results suggest that the pandemic did influence the choice of PIEDs that participants consumed, although there was little disruption to patterns of exercise, an important aspect of PIED use. Of the men who did cease use completely, the majority reported little issue with PCT access; those who reported difficulty accessing PCT compounds indicated experience some mental health concerns related to ceasing their PIED use. Clinicians and those who come into contact with this group should be alert for any negative physical or mental health concerns resulting from disrupted or ceased PIED use.

Background

The COVID-19 pandemic has caused significant worldwide disruption to almost all aspects of daily life. As the SARS-CoV-2 virus began to rapidly circulate around the world, governments of all levels were forced to enact strict interventions aimed at disrupting the virus's spread, including closing borders, shutting businesses, and restricting social interactions. Many of these restrictions occurred with little notice to the population, with travellers caught stranded in foreign countries as borders closed; businesses orienting to online sales; schools and universities pivoting to online learning; and some industries shutting completing. Faced with disruptions of indeterminant length, populations were forced to quickly adapt. The shift to working at home, as well as increased stress, led to concerns about an increase the purchase and consumption of alcohol (1). However, since the commencement of the pandemic, there has been a concentrated focus on anticipated changes in illicit substance use. There is good reason for this; drug markets can be disrupted by significant events (2), with changes in price, purity, and availability influencing the types of drugs used, and the patterns in which they are used. This in turn can have an impact on the harms experienced, as well as help seeking behaviour.

Emerging research has suggested that the pandemic has had some impact on substance use. Research with frequent psychostimulant uses in Australia found that consumers reported either no change or a reduction in their substance use, with reductions in MDMA use mostly related to reduced opportunities to socialise (3). An audit of illicit drug-related presentations to an emergency department found a decrease in presentations during COVID compared with pre-COVID (4). Greater concern has been given to those already living with a substance use disorder and in some form of treatment, given the disruption caused to accessing treatment and harm reduction services, however some research suggests that this group may have experienced fewer consequences than anticipated; one Austrian study with patients in opioid substitution treatment found that while this group did experience difficulties, these were less severe than expected (5). It is important to recognise that in all instances, these findings reflect the differing situations in the countries where the research was conducted, as well as the specific populations under investigation. For instance, a study exploring the impact of lockdowns and social distancing on people who use drugs by analysing social media posts found that these restrictions led to some people experiencing forced or intentional withdrawal, as well as impacting their ability to access take-home medication (6).

Of interest to the current study was the impact of mass restrictions on the use of performance and image enhancing drugs (PIEDs), the collective term used to refer to substances which are used to enhance sporting or athletic performance and/or for enhancing body image. The most well researched PIED is anabolic-androgenic steroids (AAS), a group of hormones that possess both anabolic properties, which causes muscle growth and fat loss, and androgenic properties, which causes such masculinising effects as voice deepening and facial hair growth but have been used non-medically for several decades in bodybuilding, fitness, and sporting populations for their growth promoting-properties. Unlike other recreationally used substances (e.g. MDMA, 'ecstasy'), the effects of most PIEDs are not felt instantly; they often take several weeks to be metabolised by the body and for the desired effects to be noticed. In the case of AAS, the body shuts down its own testosterone production in the presence of exogenous testosterone, which may take several weeks. Consequently, it may take some time, up to several years, for

the body to start producing testosterone again once a person ceases exogenous AAS use. Due to this lag-time, people who use these substances will plan their use to coincide with a time when the desired effects will be optimal, such as a bodybuilding competition. A specific regime of substances may be used to help lose body fat and to promote muscle growth, and to assist the body 'kick start' its own production of these hormones once this regime is finished. Given the nature of how PIEDs are used, the closure of borders, restrictions of movement and social interactions, as well as the closure of many gyms and other fitness institutions may have impacted PIED supply and use. Most PIEDs are purchased from those known to the consumer (7), such as friends and others in the fitness industry, and most PIEDs are manufactured from raw materials which are purchased from countries such as China. Border closures may have disrupted drug importations; research investigating border seizures in the United States found an immediate decrease in cannabis and methamphetamine seizures in April 2020 which then increased in August 2020 (8), and research suggests that there were also disrupted illicit drug transactions on the dark web (9), which are still impacted by normal market forces (10). As such, PIED consumers may have had their supply disrupted with little or no notice, which could lead to negative physical and mental effects.

