PSYCHOSOCIAL FACTORS FACILITATING USE OF PERFORMANCE AND COGNITIVE ENHANCING DRUGS IN SPORT AND EDUCATION

by

ANDREW ROBERT HEYES

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School of Sport, Exercise and Rehabilitation Sciences

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Dedicated to my sister, Jenny Walker

1983-2018

Abstract

Identifying psychosocial factors that may influence illicit performance enhancement is important given societal concerns such as health, legality, and fairness. Two areas of concern are performance enhancing drug (PED) use in sport and cognitive enhancement (CE) in education. Grounded in Bandura's (1991) social cognitive theory of theory of moral thought and action this thesis aimed to investigate psychosocial factors facilitating use of performance and cognitive enhancing drugs in sport and education. Study 1, a scoping review of 30 studies, was conducted to assess the research related to potential rationalisation and justification as well as motivations and attitudes towards CE. Study 2 qualitatively explored whether student users (n = 9, n_{female} = 1, n_{male} = 8) of CE evidenced moral disengagement (MD) when explaining their reasons for CE. Deductive analyses revealed the use of six MD mechanisms and through application of Bandura's (1991) theory, the investigation demonstrated how students may use MD to rationalise and justify their off-label use of stimulant drugs to support their academic studies. Study 3 sought to add to our understanding of the prevalence of both PED and CE use in the UK, by estimating the 12-month prevalence using indirect questioning methods to assess doping PED and CE. Student-athletes (n = 732; M_{age} = 20.08 ± 1.56 years; 55% female) from UK universities completed a questionnaire containing UQM and SSC measures of PED and CED use, counterbalanced for order. Direct questioning of PED and CED use was also assessed. For PED use, 12-month prevalence estimates were 14.02% (11.60-16.45) and 7.83% (0.00-16.54), respectively, using the UQM and SSC; direct questioning lifetime prevalence was 2.77% (1.57-3.96%). For CED use, 12-month prevalence estimates were 16.26% (13.78-18.73) and 7.00% (0.00-15.55), respectively, for UQM and SSC; direct questioning lifetime prevalence was 5.10%. The non-trivial prevalence estimates for PED and CED use in student-athletes within the UK should raise concerns for – and encourage action from – policymakers in universities and sport

governance. There was no significant difference between the use of the UQM and SSC technique though both appeared more appropriate for investigating PED and CED use than direct questioning. Study 4 utilised a latent profile analysis of student-athletes to provide an exploratory analysis via a person-centred approach to identify and characterise risk profiles for PED and CE drug use in student-athletes based on measures of doping MD, doping self-regulatory efficacy (SRE), empathy, anticipated guilt and self-reported doping. 732 (n_{female} = 400; n_{male} = 332) student-athlete participants were recruited with each participant completing a questionnaire assessing the aforementioned variables. The study identified a three-profile model: *The Reduced Risk* (0.47), *The Protected* (0.44), and *The At Risk* (0.10). *The Protected* profile combined high levels of doping self-regulatory efficacy and empathy with low doping MD and was significantly more likely to have higher levels of anticipated guilt and reduced reported doping in both contexts. *The At Risk* profile displayed lower levels of doping self-regulatory efficacy and empathy combined with higher levels of doping MD and were more likely to have lower levels of anticipated guilt and increased levels of reported doping. Finally, Study 5 consisted of a review of UK university institution policies relating to academic misconduct and drug policies was conducted to assess if and how universities regulated CE in education. All 174 registered bodies representing higher learning institutions in the United Kingdom were examined and not a single one considered or included CE as part of academic misconduct. The findings of the current thesis demonstrate that not only is PED and CE drug use in UK universities of some concern, but students also evidence the mechanism of MD when rationalising the use of CE and certain psychosocial risk profiles may influence the engagement in such doping behaviours. A greater understanding of psychosocial factors that facilitate such behaviour may be potentially useful in the development of prevention interventions while there are interesting considerations for policy in both contexts.

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Personal

You hear the stories before embarking on a PhD. You hear from current postgraduates about the turmoil and torture that they have gone through to complete their thesis. Despite wishing not to believe such, I've found many to be true and walked headfirst into the traps or pitfalls one sees signposted or humourised on Twitter. It has been a rollercoaster. Not just within the PhD but in my own life as well. Since starting back in 2015, I've experienced emotions from the highest of possible high to some incredibly dark, low moments. Subsequently, I want to take the opportunity to acknowledge several rather patient individuals who without their incredible support I would not have finished this thesis.

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I've written it now Jen. I promise to get a 'real' job soon.

Andrew

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Publications Emanating from the Thesis

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Presentations Emanating from the Thesis

Heyes, A. R. (2020, March 12). *What Does the Research Tell Us? Prevalence of Performance and Cognitive Enhancing Drug Use in UK Student-Athletes: Contrasting Estimates from Three Methods* [Conference presentation]. UK Anti-Doping's (UKAD) Clean Sport at the Front Line. Birmingham, UK.

Heyes, A. R., & Boardley, I. D. (2019, December 1). *Image and performance enhancing drug use: myth & reality* [Conference workshop]. BPS Pre-Conference Workshop. The Division of Sport and Exercise Psychology (DSEP) Annual Conference. Birmingham, UK. https://www.bps.org.uk/sites/www.bps.org.uk/files/Events%20-%20Files/BPS%20Pre-Conference%20Workshop%20Info%20for%20web.pdf

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Heyes, A. R. (2015, December). *Psychosocial factors facilitating doping in sport, exercise and education* [Conference poster]. School of Sport, Exercise and Rehabilitation, University of Birmingham Poster PGR Conference. Birmingham, UK.

Chapter 1: Introduction to Performance and Cognitive Enhancing Drugs

1.1 Introduction

Competition and the drive for performance excellence are facets of modern life. Pressurised environments often demand constant improvement with a focus on outcomes that may provide substantial rewards such as recognition or financial returns. Individuals may also find themselves in situations where they perceive they have fallen behind competitors or peers and require means to 'catch up'. Two contexts in which performance and outcome excellence play substantial roles are sport and education. In sport, elite performances are met with adoration from fans, the glorification of winning, and in many professional environments, considerable financial rewards. In academia, degree classifications may dictate the next steps one can take, be it entering the job market or continuing in academic study. In some vocational degrees such as medicine and dentistry, one's degree classification directly influences the geographical location for an individual's next stages of training, with certain areas and jobs being more desirable than others. The wish to improve and succeed means that individuals seek to enhance performance through a variety of means such as training in sport, or the hours of revision in academia (e.g., Abouserie, 1994; Petróczi et al., 2021). However, the focus on improving outcomes, productivity, or responding to real or perceived pressure to perform has led some individuals, and groups, to seek to advance through illicit or questionable means, to gain an advantage over peers and competitors (Backhouse et al., 2018; McVeigh et al., 2012; Møldrup & Rie Hansen, 2006; Petróczi & Aidman, 2008).

One method of enhancing performance, either physical or cognitive, is through the use of drugs (McVeigh et al. 2012; Møldrup & Rie Hansen, 2006; Petróczi & Aidman, 2008, etc.). In sport, this typically involves the use of performance enhancing drugs (PED), often

referred to as 'doping'[1]. However, doping in sport is not the only context illicit performance enhancing drug use behaviour is limited to. Alongside the increased competition in higher education (Musselin, 2018) and increased tuition fees in the UK coinciding with higher student expectations (Jones, 2010), there is growing interest in the use of substances and methods to cognitive enhance (CE). With student expectations and academia increasingly competitive and outcome focussed, a growing societal concern is the trend of students engaging in CE through the off-label use of prescription drugs (Hübner, 2021; McVeigh et al., 2012).

The interest in performance and cognitive enhancing drug use is not just limited to the academic literature. Doping in sport cases makes for regular news (e.g., BBC; 2021; Ingle, 2021) while it is not uncommon to see media articles highlighting the use of 'study drugs' during exam season (e.g., Dathan, 2021). Throughout this thesis, there is recurrent reference to two different contexts of substances used to enhance performance: performance enhancing drugs (PED) and CE[2]. Although several other terms are used within the literature, these will be the terms used throughout the thesis.

This introductory chapter provides background to both PED and CE, discussing common substances of use, harms related to use, prevalence, and the societal concerns regarding enhancement drug use. Following this, there is a discussion of the underpinning theory of the thesis, moral disengagement, and other potential antecedents such as empathy and self-regulatory efficacy. The final part of the introduction discusses the aims of the research programme and overall the structure of the thesis.

[1] Doping typically refers to the administration of drugs to enhance performance. More specifically, *doping* is defined as the occurrence of one or more of the anti- doping rule violations (WADA, 2021a).
[2] Another term used in the literature is pharmacological cognitive enhancement (PCE). When considering the illicit approach to CE, this is predominantly through the use of prescription stimulant medications used off-label to enhance cognitive capacities. As such PCE represents the off-label use of prescription medications for the purpose of augmenting cognitive abilities and improving academic performance. CE, CED, and PCE are used almost interchangeably within the literature. For consistency, the term CE is used in this thesis.

Performance enhancing drugs

Within sport, drugs that appear on the World Anti-Doping Agency (WADA) Prohibited List of Substances and Methods (WADA, 2021b) are controlled either in-competition, out of competition, or both. Athletes found with substances in their bodies, through a blood or urine sample, or in possession of such substances, may receive an Anti-Doping Rule Violation and risk being suspended from competing in sport for a set period. A substance or method is included, or considered for inclusion on the WADA prohibited list if it is determined that the substance or method meets two of the following three criteria (WADA, 2021a):

1. The substance or method, alone or in combination with other substances or methods, has the protentional to enhance or enhances sport performance.
2. The use of the substance or method represents an actual or potential health risk for the athlete.
3. WADA determines that the use of the substance or method violates 'the spirit of sport.'[3]

The key categories of substances and methods listed by WADA include: Anabolic agents; peptide hormones and growth factors; Beta-2 agonists; Hormone and metabolic modulators; Diuretics and masking agents; Manipulation of blood and blood components; Chemical and physical manipulation; Gene and cell doping; Stimulants; Narcotics; Cannabinoids; Glucocorticoids; and Beta-blockers. Appendix A2 provides a summary of on the categories of prohibited substances.

Cognitive enhancing drugs

CE has been defined, as the 'Use of any psychoactive drug by healthy subjects with the aim of enhancing cognitive abilities such as vigilance, attention, concentration or

[3] The spirit of sport is defined as "the ethical pursuit of human excellence through the dedicated perfection of each *Athlete's* natural talents." (WADA, 2021a, p13)

memory' (Franke et al., 2014a: p83). The importance of this topic is highlighted by the increased research attention paid to CE over recent years (Partridge et al., 2011; Partridge et al., 2012; Vargo et al., 2014; Vargo & Petróczi, 2016; Wolff & Brand, 2013). Different conceptualizations of CE have been proposed, for example Smith and Farah's (2011) description review of CE they refer to pharmaceutical substances for the purpose of CE as 'study drugs', whereas in other literature it this is referred to as pharmacological cognitive enhancement (e.g., Schelle et al., 2014). Within this thesis, the focus is narrowed to investigate prescription drugs used off-prescription for the purpose of enhancing cognitive abilities such as vigilance, attention, concentration, or memory.

Arguably the most used prescription stimulant medications used for CE purposes are amphetamine (e.g., Adderall), methylphenidate (e.g., Ritalin), and modafinil (e.g., Provigil) (De Jough, et al., 2008; Dietz et al., 2013a; Farah et al., 2004). Amphetamine and methylphenidate are typically prescribed for conditions affecting cognitive development, the most prominent of these being attention deficit hyperactivity disorder (ADHD), while modafinil is normally prescribed for narcolepsy (Joint Formulary Committee, 2021). Because of their use in the treatment of cognitive conditions, CE has become associated with presumed improvements to cognitive above the norm (i.e., when used by healthy adults). The following sub-section provides an overview of the common substances used for pharmacological cognitive enhancement.

1.2 Common substances used for cognitive enhancement[4]

This sub-section extends the introduction of CE to provide an additional overview of the specific substances, the mechanisms of action, the potential effectiveness of the

[4] The full breadth of the prohibited substances used as PEDs in sport is beyond the current thesis, as such a comprehensive text such as 'Drugs in Sport' is far better placed to provide coverage of substances and the many

substances used for CE, and some of the common concerns around harms associated with use.

Pharmacological Cognitive Enhancers

Pharmacological cognitive enhancers have been popular since the early to mid-1900s with Benzedrine, initially marketed as a decongestant inhaler, released by Smith, Kline, and French in 1934. The stimulant properties were recognised by the Allied and Axis forces during World War II with 'Pervitin' being distributed among Luftwaffe pilots (Ohler, 2016). Within the Allied forces, The British Royal Air Force officially authorised the use of Benzedrine in 1941, and when American soldiers landed in North Africa in 1942, they were also operating under the influence of half a million Benzedrine tablets, supplied by order of General Dwight D. Eisenhower (Ohler, 2016). It took until 1959 for the US Food and Drug Administration (FDA) to place controls on Benzedrine inhalers, making them available by prescription only (Morelli, 2021). However, it wasn't long before further uses of amphetamine were found. In 1960, under the brand name Obetrol, amphetamine mixed salts were approved by the FDA for exogenous obesity (Rasmussen, 2008). Although Obetrol was removed from the market in 1973, a reformulated Obetrol, with methamphetamine removed, was rebranded as Adderall and in 1996 was formally approved as a treatment for ADHD. Although Methylphenidate was first synthesised in 1944 it was a further decade before the substance was identified as a stimulant and drug. It was introduced into the US market in 1956 after the FDA approved it for use as a treatment for depression, senility, lethargy, and narcolepsy.

The use of methylphenidate as a treatment for ADHD began in the 1960s following the work of psychiatrist Charles Bradley and the use of psychostimulant drugs, such as

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complex concerns and process that run through doping in sport (Mottram & Chester, 2014). Appendix A Table A1 provides a summary of the categories of prohibited substances.

Benzedrine, on what was known as ‘maladjusted children’ (Bradley, 1950). As the understanding and acceptance of ADHD as a medical diagnosis progressed from the 1960s into the 1990s, the production and prescription of methylphenidate, under the brand name Ritalin, rose significantly. The most recent of the primary CEs used in academia, Modafinil, was approved for medical use in the United States in 1998 and in the UK in December 2002, having been originally developed in France by neurophysiologist and emeritus experimental medicine professor Michel Jouvet and Lafon Laboratories. Modafinil originated from the late 1970s invention of a series of benzhydryl sulfinyl compounds, including adrafinil, which was first offered as an experimental treatment for narcolepsy in France in 1986 (Minzenberg & Carter, 2008). Typically prescribed under the brand name Provigil (Joint Formulary Committee, 2021) the drug has gone on to receive increasing attention for its potential application as a CE in healthy individuals (Maier et al., 2018; Sahakian et al., 2015).

Regarding mechanisms of action, amphetamine and methylphenidate are stimulants that modulate the effects of dopamine, noradrenaline, and serotonin in the central nervous system. More specifically, the amphetamine salt Adderall is a stimulant that promotes noradrenaline releases and acts as an uptake inhibitor (Breggin, 1999). The active ingredients of Adderall, dextroamphetamine and levoamphetamine, play roles in the CNS and cardiovascular/peripheral system, respectively (Breggin, 1999). Although the mechanism of action of methylphenidate is less certain, evidence suggests the stimulants effects are similar to Adderall in that it acts as a dopamine and noradrenaline reuptake inhibitor. Both these neurotransmitters play a role in cognition via increasing arousal, alertness, formation and retrieval of memory, and attention and therefore increasing the transmitter activity will lead to such increased cognitive attributes. In turn, modafinil is a wakefulness-promoting agent (eugeroic) and is primarily prescribed for the treatment of narcolepsy (Joint Formulary Committee, 2021; Repantis et al., 2010), thus it does not come as a surprise that the drug is

used as a CE to promote wakefulness and alertness. However, there are some findings to suggest that the drug may also have an action on other cognitive capacities such as attention, memory, and learning (Sahakian et al., 2015) although the literature on this is equivocal. While the mechanism of action of modafinil is not fully understood, it is proposed to work as selective weak dopamine and noradrenaline reuptake inhibitor although its complex pharmacology has made its action somewhat uncertain in comparison to amphetamine and methylphenidate (d'Angelo, el a., 2017; Franke et al., 2017; Repantis et al., 2010). Appendix A1 provides an overview of the brand names often seen for the three substances, as well as information on pharmacological actions, clinical dosages, contraindications, and side effects.

Evidence for effectiveness

To provide some support for the attitudes held by users of CE towards effectiveness (Schelle et al., 2014), evidence from several meta-analyses does suggest CE substances can enhance cognitive performance in healthy individuals (Battleday & Brem, 2015; Repantis et al., 2010). That said, the perceptions of effectiveness held by users may exceed the actual effect of the CE substances (Repantis et al., 2010). Other reported subjective effects may enhance academic performance, with aspects such as confidence and motivation being described by CE using students (Vrecko, 2013). Despite this, research is still equivocal regarding CE effectiveness in healthy students using prescription stimulants off-prescription for CE (Sahakian et al., 2015).

In the Repantis et al. (2010) meta-analysis, methylphenidate was reported to have a positive effect on memory in healthy individuals, with the most prominent positive effect being spatial working memory, but no consistent evidence for any effects on attention and other executive functions. Evidence does suggest that modafinil may provide a CE effect in healthy individuals with Repantis et al. (2010) showing a moderate improvement in attention but no effect on memory, mood, or motivation. In the same meta-analysis, modafinil had a

positive effect on wakefulness, executive function, and memory but no effect on mood for sleep-deprived individuals. The positive effect on wakefulness is possibly not all that surprising given modafinil is a wakefulness agent normally prescribed for narcolepsy. The Battleday and Brem (2015) systematic review concluded that modafinil does provide genuine cognitive enhancing effects in healthy non-sleep-deprived individuals without serious side-effects. Beyond the meta-analysis of Repantis et al. (2010b), a 2016 meta-analysis by Marraccini et al. found ADHD prescription stimulants such as amphetamine or methylphenidate improved processing speed accuracy but had no effects on other areas of cognition such as planning or decision-making. Despite the possible 'encouraging' conclusions surrounding modafinil as a genuine cognitive enhancer (Battleday & Brem, 2015), there is limited understanding as to the long-term effects of regular modafinil use when taken in dosages exceeding clinically prescribed amounts. This makes it challenging to fully discern the likelihood of negative side-effects from prolonged or continued usage.

Risk of Harms related to CE

The use of substances specifically controlled as prescription-only drugs does raise questions and concerns around its use by healthy individuals such as long-term harms and whether adverse side-effects may outweigh any perceived beneficial or actual CE effects. This is particularly true in non-clinical, non-experimental settings in which there is likely to be a variety of dosages and frequency of use, and the sourcing of non-pharma grade substances may also be of concern (Corazza et al., 2014; Maher, 2008; Sahakian, 2015). Amphetamine and methylphenidate are classified as controlled drugs and therefore not available without prescription and there are some concerns surrounding the use of Concerta (methylphenidate) as it may be highly addictive at high doses (Joint Formulary Committee, 2021). In contrast, recent studies have so far suggested that modafinil has little potential for abuse and relatively few side effects (Mann & Sahakina, 2015). Although not considered

serious, some side-effects in the clinical administration of CE substances include agitation, insomnia, and headaches after acute doses, (e.g., Battleday & Brem, 2015; Franke et al., 2017). Studies of use in non-clinical settings suggest similar adverse effects (e.g., Hupli et al., 2016). However, in academic settings individuals may potentially see the adverse effects such as wakefulness or insomnia as a positive of taking such a substance to complete university work.

There are some concerns that certain behavioural practices of CE users may increase health risks. The technique of 'stacking', which involves polypharmacy or polysubstance use of more than two substances simultaneously, may increase the risk of harm (Savulich et al., 2017). While another concern is that many individuals source substances used for CE from the internet (Corazza et al., 2014; Maher, 2008; Sahakian, 2015). There are questions over the validity of the substances purchased, particularly if sourcing from the dark web in which there are concerns over the manufacture, supply, and limited regulatory control. Further concerns when using substances without prescription and/or clinical consultation with a medical professional means that individuals may be inadvertently using a substance that is contraindicated for other health issues they may have or have clinical interactions with substances they already use. An example of this is Modafinil, which may reduce the effectiveness of some hormonal contraceptives and possibly presents an increased risk of congenital malformations (Joint Formulary Committee, 2021). Appendix A1 is compiled primarily from the British National Formulary (Joint Formulary Committee, 2021) which provides useful and wide-ranging coverage of pharmacology and prescribing for such substances in a clinical setting.

1.3 Prevalence

Before considering the possible social concerns that surround the use of PEDs and CE, it is worth reflecting on our current understanding of the prevalence of such behaviours. Accurate prevalence rates are often difficult to determine, particularly for sensitive subjects such as individual drug use (Fisher, 1993; Warner 1965). A direct technique of assessing drug use, such as a simple survey question asking participants about use is thought to be susceptible to socially desirable responses, especially when assessing the prevalence of socially sensitive behaviours (Fisher, 1993; Warner, 1965). Both PED and CE use represent behaviours that have a variety of concerns surrounding them, with PED use banned in sport, and the use of prescription drugs off prescription being tightly controlled. In addition to this, investigations into PED and CE have often lacked standardisation with regard to definitions and this has resulted in a variety of substances assessed between studies (e.g., de Hon et al., 2015). This may be influenced by differing regulations between countries, particularly with CE substances (Dietz et al., 2013a; Dietz et al., 2013b).

One possible contributor to variation in prevalence estimates is whether direct or indirect assessment approaches were used. Direct questioning approaches have been used in many studies and require participants to openly report engagement in a behaviour. Survey questions that investigate subjects such as drug use, sexual behaviours, and information considered private (voting, income etc.) are usually considered sensitive. In essence, direct questioning may result in increased nonresponse or higher measurement errors of these subjects compared to others that are considered less sensitive. This could be for a variety of reasons, though Tourangeau et al. (2000) consider there to be three distinct meanings of the concept of "sensitivity". Firstly, intrusiveness. Here the question asked is taboo or not something usually open for everyday discussion. Secondly, the threat of disclosure and the worry of possible consequences of truthful disclosure if the information is accessed by a third

party. There may be possible repercussions to involvement in the sensitive behaviour. This may be of importance in sport, with the prohibited PED use being met with sometimes severe sanctions (WADA,2021). Finally, there is the extent to which a question elicits answers that are socially unacceptable or 'socially undesirable' (Tourangeau et al., 2000). Here context may play a role, as what is considered sensitive by one person, may not be by another. The question is sensitive when it asks for a socially undesirable answer. For example, a direct question about PED and CE use is potentially only sensitive to those that engage in the behaviour and are concerned about the social perceptions surrounding such behaviour. In contrast to direct questioning, indirect approaches introduce a randomisation task or uncertainty that overtly demonstrates anonymity to participants (Tourangeau & Yan, 2007). This approach ideally provides the participants with an assurance of anonymity and confidentially in their responses. Of importance, direct questioning techniques are thought to be more susceptible to socially desirable responses than indirect methods, especially when assessing the prevalence of socially sensitive behaviours (Fisher 1993; Warner 1965).

A logical starting point in assessing the prevalence of doping in sport would be the results of anti-doping tests via blood and urine samples. However, several issues exist. Chemical analyses of blood and urine samples cannot detect all the doping substances or methods open to athletes, yet even then test sensitivity, detection windows, and pharmacokinetics will influence whether substances can be detected (Hatton, 2007). The data for adverse analytical findings are published by WADA annually, with the percentage of 'findings' in doping test results fluctuating between 0.96 and 2.45% over the years (1987-2013; Stubbe et al., 2014; WADA, 2019). Prevalence estimates obtained through alternative techniques suggest the prevalence is likely higher. Within sport, de Hon et al. (2015) provided a review summarising the best available evidence that estimated prevalence of

doping in adult elite sport to be between 14 and 39%, with this estimation guided by indirect methods of prevalence and biological parameters.