To our knowledge, only one other study has explored the impact of COVID-19 on PIED use. Zoob Carter, Boardley & van de Ven (11) found that strength athletes using non-prescribed AAS perceived an impact of the pandemic on their AAS use and/training, with significant reductions in training frequency and AAS dose compared to pre-pandemic, and while there were some short-term effects on mental health, these did not appear to be long lasting. The aim of the study was to conduct a rapid survey to explore assess the impact of COVID-19 on PIED use and training, and any subsequent negative physical or mental health outcomes.

Methods

Procedure

An online survey was used explore how the coronavirus pandemic impacted peoples' exercise habits and their use of PIEDs. A convenience sample was recruited via advertisements on various social media platforms, such as bodybuilding and PIED-related subreddits on reddit.com and other online forums that were dedicated to those topics. The study was also advertised in the 'Drug Studies' thread on the Bluelight.org website. A link to the survey was posted on the authors' social media accounts, as well as forwarded to author contacts within the fitness industry. The second author also discussed the survey on several podcast interviews, and a link to the survey was available in those episodes' show notes. The advertisement outlined the purpose of the study and invited those who use PIEDs such as AAS (e.g., Testosterone, Nandrolone, Trenbolone), peptides (GHRP-6, Hexarelin, IGF-1), and hormones (Human growth hormone, insulin) primarily to enhance performance and/or appearance through promoting muscle gain and/or fat loss to complete a short survey, with the link provided to the main survey page. This page contained more detailed information about the study, including all relevant ethical information and the consent process. Apart from the eligibility criteria stated above, an additional criterion was that

people under the age of 18 years of age should not participate. The survey was available from July 2020 to December 2020.

After confirming their consent, participants completed the survey which contained four sections: Sect. 1 contained demographic questions; Sect. 2 contained questions about exercise habits in the four weeks prior to the COVID-19 lockdown (with participants being told that 'lockdown' referred to the "instance where most business, including gyms, were required to shut by their Government in response to the COVID-19 pandemic"); Sect. 3 contained questions about the participant's normal PIED use; and Sect. 4 contained questions about exercise habits and PIED use during lockdown. The survey was pilot tested prior to launch by 2 consumers known to the second author. Minor alterations were made, such as the inclusion of some demographic questions.

Participants in Australia who completed the survey were offered the opportunity to go into the draw for one of five AUD$20 gift vouchers for an online supplement supplier.

Data Analysis

Data were exported from the Qualtrics platform and analysed using IBM SPSS Statistics 27. Initially, the data consisted of 87 participants however 27 of these were incomplete or had upwards of 60% data missing at random on key variables. There was no data imputation used. Following data cleaning, data were analysed for frequency of distribution and further descriptive analyses were performed.

Ethical approval

was granted by the Deakin University Human Research Ethics Committee.

Results

Participants were 60 men (Mean age = 26.69, SD = 6.57) who identified as primarily heterosexual (95%, n = 57) with the remainder identifying as bisexual (3.3%, n = 2) or queer (1.7%, n = 1). A large portion of the sample resided outside Australia (68.3%, n = 41); Australian participants resided in Queensland (16.7%, n = 10), Victoria (6.7%, n = 4), New South Wales (6.7%, n = 4), and South Australia (1.7%, n = 1). Of these men 11.7% (n = 7) had competed in a bodybuilding competition.

Activities pre-COVID

The men in this sample were generally involved in weight training with 60% (n = 36) reporting involvement in weight training and cardio but primarily weight training, 33.3% (n = 20) reporting involvement in weight training with minimal cardio, 5% (n = 3) reporting weight training and cardio but primarily cardio, and 1.7% (n = 1) reporting cardio with minimal/no weight training. The most common training volume for these men was four or more days per week (95%, n = 57) which occurred at either a commercial gym (51.7%, n = 31), home gym (23.3%, n = 14), a local non-commercial gym (15%, n = 9), outdoor training (5%, n = 3) private studio (3.3%, n = 2), or a friend's home gym (1.7%, n = 1). Most men in this group opted for training

by themselves (91.7%, n = 55) rather than a group (8.3%, n = 5), with some men reporting having a coach/personal trainer (13.3%, n = 8) and training/preparing for a competition (20%, n = 12). In terms of training goals, 38.3% (n = 23) of men were aiming to add mass ('bulking'), 33.3% (n = 20) were reducing body fat ('cutting'), and 28.3% (n = 17) were in a maintenance phase.

With respect to PIED use, a majority of the sample opted to 'blast-cruise' (an initial high dose, followed by a lower maintenance dose; 71.7%, n = 43) as opposed to 'cycling' (using a dose for a defined period, then ceasing to use for a defined period; 28.3%, n = 17). Regarding the actual PIEDs used, these are presented in Table 1. In acquiring these compounds, a large proportion opted to do so online (51.7%, n = 31) and the darkweb (10%, n = 6), with 18.3% (n = 11) sourcing from a friend, 13.3% (n = 8) sourcing from a dealer, and 15% (n = 9) sourcing through other means. A small subgroup of men were tapering these compounds coming up to a bodybuilding show (8.3%, n = 5).

Table 1
Frequency of PIED use Pre-COVID.

PIED	Frequency
Boldenone	14 (23.3%)
Masteron	10 (16.7%)
Primobolan	3 (5%)
Nandrolone	8 (13.3%)
Stanazolol (Inj)	8 (13.3%)
Testosterone	42 (70%)
Trenbolone	17 (28.3%)
Turinabol	1 (1.7%)
Halotestin	1 (1.7%)
Proviron	5 (8.3%)
Dianabol	15 (25%)
Anavar	17 (28.3%)
Anadrol	8 (13.3%)
Stanazolol (Oral)	7 (11.7%)
Clenbuterol/Albuterol	10 (16.7%)
Thyroid Hormones (T3/T4)	3 (5%)
Insulin	5 (8.3%)
Human Growth Hormone	6 (10%)
IGF-1	3 (5%)
Peptides	6 (10%)
Prohormones	5 (8.3%)
SARMs	4 (6.7%)

Activities during COVID

During the COVID-19 restrictions there were some shifts in the sample's general activity. For example, 16.7% (n = 10) stopped training altogether, with an increasing representation of cardiovascular activity among the sample (18.4%, n = 11). Of the men that continued to train, the sample stated that their training intensity decreased (31.7%, n = 19) or stayed the same (13.3%, n = 8), with some reporting an

increase (15%, n = 9). There was a minor shift in the number of days those men were training with a larger proportion reporting under 4 days (13.4%, n = 8) while the remainder reported between 4 (6.7%, n = 4) and 7 (8.3%, n = 5) days of training; the largest proportion was still training between 5–6 days (25%, n = 15). The men that continued to train reported predominantly doing so in a home gym (35%, n = 21) or outdoors (6.7%, n = 4).

Two-fifth (45%; n = 27) reported a change in PIED use as a result of the restrictions, with 5% (n = 3) reporting this to be a result of difficulty in compound access. Reasons given by participants for this difficulty included increased post volume by postal services resulting in longer delivery times (e.g., 3 weeks for one participant's package to arrive). Another participant mentioned that due to difficulty in access they decided to drop back to a 'cruising' dose of testosterone. In light of health concerns during COVID-19, a majority of men (60%, n = 36) did not take any extra precautions relating to their PIED use (e.g., sterilising vials, not reusing needles) although some reportedly did (16.7%, n = 10). In terms of changes around compound access and sourcing, a majority reported no change in price (60%, n = 36) or quality (56.7%, n = 34). Lastly, 53.3% (n = 32) reported no issues with accessing needle and syringe programs.

A subgroup of men ceased using PIEDs completely (16.7%, n = 10) with the majority (80%, n = 8) of that subgroup following PCT of some kind. Of this subgroup a large proportion reported their use of alcohol and other drugs to change (80%%, n = 8). Half of the subgroup (50%, n = 5) reported issues accessing PCT compounds which were predominantly associated with peer networks (n = 1) or peer networks and GP refusal (n = 4). A small number of this subgroup (30%, n = 3) reported experiencing negative health effects as a resulting of PIED cessation. Two participants reported the common issues which arise as a result of sudden AAS cessation – e.g., depressed mood, little energy, and low libido. One participant expressed that their mental health declined significantly and experienced a number of symptoms such as depression, lethargy, anxiety, panic attacks, and suicidal ideation.