Prevalence of PED use estimated in university level athletes is considered to be lower than that of elite level sport, with reported figures still of levels of interest, and potential cause for concern. Papadopoulos et al. (2006) used direct questioning methods to investigate the lifetime prevalence of PED use in university students across six European countries, finding on average 2.6% disclosed the use of PEDs. More recently, using direct questioning Blank et al. (2017) found the average past year use in Austrian university students to be 9.4%. Some studies have sought to investigate the prevalence use via indirect questioning. For example, Dietz et al. (2018a) reported past-year prevalence estimates for doping up to 22.5% in a sample of 1243 university students in Germany. In their investigation comparing two indirect methods, James et al. (2013) found that in 513 amateur athletes within the UK, PED use was estimated using two indirect methods, 19.8% using the single sample count method (SSC) and 58.4% using the unrelated question model (UQM), demonstrating how different estimation methods can lead to large discrepancies in values.

The literature on prevalence estimates for CE use in university students also varies widely. A systematic review conducted by Wilens et al. (2008) found that across 21 studies within the US, encompassing 113,000 university age participants, there was a past-year prevalence of between 5% and 35% for non-prescription stimulant use. Also, within the US, a review by Racine and Forlini (2010) found that a prevalence between 3% and 11% of students had used prescription stimulants off a prescription to improve academic performance. Within Europe, prevalence measured via direct questioning has ranged from 1.4% to 21.5% (Forlini et al., 2015; Lazuras et al., 2017; Maier et al., 2013; Schelle et al., 2015). Using the UQM, Dietz et al. (2013a) estimated a prevalence of 23.7% and 17.0%, respectively, for male and female students in Germany. However, it should be noted that CE

studies within Germany include over-the-counter caffeine tablets along with prescription stimulants which may lead to higher prevalence estimates. In the UK, lifetime prevalence estimates using direct questioning have ranged from 10% (Singh et al., 2014) to 19% (McDermott et al., 2020).

To further raise the issue in a more public sphere, media articles reporting on the use of CE often suggest an area of growing concern (Cadwalladr, 2015; Dathan, 2021; Thomson, 2015). In addition, and although not directly in the university context, an oft-cited article that highlighted concern surrounding prevalence was that of an informal investigation of Nature readers; of 1400 people surveyed, one in five had used CE for non-medical reasons to stimulate their focus, concentration or memory with the two most common substances being methylphenidate and modafinil (Maher, 2008). Of importance, to date researchers have not used indirect methods to estimate the prevalence of CE use in UK-based university students. Despite the inherent challenges when investigating the prevalence of sensitive behaviours, it is important to try and determine reliable measures of prevalence in both PED and CE use.

1.4 Societal Concerns Regarding Enhancement Drug Use

The two contexts of PED and CE use share similar societal concerns and an important aim for researchers investigating these areas is to examine factors that influence the likelihood of individuals using substances to enhance performance despite such concerns. Yet despite considerations that may potentially act as deterrents for use, the prevalence literature reviewed highlights that PED and CE use is clearly of some concern. Individuals in sport, exercise, and education have, and continue to seek, methods in which to enhance performance in illicit ways. The following paragraphs provide an overview of some of these concerns.

One reason why it is important to understand the psychosocial processes that may lead to PED or CE use is that the use of such drugs may lead to detrimental health

consequences (Finger et al., 2013; Hysek et al., 2014). As such, the consideration of the medical safety of substances may represent a possible deterrent to use. As previously mentioned, 'harm to health' is one of the three criteria that may lead to a substance or method being added to the WADA prohibited list (2021b) with a recognition of the negative health consequences that numerous substances used as PEDs may have (see Sjöqvist et al., 2008). Similar to PED, medical safety and health represents one of the major concerns that influence attitudes held toward CE (Schelle et al., 2014), with nonusers typically reporting concerns over side-effects and unknown long-term health implications (e.g., Judson & Langdon, 2009). The risk of harms related to CE has already been overviewed in the early sub-section, though this perception of risk is supported by the literature highlighting that the use of prescription stimulants has been linked to side effects such as insomnia, psychosis, suppression of appetite, nausea, and irritability (Finger et al, 2013; Hysek et al., 2014). In addition to these side effects, evidence supports the addiction potential of methylphenidate (Gahr, et al., 2014; Morton & Stockton, 2000). An important concern for nonusers is the unknowns surrounding the safety of long-term use of CE. Literature on this issue is scarce though recent research has started to investigate the potential for tolerance and abuse of modafinil (Tully, 2020). In addition to concerns over side-effects and long-term health consequences, students who use CE drugs are also more likely to use and misuse other illicit substances for self-medication (Blevins et al., 2017; DeSantis et al., 2009; Singh et al., 2014). As such, the consideration of detrimental health consequences represents a possible deterrent to CE.

Legal considerations may also influence individuals' decision making around the use of PED and CE. PED are against the rules in sport (WADA, 2021a), and many of the substances are also controlled substances. For instance, anabolic steroids are classified as Class C drugs in the UK (Misuse of Drugs Act, 1971) and illegal for personal use in the US.

In addition to this, anti-doping legislation is a growing topic of discussion, such as the recently passed 'Rodchenkov Anti-Doping Act' in the USA (Pavitt, 2021). In addition, doping is already a criminal offence in Austria, France, and Italy. In the case of CE, amphetamine and methylphenidate are classified as Class B drugs within the UK, and therefore carry a five-year prison sentence for possession without a prescription and up to a 14-year sentence for supply (Misuse of Drugs Act, 1971). Regarding modafinil, although this drug is not illegal to purchase, its sale without a prescription is illegal (MHRA, 2013). Moreover, the use, misuse, and sale of controlled drugs on the property of university campuses will often contravene institutional regulations and therefore represent a disciplinary offence (see Aikins et al., 2017). Thus, potential legal and disciplinary consequences represent further possible deterrents to CE.

Finally, ethical considerations are often raised as a major concern surrounding both PED and CE use. As already highlighted, two of the three reasons that specific PEDs are banned in sport is that a substance or method, alone or in combination with other substances or methods, has the potential to enhance sport performance and/or the WADA determines the use of the substance or method violates 'the spirit of sport' (WADA, 2021a). Discussion as to the morality of doping and often more specifically the approach of anti-doping is debated within the normative literature (see Dimeo & Møller, 2018; McNamee, 2016; Møller, 2009), of which is critical of the current policies and procedures. Outside of the normative debate, many self-identified clean athletes value 'clean sport', with clean athlete identity generally rooted in early experiences and a love of sport; and characterised by a continued, intrinsically motivated commitment to fundamental values and morals acquired in childhood (Petróczi et al., 2021). There has been extended discussion as to whether CE by students represents a form of cheating given it may be deemed a form of academic dishonesty (Cakic, 2009; De Jongh et al., 2008; Vargo & Petróczi, 2016). Although this thesis will touch upon the

normative debate surrounding whether CE might represent a form of cheating or not, it may be beyond the scope to make a specific moral judgement. There is already a plethora of literature into the ethical aspects of CE (e.g., Faber et al., 2016; Giubilini, 2015; Vrecko, 2013) and it is hoped this thesis may help provide further information to such debate. As such, some have argued CE should not be considered cheating (e.g., Harris, 2009; Schermer, 2008). However, examining definitions of this concept suggest it may be. Specifically, academic dishonesty represents '…any deceitful or unfair act intended to produce a more desirable outcome on an exam, paper, homework assignment, or other assessment of learning' (Miller et al, 2017: p121). Thus, the use of CE to improve performance may constitute academic dishonesty, even when students are assessed on individual performance rather than against peers (Whetstine, 2015). Specifically, a higher university degree classification can improve a student's chance of success within a competitive job market post-university. Accordingly, students are often critical of neuroenhancement, judging pharmacologically enhanced performances as unfair and inauthentic (Bell et al., 2013; Forlini, & Racine, 2012; Forlini et al., 2015). Thus, given the normative debate and student attitudes towards CE, ethical constraints regarding academic dishonesty could act as a deterrent to students' use of CE.

In summary, PED and CE share similar societal concerns surrounding use. Regulation or legal restrictions are in place for many of the substances used for PED or CE, whereas the risk of harm to health through side-effects and long-term health consequences are also of concern. Finally, although there is healthy debate within the academic literature, it appears quite clear that there are ethical considerations that influence the discussion on the fairness of using PED and CE in sport and education. All these concerns could potentially act as deterrents to individuals engaging in either, or both, forms of enhancement. An important aim for research investigating PED and CE use is to identify possible psychosocial factors that

influence the likelihood an individual might use such substances. Given the possible health, legal, and ethical deterrents to performance and cognitive enhancing drugs, it is important to understand how individuals can circumvent such constraints.

1.5 Moral Disengagement

One theory that has proved useful in research investigating how people psychologically bypass similar constraints regarding drug use in other contexts is Bandura's (1991) social cognitive theory of moral thought and action. Bandura (1991) presented a comprehensive theory of morality that explained how moral reasoning, in interaction with other psychosocial determinants, governs individual direct moral action. Through this, behaviours are suggested to be regulated by the anticipation of personal and social sanctions; people avoid actions likely to result in personal or social rebuke. About personal sanctions, Bandura (1991) proposed that engagement in transgressive and/or harmful activities – of which PED and CE use could be categorised – is primarily discouraged by an individual's anticipation of resultant negative emotions. Individuals will avoid engaging in transgressive or harmful acts because they anticipate self-sanction (e.g., shame or guilt). Regarding social sanctions, harmful action is regulated such that people abstain from transgressive behaviour when they anticipate they will be criticised by others as a result.

Although Bandura (1991) considers both personal and social sanctions importance, personal sanctions are seen as a primary regulator of moral conduct once moral standards have been developed and internalised. Individuals are present and preside over their conduct regardless of whether social sanction is there or not. For this reason, social sanctions are considered relatively weak deterrents of transgressive behaviour. Therefore, Bandura (1991) considered personal sanctions to be the predominant regulator of moral conduct.

According to Bandura (1991), personal sanctions operate through three major subfunctions: self-monitoring of conduct, the judgement of conduct, and effective self-

reaction. Initially, individuals monitor their behaviour, they then form judgements on the moral nature of their action, and finally will experience affective reactions based on the judgement the individual has made. It is the anticipation of negative affective reactions that regulates an individual's transgressive behaviour. Behaviour that does not align with personal moral standards will result in negative emotions (e.g., guilt and shame), deterring such transgressive behaviour.

The self-regulatory process outlined by Bandura (1991) details how transgressive acts and antisocial behaviour are deterred by the anticipation of resultant negative emotions. However, Bandura (1991) proposed that individuals can diminish or eliminate anticipation of such emotions through the use of one or more of eight psychosocial mechanisms, collectively referred to as mechanisms of moral disengagement (MD). Through MD people can conditionally endorse harmful and transgressive acts by reframing the behaviour, reducing personal accountability for it and/or its consequences, distorting the consequences stemming from it, or dehumanising or blaming the victim/s. MD presents an underpinning theory with which to inform our understanding of psychosocial processes that facilitate transgressive behaviours such as PED and CE use. Individuals may anticipate feelings of guilt if they decide to use illicit substances to enhance performance, and such anticipation of unpleasant emotions should act as self-sanctions to deter them from engaging in the transgressive behaviour. Through the mechanisms of MD, PED or CE use may be facilitated by allowing individuals to use illicit substances without experiencing negative emotional reactions such as guilt. The theory appears useful in providing an understanding of the potential mechanisms that individuals may use to rationalise transgressive conduct. In addition to this, the mechanisms of MD have a social nature As mentioned previously, doping in sport is against the rules of competition (WADA, 2021a) whereas CE in education is most often in the form of prescription drug use off a prescription, which are controlled substances (Misuse of Drugs

Act, 1971) and use in competitive situations in academia are often considered morally wrong (Whetstine, 2015). Research in this area is interested in increasing our understanding of what leads individuals to engage in transgressive acts, be it athletes in sport or students in education, and then how the frequency of such acts can be reduced. As such, drawing on Bandura's (1991) theory allows the current thesis to investigate the psychologically and social-based processes involved in decisions to engage with PED and CE behaviour and an ideal framework with which to underpin the thesis.

Research has evidenced an association between doping in sport and exercise and MD over the past several years. The first of the six relevant mechanisms – moral justification – occurs when harmful activities are made personally and socially acceptable through their portrayal as achieving commendable social or moral purposes (Bandura, 1991). The second – euphemistic labelling – diminishes the damaging nature of actions through palliative and/or convoluted language. The third – advantageous comparison – makes detrimental conduct appear less damaging by comparing the act to more heinous acts. The fourth – displacement of responsibility – diminishes personal responsibility for transgressive action and/or its consequences by proffering it resulting from implicit or explicit social pressures. The fifth – diffusion of responsibility – also acts by diminishing personal accountability for harmful acts and/or their outcomes, but this time through group decision making (i.e., a group collectively deciding to engage in injurious conduct) or group action (i.e., a group collectively engaging in harmful conduct). The final mechanism – distortion of consequences – occurs when the perpetrator of a transgressive act avoids information on the harm caused, and/or downplays its significance.

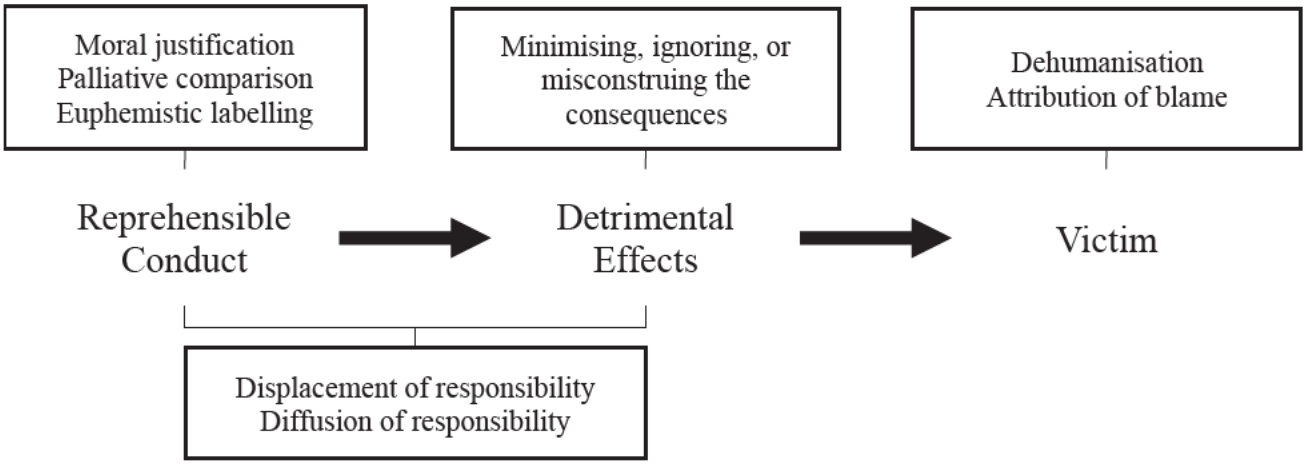
Boardley and Grix (2014) conducted semi-structured interviews with nine PED-using bodybuilders and via deductive content, the analysis revealed evidence for the six mechanisms of MD outlined above. Boardley et al., (2014) followed this initial investigation

by extending the research beyond a single gym, and conducted a follow-up study with 64 male bodybuilders with experience of doping from across England, again evidencing six of the eight mechanisms of MD. The findings of the previous two studies were supported and extended by Boardley et al. (2015) who interviewed twelve male athletes from a variety of team and individual sports. More recently, Boardley et al. (2017) presented quantitative evidence supporting a moderate positive link between MD and self-reported IPED use with athletes from sport and exercise, partially mediated through a negative predictive effect of MD on anticipated guilt. In contrast to this research on PED use, MD is yet to be investigated in a CE using population.

The two mechanisms that were not evidenced in sport and exercise (Boardley & Grix, 2014; Boardley et al., 2014; Boardley et al. 2015) are that dehumanisation and attribution of blame, both mechanisms differ from the other six in that specifically target the victim/s of transgressive acts (see Bandura 1991). Boardley and Grix (2014) suggested that the lack of evidence for the two victim associated mechanisms may have been due to the lack of such an external victim in the context of PED use in bodybuilding. Boardley et al. (2014) also found no evidence of dehumanisation and attribution of blame. As mentioned already, research is needed that qualitatively investigates MD in a CE using population, and this should include the possibility of all eight mechanisms. However, as with PED use in bodybuilding, an obvious external victim of CE use maybe even less likely than initially proposed in sport (i.e., non-doping opponents in direct competition). Figure 1.1 demonstrates the mechanisms through which moral self-sanctions are selectively activated and disengaged from transgressive behaviour at different points in the self-regulatory process.

Figure 1.1

Psychosocial mechanisms through which moral self-sanctions are selectively disengaged from detrimental practices at different points in the exercise of moral agency (Bandura, 1986)



As discussed earlier, doping in sport is against the rules (WADA, 2021a) and illicit use of prescription medications is sometimes considered a form of academic dishonesty (Cakic, 2009; De Jongh et al., 2008; Vargo & Petróczi, 2016) with students often judging pharmacologically enhanced performances as unfair and inauthentic (Bell et al., 2013; Forlini, & Racine, 2012; Forlini et al., 2015). Given that Bandura (1991) proposes MD can operate in any context, it may be used by student users of CE to prevent anticipation of negative emotions one may expect to be stimulated given the health-, legal-, and ethical-based deterrents outlined previously. Consistent with this assertion, past research (beyond that in sport and exercise) has linked MD with other illicit drug use contexts. For example, Bandura, et al. (1996) identified moderate-to-strong positive associations between MD and self- and parent-rated delinquent behaviour, incorporating drug use alongside other forms of delinquent behaviour with junior-high-school children from Italy. Similarly, Passini (2012) reported a moderate positive correlation between MD and heavy drug use in secondary-school children from Italy. More recently, Sumnall et al. (2021) investigated whether people

who use cocaine engaged in MD to reduce anticipated guilt, finding MD positively predicted cocaine use and anticipated guilt negatively. Before this thesis, MD had not been investigated within CE use in university students.

Qualitative research not grounded in Bandura's (1991) theory provides some support for use of MD to rationalise and justify CE in students. Vargo and Petróczi (2016) conducted interviews with 13 university students with experience with CE to investigate their experiences, motivations, and beliefs regarding CE. Importantly, some of the qualitative data from this study illustrate MD being used to rationalise and justify CE. For example, one student explained how he was influenced '... by the growing popularity of smart drugs' (Vargo & Petróczi, 2016, p6). This quote evidences possible diffusion of responsibility, a MD mechanism that involves diffusing personal responsibility for detrimental conduct amongst a large group of perpetrators or portrays it as resulting from collective decision making (Bandura, 1991). The mechanism of advantageous comparison is also seen in the qualitative investigation of Steward and Pickersgill (2019), whereby modafinil was advantageously compared to other study drugs such as Adderall and Ritalin with users declaring them to be preferable to other stimulants and recreational drugs. Advantageous comparison operates when a transgressive act is contrasted with another act that is deemed more heinous, making the act in question appear less harmful in comparison. In this study, modafinil was also perceived to be less addictive than Adderall and Ritalin making it appear more acceptable for CE use (Steward & Pickersgill, 2019). The comparison to street drugs and minimising of consequences when comparing CE use to harder drugs was also seen by Champagne et al. (2019). Within the qualitative investigation of McDermott et al. (2020) ,there were several cases of justification for its use. Several users were aware that the subject represented something of a taboo but felt more comfortable when people were talking about the use, and CE become more 'accepted.' This may suggest that through the diffusion of

responsibility the behaviour was perceived as becoming normalised, and thus leads to reduced personal responsibility. Much of the qualitative research investigating CE use in students could be considered through a grounding in Bandura's theory (1991), providing support to the mechanisms of MD in CE.

In addition to evidencing MD in different contexts and populations, to better understand the processes that may explain how MD may influence behaviour in both PED and CE use, research is needed that investigates empathic and self-regulatory processes due to their potential influence on MD. Bandura (1991) suggests that MD impacts transgressive behaviours through its effect on regulatory emotions such as guilt. Anticipation of guilt is thought to be diminished by MD, as the mechanisms of MD allow an individual to rationalise transgressive behaviours through restructuring such acts in a positive light, distorting the consequences of the action, or reducing personal accountability. The work of Boardley et al. (2017) and Sumnall et al. (2021) have already demonstrated evidence to suggest this occurs within sport, exercise, and other drug-use contexts. These studies show individuals with higher levels of MD have lower levels of anticipated guilt for engaging in drug use, which in turn predicts an increased likelihood to adopt such behaviours. In their qualitative investigation of elite athletes who had admitted to doping, Kirby et al. (2011) reported that the athletes interviewed were not fully successful in inhibiting their internal moral standards, reporting that guilt and shame were among the consequences of engaging in doping. As such, guilt was represented as a predominant deterrent to doping.

It is also important for researchers to consider the potential antecedents of MD such as empathy. Empathy represents the tendency to vicariously experience other individuals' emotional states and is thought to incorporate both emotional and cognitive components (Davis, 1983; 1994). A lack of empathy implies an inability to view the world from other individuals' perspectives or to feel sympathy toward them (Davis, 1994). Conversely,

therefore, increases in empathy may inhibit engagement in transgressive behaviour as it amplifies an individual's' ability to understand and experience any distress that may result from such transgressions (Bandura, 1986; Hoffman, 2000). Such effects of empathy may occur through changes in MD, as empathy is thought to impair MD, as an endorsement of deleterious conduct is more difficult when one can anticipate and experience the consequences of one's actions for others (Bandura, 1991; Paciello et al., 2013). Consistent with these propositions, negative relationships between empathy and transgressive conduct in sport have been demonstrated (Kavussanu et al., 2009; Stanger et al., 2012), and more relevant and recently, Boardley et al. (2017) demonstrated negative relationships between empathy and transgressive conduct. Research out of sport has also negatively linked empathy and MD (Paciello et al., 2013). Thus, higher levels of empathy in athletes and exercisers should be associated with lower levels of MD, which may, in turn, be linked with a reduced likelihood to use human enhancement drugs. Investigating empathy as an antecedent of MD in CE use would provide an interesting exploration and addition to the current literature.

Another variable that may influence an athlete's, exercisers', or student's MD is self-regulatory efficacy (SRE). This represents one's ability to resist personal and social pressures to engage in detrimental conduct (Bandura et al., 2001). Bandura et al. (2001) proposed those who have strong levels of belief in their ability to resist engagement in such detrimental or harmful would therefore have less need to rationalise the behaviour (i.e., increased SRE should be linked with lower levels of MD). In the context of PED or CE use, SRE represents one's ability to withstand the personal and social influences that would encourage substance use to increase the relevant form of enhancement drug use. Boardley et al. (2017) tested a modal of doping behaviour grounded in Bandura's (1991) theory that incorporated doping MD, doping SRE, empathy, anticipated guilt, and self-reported doping/doping susceptibility. In support of Bandura's (2001) theory, Boardley et al. (2017) evidenced that doping SRE

negatively predicted reported doping mediated through doping MD, whilst doping SRE had a positive predictive effect on reported doping, also via doping MD. This suggests that the tendency for individuals with higher levels of doping SRE to have higher levels of anticipated guilt could be explained by lower levels of MD (Boardley et al. 2017). Athletes and exercises who are more able to resist pressures, either external or internal, to engage in PED use may anticipate feelings of guilt due to their reduced tendency to rationalise doping behaviours. As with empathy, investigating SRE in CE use would further our understanding in this context.

As mentioned previously, literature investigating MD in PED use has already been undertaken and there are other areas of drug use in which MD has been investigated. However, both qualitative and quantitative research evidence associating CE use with MD is lacking. Further research in these areas would build upon the work in PED from Boardley et al. (2017). Therefore, an investigation of students' and student-athletes use of PED and CE underpinned by Bandura's (1991) social cognitive theory of moral thought and action and associated antecedents to moral disengagement provides an opportunity to increase our understanding of both behaviours, identify similarities in each context and may also provide potential opportunities to develop interventions. Previous research has already identified the mechanisms of MD in sporting and exercise context (Boardley & Grix, 2014; Boardley et al., 2014; Boardley et al. 2015; Boardley et al., 2017), and in other substance users (Sumnall et al., 2021) and underpinning such an investigation into CE use through Bandura's theory would be a novel addition to the literature.

Developing our understanding of PED and CE use in a student population through the lens of moral disengagement may also the development of interventions. In addition to interventions focused on MD, empathy has also been demonstrated to be trainable in groups with low levels of empathy (Hepper et al., 2014). Investigating MD further in a PED context,

and for the first time in the CE context may therefore provide further information for the proposal and development of interventions in the future.