Discussion

The COVID-19 pandemic has disrupted almost all facets of daily life. Of concern has been how this pandemic has shifted substance use habits. The focus of this study was to explore whether the initial restrictions imposed on movement, such as the closure of gymnasiums, impacted PIED use. Physical activity, and specifically weight training, is psychologically and physically beneficial (12, 13). To achieve a mesomorphic body ideal, individuals adhere to a weight training program and diet that promotes lean muscle mass. The increase in weight training, protein consumption, and supplement use is generally considered to form the foundation for increased risks of the use of PIEDs (14). Therefore, it is unsurprising that this sample group showed commitment above and beyond what would be considered normal in keeping with their training volume/program during a period of lockdown. Certainly, the fact that such a small subgroup stopped training completely (16.7%, n = 10) speaks to the dedication of this group. Although some men reported cessation of PIED use, the training volume reflects an ongoing commitment in spite of large-scale lockdown and societal restructure as a whole.

Although the effect of the pandemic on general measures of participant characteristics was not obvious, the fact that almost half the sample reported changes in their PIED use as a result does warrant mention. Almost half of the sample reported changes in the way they used PIEDs; however, these changes were more commonly changing from a blasting dose (e.g., 1 gram of testosterone enanthate per week) down to a cruising dose (250mg of testosterone enanthate per week). Participants reported these changes were related to changes in training goals and not necessarily related to compound access. A small subgroup (16.7%, n = 10) did report cessation of PIED use completely, although a majority of these men followed post-cycle therapy (PCT) of some kind and did not report experiencing harms. PCT is an important feature of PIED use, and refers to the period when the consumer is no longer using (also known as an 'off cycle'). Consumers may access PCT for a variety of reasons, such as to minimise any loss of muscle or strength gained through their PIED cycle; because they are concerned that they were no longer naturally producing hormones; or because they are concerned about their mental health, particularly when coming 'off cycle' (15). Some men reported to issues with PCT access and, therefore, reported some mental health issues and harm associated with mood changes related to hormone fluctuation. Clinicians and other healthcare providers, including general practitioners, should be aware of the negative effects that may arise from ceasing PIED use, especially if the consumer lacks access to PCT.

The lack of impact of the COVID-19 pandemic on PIED use aligns with other trends in the alcohol and drug space. The data supports the notion that COVID-19 did not impact PIED access as a result of increased utilisation of online and dark web networks by consumers. Furthermore, participants reported negligible changes in price and purity/quality of compounds. The fact that a majority of men continued using PIEDs speaks to the prevalence of online markets in facilitating access to these compounds. In this way, the ease of access highlights a pseudo-protective effect by allowing the men in this study to maintain cruising doses of AAS, perhaps placing less pressure to restructure their compound use entirely which, in turn, may mean addressing underlying issues of their PIED use – reportedly best done in an environment conducive to harm reduction and not subject to external pressures (16).

Limitations

There are limitations to the current study. Firstly, the online nature of project lends itself to response bias, in that those who completed the survey may be different to those who did not. The characteristics of the sample suggest that this is a group highly engaged in the PIED consuming and fitness/bodybuilding community, who may differ from those who are less engaged in PIED use or those who train less frequently. That is not surprising, given the recruitment method, but it does suggest that perhaps this is a group for whom disruptions to general supply chains or the closure of gymnasiums poses little disruption to their individual circumstances. For those who rely on purchasing PIEDs from a close contact, such as a personal trainer or a friend, restrictions may have posed more of a challenge. Secondly, the sample size is lower than what the research team had anticipated. Recruitment was done through a variety of avenues, such as through personal contacts as well as a variety of online forums. Recruitment did occur commence in July 2020, when many countries were undergoing severe disruption, and it could just be the case that participants were concerned more the daily disruptions occurring in their lives. Research may

wish to explore this period of time and the impact of lockdowns on PIED use now that countries are starting to open up and recruitment may be more fruitful.

Conclusions

This study contributes to the emerging literature of the impact of the COVID-19 pandemic on substance use, specifically PIED use among men. The results suggest that the pandemic did influence the choice of PIEDs that participants consumed, although there was little disruption to patterns of exercise, an important aspect of PIED use. Of the men who did cease use completely, the majority reported little issue with PCT access; those who reported difficulty accessing PCT compounds indicated experience some mental health concerns related to ceasing their PIED use. Clinicians and those who come into contact with this group should be alert for any negative physical or mental health concerns resulting from disrupted or ceased PIED use.