While underpinning the current investigation of CE use through Bandura's theory is novel, when discussing the two contexts of PED and CE use, and the similarities between them, there is a certain population of interest, student-athletes. Student-athletes may be seeking to target achievement outcomes both in sport and education. As such, they present a population that is at risk for both forms of enhancement drug use. Although this population has been investigated from a perspective of MD and PED use by Boardley et al. (2017), no such study has examined the context of CE regarding MD, nor have both forms of drug use been investigated concurrently. Given the similar societal concerns that PED and CE share, an initial focus of this thesis is to identify whether students do evidence use of the mechanism of MD when explaining and rationalising their use of CE. If this is the case, following on from such an investigation, student-athletes, as a population of interest, can be examined related to both forms of substance use.

1.6 The Aims of the Research Programme

The primary aim of this thesis was to investigate psychosocial factors that facilitate the use of performance enhancing drugs in sport and education. From the introduction literature reviewed in this thesis and to achieve the primary aim, several research questions emerge which form the basis of the empirical studies. The aims are as follows:

a) To review the recent literature relating to rationalisation and justification held by students that may facilitate cognitive enhancing drug use to improve academic performance. This was explored in Study 1, via a scoping review (Chapter 3).
b) To investigate whether student users of CE evidenced specific psychosocial mechanisms when explaining their reasons for CE, and if so which mechanisms. This

question is explored in Study 2 of the thesis through semi-structure interviews with CE using students (see Chapter 4).

c) To estimate the prevalence of PED and CE use in UK student-athletes using two indirect questioning approaches and direct question self-report. This was explored in Study 3 of the thesis (see Chapter 5).

d) Provide an exploratory analysis to identify and characterise profiles with student-athletes based on psychosocial factors that might facilitate or deter the use of PED and CE (Study 4, see Chapter 6).

e) Finally, to provide further understanding to the landscape surrounding CE in UK universities. Study 5 in Chapter 7 explores UK institutional policies related to CE and whether CE is considered part of academic misconduct.

To address the above aims, several hypotheses were formed and are outlined in the respective empirical chapters.

1.7 Structure of the Thesis

Chapter 1 has provided an introduction and foundation of the societal significance of the research programme, highlighting several societal concerns surrounding the use of both performance and cognitive enhancing drugs. Chapter 2 describes the individual methods and theories used to investigate the research aims through qualitative and quantitative investigation. Chapter 3 (Study 1) is a scoping review of the recent literature relating to rationalisation and justification that facilitate the use of CE by students for the purpose iof mproving academic performance. Chapter 4 details Study 2, in which a qualitative investigation of the mechanisms of MD within Banduras (1991) social cognitive theory of moral thought and action identifies psychosocial factors that facilitate the use of cognitive enhancing drug use in students. With limited research into PED and CE use within the UK, Chapter 5 (Study 3) provides an estimate of the prevalence of PED alongside CE use in

student-athletes through indirect questioning methods and direct-questioning self-report. Chapter 6 (Study 4) explores a latent profile analysis of psychosocial factors that facilitate the use of PED and CE in student-athletes, specifically MD, SRE, empathy, anticipated guilt, and reported doping. Chapter 7 (Study 5) reviews Institutional Policies Regarding Nonmedical use of Prescription Stimulants for Cognitive Enhancement in U.K. Higher Education. And finally, Chapter 8 provides the general discussion of the research findings of the previous chapters, also expanding on the findings, process, and limitations of the research concluding with a consideration of the contributions to knowledge, future directions and concludes the research programme.

The thesis is a logical account of the research process to provide insight into the psychosocial factors that facilitate the use of performance enhancing drugs in both sport and education. Due to the COVID-19 pandemic alterations were made to the research process. The initial plan of the thesis was to conduct a final empirical investigation through the use of Ecological Momentary Assessment (EMA). However, due to the limited access to student participants from March 2020 onwards it was decided to replace the EMA investigation with a literature review chapter (Chapter 3) assessing the attitudes and motivations for cognitive enhancing drug use. As such the final thesis is not fully chronological, with Chapter 4 completed prior to Chapter 3. Also of note, Study 2 was published in July 2019 in Drugs: Education Prevention and Policy (Heyes & Boardley, 2019). Study 3 is currently under review having been submitted for publication in Performance Enhancement and Health in August 2021 (Heyes & Boardley, 2021). Both studies have been included in chapters 4 and 5 in the form in which they have been published or submitted.

Performance and cognitive enhancing drug research, especially psychosocial, is vital in the current climate. Testing procedures regularly only catch 1 to 2% of PED using athletes when the reliable estimates predict use to be between 14 and 39% (de Hon et al., 2015). An

understanding of psychosocial processes and valid provision of education in both a sport and academia to cope with the use of illicit substances for performance enhancement is vital. It is hoped the mixed-methods approach to this investigation into both performance enhancing drugs and cognitive enhancing drugs sets the ground for future study of these controversial societal issues and provides avenues for the development of educational interventions. Such pharmacological enhancement goes beyond the more publicly well-known context of elite sport with education representation as another recognised societal concern. This research programme aimed to investigate factors that facilitate the use of PED and CE to increase our understanding of the two contexts.

Chapter 2: Methodology

2.1 Chapter Overview

Following on from the introduction, aims of the research, and overall structure of the thesis, this chapter describes the individual methods and theoretical underpinning used to investigate the research aims. The various approaches discussed within this chapter are the methods and processes by which the thesis seeks to achieve the primary aim of investigating psychosocial factors that facilitate the use of performance enhancing drugs in sport, exercise, and education.

2.2 Introduction to Methods

This thesis is concerned with investigating psychosocial factors that facilitate the use of PED and CE in sport and education. To achieve this, several aims, and research questions were formulated and several approaches were chosen to investigate each in turn. Study 1, a scoping review, was selected to investigate the current literature in CE the with a focus on justifications and rationalisations for use (Chapter 3). A Qualitative semi-structured interview was selected for Study 2 to provide an in-depth exploration of how CE using students rationalise and justify their use (Chapter 4). In Study 3, Indirect question methods used to assess prevalence were chosen as a way of investigating sensitive subjects such as PED and CE (Chapter 5). A person-centred approach to profiling student-athletes via psychosocial measures to develop risk profiles for performance and cognitive enhancing drug use (Chapter 6). An understanding of psychosocial processes in both a sport and education regarding the use of illicit substances to performance enhance is vital. It is hoped the mixed-methods approach to this investigation into both performance enhancing drugs and cognitive enhancing drugs sets the ground for future study of these controversial societal issues and provides avenues for the development of educational or regulatory interventions. The

subsections below detail the different studies of the thesis and the method chosen to investigate the overarching research questions.

2.3 Scoping Review

A scoping review provides a tool to determine the scope or coverage of an area of literature on a given topic and an overview of its focus (Munn et al., 2018). Scoping reviews are useful for examining evidence when it is still unclear what other, more specific questions can be posed and valuably addressed by a more precise systematic review (Amstrong et al., 2011). Such an approach is useful for examining subjects that might be under-documented in the literature or before the conduct of a more specific systematic review (Arksey & O'Malley, 2005). Therefore, a scoping review provides the opportunity to have a broader 'scope' than traditional systematic reviews with wider inclusion criteria that allow for an overview map of the evidence rather than a critically appraised and synthesised result/answer to a particular question.

Given the societal concerns and possible deterrents for CE, such a review may provide a focus on rationalisations and justifications as to how students can discount such deterrents and engage in transgressive behaviour. Schelle et al. (2014) published a review on attitudes held towards CE in students, healthcare professionals, and the public, focusing their review on three major themes of concern; medical safety, coercion, and fairness. Several of these concerns are potential deterrents for performance enhancing substance use highlighted in this thesis introduction. A major distinction highlighted by Schelle et al. (2014) was the differences between nonusers and users. No review has yet collated information on the possible rationalisations and justifications that allow CE users to engage in the behaviour. Therefore, the scoping review in Chapter 3 aimed to assess the literature on how individuals rationalise and justify CE use in education.

2.4 Qualitative Semi-Structured Interview

Qualitative research provides an in-depth way of assessing the way individuals interpret and make sense of their experiences in the world and explore the behaviours and perspectives of individuals (Sparkes & Smith, 2013). Semi-structured interviews provide a method in which an interview matrix or guide can be used to direct the interaction between researcher and participant. Although not all the same questions will be asked of each participant, as the conversation is more flexible than a purely structured approach, a matrix or guide does allow for important information to be collected on the topic of interest.

Previous research investigating MD grounded in Bandura's theory in sport and exercise has utilised this approach successfully. Several studies by Boardley and colleagues investigating PED use in sport and exercise were able to evidence six of the eight mechanisms of MD (Boardley & Grix, 2014; Boardley et al., 2014; Boardley et al., 2015). Research not grounded in Bandura's (1991) theory has also provided support for the mechanisms of MD to rationalise and justify CE in students. Specifically, Vargo and Petróczi (2016) conducted interviews with 13 university students with experience with CE to investigate their experiences, motivations, and beliefs regarding CE. More recently, further qualitative research in the UK with CE using students has investing attitudes and motivations (McDermott et al., 2020; Steward & Pickersgill, 2019).

The overarching aim of Study 2 was to investigate whether university students engage in CE evidence mechanisms of MD when explaining their use of CE drugs. Although research has shown the potential use of MD to rationalise and justify CE drug use (i.e., Vargo & Petróczi, 2016), to date researchers have not systematically applied Bandura's (1991) theory to this issue. As such, in-depth semi-structured interviews were conducted based on a protocol designed to identify psychosocial mechanisms used to justify and rationalise CE through the use of one or more of the eight mechanisms of MD.

The philosophical approach taken in underpinning Study 2 is a variant of the post-positivist position (Brustad, 2008). This was done as it was felt is impossible to produce theory-free knowledge. Therefore, acknowledgement was given to the fact the interview, results, and analyses are all instilled with the researchers' subjectivity (McGannon & Smith, 2015). Given the nature of qualitative semi-interviewing specifically, to examine elements of Bandura's (1991) theory, the themes have the potential to be interpreted differently if they had been examined using an alternative theory. In addition to this, qualitative research and the construction of data themes are influenced by the researchers' experiences and perspectives (McGannon & Smith, 2015). The interview itself and the resulting findings may have been different if conducted by a different researcher, with acknowledgement and consideration given to this aspect of qualitative research.

2.5 Quantitative Survey

Survey methods not only provide useful and interesting demographic data, but a wealth of information on psychometric measures, attitudes, and behaviours. In the case of the current thesis, this ranges from specific measures to assess prevalence in a sensitive subject to psychometric measures of components within Bandura's (1991) theory. These approaches allow for objective questions to be investigated to gain detailed insights from respondents regarding the research topic of interest. Surveys are also useful when investigating subjects that cannot be easily measured within a lab setting. There are of course some limitations to assessing participants through survey methods. Self-report measures are at risk of recall bias when questioning participants (Althubaiti, 2016). In addition, when considering sensitive subjects such as doping in sport or education, participants may perceive a threat of disclosure and the worry of possible consequences of truthful disclosure of the information (de hon et al., 2015; Petróczi et al., 2011). This may be due to possible repercussions of involvement in the sensitive behaviour.

There are several examples of surveys investigating the PED and CE use through the use of surveys designed to investigate sensitive subjects (e.g., Dietz et al., 2013a, Dietz et al., 2013b, Dietz et al., 2018b; Franke et al., 2011 etc.), with these detailed further in Chapter 5. In addition, several quantitative research investigations have examined Bandura's (1991) theory (e.g., Boardley et al., 2017; Lucidi et al., 2004, 2008; Passini, 2012). Study 4 uses a similar survey approach to that of Boardley et al. (2017), by administering a cross-sectional survey to investigate psychosocial factors that facilitate PED and CE use. The following sections discuss the methods and measures used within Study 3 and 4, though a more extensive discussion on the specific literature can be found in those specific chapters.

2.5.1 Prevalence estimations

The estimation of prevalence in sensitive subjects is challenging. However, it is vital to obtain accurate data regarding such things as illicit drug use both for understanding the degree of the issue of concern and to establish the requirements for any preventative regulation or educational measures. The introduction in Chapter 1 overviews prevalence research within the relevant PED and CE context, and this is further considered within Chapter 5. What is of note here is the variation that is present in prevalence estimates. One possible contributor to this is whether direct or indirect assessment approaches were used. Direct questioning approaches have been used in many studies and require participants to openly report engagement in a behaviour. In contrast, indirect approaches introduce a randomisation task or uncertainty that overtly demonstrates anonymity to participants (Tourangeau & Yan, 2007). Of importance, direct questioning techniques are thought to be more susceptible to socially desirable responding than indirect methods, especially when assessing the prevalence of socially sensitive behaviours (Fisher, 1993; Warner, 1965). Given the societal concerns and possible deterrents for both PED and CE use discussed in Chapter 1, both PED and CE use represent potentially sensitive behaviours.

The structure and method employed to investigate sensitive questions requires careful handling to ensure the most reliable data. Sensitive questions are considered to affect survey outcomes in several different ways. Overall or unit response rates for the whole survey may be decreased due to the sensitive nature of the topic (Tourangeau & Yan, 2007) while item nonresponse rates may affect the data. And finally, response accuracy, such as social desirability may also affect the reliability of the data as respondents may not answer truthfully. Therefore, it is key to construct a survey carefully with these considerations in mind.

In contrast to direct questioning, indirect approaches introduce a randomisation task or uncertainty that overtly demonstrates anonymity to participants (Tourangeau & Yan, 2007). This approach ideally provides the participants with an assurance of anonymity in their participation. As such, underpinning the validity of the indirect methods is the acceptance of the sensitive nature of the subject under investigation, and the concept of providing a participant with an understanding of the anonymity provided in the method. Chapter 5 (Study 3) provides greater detail as to the intricacies of indirect methods, in particular the unrelated question model (UQM) and single sample count (SSC). These were the two methods chosen to investigate the prevalence of PED and CE use in student-athletes, alongside a direct-question self-report more regularly seen in the CE literature.

In investigating the prevalence of drug use in both contexts, through an exploration of indirect methods, Study 3 provides a novel contribution to the literature. No study to date has estimated the prevalence of PED or CE use in UK student-athletes using indirect estimation approaches. In summary, Study 3 sought to use both indirect methods to add to the literature and knowledge of prevalence in both contexts and determine whether the randomised (UQM) and non-randomised (SSC) approaches produce comparable estimates for the two forms of enhancement drug use.

2.5.2 Psychometric measures

Chapter 6 involves an extensive questionnaire measuring several different variables associated with PED and CE use. Again grounded in the theory of Bandura (1991), Study 4 sought to provide an exploratory analysis to identify and characterise profiles of student-athletes based on psychosocial factors that might facilitate or deter the use of PED and CE. As highlighted in the introduction, Bandura (1991) proposed that transgressive activities – such as doping – would be deterred when people anticipate resultant negative emotions (e.g., guilt) from engagement in such acts however, individuals may reduce or eliminate such anticipation of negative emotions through the mechanisms of MD. Two potential antecedents associated with MD are SRE and empathy. Built upon the research evidencing MD in PED use in sport and exercise, and in education (Study 2), the research sought to take a novel approach by considering a person-centred approach rather than a variable-centred. In doing so, the investigation may move beyond just demonstrating associations among variables, toward a person-centred approach which considers population heterogeneity and identify configurations of variable relations at the within-person level (Peugh & Fan, 2013). Therefore, person-centred approaches are useful in identifying profiles of individuals based on within-profile similarities and between-profile differences in the patterns of association among variables. A greater understanding of the individuals' profile in such antecedents would also provide an insight into a population and their propensity to use either PED or CE. Such an understanding could prove useful when considering possible interventions tackling PED and CE use in UK based students. Profile analysis presents a promising solution in which there is a person-centred approach by providing a profile through organising individual participants into groups according to a variety of factors.

One method to conduct such analysis is latent profile analysis, which is an extension of latent class analysis that uses continuous variables as indicators of profile membership

(Collins and Lanza 2010). Latent profile analysis 'profiles' individual participants into groups of those who are similar to each other and different from the other groups, or profiles, based on the individuals' values of indicator variables.

To achieve this, Study 4 quantitatively examined the predictive abilities of MD on PED use alongside other key elements of Bandura's (1991) theoretical framework in sport and exercise first through scale/questionnaire development, followed by the person-centred approach of latent profile analysis. When considering that such information highlighting the psychosocial factors that might facilitate such drug use may allow for profiling of individuals, the method of classification using profile analysis would provide a tool for possible future targeted interventions. Below is an overview of the measures involved to develop psychosocial risk profiles for performance and cognitive enhancing drug use in student-athletes

The Doping Moral Disengagement Scale (DMDS; Boardley et al., 2017, 2018) was used to measure moral disengagement in relation to doping in sport. This scale consists of 18 items (e.g., 'Athletes shouldn't be blamed for doping if training partners/teammates pressure them to do it" and "It is okay to dope if it helps an athlete to provide for his/her family.") structured to measure three items for each of the six MD mechanisms relevant to doping in sport/exercise and assess via a Likert scale. The scale has shown very good levels of internal consistency and test-retest reliability and evidence for its factorial, convergent and discriminant validity has been provided (Boardley et al., 2018). This scale has also been adapted recently to assess MD in cocaine use with good internal consistency (Sumnall et al., 2021). The doping self-regulatory efficacy scale (DSRES; Boardley et al., 2017; 2018) was used to assess doping SRE. A single measure of self-efficacy was used, rather than a separate measure for PED and CED use. This measure assesses an individual's capacity to withstand personal and social influences encouraging the use of PEDs and CEDs. DSRES consists of

six items (e.g., 'Resist doping even if you knew you could get away with it?'). A five-point Likert scale, anchored by 1 (*no confidence*) and 5 (*complete confidence*), was used for participants to rate their confidence in their ability to engage in relevant behaviours. The DSRES scale has shown very good levels of internal consistency and test–retest reliability and Boardley et al. (2018) provided evidence for its factorial, convergent and discriminant validity. Empathy was measured with the seven-item perspective-taking (e.g., 'Before criticizing somebody, I try to imagine how I would feel if I were in their place') and seven-item empathic concern (e.g., 'I am often quite touched by things that I see happen'), two subscales of the Interpersonal Reactivity Index (Davis, 1983).

Anticipated guilt and reported doping were measured in both a PED and CE context. When assessing responses to anticipated guilt in both performance enhancing drug use and cognitive enhancing drug use, participants were asked to imagine situations surrounding both PED and CE contexts. After reading the situations, participants were then asked to indicate how they would anticipate feeling about continuing to take the substance by responding to the five items (e.g., "I would feel remorse, regret") that form the guilt scale in the State Shame and Guilt Scale (SSGS; Marschall et al., 1994). Participants responded on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Marschall et al. (1994) provided evidence supporting the construct validity and internal reliability of this sub-scale.

Reported doping was based on the method used by Boardley et al. (2017). Participants were provided with a list of nine categories of doping substances (e.g., Ephedrine stimulants) and methods (e.g., Blood manipulation) and asked to indicate which ones they currently used, had used in the past 3 months, had used prior to the past 3 months, or had never used. The categories and any examples of doping substances was based on the substances and methods banned in sport by WADA. Participants' responses were used to form a score from one to four, with participants being assigned a score of one if they indicated never using any of the

substances/methods, two if they had used one or more of them but only prior to the past 3 months, three if they had used one or more of them in the past 3 months and four if they currently used one or more of the substances/methods. Reported CE use was assessed in a similar way to PED. Participants were asked to indicate which substances they had used for the purposes of CE in academia, and whether they currently used, had used in the past 3 months, had used prior to the past 3 months, or had never used. The three common substances used as CE in education (amphetamine, methylphenidate, and modafinil) were included. Scoring was the same as for reported PED use.

Latent Profile Analysis was used to uncover distinct groups of individuals from a sample (patterns) in a person-centred, rather than variable centred approach. This method of profiling, or classification, has been used previously in studying sportsmanship and violent attitudes in sport (Courel-Ibáñez et al., 2019). Latent profile analysis, which is an extension of latent class analysis, uses continuous variables as indicators of profile membership (Collins & Lanza 2010). Latent profile analysis 'profiles' individual participants into groups of those who are similar to each other and different from the other groups, or profiles, based on the individuals' values of indicator variables. Such an approach has been used recently in athletic populations to identify phenotypes of asthma in elite athletes Couto et al. (2015), explore mental health profiles of elite athletes (Küttel et al., 2021), and examine aggression and psychological distress in Anabolic-Androgenic Steroid Users (Chegeni et al., 2021).

2.6 Policy analysis

In addition to the studies in Chapters 3, 4, 5, and 6, a final chapter prior to the discussion was included to assess the institutional policy of UK universities and CE regulations.

A prior review in the USA was conducted to assess both academic integrity policies and alcohol and drug policies for evidence of regulations concerning CE (Aikins et al., 2017). Across the sample of 200 institutions within the USA, only one university had a specific

policy aimed at deterring demand for CE by making consumption a violation of academic standards. However, nonmedical use of prescription stimulants was addressed in all but two of the 200 institutions as part of general drug policies. To achieve this, Aikins et al. (2017) employed text searches to access the relevant online data which is an accepted approach for systematically locating pertinent online data (Krippendorff, 2004). Following this, content analysis was used to examine the publicly available institutions' policies on academic integrity and alcohol and drug use (Saichaie & Morphew, 2014) with a systematic approach to identify terms related to CE use in students. This research has yet to be conducted within the UK and doing so would provide further information to our understanding of institutional positions regarding CE use. The purpose of adding this investigation to the current thesis is that it provides greater context when discussing the comparisons between doping in sport, which is explicitly regulated by WADA (2021a) whereas similar explicit regulation is potentially lacking in CE use at universities. In summary, the current research uses a similar methodology to Aikins et al. (2017) in assessing institutional policies for CE regulation.

2.7 Summary

This chapter described the methodology behind the approaches taken in the empirical studies. This follows from the aims of the research which were derived from peer-reviewed literature and led to the decisions on methods selected to investigate the research questions formulated. This has led to a mixed methods thesis with: an initial into attitudes, motivations, and potential rationalisation of CE in academia, a qualitative study using semi-structured interviews (Study 2), a 12-month prevalence estimation using two indirect questioning methods to investigate a sensitive subject such as PED and CE use (Study 3), and finally a cross-sectional survey used with LPA to classify student-athletes into profiles based upon psychometric measures such as doping MD, doping SRE, empathy, and anticipated guilt (Study 4). These approaches allow the thesis to achieve the principle aims and add to our

understanding of PED and CE use, particularly in a UK student population. Study 2 was designed to evidence whether and what mechanisms CE using students might draw on when explaining and rationalising CE use. Study 3 was designed to add to our current limited understanding of PED and CE prevalence among UK students and the literature on indirect questioning in sensitive subjects. Finally, Study 4 extends recent work supporting Bandura's (1991) on MD and antecedents of SRE and empathy to investigate whether and how student-athletes might be profiled based on such indicator variables, and through this whether profiles may provide risk profiles relating to the use of PED and CE. Finally, an additional investigation into institutional policies for CE regulation was conducted to provide a greater understanding to the normative discussion.

Chapter 3: Study 1. A Scoping Review of Justification, and Rationalisation for the Use of Cognitive Enhancing Drugs in Education

3.2 Introduction

Performance enhancement through the use of pharmacological substances is a contentious issue across a range of contexts. One context in which individuals seek to enhance performance using pharmacological substances is education. Cognitive enhancement (CE; Maher, 2008; Wolff & Brand, 2013) refers to the use of prescription drugs to augment cognitive capabilities such as memory, attention, and wakefulness or as Franke et al. (2014a: p83) define, 'the use of any psychoactive drug by healthy subjects to enhance cognitive abilities such as vigilance, attention, concentration or memory.' There has been much attention and debate regarding CE in education within the academic literature (see Arria & DuPont, 2010; Greely et al., 2008; Lucke et al., 2011) and this interest has appeared in the mainstream media (e.g., Marsh, 2017), often leading to debate on the benefits and concerns of students' non-medical use of prescription drugs (see Diver, 2017; Oxford Student, 2015). Common CE substances are prescription stimulant drugs such as amphetamine (e.g., Adderall), methylphenidate (e.g., Ritalin), and modafinil (e.g., Provigil). The first two are primarily prescribed for the treatment of Attention Deficit Hyperactivity Disorder (ADHD) while modafinil is used mostly in the treatment of narcolepsy. Although the evidence supporting true cognitive performance effects is equivocal, this doesn't appear to have negatively affected the use of CE amongst student populations (e.g., Maher, 2008; Repantis et al., 2010; Smith & Farah, 2011).

The apparent prevalence of CE in education is potentially of concern. A systematic review conducted by Wilens et al. (2008) found that across 21 studies within the US, encompassing 113,000 university age participants, between 5% and 35% had taken non-prescription stimulants over the past 12-month. Also within the US, a review by Racine and

Forlini (2010) found that a prevalence of between 3% and 11% of students had used prescription stimulants off prescription to improve academic performance. Prevalence rate estimates of CE are typically lower in Europe (Franke et al., 2014a). Research within the UK has been limited, but a lifetime prevalence of CE of 10% has been reported for UK students (Singh et al., 2014). Such estimates suggest an issue of concern and one which is possibly growing (d'Angelo et al., 2017; Singh et al., 2014).

Several societal concerns may potentially deter the use of prescription stimulants for CE reasons, these might be health, legal, or ethical considerations. The use of prescription stimulants such as those introduced previously have been linked to side effects such as insomnia, psychosis, suppression of appetite, nausea, and irritability (Finger et al., 2013; Hysek et al., 2014). In addition to these side effects, evidence supports the abuse potential of methylphenidate (Gahr et al., 2014; Morton & Stockton, 2000). Certain legal considerations may also influence students' decision making around CE. Amphetamine and methylphenidate are classified as Class B drugs within the UK and carry a 5-year prison sentence for possession without a prescription, with up to a 14-year sentence for supply (Misuse of Drugs Act, 1971). Although modafinil is not illegal to purchase, its sale without a prescription is illegal (MHRA, 2013). There has also been extended discussion as to whether CE by students may be considered cheating as it potentially represents a form of academic dishonesty (Cakic, 2009; De Jongh, et al., 2008). The use of CE drugs to improve performance may also constitute academic dishonesty even when students are assessed on individual performance rather than against peers (Whetstine, 2015). Students, particularly nonusers are often critical of neuroenhancement, judging pharmacologically enhanced performances as unfair and inauthentic (Bell et al., 2013; Forlini, & Racine, 2012). Despite these potential deterrents, prevalence rates suggest an issue of concern.

An important aim for researchers investigating performance enhancing drug use in any context is to identify and understand the psychosocial factors that influence the likelihood of an individual using illicit performance enhancing substances. Schelle and colleagues (2014) published a review overviewing attitudes towards CE in students, medical professionals, and the public in which they focused on three common concerns; medical safety; coercion; and fairness. A major distinction highlighted by Schelle et al. (2014) was the differences between attitudes held by nonusers and users, with users far more positive regard their attitudes towards CE. Absent from this review and less well investigated are the motivations, rationalisation, and justification that student users exhibited. A greater understanding of these psychosocial processes may help to explain how student users are able to circumvent potential deterrents for CE use and engage in the behaviour. With this knowledge, there is the opportunity to explore and develop potential interventions that manage CE use in academia. The current study, through a scoping review, sought to answer the question: what are the potential rationalisation and justifications for CE use exhibited by students? This was further guided by the following questions: what motivations do users and nonusers hold related to CE use? and what attitudes do users and nonusers hold on potential deterrents to CE use? The questions and review of attitude and motivations are included as part of the review to help answer the more specific question related to rationalisation and justifications.

3.2 Methods

A scoping review provides a tool to determine coverage or scope when a more broad research question is present or to rapidly map key concepts within a research area (Arksey, O'Malley, 2005). Such an approach is useful for examining subjects that may be under-documented in the literature or prior to the conduct of a more specific systematic review. The current

scoping review was undertaken to examine the extent range and nature of research evidence on a topic, specifically focused on the rationalisation and justification of CE use.

The current scoping review was conducted under Arksey and O'Malley's (2005) methodological framework. This is a five-stage process: (1) identifying the research question (2) identifying relevant studies (3) study selection (4) charting the data (5) collating, summarising, and reporting the results. Following the recommendation of Arksey and O'Malley (2005) to maintain a wide approach to generate a breadth of coverage and as highlighted in the introduction, the review sought to answer the questions: *what are the potential rationalisation, and justifications for CE use exhibited by students? What motivations do users and nonusers hold related to CE use? What attitudes do users and nonusers hold on potential deterrents to CE use?*

A systematic search was conducted from the beginning of 2015 to 2020 of the following databases Web of Science, Scopus, PsycINFO, PsychArticles, and PubMed. The following search terms were used [("cognitive enhancer" OR "cognitive enhancement" OR "pharmacological enhancement" OR "prescription drug" OR "performance enhancing drug" OR neuroenhancement OR "human enhancement") AND (view OR perspective OR opinion OR attitude OR judgment OR motive OR justification)] as part of the title, abstract, or keyword of the text. In addition to the main databases, the authors used manually searching specialist peer-reviewed journals and cross-checked the reference lists of studies included in the initial search. Peer-reviewed, published, human studies that examined the experience, attitude, or use of cognitive enhancing substances or processes, in a student age population, both undergraduate and postgraduate were eligible. Included studies could be quantitative, qualitative, or mixed methods and the article was available in English. Studies that were not available in English, did not examine a relevant population, were not published in peer-reviewed journals, or reported chemical, biochemical, or medical analyses of cognitive

enhancing drugs for detection, were excluded. Studies that solely looked at the prevalence of CE use were also excluded.

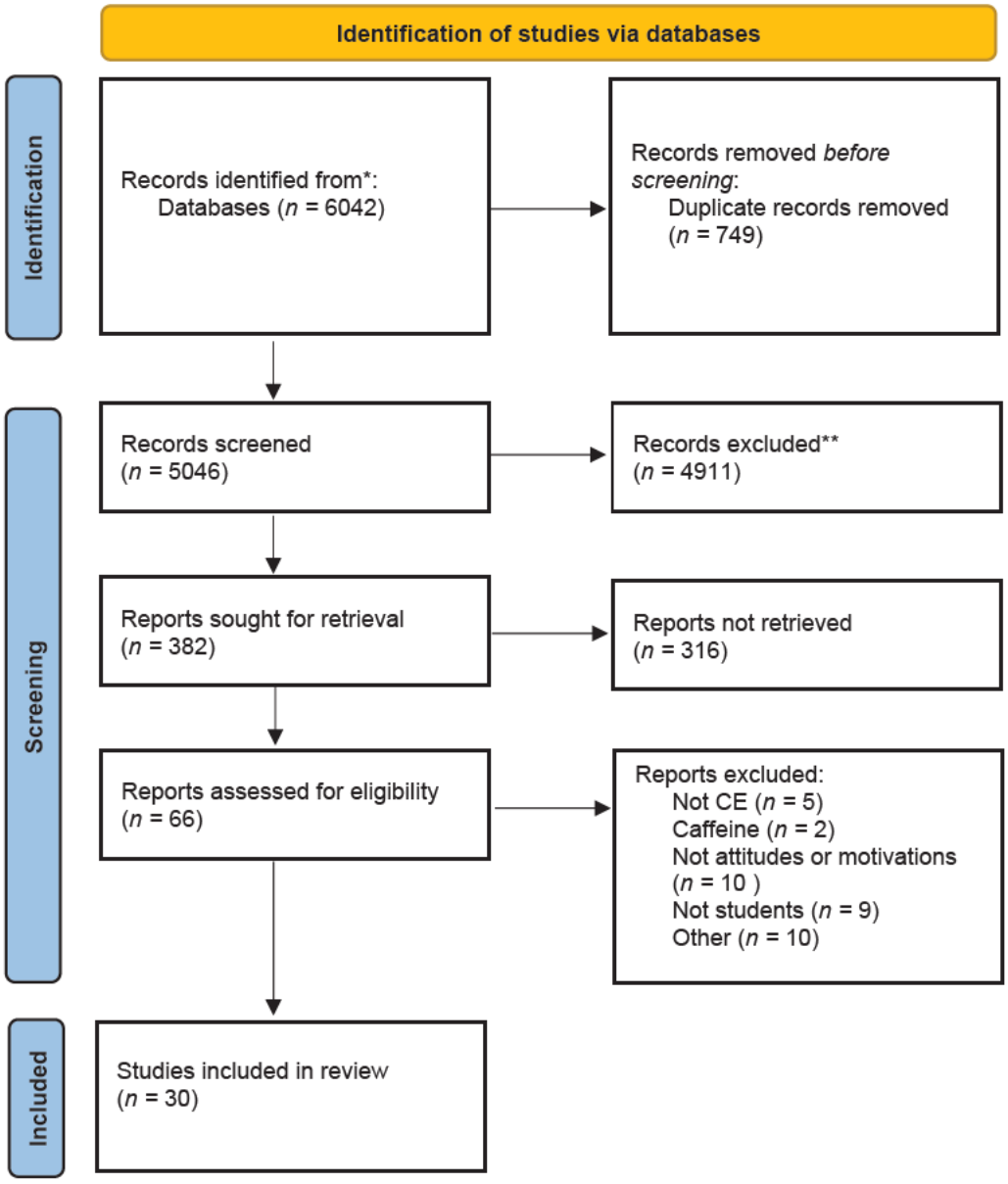
In total, 6042 records were initially identified, with 749 of these records duplicates. 5046 titles and abstracts were screened initially, excluding 4911. Based upon the eligibility criteria, 316 studies were sought for retrieval. The full text of 66 papers were read, and 36 papers were excluded because they did fulfil the inclusion criteria. 30 studies fulfilled the study's inclusion criteria and were included in the review (Figure. 3.1). All stages of the review were completed by the PhD candidate.

Following the identification of eligible studies, the lead researcher charted and tabulated the following information from included studies: author/s, year of publication, title, country, or countries in which the research took place, study population (what type of population, basic demographics), aims of the study, experimental methods used, and summary of key results (Appendix B)[5].

[5] Where possible the original wording from included studies is maintained in the table to protect the authenticity of the extracted findings

Figure. 3.1

Flow diagram for rationalisation, justification, motivations, and attitudes towards cognitive enhancing drugs.



3.3 Results

3.4.1 Profile of studies reviewed

In accordance with the aims of the review, methodological characteristics across the 30 studies are summarised in Appendix B. The identified studies included quantitative (n = 22), qualitative (n = 7), and mixed methods (n = 1) designs. Questionnaires (n = 24) were the most frequently used method of data collection within the quantitative studies with semi-

structured interviews (n = 6) being the most frequent method in the qualitative research. The 30 studies included 30908 participants. Participants represented in the review ranged across 11 countries: Belgium, Brazil, Canada, Germany, Greece, Italy, Iran, New Zealand, Netherlands, Switzerland, United Kingdom, and the United States. The country most widely represented was the USA (n = 11) followed by the UK (n = 7). A total of 15 studies were conducted in European nations. The main demographic information from all the reviewed studies can be found in Appendix B. Not all studies compared nonusers with users. Some studies, particularly the qualitative investigations, focused on CE users.

The findings from the studies reviewed are presented under the headings directly relating to the research questions: (1) what are the potential rationalisation and justifications for CE use exhibited by students? (2) what motivations do users and nonusers hold related to CE use?, and, (3) what attitudes do users and nonusers hold on potential deterrents to CE use? The results are presented first with attitudes towards potential deterrents, followed by motivations for use and finally, by potential rationalisation and justification.

3.3.2 Attitudes towards cognitive enhancement

Attitudes were examined in 16 studies, four were qualitative, and there was a single mixed-method study. Quantitative investigations used a cross-sectional questionnaire approach while the qualitative studies were primarily interview-based, though there was a single focus group study. The single mixed methods study (McDermott, 2020) used both a questionnaire before following this up with interviews on motivations for use. The main subthemes of attitudes related to potential deterrents of CE included: medical safety/health concerns, fairness, and legality.

Attitudes towards medical safety, side-effects, and detrimental health consequences were split between nonusers and users. Studies included in the review suggested that nonusers tend to demonstrate concerns over the safety of CE and in several studies, it was

highlighted that this is the most influential attitude held in dissuading CE use (Bavarian et al., 2019; De Oliveria Cata Prate et al., 2020; McDermott et al., 2020; Ram et al., 2017). This may be due to concerns over side-effects, long-term health consequences, or worries surrounding addiction and dependency. In contrast, users of CE hold very different attitudes relating to the health risks of CE substances. In qualitative interviews of 15 UK undergraduate students by Steward and Pickersgill (2019), the general view being the known side-effects were not significant enough to be major deterrents while US college students perceived the medical industry to be inherently trustworthy and therefore if the guidelines on use were followed then the use was both safe, and justifiable (Kerley, 2015).

Regarding fairness, the concept of CE as 'cheating' and whether such use might represent an unfair performance advantage over nonusers was raised within several studies reviewed. McDermott et al. (2020) evidenced that behind health concerns, the moral obligations on the basis that CE use might constitute a form of cheating were the second most important aspect underpinning negative attitudes towards use. And this finding is evident in several other studies such as Barvarian et al. (2018), where ethical disapproval or moral reservations were the second most endorsed aspect of negative attitudes towards CE. Similarly, 80% of participants in Maier et al.'s (2015) study disagreed that CE is acceptable in a competitive environment. In several of the qualitative studies, users were likely to suggest that although CE use allows them to work within stressful environments such as upcoming deadlines, the use of CE does not improve their grades above what they may be capable of without the use of CE (McDermott et al., 2020; Pohl et al., 2018).

The legal classification of CE was a concern for some but not all and of the concerns raised by the students, it was the least documented within the reviewed literature. An example of the limited recognition that the legal discussion had was within Bavarian et al. (2019). While concerns over health (non-malfeasance) and ethical disapproval of CE use

were themes endorsed highly by participants, 120 and 51 respectively out of 499, only three students endorsed illegality as a negative theme within attitudes towards CE use. Differences were seen between users and nonusers with users rarely associated CE use with wrongdoing and only occasionally identified nonmedical use as illegal (Aikins, 2019). When the concern was raised, none of the students reported fearing the legal consequences of access, use, or diversion. This contrasts with observations in Forlini et al. (2015) where a sample of 1026 German students found a preference for a restrictive policy for CE substances to discourage use, and this was due to strong beliefs in resisting peer pressure, avoiding the creation of injustices, and valuing of hard work.

3.3.3 Motivations for cognitive enhancement

Motivations were examined by 17 studies, 12 were quantitative investigations, 4 were qualitative and there was a single mixed-method study. Quantitative investigations used a cross-sectional questionnaire approach while the qualitative studies were interview-based. The main subthemes of motivations were improving concentration or focus, improving academic performance, improving learning ability and/or memory, improving wakefulness, and managing stress.

Through the use of the Prescription Stimulant Motive scale, Blevins et al. (2017) found that the most common motive among near 200 US students was ‘academic performance’, and such use was not on a regular basis, suggesting strategic use to study for exams. This focus on improving academic performance is also evidenced in a survey of 1505 students from the Netherlands, in which the primary motivation was to improve academic performance (Schelle et al., 2015). This general finding of improvement in academic performance was also seen in the large sample of 3589 Belgium students, in which 4.8% reported stimulant use without prescription (Ponnet et al., 2015). In another large sample, an investigation of over 3000 Flemish medical students, structural equation modelling indicated

significant associations between competition, stress, and CE use with 8.7% using stimulant medication in the exam period to enhance study performance. (De Bruyn et al., 2019). Through direct question self-report, an Iranian study of 579 Medical students evidenced a much higher prevalence rate of 17.6%, with the primary motives for CE use reported as 'to improve concentration' (70.45%), 'to increase study hours' (22.7%), and 'to increase memory' (18.8%) (Mousavi et al., 2017).

Improving concentration was also seen as the primary motivator in a Brazilian study of 1865 college students (De Oliveria et al., 2020). 4.2% of the sample had used smart drugs in the last 12 months with law students at 14.3% and medical students at 10.0%. The participants were asked direct questions relating to specific motives for use. The main reason was to increase concentration in 88.7% of users and increase learning ability in 64.4%. There was no question relating to improving grades. A sample of 682 college students in the USA assessed for motivations based on previous literature with the most reported motivation was better concertation when studying (77.4%) followed by to study longer or completing major assignments (68.8%) and finally to improve mental focus (52.7%) (Galluci et al., 2015). 899 students based in Italy with 11.3% reported CE use were investigated via survey to assess both academic motives and non-academic motives for use. From an academic perspective, 'improve concentration' (51%) followed by improving 'mental stamina for studying' (48.0%) and then 'exam performance' (42.2%). Outside of academics, the highest motivation for use was to 'improve sport performance' (25.5%) (Majori et al., 2017).

Qualitative research provided extra depth when assessing motivation. 15 UK undergraduates were interviewed with a mix of nonusers and users, who were predominately modafinil users, with all interviewed respondents reporting improved academic study as the primary purpose for CE use. Specifically, this was to improve focus and increase efficiency (Steward & Pickersgill, 2019). Also in the UK, a mixed-methods investigation demonstrated

that the considerable quantity of academic work and a short space of time coupled with an underlying lack of motivations for such work were the primary motivations behind CE use. In such a context, CE was viewed as a simple solution or a 'quick fix' to meet a deadline. (McDermott et al., 2020). Within 13 life-story interviews in the UK the most important motivation that led to use was work management and the potential to intensify work sessions within limited periods (Vargo & Petróczi, 2016). Essentially, participants interviewed were motivated to use CE to help them 'pull an all-nighter (Vargo & Petróczi, 2016). Semi-structured interviews with 22 college students in the USA found the number one reason for use for CE use was academic success with 18 out of the 22 students defining such as a motive as their only reason for using (Kerley, 2015).

3.3.4 Rationalisation and justification of cognitive enhancement

Rationalisation and justifications for CE were not explicitly examined in the same way as motivations or attitudes. However, several studies did refer to student users describing their justification or rationalisation for use and this was most often this was explored in more depth within the discussions. The main subthemes of rationalisation and justification for use were: perceived normalisation: perceived stress and academic demands; perceived comparisons; and perceptions of acceptability and fairness.

CE was often perceived as becoming increasingly commonplace. This was evidenced by CE using participants interviewed in a recent UK study (McDermott et al., 2020) with such a perception of use among health students now considered 'normal'. Users also reported a perception that this acceptability had also developed amongst non-using students because of CEs growing commonality. This was supported by Kerley et al. (2015), with CE use being heavily framed as common and accepted, such that that use was not considered an issue by CE using participants. A similar concept tied to the perception of commonality of CE use was user perceptions of accessibility. Again, the participants in McDermott et al. (2020) were

keen to impress how the ease of access to CE substances had been influential in their increased prevalence, with cost and speed of attainability also key. Vargo and Petróczi (2016) evidenced the perceived growing popularity of 'smart drugs' and ease of access to both the substances themselves and information, driven by the participants desire to assist in work management.

Regarding work management, university academic demands appeared central to the initiation and continued use of cognitive enhancers making this a student-specific issue. Beyond the drive evidenced by Vargo and Petróczi (2016), university life was framed as an environment of heightened competitiveness and the resulting stress and anxiety were felt in addition to explicit and implicit pressure. Such pressures allowed the participants to legitimise their behaviour, and even shape use, with convergence of pressures significant enough to warrant CE use (Steward & Pickersgill, 2019). This concept is similar to the motivations highlighted previous but appeared more focused on the implicit and explicit stress on students allowing justification of CE use. Participants in the quantitative study from Schelle et al. (2015) saw CE use as functional while still a student, and participants did not see use continuing beyond education.

Another area of rationalisation that reviewed studies highlighted was the comparative analogies that student users would draw upon. This may have been to licit stimulants such as coffee or caffeine (Heyes & Boardley, 2019; Vargo & Petróczi, 2016), other more illicit CE substances (Steward & Pickersgill, 2019), other illicit substances (Heyes & Boardley, 2019; Kerley et al., 2015), and doping (Maier et al., 2015). Students in one study defined their drug use as acceptable by pointing to their 'proper' motives claiming to make them better students, classmates, and workers, while also exercising justifications rooted in what was described as 'middle-class values' to create symbolic boundaries between themselves and other more illicit drug users (Kerley 2015).

Student users appeared keen to rationalise their use as in the context of non-competitive academia, essentially, they did not consider CE use as cheating. Justification for not considering use as cheating came from the claim that CE use merely allowed an individual the ability to apply themselves fully and that CE did not provide a competitive advantage (McDermott et al., 2020; Pohl et al., 2018). In the case of Pohl et al. (2018) large interview investigation into German students, a rationalisation for not considering CE as cheating was that there were too few users to seriously distort the competition. Within Vargo and Petróczi (2016), users displayed a contextualized or 'situated morality'. This situated morality for participants meant that the use of CE for revision or coursework and dissertations was not considered cheating, whereas for an exam or job interview it was. In Aikins' (2019) article investigating how collegiate prescription stimulant users regard social and ethical implications of use, 32 students were interviewed, of which 27 used CE. CE was seen as overwhelmingly advantageous among users and the emergent themes highlighted the degree of rationalisation for such use. Many of the users, particularly those that estimated a high percentage of peer use, perceived that they would be at a competitive disadvantage if they were not to use. This was exemplified by a participant within Aikins (2019, p118) highlighted a combination of two notable rationales, that not only was CE use ubiquitous, but that the competitive environment of college justified use:

> I think it puts you at more of a disadvantage to not take it. ... When you get into these bio or pre-med classes where everyone's trying to go to graduate school, people are going to try to do things to get an upper hand, and one of those things, unfortunately, is Adderall.

3.4 Discussion

To our knowledge, this is the first study to use a scoping review to examine the evidence surrounding the rationalisation and justification of CE use in students. The countries profiled included Belgium, Brazil, Canada, Germany, Italy, Iran, New Zealand, Netherlands,

Switzerland, United Kingdom, and the United States with the research predominately conducted either in Europe or North America. Given the possible health, fairness, and regulatory concerns as possible deterrents to CE use it is important to understand how individuals circumvent constraints and engage in the behaviour.

Attitudes held toward CE use support the idea that certain societal concerns potentially act as deterrents to engaging in CE use. Medical safety or health was a major concern for nonusers and was often evidenced to be the primary reason for not engaging in the behaviour. Concerns related to fairness, particularly whether CE constituted cheating or 'honesty', were also major factors in dissuading use. The review from Schelle et al. (2014) demonstrated how there are major differences in perception between nonusers and users and the same was the case within the current scoping review. Users had a far more positive view on the medical safety surrounding CE use, downplaying potential side effects despite many users often reporting negative effects with their own use. In contrast, the concerns over side-effects, long-term health consequences, or worries surrounding addiction and dependency were major factors for preventing engagement in CE for nonusers. Legality was less of a concern raised by nonusers who appear to rate the issues of safety and fairness higher in terms of deterrents. Nor was legality a major issue raised by users, who did not appear to be deterred by CE substances legal classification.

The primary motivation for CE use varied and was not consistently assessed across the research. *Academic enhancement* was often used within scales in the quantitative literature to assess motives but there was limited evidence as to what this might represent. Improvements in concentration were evidenced as a primary motivation in several studies. This was often followed by increasing focus, increasing hours for study, or mental stamina for studying. The qualitative studies (e.g., Steward & Pickersgill, 2019; Vargo & Petróczi, 2016) provide further insight as such approaches allow for a deeper discussion with

participants relating to what motivates use beyond the broad titles of 'academic enhancement' or 'managing academic demands.'. Stress and convergent demands of academia and general life meant that students felt that were under pressure, dealing with the extensive workloads and stress encountered at university level. It appears that a perceived 'need' to enhance is a response to contextual demands placed on student participants by the academic environment they find themselves in, possibly evidencing the functional role that participants see CE playing. Rather than seeking to use CE as a means of performance enhancement with regards to being a competitive high achieving student achieving high grades it instead appears that users are primarily motivated to engage in CE for 'catching-up' or coping with what is perceived as excessive academic demands or complete assignments within a short window of time. As Vargo and Petróczi highlight, 'use is tied to a need to comply with and readjust work performance to meet the day-to-day demands of their academic courses.' (2016, p.10) with participants primarily hoping the CE would help them to "pull an all-nighter" (2016, p.5).