Abbreviations

AAS Anabolic-androgenic steroids

GHRP-6 Growth hormone-releasing peptide 6

IGF-1 Insulin-like growth factor 1

PIEDs Performance and image enhancing drugs

Declarations

Ethics approval and consent to participate: Ethical approval was granted by the Deakin University Human Research Ethics Committee 2020-264.

Consent for publication: Not applicable.

Availability of data and material: The data analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: Both authors conceived and designed the study, developed the survey, analysed the data, and contributed to the writing of the manuscript. Both authors reviewed and approved the final manuscript.

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References

1. Moodie R, Soller T. Australia's COVID-19 relationship with booze Melbourne, Australia: The University of Melbourne,; 2020 [Available from: https://pursuit.unimelb.edu.au/articles/australia-s-covid-19-relationship-with-booze.
2. Dietze PM, Peacock A. Illicit drug use and harms in Australia in the context of COVID-19 and associated restrictions: Anticipated consequences and initial responses. Drug Alcohol Rev. 2020;39(4):297–300.
3. Price O, Man N, Bruno R, Dietze P, Salom C, Lenton S, et al. Changes in illicit drug use and markets with the COVID-19 pandemic and associated restrictions: Findings from the Ecstasy and Related Drugs Reporting System, 2016–2020. Addiction. 2021.
4. Marais C, Soderstrom J, Fatovich D. Comparison of illicit drug-related presentations to the emergency department: Pre-COVID versus COVID. Emerg Med Australas. 2020;32(5):901.
5. Fuchs-Leitner I, Yazdi K, Gerstgrasser NW, Rosenleitner J. Developments in Drug Addiction During COVID-19-An Austrian Perspective Based on a Clinical Sample. Front Psychiatry. 2020;11:602033.
6. El-Bassel N, Hochstatter KR, Slavin MN, Yang C, Zhang Y, Muresan S. Harnessing the Power of Social Media to Understand the Impact of COVID-19 on People Who Use Drugs During Lockdown and Social Distancing. J Addict Med. 2021.
7. van de Ven K, Dunn M, Mulrooney K. Performance and image enhancing drug (PIED) producers and suppliers: a retrospective content analysis of PIED-provider cases in Australia from 2010–2016. Trends in Organized Crime. 2020;23:143–53.
8. Palamar JJ, Le A, Carr TH, Cottler LB. Shifts in drug seizures in the United States during the COVID-19 pandemic. Drug Alcohol Depend. 2021;221:108580.
9. Bergeron A, Décary-Hétu D, Giommoni L. Preliminary findings of the impact of COVID-19 on drugs crypto markets. Int J Drug Policy. 2020;83:102870.
10. Barratt MJ, Aldridge J. No magic pocket: Buying and selling on drug cryptomarkets in response to the COVID-19 pandemic and social restrictions. Int J Drug Policy. 2020;83:102894.
11. Zoob Carter BN, Boardley ID, van de Ven K. The Impact of the COVID-19 Pandemic on Male Strength Athletes Who Use Non-prescribed Anabolic-Androgenic Steroids. Frontiers in Psychiatry. 2021;12(305).
12. Folland JP, Williams AG. The adaptations to strength training: morphological and neurological contributions to increased strength. Sports Med. 2007;37(2):145–68.
13. Schneider C, Rollitz L, Voracek M, Hennig-Fast K. Biological, Psychological, and Sociocultural Factors Contributing to the Drive for Muscularity in Weight-Training Men. Front Psychol. 2016;7:1992.
14. Sagoe D, Andreassen CS, Pallesen S. The aetiology and trajectory of anabolic-androgenic steroid use initiation: a systematic review and synthesis of qualitative research. Subst Abuse Treat Prev Policy. 2014;9:27.

15. Griffiths S, Henshaw R, McKay FH, Dunn M. Post-cycle therapy for performance and image enhancing drug users: A qualitative investigation. Performance Enhancement & Health; 2016.
16. Piatkowsky TM, Hides LM, White KM, Obst PL, Dunn M. Under Review.