There was still some evidence that managing academic demands and improving academic performance could mean students were turning to CE use to manage a competitive environment, seeking to improve grades or to become better students assisted by CE. This was the case in Kerley et al. (2015), and with Forlini et al. (2015) who also highlighted that exam and competitive situations were the predominant motivations for CE. The De Bruyn et al. (2019) investigation into medical students provides further interesting findings regarding the concept of competition within academia. In this medical student cohort, it appeared that higher perceptions of medical school competitiveness led to higher stress levels and this resulted in a greater chance of CE use. The concept of whether academia was a competitive environment and CE may represent a form of cheating caused discrepancies in users when rationalising and justifying use. Some studies presented evidence that CE users did not see

academia as a competitive environment (e.g., McDermott et al., 2020 Pohl et al., 2018) while for users that were one of the main rationalisations for use (e.g., Kerley et al., 2015; Steward & Pickersgill, 2019). This discrepancy as to whether CE should be considered cheating was typified in Pohl et al. (2018) where although participants didn't see academic as competitive and explained that CE did not provide an advantage, yet participants described how there were too few users to seriously distort the competition of academia.

Although it appears rationalisations haven't been major areas of focus for the CE literature, within the motivation research several forms of such justification for use do appear. Often this was to describe the extent to which CE use is now widespread, and the ease of access was taken as a further indication of a changing social norm as use became more commonplace among students seeking to handle increasing academic workloads. Tied to the motivation in managing academic demands, users were also able to justify CE use as allowing them the ability to manage such academic demands when faced with implicit or explicit pressure. This pressure was perceived to come from a variety of sources such as institutions, parents, or own expectations for academic outcomes (e.g., Kerley et al., 2015).

Several of the evidenced rationalisations and justifications appear to reflect certain mechanisms that allow individuals to psychologically bypass similar constraints regarding drug use in other contexts. One theory that has proved useful in research investigating this is Bandura's (1991) social cognitive theory of moral thought and action. Bandura (1991) proposed that transgressive activities – such as doping – would be deterred when people anticipant self-sanction through negative emotions. Mechanisms of moral disengagement, such as diffusion of responsibility, moral justification, advantageous comparison, and distortion of consequences appear to be relevant in the CE user population. One study, grounded in Bandura's (1991) has investigated CE users finding support for the mechanism of moral disengagement (Heyes & Boardley, 2019). The study, Chapter 4 of this thesis,

suggests that students may morally disengage to justify and rationalise the use of CE to minimise negative emotional responses (e.g., guilt) that may be expected to result given the potential legal-, health-, and ethics-based deterrents to CE. Further research is needed to investigate this beyond the 9 students from a single university.

Limitations

The current review was conducted within a scoping review framework and so is limited to a board summary of the literature relevant to the research question investigated relating to CE use in students. It is beyond the scope of the current review to provide specific insight into any one aspect of the extant literature on this topic. This also means we did not include an assessment of bias or nor does a quality assessment form part of a scoping study remit (Arksey & O'Malley, 2005). The current review only investigated studies that were conducted with students. Therefore, this review may have missed relevant information on the broader context of CE rationalisation and justification beyond just university students. The current investigation was also limited to articles available in English, with those not excluded from the review. As such the review may have missed some relevant studies published in the area of interest.

Conclusion

To our knowledge this is the first scoping study to examine whether rationalisation and justification has been investigated in the CE literature. Attitudes towards certain societal concerns suggest the presence of deterrents for use, primarily based on medical safety and fairness concerns. Primary motivations for CE use appeared varied, with a focus on the general theme of 'managing academic demands.' In some circumstances this may be high achieving students considering the competitive academic environment and desiring to perform at an even higher level. However, the more likely reason for these academic demands centred around managing stresses from perceived extensive workloads or poor

study practices. Key rationalisations and justifications for CE use centre around the perceived normalisation of the behaviour and stress experienced when managing perceived explicit and implicit pressure at university. Further investigation into rationalisations of CE use in a university environment would therefore provide greater insight into the behaviour. With such insight, academics and institutions and other stakeholders may then seek to explore methods of how to handle such behaviour at university. This may take the form of explicit regulation, harm reduction approaches, or other interventions surrounding the academic demands that are potentially driving such prescription drug use.

Chapter 4: Study 2. Psychosocial factors facilitating use of cognitive enhancing drugs in education: a qualitative investigation of moral disengagement and associated processes

4.1 Introduction

Competition and the drive for performance excellence are a facet of modern life. The pressure to perform, either real or perceived, has led individuals to seek methods to enhance their performance across a broad range of contexts. One method of enhancing performance, either physical or cognitive, is the use of drugs (McVeigh, Evans-Brown, & Bellis, 2012; Møldrup & Rie Hansen, 2006; Petróczi & Aidman, 2008; Petróczi et al., 2011). As academia becomes more competitive and outcome focussed, a growing societal concern is the trend of students engaging in cognitive enhancement (CE) through the off-label use of prescription drugs (Hübner, 2012; McVeigh et al., 2012). CE has been defined, as 'Use of any psychoactive drug by healthy subjects with the aim of enhancing cognitive abilities such as vigilance, attention, concentration or memory' (Franke, Bagusat, Rust, Engel, & Lieb, 2014a, p. 83). The importance of this topic is highlighted by the increased research attention paid to CE over recent years (Partridge, Bell, Lucke, Yeates, & Hall, 2011; Partridge, Lucke, & Hall, 2012; Vargo et al., 2014; Vargo & Petróczi, 2016; Wolff & Brand, 2013). Although different conceptualizations of CE have been proposed, in the current investigation CE represents the off-label use of prescription medications for the purpose of augmenting cognitive abilities and improving academic performance.

Three types of prescription stimulant medications commonly used by university students for CE purposes are amphetamines (e.g., Adderall), methylphenidate (e.g., Ritalin), and modafinil (e.g., Provigil) (De Jough, Bolt, Schermer, & Olivier, 2008; Dietz et al., 2013a; Farah et al., 2004). Although prevalence is difficult to determine categorically, lifetime use of such drugs for CE purposes is estimated to be between 5 and 35% in North American (Smith & Farah, 2011; Wilens et al., 2008) and between 1 and 10% in the UK and Europe (Franke et

al., 2011; Ott & Biller-Andorno, 2014; Singh, Bard, & Jackson, 2014). Although researchers (e.g., Vargo et al., 2014; Vargo & Petróczi, 2016) have started to explore psychosocial factors that influence student's use of CE, more work is needed to fully understand such influences. Thus, the overarching aim of the current research was to explore specific psychosocial factors that may facilitate illicit use of CE by university students.

One reason why it is important to understand the psychosocial processes that may lead to CE drug use is that use of such drugs could lead to detrimental health consequences. Use of prescription stimulants such as those introduced previously has been linked to side effects such as insomnia, psychosis, suppression of appetite, nausea, and irritability (Finger, Silva, & Falavigna, 2013; Hysek et al., 2014). In addition to these side effects, evidence supports the abuse potential of methylphenidate (Gahr, Freudenmann, Hiemke, Kölle, & Schönfeldt-Lecuona, 2014; Morton & Stockton, 2000) and longer-term studies investigating the potential for tolerance and abuse of modafinil are yet to be conducted (Sahakian & Morein-Zamir, 2011). Students who use CE drugs are also more likely to use and misuse other illicit substances for the purposes of self-medication (Singh et al., 2014). As such, detrimental health consequences represent one possible deterrent to CE.

Beyond potential health consequences, certain legal considerations may also influence students' decision making around CE. For instance, amphetamine and methylphenidate are classified as Class B drugs within the UK, and therefore, carry a 5-year prison sentence for possession without a prescription and up to a 14-year sentence for supply (Misuse of Drugs Act, 1971). Regarding modafinil, although this drug is not illegal to purchase, its sale without a prescription is illegal (MHRA, 2013). Moreover, the use, misuse, and sale of controlled drugs on the property of university campuses will often contravene institutional regulations and therefore represent a disciplinary offence (e.g., University of Birmingham, 2013). Thus, potential legal and disciplinary consequences represent further possible deterrents to CE.

A further issue related to – but distinct from – legality, are ethical considerations relating to CE. In particular, there has been extended discussion as to whether CE by students represents a form of cheating given it may be deemed a form of academic dishonesty (Cakic, 2009; De Jongh, Bolt, Schermer, & Olivier, 2008; Vargo & Petróczi, 2016). Although some have argued pharmacological enhancement should not be considered cheating (e.g. Harris, 2009; Schermer, 2008), applying definitions of this concept suggest it should. Specifically, academic dishonesty represents '...any deceitful or unfair act intended to produce a more desirable outcome on an exam, paper, homework assignment, or other assessment of learning' (Miller, Murdock, & Grotewiel, 2017, p121). Thus, use of CE drugs to improve performance constitutes academic dishonesty, even when students are assessed on individual performance rather than against peers (Whetstine, 2015). Specifically, even in such cases, an improved university degree classification can improve a student's chance of success within a competitive job market post-university. Accordingly, students are often critical of neuroenhancement, judging pharmacologically enhanced performances as unfair and inauthentic (Bell, Partridge, Lucke, & Hall, 2013; Forlini, & Racine, 2012; Forlini, Schildmann, Roser, Beranek, & Vollmann, 2015). Thus, ethical constraints regarding academic dishonesty could also deter students' use of CE.

4.1.1 Moral disengagement

Given the possible health-, legal-, and ethical-based deterrents to CE, an important aim for researchers is to understand psychosocial mechanisms that may allow some students to circumvent such constraints. One theory that has proved useful in research investigating how people psychologically bypass similar constraints regarding drug use in other contexts is Bandura's (1991) social cognitive theory of moral thought and action. Bandura (1991) proposed engagement in harmful and/or transgressive activities – of which CE could be categorised – is primarily discouraged by anticipation of resultant negative emotions (e.g.,

guilt). However, people can diminish or eliminate anticipation of such emotions through use of one or more of eight psychosocial mechanisms, collectively referred to as mechanisms of moral disengagement (MD). Through MD people can conditionally endorse harmful and transgressive acts by cognitively reframing the behaviour, reducing personal accountability for it and/or its consequences, distorting the consequences stemming from it, or dehumanising or blaming the victim/s.

Given that Bandura (1991) proposes MD can operate in any context, it may be used by student users of CE to prevent anticipation of negative emotions one may expect to be stimulated given the health-, legal-, and ethical-based deterrents outlined previously. Consistent with this assertion, past research has linked MD with illicit drug use in non-academic contexts. For example, Bandura, Barbaranelli, Caprara, and Pastorelli (1996) identified moderate-to-strong positive associations between MD and self- and parent-rated delinquent behaviour, incorporating drug use alongside other forms of delinquent behaviour with junior-high school children from Italy. Similarly, Passini (2012) reported a moderate positive correlation between MD and heavy drug use with secondary-school children from Italy. In addition, MD has also been linked with illicit image and performance enhancing drug (IPED) use in sport and exercise. First, across three studies Boardley and colleagues presented qualitative evidence supporting the use of six mechanisms (i.e., moral justification; euphemistic labelling; advantageous comparison (AC); displacement of responsibility; diffusion of responsibility (DR); distortion of consequences (DCs)) of MD to justify and rationalise IPED use with samples of IPED users (Boardley & Grix 2014; Boardley, Grix, & Dewar, 2014; Boardley, Grix, & Harkin, 2015). More recently, Boardley, Smith, Mills, Grix, and Wynne (2017) presented quantitative evidence supporting a moderate positive link between MD and self-reported IPED use with athletes from sport and exercise contexts. Thus, MD has been positively linked with drug use across a range of non-academic contexts.

However, to date researchers have not explored possible links between MD and CE in student populations.

Research not grounded in Bandura's (1991) theory provides some support for use of MD to rationalise and justify CE in students. Specifically, Vargo and Petróczi (2016) conducted interviews with 13 university students with experience of CE to investigate their experiences, motivations, and beliefs regarding CE. Importantly, some of the qualitative data presented from this study illustrate MD being used to rationalise and justify CE. For example, one student explained how he was influenced '... by the growing popularity of smart drugs' (Vargo & Petróczi, 2016, p6). This quote provides evidence for displacement of responsibility, a MD mechanism that involves diffusing personal responsibility for detrimental conduct amongst a large group of perpetrators or portrays it as resulting from collective decision making (Bandura, 1991). Another participant stated 'neuroenhancement was seen as significantly different from other illicit drugs as the former were used for functional reasons and not recreationally' (Vargo & Petróczi, 2016, p7). This quote demonstrates AC, an MD mechanism that operates when a transgressive act is contrasted with another act that is deemed more heinous, thus making the act in question appear less harmful or even inconsequential in comparison (Bandura, 1991). Although this study provides initial evidence supporting students' use of MD to justify and rationalise CE, research is needed that systematically applies Bandura's (1991) theory to this issue.

Based upon the arguments and evidence presented to this point, the overarching aim of this study was to investigate whether university students engaging in CE evidence mechanisms of MD when explaining their use of CE drugs. Although research has shown potential use of MD to rationalise and justify CE drug use (i.e., Vargo & Petróczi, 2016), to date researchers have not systematically applied Bandura's (1991) theory to this issue. As such, the current research sought to extend research linking MD with drug use in non-

academic contexts (e.g., Bandura et al., 1996; Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015, Boardley et al., 2017; Passini 2012) to the use of CE drugs in education. Specifically, we looked to answer the following research questions: (a) do university students evidence MD when explaining their CE drug use (b) and if so, which of the eight MD mechanisms are used.

4.2 Methods

4.2.1. Participants, procedures, and interviewer

Study participants were nine university students ($n_{female} = 1, n_{male} = 8$), attending dissimilar programmes of study at one University in the West Midlands region of England. Participants' ages ranged from 20 to 22 years. The sample size is in line with those used in similar investigations at this stage of enquiry (Boardley & Grix, 2014; Vargo & Petróczi, 2016). All participants had experience of CE, with period of use ranging from 1 to 4 years; seven were users at the time of interview and two were past users. The CE drugs used were, Ritalin (n = 3), and modafinil (n = 9). Although recognised as one of the most prevalent CE drugs in the United States, none of the participants had used Adderall.

Ethical clearance was granted by the host institution[6]. Due to the sensitive nature of the topic, recruitment occurred through intermediaries who knew individuals with experience of CE use. One of the intermediaries first described the purpose of the study, the rights of participants, and what participation involved to potential participants (Appendix C). Interviews were then arranged for those volunteering to participate. To ensure the anonymity of the participants, names and contact details were not recorded; participants were unknown to the interviewer. As such, verbal – rather than written – informed consent was obtained. Finally, to protect the anonymity of participants, all interviews were transcribed within 48h of interview, with audio files immediately deleted upon transcription completion. The

[6] ERN_16-1295

interviewer – although not a CE user – ensured preparation for the interviews by studying a wide range of substances used for CE, and how students tend to locate and use such substances.

4.2.2 Interview structure and data analysis

In-depth semi-structured interviews were conducted during the winter of 2016/17, based on a protocol designed to identify psychosocial mechanisms used to justify and rationalise CE through use of one or more of the eight mechanisms of MD. The protocol comprised of open-ended questions (Appendix D) that were succeeded by more targeted questions centred on the eight predetermined categories (e.g., moral justification, euphemistic labelling). This structure allowed for most instances of MD to emerge naturally during interview, rather than being imposed by the interview structure. The more targeted questions later in the protocol gave us the opportunity to probe further on mechanisms that had risen during the open-ended questions. Study data were first analysed through deductive reasoning using directed content analysis. This involved the application of functional definitions for the eight mechanisms of MD when content analysing the data. This approach is considered appropriate when qualitatively investigating an existing theory (Hsieh & Shannon, 2005).

Directed content analysis involved reading each transcript and highlighting all text that appears representing one or more mechanisms of MD; highlighted passages were then coded according to the predetermined codes (Hsieh & Shannon, 2005). The unit of coding used throughout data analysis was the complete response to a question; this avoided potential loss of context if only individual sentences were coded (De Wever, Schellens, Valcke, & Van Keer, 2006). In the presentation of results, exemplar quotes are provided with reference to the participant (e.g., P1, P2) and the page and line numbers (2, 5–10) from the relevant transcript. In some cases, clarification was required, and additional words have been included within square brackets [] when this was the case. Any data relevant to psychosocial processes

facilitating CE use that could not be coded into one of the eight predetermined categories were coded inductively into a category that captured the essence of the underlying process. This inductive analysis allowed further themes to emerge from the data that would otherwise have been missed if the data analysis had solely been deductive in nature. The three inductive themes detailed in the Results section emerged during all interviews.

The philosophical approach underpinning the study is a variant of the post-positivist position (Brustad, 2008). While the world view is aligned to that of positivism, the researchers are more reserved regarding the ability to fully discern reality. The researchers are of the view that it is impossible to produced theory-free knowledge. As such, we acknowledge the interview, results, and analyses are all instilled with the researchers' subjectivity (McGannon & Smith, 2015). As the current investigation was specifically designed to examine elements of Bandura's (1991) social cognitive theory of moral thought and action, the themes described may have been interpreted differently if they had been examined using an alternative theory. Also, as with all qualitative research, the construction of data themes is influenced by the researchers' experiences and perspectives relevant to the topic of study. As such, the findings may have been different if investigated by a different research team.

4.3 Results and discussion

Within this section, we present and discuss the results from the deductively and inductively determined themes evidenced in the data. The primary research aim for the deductive analyses was to investigate whether university students evidence MD when explaining their CE drug use and if so, which of the eight MD mechanisms are demonstrated. Overall, deductive data analyses revealed evidence of six mechanisms of moral MD: DR, AC, DCs, displacement of responsibility, moral justification, and euphemistic labelling; no evidence of dehumanisation or attribution of blame was identified. Subsequent inductive analysis

revealed three further data themes. The most frequently evidenced mechanisms within the study were those of DC, DR, and AC. DCs was evidenced in all nine of the participants with DR and AC being evidenced by eight of the nine participants. All participants displayed at least one mechanism of MD. However, the current data suggest that the mechanisms of DR and AC were favoured by the participants. Over the following subsections, we present and discuss the results for each of the identified themes beginning with those evidenced most by the participants.

Diffusion of responsibility

DR can occur through collective action, group decision making, or division of labour, leading to responsibility for transgressive acts and/or their consequences being diffused within the broader group (Bandura, 1991). Such diffusion was evident within our study participants, especially with reference to their close social group. The concept of collective action was represented by P6:

> Yeah [I] definitely feel like it's that mass psychology thing again, where you know if everyone is doing it, so you're sort of like well, surely can't be that bad if I was doing, it wouldn't be bad if I was doing it. (7, 30–32)

Many of the participants were keen to highlight how common the use of CE drugs was, especially within their immediate social group:

> Students love study drugs. I didn't realize how popular it was until I started to talk to people in my social group in second year and then most people have tried it and a lot of people I know. (P3, 5, 27–31)

The possibility that perceived ubiquity of CE leads to reduced personal responsibility for it highlights the potential danger in CE becoming normalised. Consistent with our findings here, Vargo and Petróczi (2016) evidenced the perceived growing popularity of CE may lead to its wider adoption. The perception of increasing and widespread use may allow students to diffuse personal responsibility for their actions when using CE drugs. Similarly, DR through

collective action has also been evidenced with IPDE use in sport and exercise (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015; Kirby, Moran, & Guerin, 2011). Consistent with what was seen presently with CE, in these studies athletes argued performance-enhancing drug use was morally acceptable in contexts in which it is highly prevalent. As such, it seems DR may be an important facilitator of drug use across a range of contexts where it is perceived as pervasive.

Advantageous comparison

AC takes advantage of the contrast principle by making a transgressive act appear inconsequential or less harmful by comparing it with act/s perceived to be more heinous (Bandura, 1991). This mechanism was evidenced frequently when CE was favourably compared to other illegal activities. For example, P3 stated 'As a student you come into contact with so much stuff that is illegal that when you put it relative to other things it's not that bad.' (5, 4–6) As such, this mechanism appears to allow users of CE to portray it as almost inconsequential when compared to more detrimental activities. This was again demonstrated by P5:

> I've sped over the speed limit before, smoked marijuana before, I've broke the law in a number of ways I think most people do every day... so I'm not going to feel guilty about doing something which I will use that's minor... it's not like I've done anything against anyone, I haven't hurt anyone, it's just literally for me to me. (8, 4–19)

Clearly, this participant did not view his CE as a serious transgression when he compared it to other illegal activities he had engaged in as a student.

Some participants focussed less on the relative legality of CE drug use and more on the possible health consequences by framing their comparisons to activities that to them present more of a health concern:

> There's far worse things to be doing... in the scheme of things you could be out drinking every night and you know, doing hard drugs and like putting yourself in danger and all that sort of stuff ... whereas you're just trying to work. (P5, 8, 26–31)

In comparing CE drug use to unhealthy lifestyle behaviours that would likely be detrimental to – as opposed to supportive of – academic study, this individual is able to portray his CE in a very favourable light. Similarly, qualitative research with IPED users has shown how they can compare IPED use to unhealthy lifestyle behaviours such as poor diet, alcohol use, and recreational drugs to make IPED use appear favourable in comparison (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015).

Presently, ACs were also made with IPED use, with numerous participants focussing on the negative health consequences associated with steroid use. Specifically, participants perceived the long-term physical impact of steroid use to be more detrimental than those resulting from use of CE drugs. An example of this was seen with P4, who stated, 'things that they [anabolic steroids] do physically, there are a lot more drastic compared to mods.' (7, 42–43)

This mechanism was also evidenced when participants compared their use of CE drugs to that of others, 'I've had friends who have done it for like a week and they don't look too good by the end.' (P4, 1, 38–39) This form of AC has also been evidenced in IPED users in exercise (Boardley & Grix, 2014; Boardley et al., 2014). Specifically, bodybuilders using anabolic steroids compared the dosages they used with those of other bodybuilders who used much higher dosages and ran longer drug-use cycles than them to make their own use appear less harmful. Thus, AC s whereby drug users compare their frequency and volume of drug use to others who use the same drugs more frequently and/or in greater volumes appear common across a range of contexts.

Distortion of consequences

DC s occurs when transgressors actively avoid or cognitively minimise the harmful outcomes resulting from their actions (Bandura, 1991). This was evidenced when students professed their use of CE harmed neither themselves nor anyone else, therefore, downplaying the outcomes stemming from it. For instance, some participants suggested use of drugs such as methylphenidate or modafinil in medical practice (i.e., to treat ADHD/narcolepsy) meant they were safe to use. P7 provided a good example of this when stating, ' ... I googled it before I did take it but didn't read up massively into it. I saw it was prescribed and nowhere on the internet saying it had killed them or anything like that.' (2, 10–12) Similarly, P5 suggested:

> I see it as quite normal... other people take it on like a prescription ... I know they've got ADHD and I don't ... if I need the help with work and it's not going to affect me long term, I would take it. (11, 2–7)

It seems that because a drug is approved for use in clinical practice it is, therefore, safe to take. However, even when medications are fully approved following clinical trials, they may still have damaging side effects (FDA, 2017).

DCs was also demonstrated when participants argued CE caused no harm to others. For instance, P5 disregarded any potential effects on others, '...I feel like there's no victims, no hurt, it's just me it's helping.' (13, 20–22). Such a position taken by the student may be ignorant of possible psychological harm caused to family members if CE ultimately resulted in harm to the user. Such harm should not be discounted given evidence that stimulant medication may lead to negative side effects such as irritability, insomnia, psychosis, and in some cases cardiac pathologies (Hysek et al., 2014; Vetter et al., 2008).

Participants also downplayed the academic advantage CE gave them over students not using CE, arguing the educational environment is not competitive. P4 evidenced this when suggesting, 'you are not necessarily competing at uni ... if you get high marks you can get high marks anyway.' (7, 18) There was also a feeling that although there was a stigma

attached to the use of CE drugs; their use did not constitute cheating, 'in terms of just the cheating and morality, I just personally feel no guilt associated with taking modafinil. I don't feel like I've cheated at all.' (P5, 11, 24–26) This accords with Vargo and Petróczi (2016), who found students regarded vignettes portraying CE in zero-sum games more negatively than ones portraying its use in non-zero-sum games; students were more likely to consider CE as cheating if there was an explicit competitive element within the context. Thus, CE drug users may portray academic study as a non-competitive context to allow them to view it as inconsequential for other students. In addition to this it has been evidenced that students' perception of CE drug use within academia is often negative with CE often considered unfair and inauthentic (Bell et al., 2013; Forlini, & Racine, 2012; Forlini et al., 2015).

Some students also suggested CE allowed them to reach grades they were already capable of, but that it is just a means of achieving this more efficiently. For example, P7 suggested:

> I think the majority of people could get the same degrees than they do with it just by working a little bit harder ... I don't think it really makes a huge difference to your grades unless, well it sort of allows you to do what you should be able to do in a sense. (7, 45–47)

Thus, participants downplayed the advantage given to them by CE; there was a belief that if the student worked harder they would be able to attain the same grade anyway. The concept of CE only improving the 'admin' side of university work and the ability to read large volumes of material prior to an assignment was also made, 'it's more like for admin work almost just to get all (the work done), to get that focus' (P3, 1, 8 – 9) and this perception appears similar to the belief of IPED use benefiting training rather than competition (Boardley et al., 2015). In the academic context, such beliefs appear to distort any advantage gained from being more effective in one's reading provides for performance in assignments using illicit prescription drugs. Thus, DCs allowed participants to not see CE as unethical by separating its effects on day-to-day work from subsequent assignment performance.

Interestingly, even when a participant did openly recognise the benefit of CE, they still did not perceive it as cheating:

> I suppose it does give you a benefit, it's illegal and it does give you a benefit over people that don't take it so in a way that is cheating but then I mean it's not that different of caffeine in that respect, you wouldn't class it as proper cheating anyway. (P7, 3, 41–43)

Here, P7 displays what was a frequent use of analogy, whereby CE was compared to use of coffee and caffeine tablets as a similar form of academic performance enhancement. Similarly, P5 said:

> It's like, people drink coffee before they work to help them feel energized and awake. I'd say it's pretty much a similar thing but you feel like more consistent, like for a longer amount of period of time. And it keeps you more just like coffee would, but like longer. But you don't have to keep drinking coffee throughout the day. (7, 8–12)

This was reinforced by P6 who stated:

> It's sort of a mega coffee shot that makes you concentrate for way longer and makes you work for way longer than sort of drinking coffee you can just take half or a pill in the day and that's you. (6, 11)

Participants appeared to be portraying CE drug use as analogous to caffeine use. This may allow CE drug users to perceive it as equivalent to a legal behaviour, and therefore, as ethically acceptable.

Participants also compared CE to another licit behaviour when comparing CE drug use to pay a dissertation tutor for essay coaching. P2 provided an example of this, suggesting CE is no worse than employing a dissertation tutor, 'I'm semi-aware its cheating but I don't think it is any more cheating than getting a dissertation tutor, like a paid one.' (5, 17–18) P2 then expanded further on this:

> I'd say it's not level because of the cost of dissertation tutor is more than modafinil and the goal of the degree is to get your grade and know what you are on about... Whereas someone who has got a dissertation tutor that isn't in the same way frowned upon, they can have a dissertation where they have barely got a clue what is written on it. (P2, 8, 11–31)

The ethical nature of dissertation tutors is a growing concern for academic study (Miller et al., 2017), and participants appeared to be proposing that whilst use of dissertation tutors may be permitted to some degree, morally their use is worse than CE because at least with CE the work produced is the student's own, whereas with a dissertation tutor this may not be the case. Thus, comparison of CE-drug use to a licit behaviour again appeared to help users downplay its potential consequences.

Displacement of responsibility

Displacement of responsibility is apparent when people view their actions and consequences as stemming from implicit or explicit social pressures, rather than something for which they are personally responsible (Bandura, 1991). Regarding implicit pressures to use CE, some of the participants felt pressurized to 'catch up' with university assignments and CE was perceived as an effective way of achieving this. For instance, P9 suggested:

> I think it's only because of the situation I was in and I don't plan to be in a situation like that again. But if I happen to be in a situation where I have to write 3000 words in a matter of hours, then probably yeah, risk and reward. (2, 16–18)

This approach to dealing with pressures to meet deadlines was evidenced among several other participants including P4 who would, '[I] only ever use it really when I need to use it, it's like a panic thing.' (1, 9) when 'if everything is getting too much. Then you, I would just spend a 16-hour shift in [the] library and bosh it out.' (1, 20–21) This motivation to 'catch up' using CE has been evidenced elsewhere (Vargo & Petróczi, 2016; Vrecko, 2013). This has often been about meeting the standards of other students that have worked harder to meet deadlines, suggesting standards set by other students may create an implicit social pressure to catch up. Presently, it appeared CE drugs were perceived as acceptable responses to such pressures. Such pressures only appeared to increase through the course of their academic studies. Accordingly, students appeared to rely even more on CE during their final study year. Further, consumption patterns described by participants suggested CE-drug use was

primarily used during exam revision or immediately prior to assignment submission deadlines. Such use of CE drugs is consistent with those reported in past research (Vargo & Petróczi, 2016).

Participants also described how their own use could actually create implicit pressure for others to adopt CE-drug use. For instance, P2 described how his own use of CE drugs may encourage others to adopt it,

> I've come back from the library having said I've done really well today; I've done 10hours' work. "Oh why have you done that?" Oh I've had a modafinil this morning. In a secondary way people probably pick it up that it is beneficial. (7, 23–26)

This potential role of the social group was consistent with the experiences of most participants, as the majority had first learnt of CE drugs from their social group. For example, P8 described:

> there was a group about five of us, my friends, and we sort of heard about these things, we thought they might be like a limitless pill type of thing... I tried it I just sort of found that it sort of worked for me. (2, 23–25)

P1 also noted, 'if they're [friends] like doing all that work, you want to see if it actually does work.' (2, 15) Thus, when social-group members describe favourable experiences with CE drugs, this may create an implicit pressure to try them that allows users to displace responsibility for this initial decision to adopt their use. Similar processes have been identified with IPED users, whereby bodybuilders described how seeing the impressive physiques of steroid users created an implicit pressure for them to adopt use of IPEDs (Boardley & Grix, 2014; Boardley et al., 2014). However, evidence for displacement of responsibility in CE users differs in some ways to its application with IPED users. Whereas research with IPED users has consistently found evidence of explicit coercion to use IPEDs (Boardley & Grix, 2014; Boardley et al., 2014; Boardley et al., 2015), no evidence of explicit pressure to use CE drugs was found presently.

Moral justification

Moral justification represents the cognitive restructuring of harmful activities as a means of achieving commendable social or moral outcomes (Bandura, 1991). One example of moral justification was seen when students rationalized their use of CE on the basis of it facilitating an enhanced return on their parents' financial investment in their education. P5 provided an example of this when arguing:

> Yeah, if it's helping me get a 2:1... university is sort of an investment isn't it. So, if like, if you leave with a 2:2 it's sort of a fail ... (5, 37–39)[7]

With the cost of tuition fees in the UK rising and the consequent impact on student debt, financial assistance is critical for a considerable proportion of students, and can also be a significant source of stress (Ross, Cleland, & Macleod, 2006). Thus, it is possible students see CE as a justifiable means of enhancing academic performance if it helps them maximise the return on their parents' investment.

Moral justifications were also framed in terms of potential benefits for other students, with almost all students suggesting they were able to help other students on their course. A good example of this was seen with P1:

> ... if I've maybe had a modafinil and I've done a piece of work, and [my friend] comes in and is like, oh I haven't understood this, if I've maybe done that work and I've really fully understood it,
> ... I could maybe better just like explain it to them. (7, 5–13)

As such, by suggesting there are social benefits stemming from their CE, students appear able to morally justify it. A similar justification has been seen in research with IPED users, who often suggest they develop knowledge of safe and effective practices through their own use which they then pass onto others (Boardley & Grix, 2014; Boardley et al., 2014, Boardley et al., 2015).

[7] In the UK the higher education system, the major degree classifications are first class (70%), upper second class (i.e. a 2:1; 60–69%), lower second class (i.e. 2:2; 50–59%, and third class (40–49%). A 2:1 classification is required for entry into many postgraduate courses in the UK.

Euphemistic labelling

Euphemistic labelling involves the selective use of anodyne language to portray transgressive actions as less harmful (Bandura, 1991). Participants appeared uncomfortable with the term 'cognitive enhancing drugs,' instead preferring to refer to them as 'Study Drugs' or 'Mods,' with mods apparently the most popular term. P1 summed up the collective feeling among the participants on why such terminology is preferred when stating, 'They call them mods. I think again, cos yeah it's an illegal drug....' (7, 27–30) There was a general feeling that as use of CE drugs is still be in its infancy, the broader lexicon around CE drug use – as seen with other forms of drug use – is yet to be fully developed. P8 explained this effectively, 'Other drugs... they've been around for ages and people have coined them different things, whereas this is quite a recent thing.' (7, 38–40)

Importantly, use of colloquial language when referring to CE drugs has the potential to weaken emotional responses that may normally deter it. The influence of euphemistic labelling is likely to be intrapsychic. Emotional reactions that would likely be stimulated if individuals used more accurate and complete terminology (e.g. modafinil, Ritalin) are likely stunted through use of terms such as mods (see Bandura, 1991, 2002). Similarly, the term 'study drug' has positive connotations as it likely focuses the mind on links to a positive behaviour (i.e. studying).

Self-medication

Self-medication was the first of three themes that emerged inductively during data analysis, and related largely to the use of ancillary drugs to address issues with sleep disturbance, an acute side-effect of the stimulant drugs used for CE (Hysek et al., 2014). Several participants attempted to address this through use of other drugs, primarily marijuana. For example, P5 described that, '[weed] is the only thing that can help put me to sleep after I've taken a modafinil.' (1, 36–37) Marijuana was used to offset the wakefulness effects of CE drugs,

‘modafinil takes you up in like your concentration, your focus, everything like that. It takes you up a level. And then weed, just sort of like brings you back down to your normal level... it allowed you to sleep.’ (P5, 2, 1–3) This finding suggests some students are using ancillary drugs to offset the side effects of the drugs they use for CE purposes.

In contrast, P9 described how modafinil may also be used to offset the lethargy often experienced following use of marijuana:

> It will just sort of clear my head. I would say, because I smoke a lot of weed, in the evenings. So, if I try and get work and do work in the morning, I sort of will be a bit like, foggy. So, for me that kind of clears me out ready to do work. (1, 26–28)

Such polypharmacy has the potential to lead to additional adverse side effects that can result from accumulated effects or adverse drug interactions (Rambhade, Chakarborty, Shrivastava, Patil, & Rambhade, 2012).

Family and friends

A further emergent theme related to students’ categorisation of associates into fellow CE users, non-using subject peers, and family members, with students’ discussing CE only with those in the first category. For example, P1 was adamant he would not disclose his use of modafinil to family members, ‘ ... I think they would home in on the fact that it’s an illegal drug rather than seeing that it would help you ... .’ (9, 24–26) There was an acknowledgement that there was a stigma attached to CE and this led to reluctance in discussing CE with anyone but other CE users. The label for this theme has been adopted from research in the sport and exercise context (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015), where similar selectiveness regarding who they discussed drug use with has been identified. Specifically, athletes who use IPEDs tend to only discuss their use with other users and not with family or even close friends if they are not part of the IPED-using community. Thus, across both athletic and academic contexts, those who use drugs for performance-enhancing purposes may avoid discussing their drug use with those who may challenge their

use of such drugs, proactively avoiding social censure (see Boardley et al., 2015). Avoiding such social censure is important, as the emotional responses (e.g. shame) stemming from social censure could constrain future engagement in the transgressive acts that led to them (Bandura, 2002)[8].

Institutional position

The final theme related to the potential influence of institutional stance on CE, with some students suggesting an explicit standpoint from the University against CE might reduce it. For instance, P7 said, '... if the uni said, put out a rule... said modafinil is not allowed then I'm sure that would deter a lot of people ....' (5, 39–43) Others suggested a lack of awareness regarding the scale of the issue may explain why most institutions do not currently have an explicit stance on CE, 'People say its cheating and it essentially is. It does get you a step ahead ... if they [the university] knew [how] common it was, [they] would crack down on it.' (P3, 5, 23–25) Interestingly, some universities in the USA – such as Duke University (Duke University, 2017) – have started to explicitly ban use of CE drugs. This may be because more prevalence research has been conducted in the USA, so institutions may be more aware of the scale of the issue, and therefore feel the need to take action to try to deter it. As prevalence data increases globally, it is possible more institutions may follow suit. Though as noted in Steward and Pickersgill (2019) care should be taken if and when university institutions decide on CE drug use policy.

Practical implications

While it may be too soon to design detailed interventions aimed at the use of CE drugs, the current findings do provide insight that could inform any such interventions developed in the future. Specifically, the aspects of CE drug use that was the focus of MD, and the mechanisms of MD used provide an indication of what users of CE drugs feel the need to

[8] The emergent theme here was related to disclosure and the distinctions made between different social groups when sharing knowledge of CE drug use, for clarity within the literature the current investigation maintains the same title of the theme.

rationalise. Further, interventions that aim to undermine the basis of these rationalizations could help to stimulate the self-regulatory mechanisms (e.g. anticipated guilt) that MD serves to blunt. One example would be to provide education on the possible harms associated with misuse of CE drugs, as well as highlighting how any harm to the self can have implications for others such as family members. Such an intervention has the potential to make MD through DC more difficult by making the potentially harms of use more salient. Interestingly, consistent with this suggestion, Oxford University Students Union recently organised a series of workshops for users of CE drugs that included educational materials such as this (Fullerton, 2017).

Limitations and future directions

This study contributes important knowledge on the facilitation of CE drug use in student populations. However, as with any research, there are methodological limitations that should be considered when interpreting the findings. As the participants within the present investigation all resided within the UK, any cultural differences in rationalisation of CE drug use will not have been captured. Cultural differences could result from differences in government policy (e.g. legal status) on the relevant medications across countries. Such differences have the potential to influence the degree to which students feel the need to rationalise their use. For instance, legal status is known to influence morality (Wingrove, Korpasa, & Weisz, 2011), and therefore differences in legal status could impact upon people's ethical views on CE drug use. Thus, future researchers are encouraged to seek to investigate the current research questions in alternative cultures/countries.

Another limitation relates to the makeup of the sample. Specifically, although the sample represented a range of academic subjects, no single subject was represented by more than three students. As a result, it was not possible to investigate the possibility of nuanced themes specific to particular degree programmes. In future research, larger numbers of users

from different subjects could be recruited, allowing for any subject-specific themes to emerge. An additional limitation of the sample is the limited number of female participants; therefore, future researchers are also encouraged to incorporate more females in the sample.

Conclusion

When explaining their reasons for use of CE drugs, students show clear evidence of six mechanisms of MD, with deductive analyses supporting use of all MD mechanisms aside from dehumanisation and attribution of blame. To support their MD, participants appeared to avoid information relating to the legality and safety of CE. Instead, information such as the ease of availability and use of CE drugs in legitimate medical practice was proposed as being indicative of their perceived legality and safety. Through application of Bandura's (1991) theory, the present research has demonstrated how MD may be central to how student users of CE rationalise and justify their off-label use of drugs to support their academic studies. Continuation of this line of research may further our understanding of the psychosocial mechanisms that support CE, leading to the development of harm-reduction interventions aimed at reducing students' use of CE drugs. For instance, the nature of the rationalizations identified could help inform interventions aimed at reducing the possible harmful use of CE drugs in student populations. Finally, such research may help universities take an explicit stance on this issue; at present very few institutions take any position on the use of CE drugs by students.

Chapter 5: Study 3. Doping and Study Drug Prevalence in UK Student-Athletes: Indirect estimates using Randomised and Non-Randomised Approaches

5.1 Introduction

Illicit drug use for enhancement purposes is an issue across a range of contexts, but particularly in sport and education (Faraone et al., 2020; Heyes & Boardley, 2019; Maher, 2008; Schelle et al., 2014; Wolff & Brand, 2013, Gleave et al., 2021). In sport, performance enhancing drug (PED) use – referred to as doping – represents the use of prohibited substances or methods to improve athletic performance. Typically, these are substances and methods contained within the World Anti-Doping Agency prohibited list (WADA, 2021b). In education, cognitive enhancing drug (CED) use to facilitate academic study is defined as the 'Use of any psychoactive drug by healthy subjects with the aim of enhancing cognitive abilities such as vigilance, attention, concentration or memory' (Franke et al., 2014a: p83). This most frequently involves the non-medical use of stimulant medications such as modafinil (Provigil), amphetamine (Adderall) or methylphenidate (Ritalin). Student-athletes targeting achievement outcomes both in sport and education may potentially be at risk for both forms of enhancement drug use. The overarching objective of the present research was to examine the prevalence of PED and CED use in UK-based student-athletes.

Prevalence of PED use in elite adult sport has been estimated between 14 and 39% (de Hon et al., 2015) and although the prevalence of PED use estimated in university-level athletes appears to be lower than that of elite athletes, research suggests it is still of concern. For example, Papadopoulos et al. (2006) used direct questioning methods to investigate the lifetime prevalence of PED use in university students across six European countries, finding on average 2.6% disclosed the use of PEDs. More recently, using direct questioning Blank et al. (2017) found the average past year use in Austrian university students to be 9.4%. Higher values have been reported elsewhere. Specifically, via indirect questioning Dietz et al. (2018)

reported past year prevalence estimates for doping up to 22.5% in a sample of 1243 university students in Germany. In a study comparing two indirect methods, James et al. (2013) found in 513 club-level athletes within the UK that PED use was estimated at 19.8% using the single sample count method and 58.4% using the unrelated question method, demonstrating how different estimation methods can lead to large discrepancies in values.

The prevalence estimates for CED use in university students also vary widely. Across Europe, prevalence, measured via direct questioning, has ranged from 1.4% to 21.5% (Forlini et al., 2015; Lazuras et al., 2017; Maier et al., 2013; Schelle et al., 2015). In the UK, lifetime prevalence estimates have ranged from 10% (Singh et al., 2014) to 19% (McDermott et al., 2020) using the direct questioning technique. Of importance, to date researchers have not used indirect methods to estimate the prevalence of CED used in UK-based university students.

One possible contributor to variation in prevalence estimates is whether direct or indirect assessment approaches were used. Direct questioning approaches have been used in many studies and require participants to openly report engagement in a behaviour. In contrast, indirect approaches introduce a randomisation task or uncertainty that overtly demonstrates anonymity to participants (Tourangeau & Yan, 2007). Of importance, direct questioning techniques are thought to be more susceptible to socially desirable responses than indirect methods, especially when assessing the prevalence of socially sensitive behaviours (Fisher, 1993; Warner, 1965).

One popular indirect approach – the randomised response technique (RRT; Warner, 1965) – involves some participants not answering the sensitive question at all, using a randomising device to determine who answers the sensitive question and who doesn't. There have been several adaptations to the RRT originally developed by Warner (1965), including the unrelated question model (UQM; Greenberg et al., 1969) which has been used to estimate

the prevalence of PED/CED use (e.g., Dietz et al., 2013a; Dietz et al., 2013b; Dietz et al., 2018; Ulrich et al., 2018). The UQM utilises a distributing method of known distribution to direct participants to either the sensitive question or an innocuous question; only participants know which of these two questions they were directed to. As the response distributions for the distributing method/innocuous question are known, the number of affirmative responses for the sensitive question can be determined (Greenberg et al., 1969). In addition to being considered more acceptable than Warner's (1965) original method, the UQM has more favourable statistical properties (Ulrich et al., 2012) and has been used to explore doping in athletic populations (Ulrich et al., 2018; Boardley et al., 2019).

Several studies have employed the UQM to estimate the prevalence of PED and CED use. For example, Striegel et al. (2010) estimated a lifetime prevalence of 6.8% amongst elite junior athletes for PED use, whereas Dietz et al. (2013b) estimated the 12-month prevalence of PED use to be 13.0% and CED use to be 15.1% with adult recreational German triathletes. They also reported similar results in a more recent paper investigating PED use in students (Dietz et al., 2018b). Further, Seifarth et al. (2019) estimated a 12-month prevalence of PED use of 7.0% among adult recreational triathletes and Boardley et al. (2019) estimated the 12-month prevalence of PED use amongst high-level athletes from three continents to be 13.9%. Further, Dietz et al. (2013a) estimated the 12-month prevalence of CED use among a sample of German university students to be 20.0%, whilst in another study, they reported CED use estimates for German students of 22.5% and 18.0% (Dietz et al., 2018b). Thus, the use of the UQM to examine the prevalence of PED and CED use to date suggests prevalence estimates that are of some concern. These estimates are non-trivial[9], in that they are greater than zero

[9] Non-trivial being defined, 'Not trivial' or 'Having the value of at least one variable or term not equal to zero.' (Merriam-Webster, n.d.)

and such use of PED and CED by students should provoke consideration by regulatory bodies as to how best to mitigate or control use.

Previous research employing the UQM has evidenced gender differences in the prevalence of PED and CED use. For instance, Boardley et al. (2019) provided 12-month PED use prevalence estimates of 15.2% and 11.3% for male and female athletes, respectively. Similarly, Dietz et al. (2013b) reported estimates of 13.7% and 8.0% for males and females, respectively, within their sample of recreational triathletes in Germany. Regarding CED use, Dietz et al. (2013a) estimated a prevalence of 23.7% and 17.0%, respectively, for male and female students in Germany[10]. Hence, the limited research to date using indirect approaches suggests a higher prevalence of both PED and CED use in males than females. However, gender differences in the prevalence of PED and CED use have not thus far been examined in student-athletes.

As indicated previously, indirect methods are considered by some to provide a truer representation of the prevalence of doping in sport than direct methods or drug testing (de Hon et al., 2015). In support of this, an extensive review by Lensvelt-Mulders et al. (2005a) demonstrated that RRT estimates yield more valid results when estimating socially sensitive behaviours in comparison to conventional direct questioning techniques or face-to-face interviews. These issues are of relevance to the current research, given the social stigma and consequences attached to enhancement of drug use. No study to date has estimated the prevalence of PED (or CED) use in UK student-athletes using indirect estimation approaches.

One downside to the UQM is not all participants answer the sensitive question due to the randomisation element of the method. Alternatively, responses to the sensitive question can be hidden amongst those for non-sensitive questions (Lensvelt-Mulders et al, 2005b),

[10] One issue related to the CE studies within Germany that may lead to higher prevalence estimates is the inclusion of caffeine tablets as a CE.

using non-randomised approaches such as the SSC (Petróczi et al., 2011). The SSC represents a simplified version of the Unmatched List Count (Dalton et al., 1994) whereby the sensitive question is embedded within a series of innocuous questions, with participants providing a single response indicating how many of the questions they answer yes to. This makes it impossible to determine any individual's response to the sensitive question. However, as the response distributions are known for the innocuous questions, it is possible to determine the number of yes responses to the sensitive question overall. The SSC has been shown to have good face validity, uses the data of all participants to derive prevalence estimates and provides estimates similar to those using the RRT (Petróczi et al., 2011). The SSC has also been used successfully to estimate the prevalence of PED by use comparing prevalence estimates to those from UQM (James et al., 2013).

The validity of the SSC to assess the prevalence of drug use has been supported in studies investigating the prevalence of mephedrone (Petróczi et al., 2011), and recreational drug (Nepusz et al., 2014) use, and PED use (James et al., 2013). Further, it has been shown to compare favourably to other indirect methods in terms of their efficiency, ease of use and face validity (Petróczi et al., 2011; James et al., 2013) and therefore the SSC has potential as a valid approach for assessing PED and CED use. The current study sought to use both indirect methods to add to the literature and knowledge of prevalence in both contexts and determine whether the randomised (UQM) and non-randomised (SSC) approaches produce comparable estimates for the two forms of enhancement drug use.

Based on the arguments to this point, the current study had two primary aims. First, we aimed to estimate the 12-month prevalence of PED and CED use in UK student-athletes. As part of this aim, we sought to examine gender differences in both forms of drug use. Due to the lack of studies that have investigated prevalence within student-athlete populations, and the degree of variability in prevalence estimates for other populations, we have not

formed specific hypotheses regarding overall expected levels of PED and CED use. However, based on the evidence available, we did hypothesise that prevalence estimates for both PED and CED use would be higher for males than for females (Boardley et al., 2019; Dietz et al., 2013a). Second, we aimed to compare prevalence estimates for PED and CED use using randomised (i.e., UQM) and non-randomised (i.e., SSC) indirect approaches. Based on the single study (i.e., James et al., 2013) that has compared estimates derived with these two techniques, we tentatively hypothesised that UQM estimates would be higher than SSC estimates.

5.2 Material and Methods

5.2.1 Participants

Using the UQM, to detect a prevalence of ≥6% with a statistical power of 85%, a sample size of ≥650 is required (see Dietz et al., 2013a). As the recommended minimum sample size for the SSC model is smaller than this (i.e., n = 300; see Petróczi et al., 2011), we targeted a sample size of ≥650.

University team- (n = 461) and individual- (n = 271) sport athletes (n = 732; n_{female} = 400, n_{male} = 332) from England and Wales participated. Participants' ages ranged from 18-33 years (M = 20.08, SD = 1.56), the mean number of years spent in their sport was 7.32 (SD = 4.84) and the mean number of hours spent participating each week was 6.81 (SD = 3.75). Across the sample 33 sports were represented, with athletics and cross country (n = 91), football (n = 88), netball (n = 88), rowing (n = 71), and hockey (n = 48) indicated most frequently. Nine different universities were sampled from; three were in the North of England, two in the Midlands, and one each from the South East, East, and Wales. Across the sample, 49 different academic subjects were represented.[11]

[11] The data for Study 3 and Study 4 were collected as part of the same data collection. The prevalence measures for Study 3 were completed and returned first, followed by completion of the second questionnaire pack

5.2.2 Measures

Participants completed a paper questionnaire incorporating two indirect measures (see Appendix F, UQM and SSC) to assess the 12-month prevalence of PED and CED use. Definitions and examples of PED and CED use were provided to ensure clarity of meaning[12]. As such, four indirect measures were completed by each participant. To prevent possible order effects, the presentation of the four measures was counter-balanced with 24 permutations across the sample. Following the indirect measures, participants completed a direct measure of PED and CED use. As our primary focus was on indirect techniques, the direct measures were not included when counterbalancing. To ensure timely completion of the questionnaire pack, the randomisation question within the UQM was similar to the set of innocuous items within the SSC.

Unrelated question model

Prevalence of past 12-month PED and CED use were assessed using the UQM (Greenberg et al., 1969). For convenience, the UQM has been adapted for use in paper-and-pen questionnaire format similar to that of Dietz et al. (2013a) (see Figure 5.1). We referred to a specific person (i.e., father) in Question A rather than allowing participants to choose this person. This was in response to Ulrich et al. (2018) and James et al. (2013), who expressed concerns that upon receiving the sensitive Question B, participants might surreptitiously revert to non-sensitive Question A to select a person with a birthdate that directed them to the non-sensitive Question B. Using the initial randomising question, 32.9% (120 of 365.25) of the student-athletes were directed to the non-sensitive question A, whereas 67.1% (245.25 of 365.25) were directed to the sensitive question B. Figure 5.2 presents the probability tree for

containing the demographics and psychometric questionnaires for Study 4. The two questionnaire packs were linked by an identification number allowing for the packs to be connected following collection.

[12] PED defined as substances used to illicit improve athletic performance and are prohibited substances listed on the WADA prohibited list. CED defined as prescription stimulant medications used off prescription to improve cognitive or academic performance, for example Ritalin, Adderall, and Modafinil.

the UQM (Greenberg et al., 1969). See Dietz et al. (2013a) for the process and formulas used to estimate prevalence using this method.

Figure 5.1

Unrelated Question Model.

We are aiming to estimate in the prevalence of **performance-enhancing drug** use. We can work this out from a sample without you having to explicitly indicate whether or not you have used performance-enhancing drugs through the following procedure.

Please read the following question and ***follow the instructions carefully:***

Please consider your father's birthday (if not known, please inform the researcher).

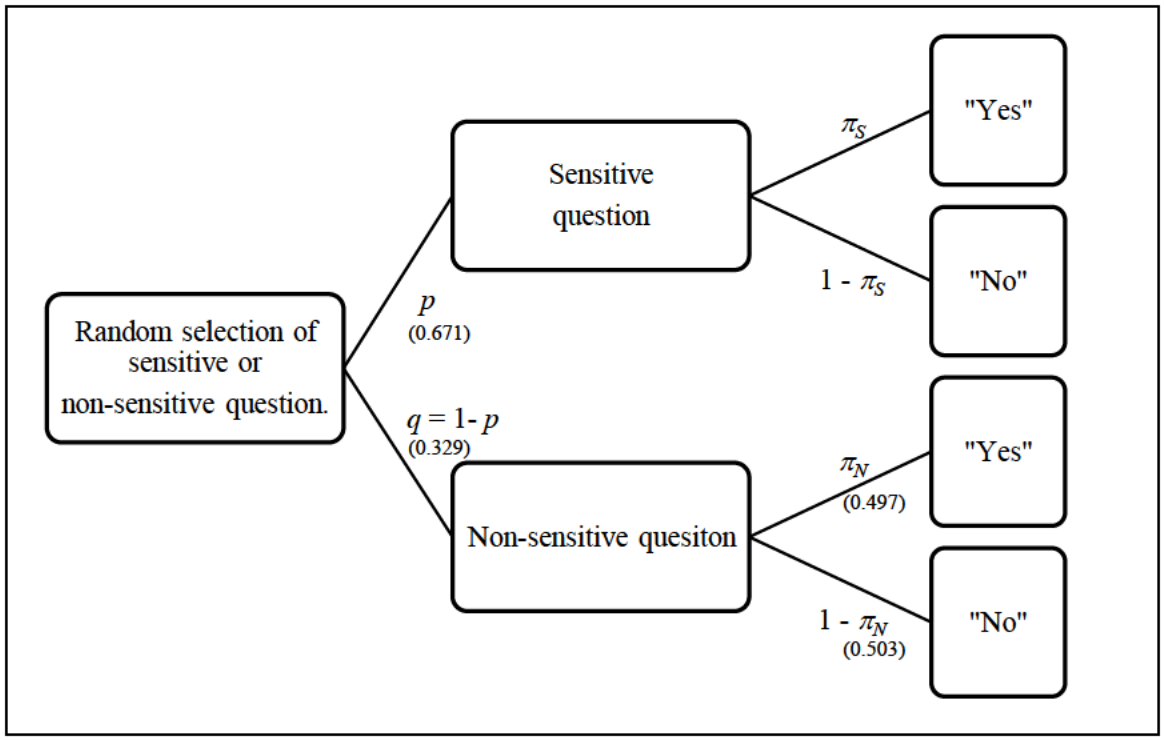
Is this birthday in the first third of the month (1st to 10th day)?

If yes, please answer Question A; if no, please proceed to Question B.

Question A.	**Question B.**
Is this birthday in the first half of the year (prior to the 1st July)?	Have you used **performance-enhancing drugs** or methods prohibited in sport (e.g., EPO, testosterone, HGH) in the last 12 months?
Please circle your answer	
Yes	No
Note that ***only you know*** which of the two questions you have answered.	

Figure 5.2

Probability tree for the unrelated question model (UQM).



Note. The participant is asked an initial non-sensitive question for which only the participant knows the answer, but for which the probability p of a ''no'' response and the complementary probability $q = 1 - p$ of a ''yes'' response in the overall population are known (e.g., a birthday). Participants answering ''yes'' to the initial question are then directed to a further non-sensitive question, for which the probability π_N of a ''yes'' answer is again known. Respondents answering ''no'' on the initial question are directed to the sensitive question (e.g., past 12-month performance enhancing drug use), where the probability π_S of a ''yes'' answer is unknown and represents the target of the investigation. Known probabilities are presented in brackets.

Single sample count

Prevalence of past 12-month PED and CED use were also assessed using the SSC (see Figure 5.3; Petróczi et al., 2011). The SSC consists of four innocuous questions alongside one sensitive question, with participants reporting how many of the five questions they answer affirmatively. The innocuous questions each have a known answer distribution in the population (e.g., Is your father's birthday in the first half of the year?). Thus, the expected number of "yes" answers to the innocuous questions can be calculated, with any additional

"yes" answers assumed to result from the sensitive question. The innocuous questions add 'noise' to mask participants' responses to the sensitive question (Nepusz et al., 2014). To remove the possibility of unintentional disclosure when answering affirmatively to all five questions, there is a shared 0/5 option. Prevalence estimates and confidence intervals were calculated using software developed by Nepusz et al. (2014), accessed through personal communication (A. Petróczi, October 2, 2019).

Figure 5.3

Single Sample Count Technique

Here, we would like to estimate the prevalence of **performance-enhancing drug** use. We can work this out from a sample without you having to indicate whether or not you have used performance-enhancing drugs by answering the following questions.

Think of your father's date of birth (if not known, please inform the researcher)
Please indicate how many of the following 5 statements are true. Only report the total number of 'true' answers.

- The birthday falls in the second half of the year (July – December).
- The birthday is in February, April, June, August, October, or December.
- The birthday falls in the first half of the month (1^{st}-15^{th}).
- I have used performance-enhancing drugs or methods prohibited in sport (e.g., EPO, testosterone, HGH) in the last 12 months.
- The birthday is on an odd day (on or ending with 1, 3, 5, 7, 9).

Please tick the box that corresponds to your total number of 'true' answers.

0 or 5 □	1 □	2 □	3 □	4 □

Direct Question PED and CED use

PED and CED use were assessed currently, during the past three months, and prior to the past three months via direct questioning. We assessed these three periods of use to capture a more complete picture of PED and CED use in the sample. Participants were presented with a list of common PEDs and CEDs and asked to report use during the three time periods (Appendix G, see Boardley et al., 2017). Participants' responses to current, past three months, and prior to past three months were collated to provide information on historical patterns of use across

the sample. Such information is difficult to collect using indirect approaches due to the elative complexity of indirect approaches in comparison to direct approaches.

5.2.3 Procedures

The study was approved by the University Ethics Committee[13]. Team captains/coaches of university sport teams at eight institutions based in the UK were contacted to discuss the possible participation of their athletes. For those expressing interest, a convenient time and location for data collection was arranged, with team training sessions the most common location. A researcher attended at the arranged time, first providing an information sheet to athletes before explaining the study aims and procedures, included clear definitions of the terms PED and CED as operationalised in the present study. The complete anonymity of participation was emphasised, and athletes invited to participate. Those volunteering proceeded to complete the questionnaire pack, having been told doing so indicated consent to participate. Completion of the questionnaire pack took approximately 10 to 15 minutes. Participants placed their completed packs in a blank envelope before handing it to the researcher.

5.3 Results

For PED use, 722 participants answered the UQM (98.63%) and 724 the SSC (98.90%), whereas for CED use 719 answered the UQM (98.22%) and 724 the SSC (98.90%). Table 5.4 provides the prevalence estimates for PED and CED use using the two indirect and one direct method. Statistical differences were determined through the use of confidence intervals. Overall, 12-month prevalence of PED use was estimated to be 14.02% (95% CI: 11.60-16.45%) using the UQM and 7.83% (95% CI: 0.00-16.54%) for the SSC. For males, the UQM estimate was 15.16% (95% CI: 11.53-18.79%) whereas for females it was13.08% (95% CI: 9.82-16.33%). With the SSC, the PED use prevalence estimate for males was

[13] ERN_16-1609

9.28% (95% CI: 0.00-22.60%) whereas for females it was 6.72% (95% CI: 0.00-18.14%). Given the 95% CIs intervals for estimates for males vs. females overlapped with both the UQM and SSC, we did not detect a significant gender difference for PED use using either technique. For CED use, prevalence was estimated to be between 16.26% (95% CI: 13.78-18.73%) using the UQM and 7.00% (95% CI: 0.00%-15.55%) for the SSC. For males, the UQM estimate was 18.80% (95% CI: 0.00-15.06-22.53%) whereas for females it was 14.13% (95% CI: 10.83-17.43%). With the SSC, the CED use prevalence estimate for males was 11.30% (95% CI: 0.00-24.35%) whereas for females it was 3.38% (95% CI: 0.00-14.67%). As the 95% CIs intervals for estimates for males and females overlapped with both the UQM and SSC, we did not detect a significant gender difference using either technique. Finally, using direct questioning, 2.77% (95% CI: 1.57-3.96%) of students reported PED use and 5.10% (95% CI: 3.50-6.71%) reported CED use either currently, in the past three months, or prior to the past three months. For males, this 4.56% and 6.69% while for females this was 1.27% (95% CI: 0.16-2.38%) and 3.79% (95% CI: 1.90-5.68%) for PED and CED respectively.

Table 5.1

Prevalence of Performance Enhancing Drug (PED) and Cognitive Enhancing Drug (CED) Use Using the Unrelated Question Model (UQM), Single Sample Count (SSC) method, and Direct Questioning (DQ).

	UQM (%)	SSC (%)	DQ Current (%)	DQ Past 3 Months (%)	DQ <Past 3 Months (%)
			PED		
Total	14.02 (11.60-16.45)	7.83 (0.00-16.54)	0.83 (0.17-1.49)	0.28 (0.00-0.66)	1.66 (0.73-2.59)
Female	13.08 (9.82-16.33)	6.72 (0.00-18.14)	0.51 (0.00-1.21)	0.25 (0.00-0.75)	0.51 (0.00-1.21)
Male	15.16 (11.53-18.79)	9.28 (0.00-22.60)	1.22 (0.03-2.41)	0.30 (0.00-0.90)	3.04 (1.17-4.90)
			CED		
Total	16.26 (13.78-18.73)	7.00 (0.00-15.55)	0.55 (0.01-1.09)	0.83 (0.17-1.49)	3.72 (2.34-5.11)
Female	14.13 (10.83-17.43)	3.38 (0.00-14.67)	0.51 (0.00-1.21)	0.25 (0.00-0.75)	3.03 (1.33-4.73)
Male	18.80 (15.06-22.53)	11.30 (0.00-24.35)	0.61 (0.00-1.45)	1.52 (0.19-2.85)	4.56 (2.29-6.83)

5.4 Discussion

This study had two primary aims. First, we aimed to estimate the prevalence of PED and CED use in UK student-athletes, as part of this, we sought to examine gender differences for both forms of drug use. Second, we aimed to compare prevalence estimates derived using randomised (i.e., UQM) and non-randomised (i.e., SSC) indirect approaches to determine whether the two types produce comparable (i.e., similar) estimates. This is the first study to

assess PED and CED use using two indirect approaches simultaneously. Direct question data were also collected to further understand the nature of PED and CED use in the sample, and to provide a comparator for estimates derived using the indirect approaches. Over the following paragraphs we compare the derived prevalence estimates and discuss them in terms of our overarching study aims.

5.4.1 Prevalence of PED and CED use

Despite the doping rules that govern sport in the UK, the UQM and SSC yielded prevalence estimates of 14.0% and 7.8%, respectively, for the past 12-month doping in UK student-athletes. These estimates provide the first evaluations of PED use in UK student-athletes and suggest reasonably widespread contravention of anti-doping rules in UK university sport. Further, the levels are comparable to UQM estimates for junior (i.e., 6.8% lifetime use; Striegel et al., 2010) and recreational athletes (i.e., 7.0% 12-month use; Seifarth et al. 2019), and even span the lower bound of the range estimated for elite athletes (i.e., 14.0%; de Hon et al., 2015). The levels estimated are concerning both from the perspective of rule violations and risk to health, suggesting a potential need for more widespread testing and education within UK university sport.

Despite the concerns regarding medical safety, coercion, and fairness for CED use (Faraone et al., 2020; Schelle et al., 2014), the UQM and SSC yielded prevalence estimates of 16.3% and 7.0%, respectively, for the past 12-month CED use in UK student-athletes. These estimates provide the first evaluations of CED use in UK-based student-athletes and suggest off-label use of prescription medications to facilitate study may be reasonably common among UK student-athletes. Further, the levels are comparable to estimates for lifetime use in the UK (i.e., 10.0%; Singh et al., 2014) and Swiss (i.e., 7.6% Maier et al., 2013) students but lower than the direct question survey carried out by McDermott et al. (2020). Thus, the limited evidence to date suggests the prevalence of CED use in UK student-

athletes may not be too dissimilar to the broader student population. Further, given the potential health consequences associated with the use of stimulant medications (Finger et al., 2013; Hysek et al., 2014), policymakers within university institutions may consider introducing policies or educational workshops looking to reduce possible harmful use. However, as highlighted in Aikins et al. (2017) review of academic integrity policies, across 200 US, only one had a specific policy aimed at deterring demand for CEDs by making consumption a violation of academic standards. Therefore, it may be a more suitable route to consider educational workshops such as those that have previously been implemented at Oxford (Fullerton, 2017).

Although the point prevalence estimates for both PED and CED use were higher for males than females, the overlapping confidence intervals preclude the detection of significant gender differences for either form of drug use. These findings are consistent with past research using the UQM to estimate the prevalence of PED (i.e., Boardley et al., 2019) and CED (i.e., Dietz et al., 2013a) use. Gender differences have been reported in studies using direct questioning methods (e.g., McDermott et al. 2020; Shah et al., 2019). This is consistent with anti-doping literature on gender differences in which male athletes generally report both a more positive attitude toward doping and a more frequent use of substances than female athletes (Backhouse et al., 2016; Cook et al., 2018; Erickson et al., 2019; Gleaves et al., 2021; Ntoumanis et al., 2014). However, not all of these studies have detected statistically significant gender differences, so more work is needed to fully determine the consistency of gender differences in PED and CED use across different athletic populations.

5.4.2 Comparing the UQM and SSC

The current study was the first to generate prevalence estimates of PED and CED use in student-athletes with both the UQM and SSC. Both approaches returned higher 12-month prevalence estimates for PED and CED use than direct question assessment of lifetime use.

Despite the point prevalence for all estimates being higher in the UQM compared to the SSC, the overlapping confidence intervals meant these differences were not statistically significant. In part, this was due to the wide confidence intervals, and research with larger sample sizes would be required to narrow these.

One of the advantages of the indirect methods used here is that it is clear to the respondent that the researcher cannot determine their response to the sensitive question (i.e., SSC) or whether they have answered it at all (i.e., UQM). For this reason, Lensvelt-Mulders et al. (2005) suggested that indirect methods provide more valid estimates than direct approaches. However, it should be noted that in the case of RRTs, the reliability is not always guaranteed (John et al., 2018) and due to the novelty of the SSC, there are few studies exploring its use. Although indirect methods for assessing prevalence in sensitive subjects are encouraged, further work is required with these techniques to establish their reliability and validity and establish a consensus on 'best practice' method for prevalence estimations. Importantly, a WADA expert group on prevalence estimates is currently working toward establishing such best practice guidelines for estimating the prevalence of PED use (MacDonald, 2020). Although their reliability cannot always be guaranteed, indirect methods, as well as providing increased protection, also remove any ethical or legal obligation for researchers to act upon answers to the sensitive questions to may indicate unlawful activity (Petróczi et al., 2011). This facet of the methods should be considered important when investigating doping in sport and drug use within universities.

Although indirect methods are perceived to provide PED-use estimates closer to the true prevalence than direct questioning methods (de Hon, 2015), it has been suggested that UQM estimates may at times lead to inflated estimates. Specifically, it is thought some participants avoid answering the sensitive question by changing the person whose birthday they use when answering the randomising question when they are given the freedom to select

the person they use (see James et al., 2013; Ulrich et al., 2018). To prevent this, we specified the person whose birthday should be used when answering the randomising question.

While the UQM has been used to indirectly assess the prevalence of PED use (e.g., Boardley et al. 2019; Dietz et al., 2013b; Ulrich et al. 2018), the SSC may have some advantages. First, the SSC averts the need for a randomisation step, therefore preventing the effective loss of participants associated with the UQM, with a proportion (i.e., a third presently) not answering the sensitive question. This 'efficiency' (Petróczi et al., 2011) ensures every participant provides a response to the sensitive question, and all responses are used to estimate prevalence. In addition, the SSC avoids the need to answer the sensitive question in isolation, with responses hidden amongst responses to the non-sensitive questions. As well as adding an additional layer of privacy for respondents, this means all participants respond to the research question and can therefore more easily identify the contribution they are making to the study, supporting the face validity of the method (Petróczi et al., 2011). Further, the SSC is simple to understand and quick to complete (Petróczi et al., 2011; James et al., 2013). In contrast, some participants find the UQM obtrusive and overly complex (Droitcour et al., 1991). A limitation of using the SSC is the need for very large samples to reduce the range for CIs. for a given sample size, the SSC provides wider confidence intervals than the UQM because of the increased number of non-sensitive questions used (James et al., 2013; Petróczi et al., 2011). In the case of the current study, the sample size led to CIs including zero for both PED and CED.

Given the SSCs recent development it has not yet been used as extensively as the UQM (see Lensvelt-Mulders et al., 2005a; 2005b for reviews). Consistent with James et al. (2013), we believe further research is needed that compares prevalence estimates for sensitive behaviours using the UQM and SSC. Over time this may help us to determine more

accurately the relative strengths and weaknesses of the two methods, and whether these methods should be considered more reliable than direct questioning.

Limitations and future directions

Despite making some important contributions to knowledge, as with any study, there were some inherent limitations that should be acknowledged. First, whilst indirect methods are widely acknowledged to provide more accurate prevalence estimates than direct questioning approaches in sensitive subjects, the lack of any objective indices of PED or CED use means we had no means of verifying the accuracy of the estimates derived through the UQM and SSC. Previous research validating the SSC with mephedrone use incorporated an assessment of hair samples to determine actual mephedrone use (Petróczi et al., 2011). Although it would not be practical to test for all substances examined in the current study, in future validation studies it could be useful to focus on a small number of specific PEDs and CEDs and include testing of urine, blood and/or hair for these substances. If it was affordable, greater use of such analytical methods may improve our ability to assess the reliability and validity of indirect methods. Such work could focus specifically on substances that are present in samples for an extended period, with indirect questioning focused on equivalent periods. However, as noted in Petróczi et al. (2011) the single most useful application for the hair sampling technique was providing evidence that the sample prevalence of the sensitive behaviour of interest was above zero. Despite the logical processes involved with both the UQM and SSC, and the anonymity these processes offer, there is evidence indirect approaches are not cheating free (Böckenholt et al. 2009; Ulrich et al., 2018).

Next, when wording our direct question, we measured PED and CED use currently, during the past three months, and prior to the past three months. Whilst this was to provide us with a better understanding of PED and CED use in our sample, it meant we could not make direct comparisons between direct question estimates and those from the two indirect

methods. Future researchers could align direct and indirect approaches so values obtained can be directly compared. Although our sample size was in excess of those indicated by our a priori calculations, the CIs for our estimates were still quite broad making it difficult to conduct comparisons. Whilst this is a known issue with indirect approaches, in future it may be worthwhile targeting even larger samples which will help narrow the confidence intervals and therefore provide more precise prevalence estimates (see Petróczi et al., 2011). This is the case with the SSC, as the number of non-sensitive questions leads to wider CIs for a given sample size compared to the UQM (James et al., 2013; Petróczi et al., 2011). Alternatively, for the SSC researchers may explore using innocuous questions whereby the probability of getting an affirmative answer is less than 0.5, as this can reduce the width of CIs (Nepusz et al., 2014). Finally, our use of the same birthday across the four innocuous questions for the SSC may not be as effective in demonstrating anonymity as approaches that vary the birthday (see James et al., 2013). However, we choose this approach because it simplifies the instructions and encourages timely survey completion.

One aspect for future reflection is the comparison between the two contexts, sport and education, in terms of whether these are equally sensitive subjects. Doping in sport is explicitly regulated and anti-doping rule violation sanctions on an athlete can be serious. This explicit regulation does not exist in the context of enhancement in academia. Predominant attitudes to PED use and CED use are also different, with much of the sport literature focused on the pursuit of 'clean sport' (Petróczi et al., 2021; Woolway et al., 2020). While within CED use, attitudes vary considerably between non-users and users (Schelle et al., 2014) and there is debate within the literature around the acceptance or not of CED within academia (see Faber et al., 2016; Giubilini, 2015; Greely et al. 2008; Maher, 2008; Vrecko, 2013). Further investigation into this sensitivity comparison between the two contexts would be useful.

Conclusion

This is the first study to use both the UQM and SSC to explore PED and CED use in UK student-athletes, and therefore provides important and novel contributions to our understanding of the prevalence of these behaviours in this population. Specifically, we obtained 12-month prevalence estimates of 14.0% (UQM) and 7.8% (SSC) for PED use and 16.3% (UQM) and 7.0% (SSC) for CED use. These estimates should raise concern for those involved with the governance of sport and education in the UK. Additionally, our findings contribute important knowledge on the potential usefulness of randomised and non-randomised indirect approaches for estimating socially sensitive behaviours.

Chapter 6: Study 4. Psychosocial risk profiles for performance and cognitive enhancing drug use in student-athletes: A latent profile analysis

6.1 Introduction

Identifying psychosocial factors that may influence the use of illicit performance enhancing substances is important due to societal concerns such as health, legality, and fairness. In sport, the use of performance enhancing substances and methods are commonly referred to as doping or performance enhancing drugs (PED). Another area in which there is a growing societal concern over substance use for performance enhancement is students use of cognitive enhancement (CE; e.g., Greely, 2008; Maher, 2008; Whetstine, 2015). This CE use in students represents the off-label use of prescription stimulant medication such as amphetamine (Adderall), methylphenidate (Concerta or Ritalin), or modafinil (Provigil) to enhance working memory or attention in healthy individuals (Franke et al., 2014a).

For both potential forms of enhancement, there are legal and regulatory concerns that may potentially act as deterrents for use. In sport, PED represents an unfair advantage over competitors as it is against the rules set out by the World Anti-Doping Agency (WADA) in the World Anti-Doping Code (WADA, 2021a). While few university institutions explicitly ban the use of CE (Aikins et al., 2017), such prescription drugs are controlled substances with amphetamine and methylphenidate classified as Class B drugs within the UK, carrying a five-year prison sentence for possession without a prescription and up to a 14-year sentence for supply (Misuse of Drugs Act, 1971). Regarding modafinil, although not illegal to purchase, its sale without a prescription is illegal (MHRA, 2013).

In addition to legal and regulatory considerations surrounding PED and CE, there are concerns that potential misuse of such substances could lead to detrimental health consequences. Those who use PED are at increased risk of the numerous adverse health consequences associated with their use (e.g., Pope et al., 2014) while the use of prescription

stimulants have been linked to side effects such as insomnia, psychosis, suppression of appetite, nausea, and irritability (Finger et al., 2013; Hysek et al., 2014). Evidence also supports the abuse potential of methylphenidate (Gahr et al., 2014; Morton & Stockton, 2000) and although longer-term studies investigating the potential for tolerance and abuse of modafinil are yet to be conducted (Sahakian & Morein-Zamir, 2011). Further, individuals who use CE drugs are also more likely to use and misuse other illicit substances for the purposes of self-medication (Singh et al., 2014).

Similar to – but still distinct from – the legal issues surrounding PED and CE use are ethical considerations in both contexts. Within PED use in sport, one of the three criteria for the prohibition of a substance is that WADA determines that the use of the substance or method violates 'the spirit of sport' (WADA, 2021a). Although discussion as to the morality of doping and often more specifically the approach of anti-doping is debated within the normative literature (see Dimeo & Møller, 2018; McNamee, 2016; Møller, 2009) many self-identified clean athletes value 'clean sport', with clean athlete identity generally rooted in early experiences and a love of sport, and characterised by a continued, intrinsically motivated commitment to fundamental values and morals acquired in childhood (Petróczi et al., 2021). Within the CE context, there has been extended discussion as to whether CE use in students represents a form of cheating given it may be deemed a form of academic dishonesty (Cakic, 2009; Vargo & Petróczi, 2016; Whetstine, 2017), while there has been extensive ethical discussion on the subject (e.g., Faber et al., 2016; Giubilini, 2015; Vrecko, 2013), fairness is a major concern for nonusers of CE (Schelle et al., 2014). Although there might be some disagreement as to the future of CE use in education, CE use is a questionable ethical practice within competitive academic contexts.

Accurate prevalence rates are often difficult to determine when investigating a sensitive subject such as illicit substance use. However, a review article summarising the best

available evidence estimated the prevalence of doping in adult elite sport to be between 14 and 39% (de Hon et al., 2015). Studies with adolescent and college-age athletes have reported lower prevalence estimates. For example, a study with French athletes aged 15–19 years estimated a lifetime prevalence of doping of 4.0% (Laure et al., 2007). In turn, Papadopoulos et al. (2006) investigated tertiary education students from five European countries, estimating lifetime usage at 2.8%. Recently, Blank et al. (2017) found 9.4% of Austrian university students self-reported the use of PEDs in the past 12-months. Using indirect question techniques, 12-month prevalence estimates for PED use in UK student-athletes was recently estimated at 14.02% via the unrelated question method and 7.83% using the single sample count (Heyes & Boardley, in review). Prevalence estimates for CE in university students have also ranged widely. For instance, a systematic review of off-label use of prescription medicines by US college students suggested prevalence can range between 5-35% (Wilens et al., 2008). In Europe, a lifetime prevalence of 10% was reported for UK students (Singh et al., 2014), whereas in Swiss students a 7.6% lifetime prevalence was estimated (Maier et al., 2013). More recent direct questioning within the UK have suggested the prevalence to be as high as 19% (McDermott et al., 2020). However, self-selection for such online surveys may not provide a true reflection of the current level of CE. Recent 12-month prevalence estimates for CE in UK student-athletes were 16.26% using the unrelated question technique and 7.00% using the single sample count (Chapter 5). Despite some of the methodological challenges to assessing the prevalence of PED use and CE, such behaviours at a university level are non-trivial and present a concern given the health, legal, and ethical contexts surrounding such substance use.

Given the societal concerns, legal, ethical, health deterrents and potentially concerning prevalence estimates, an important aim for researchers investigating PED use and CE is to identify and understand psychosocial factors that influence the likelihood of athletes,

exercises, and students using illicit substances. One popular theory in research investigating how people rationalise and justify illicit enhancement drug use is Bandura's (1991) social cognitive theory of moral thought and action. Bandura (1991) proposed that transgressive activities – such as drug use – should be deterred when people anticipate resultant negative emotions (e.g., guilt) from engagement in such acts. Doping in sport is against the rules (WADA, 2021a) while illicit use of prescription medications is also considered a form of academic dishonesty (Cakic, 2009; De Jongh et al., 2008; Vargo & Petróczi, 2016) and literature has demonstrated that students are often critical of neuroenhancement, judging pharmacologically enhanced performances as unfair and inauthentic (Racine & Forlini, 2010; Forlini & Hall, 2015). As such, individuals may anticipate feeling guilty if they decided to illicitly performance enhance through the use of PED or CE. Bandura (1991) proposed this anticipation of negative emotions would deter individuals from engaging in the activity. However, Bandura (1991) also proposed that individuals may reduce or eliminate such anticipation of negative emotions through the use of any of eight psychosocial processes known as the mechanisms of moral disengagement (MD). Through MD people can conditionally endorse harmful and transgressive acts by cognitively reframing the behaviour, reducing personal accountability for it and/or its consequences, distorting the consequences stemming from it, or dehumanizing or blaming the victim/s (Bandura, 1991).

Research evidence associating PED use and CE with MD has emerged over the previous decade. For instance, across three studies Boardley and colleagues presented qualitative evidence supporting the use of six mechanisms (i.e., moral justification; euphemistic labelling; advantageous comparison; displacement of responsibility; diffusion of responsibility; distortion of consequences) of MD to justify and rationalize PED use with samples of PED users (Boardley & Grix, 2014; Boardley, et al., 2014; Boardley et al., 2015). More recently, Boardley et al. (2017) presented quantitative evidence supporting a moderate

positive link between MD and self-reported PED use with athletes from sport and exercise contexts. This quantitative study also evidenced how empathy and self-regulatory efficacy negatively predicted reported doping, mediated by doping MD and anticipated guilt. In addition to the literature on sport and exercise, MD has also been evidenced in a university student population when rationalising the use of CE (Heyes & Boardley, 2019) with qualitative interviews providing support for six of the eight mechanisms of MD.

The predominant focus of previous research into illicit performance enhancement and MD has been through a variable-centred approach. While variable-centred approaches are able to demonstrate associations among variables, person-centred approaches consider population heterogeneity and identify configurations of variable relations at the within-person level (Peugh & Fan, 2013). Therefore, person-centred approaches are useful in identifying profiles of individuals based on within-profile similarities and between-profile differences in the patterns of association among variables. Given this consideration, a greater understanding of the profile for performance enhancement in either context would provide an insight into a population and their propensity to use either PEDs or CE and thus applying a person-centred approach and profiling across variables would provide a novel contribution to the literature. Such a person-centred approach would allow PED and CE use to be examined in relation to psychosocial factors as indicators or outcomes.

Beyond MD, Bandura (1991) identifies potential antecedents that may deter transgressive behaviour. Firstly, empathy, which represents a tendency to vicariously experience emotional and cognitive responses to another individual's emotional state (Davis, 1983, 1994). A lack of empathy implies an inability to view the world from another individual's perspective or to feel sympathy toward them (Davis, 1994). Bandura (1991) contended that increased levels of empathy will be linked with a reduced likelihood of engaging in transgressive behaviour. In addition to this, self-regulatory efficacy (SRE) which

represents an individual's ability to resist personal and social pressures to engage in transgressive or detrimental conduct (Bandura, 1991), and as such individuals with strong self-efficacy believe in their ability to resist pressures would not need to rationalise engagement in the behaviour. In addition to MD, SRE and empathy may play considerable roles in effecting transgressive behaviour, in this case, PED and CE use. Therefore, considering the combined effects via a person-centred appraoch would allow for the identification of within-profile similarities and between-profile differences.

In addition to the antecedents of MD, Bandura (1991) suggests that engagement in transgressive behaviour may be deterred by regulatory emotions such as guilt. Guilt represents a distasteful emotional state experienced as tension and regret resulting from the personal responsibility felt – and empathic feelings for – someone suffering anguish (Hoffman, 2000). Given the distasteful nature of experiencing guilt, it can act as a regulating influence in deterring individuals from engaging in transgressive behaviour if they anticipate such a negative emotional state (Bandura, 1991). This theory was recently supported in the variable-centred approach by Boardley et al. (2017) research on empathic and self-regulatory processes to suggest the predictive effects of doping MD on reported doping in student-athletes were partially mediated by anticipated guilt. As such, anticipated guilt may be a potential risk factor for both PED and CE use, for individuals with lower levels of anticipated guilt may find it easier to engage in transgressive behaviour without the concern of negative self-sanction.

A proposed person-centred approach and development of risk profiles to investigate performance and cognitive enhancing drug use in student-athletes presents a novel investigation. A greater understanding of potential profiles for performance enhancement in either context would provide an insight into a population and their propensity to use either PEDs or CE. Given Bandura's (1991) theory, a profile of low levels of MD and high levels of

both SRE and empathy would lead to high levels of anticipated guilt for both PED and CE and lower reported use. High levels of MD coupled with low levels of SRE, and empathy would lead to higher levels of anticipated guilt, presenting a risk factor for PED and/or CE use.

This method of profiling, or classification, has been used in a variety of previous research in sport such as phenotypes of asthma in elite athletes Couto et al. (2015), sportsmanship and violent attitudes in sport (Courel-Ibáñez et al., (2019), exploring mental health profiles of elite athletes (Küttel et al., 2021), and examine aggression and psychological distress in Anabolic-Androgenic Steroid Users (Chegeni et al., 2021). In each of these person-centred investigations, modelling allows the identification of profiles of individuals based on within-profile similarities and between-profile differences. This not only increases our understanding but also highlights potential needs for targeted interventions. To our knowledge, the current study represents a novel approach to examining profiles of performance enhancing substances in potential antecedents. Understanding different profiles in such a way may potentially provide avenues for interventions based on such psychological risk profiles.

Grounded in Bandura's (1991) theory and building on the work of Boardley et al. (2017) which established the predictive effects of empathy and doping SRE on reported doping were mediated by doping MD, the objective of the present study was to provide an exploratory analysis via a person-centred approach to identify and characterise profiles with student-athletes based upon doping SRE, empathy, and doping MD using latent profile analysis and to assess a possible association with levels of associated guilt and reported use for both PED and CE.

6.2 Material and Methods

6.2.1 Participants

Participants had to be a current university students and participate in British University and College Sport (BUCS) level sport. Participants were 732 student-athletes from individual- (e.g., athletics, swimming, triathlon; n = 271) or team- (e.g., netball, football, field hockey; n = 461) sports, representing both sexes (n_{female} = 400; n_{male} = 332), with ages ranging from 18 to 33 years (M = 20.08, SD = 1.56). Across the sample, 49 different academic subjects were represented. They had been training/competing in their specific sport for an average of 7.32 years (SD = 4.84), spent an average of 6.81 h (SD = 3.76) per week training. 703 (96.0%) participants reported never having used PEDs, 11 (1.5%) had used them prior to the past 3 months, 2 (0.3%) had used them in the past 3 months and 7 (0.9%) were current users. 688 (94.0%) participants reported never having used CE, 25 (3.4%) had used them prior to the past 3 months, 8 (1.1%) had used them in the past 3 months and 4 (0.5%) were current users.[14]

6.2.2 Measures

Moral Disengagement

The Doping Moral Disengagement Scale (DMDS; Boardley et al., 2017, 2018) was used to measure moral disengagement in relation to doping in sport. This scale consists of 18 items (e.g. 'Athletes shouldn't be blamed for doping if training partners/teammates pressure them to do it" and "It is okay to dope if it helps an athlete to provide for his/her family.") structured to measure three items for each of the six MD mechanisms relevant to doping in sport/exercise. Participants were asked to read each of the item statements carefully

[14] The data for Study 3 and Study 4 were collected as part of the same data collection. The prevalence measures for Study 3 were completed and returned first, followed by completion of the second questionnaire pack containing the demographics and psychometric questionnaires for Study 4. The two questionnaire packs were linked by an identification number allowing for the packs to be connected following collection.

describing thoughts and feelings that athletes may have and indicate their level of agreement with each statement using a Likert scale anchored by 1 (*strongly disagree*) and 7 (*strongly agree*). The scale has shown very good levels of internal consistency and test-retest reliability and evidence for its factorial, convergent and discriminant validity has been provided (Boardley et al., 2018).

Doping Self-Regulatory Efficacy

The doping self-regulatory efficacy scale (DSRES; Boardley et al., 2017; 2018) was used to assess doping SRE. This measure assesses an individual's capacity to withstand personal and social influences encouraging the use of PEDs. DSRES consists of six items (e.g., 'Resist doping even if you knew you could get away with it?'). A five-point Likert scale, anchored by 1 (*no confidence*) and 5 (*complete confidence*), was used for participants to rate their confidence in their ability to engage in relevant behaviours. The DSRES scale has shown very good levels of internal test-retest reliability and Boardley et al. (2018) provided evidence for its factorial, convergent and discriminant validity.

Empathy

Empathy was measured with the seven-item perspective taking (e.g., 'Before criticizing somebody, I try to imagine how I would feel if I were in their place') and seven-item empathic concern (e.g., 'I am often quite touched by things that I see happen'), two subscales of the Interpersonal Reactivity Index (Davis, 1983). Participants were asked to indicate how well the statements described them and responded on a scale with anchors of 1 (*does not describe me well*) and 7 (*describes me very well*). This scale has been used in past research and has been shown to be a valid and reliable measure of empathy (Carlo et al., 1999) and has been used to measure empathy in a doping context (Boardley, 2017).

Anticipated Guilt

When assessing responses to anticipated guilt in both PED use and CE use, participants were asked to imagine situations surrounding both PED and CE contexts. This guilt scale was used by Boardley et al. (2017) to assess anticipated guilt in PED use while Sumnall et al. (2021) used a similar measure in assessing anticipated guilt for cocaine use. Below are the two situations presented to student-athletes in both a PED and CE context:

> *Having returned to training following a period of injury, you are feeling very out of shape. As such, you feel the need to get back in shape as soon as possible. A friend who you train with has been taking a training supplement that he/she says really helped him/her get back in shape quickly following a similar injury. He/she offers to give you some and you decide to take it. Subsequently you get back in shape much quicker than expected, but then discover the supplement you have been taking is a banned performance-enhancing substance. However, due to the improvements you have experienced, you decide to continue taking the substance.*

> *Having returned to your studies following a period of illness, you are feeling behind on your work and unprepared for your upcoming exams. As such, you feel the need to catch up with your assignments and revision as soon as possible. A friend on your programme has been taking a revision-aid pill that he/she says really helps him/her to study more effectively. He/she offers to give you some and you decide to take them. Subsequently you get back on track with your work much quicker than expected, but then discover the pills you have been taking are a prescription-only medicine that you don't have a prescription for. However, due to the benefits you have been experiencing, you decide to continue taking the pills to help you prepare for your upcoming exams.*

Participants were then asked to indicate how they would anticipate feeling about continuing to take the substance by responding to the five items (e.g., "I would feel remorse, regret") that form the guilt scale in the State Shame and Guilt Scale (SSGS; Marschall et al., 1994). Participants responded on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Marschall et al. (1994) provided evidence supporting the construct validity and internal reliability of this sub-scale.

Reported Doping and Reported Cognitive Enhancing Drug Use[15]

Reported doping was based on the method used by Boardley et al. (2017). Participants were provided with a list of nine categories of doping substances (e.g., Ephedrine stimulants) and methods (e.g., Blood manipulation) and asked to indicate which ones they currently used, had used in the past 3 months, had used prior to the past 3 months, or had never used. The categories and any examples of doping substances was based on the substances and methods banned in sport by WADA. Participants' responses were used to form a score from one to four, with participants being assigned a score of one if they indicated never using any of the substances/methods, two if they had used one or more of them but only prior to the past 3 months, three if they had used one or more of them in the past 3 months and four if they currently used one or more of the substances/methods. Reported CE use was assessed in a similar way to PED. Participants were asked to indicate which substances they had used for the purposes of CE in academia, and whether they currently used, had used in the past 3 months, had used prior to the past 3 months, or had never used. The three common substances used as CE in education (amphetamine, methylphenidate, and modafinil) were included. Scoring was the same as for reported PED use.

[15] Direct question self-report was used for reported doping. The indirect methods used in Chapter 5 are not applicable here as those responses do not provide evidence of reported doping, instead providing a method of estimating prevalence within a sample.

6.2.3 Procedures

Recruitment and data collection commenced once the study was approved by the University Ethics Committee[16]. Participants were convenience sampled from nine UK universities; three in the North of England, two in the Midlands, and one each from the South East, East, and Wales. Team captains/coaches of university sport teams at eight institutions were contacted to discuss the possible participation of their athletes. For those expressing interest, a convenient time and location for data collection was arranged, with team training sessions the most common location. A researcher attended at the arranged time, first providing an information sheet to athletes before explaining the study aims and procedures, including clear definitions of the terms PED and CE as operationalised in the present study. The complete anonymity of participation was emphasised, and student-athletes were invited to participate. Those volunteering proceeded to complete the questionnaire pack, having been informed that doing so indicated consent to participate. Completion of the questionnaire pack took approximately 10 to 15 minutes for each participant. On completion, participants placed their packs in a blank envelope before handing it to the researcher.

6.2.4 Statistical Analysis

Latent profile analysis was used to identify distinct groups of individuals from the sample (patterns) homogeneous within the overall sample based on the indicator variables of doping MD, doping SRE, and empathy. Model interpretation was based on item profiles in each category and obtained from probabilities of endorsing each item response, conditional on profile membership. As the expected number of profiles were unknown, an exploratory method of determining the optimal number of profiles was used. Models containing 1 to 5 profiles were evaluated using the following information criteria based on the model log likelihood: Bayesian Information Criterion, Akaike Information Criterion and with lower

[16] ERN_16-1609

values of these indices suggest a better-fitted model. Profile models were also assessed on parsimony, profile, and latent profile sizes to determine if the models represent different categories (Vermunt & Magidson, 2021). The models were fitted through the use of Latent Gold 6.0 (Vermunt & Magidson, 2021). The analyses were performed using appropriate techniques for models relating distal outcomes with latent profiles while minimizing bias from classification error. The process followed three steps (Bias-adjusted three-step): (1) determine an optimal latent profile model using doping MD, doping SRE, and empathy, (2) based on results from step 1, assign participants to latent profiles based on modal posterior probabilities, and (3) investigate the relationship between the profiles and distal variables, while accounting for classification errors introduced in step two. The stepwise approach is used as external variables in step three can be covariates affecting the profiles (Vermunt, 2010) and/or distal outcomes affected by the profiles (Bakk et al., 2013; Bakk & Vermunt, 2016). The latent profile analysis method is similar to traditional clustering procedures and offers advantages as it is both more practical and has greater power for detecting the optimal number of profiles (Vermunt & Magidson, 2002). Gender (either male or female) was included as a potential covariant in the analysis as was sport (individual or team). This was to explore whether gender or sport may serve as a predictor for profile membership.

6.3 Results

6.3.1 Descriptive Statistics, Scale Reliabilities, and Correlations

Preliminary data screening was conducted to check for missing values (Tabachnick & Fidell, 2018). 1.16% of the data were missing and this missingness was not related to any particular variable, missing data were assumed to be missing at random. Within Latent Gold, records with missing values are eliminated using list-wise deletion. Preliminary checks showed that data deviated from multivariate normality, in this case, robust estimation strategies, ML with

robust standard errors (MLR), are appropriate and were therefore adopted (Vermunt & Magidson, 2002).

Descriptive statistics, scale reliabilities and Pearson correlations for all study variables are presented in Table 6.1. On average across the whole sample, participants reported low-to-moderate levels of doping MD, high levels of doping SRE, moderate levels of empathy, moderate levels of anticipated guilt in both PED and CE, and very low levels of reported PED and CE use via direct question self-report.

The five psychometric instruments demonstrated good to excellent internal consistency. Skewness and kurtosis values indicated that all psychological variables were normally disturbed. As with Boardley et al. (2017), this was not the case for reported PED and CE use, which demonstrated positive skew and kurtosis values due to most of the sample having reported never using PED (96.0%) and CE (94.0%). Significant Pearson correlations were observed between all psychological variables, but not for all psychological variables with PED and CE use. Doping MD had strong negative correlations with doping SRE and anticipated guilt for PED use, while it also showed moderate negative correlations with empathy and anticipated guilt for CE. Doping MD showed weak positive correlations with reported PED and CE use. Empathy showed a strong positive association with anticipated guilt for PED use and a moderate positive association with anticipated guilt for CE use. Reported CE use showed significant correlations with all the psychological variables aside from empathy, with a weak positive correlation with doping MD and weak negative correlations for SRE and anticipated guilt. However, reported PED use was only significantly related to Doping MD, showing a weak positive correlation.

Table 6.1

Descriptive statistics, scale reliabilities, and correlations.

Variable	*M*	*SD*	Range	Skew	Kurtosis	1	2	3	4	5	6
(1) Doping moral disengagement	2.53	0.91	1.00-7.00	0.73	0.69	-					
(2) Doping self-regulatory efficacy	4.46	0.73	1.00 -5.00	-1.72	3.31	-0.42**	-				
(3) Empathy	4.92	0.83	1.64-7.00	-0.32	0.25	-0.22**	0.26**	-			
(4) Anticipated Guilt PED	4.13	0.91	1.00-5.00	-1.31	1.48	-0.41**	0.41**	0.44**	-		
(5) Anticipated Guilt CE	3.43	1.18	1.00-5.00	-0.29	-0.99	-0.29**	0.28**	0.28**	0.62**	-	
(6) Reported doping PED	1.05	0.33	1.00 – 4.00	7.65	61.29	0.09*	-0.16	-0.05	-0.04	-0.02	-
(7) Reported doping CE	1.07	0.35	1.00 – 4.00	5.68	35.80	0.12**	-0.14**	0.04	-0.12	-0.17**	0.09*

For correlations between (1) to (5), $p < 0.01$. PED, performance enhancing drugs; CE, cognitive enhancement.

.6.3.2 Latent profile analysis

Latent profile analysis was conducted to identify profiles based on doping MD, doping SRE, and empathy. Models with one to five profile solutions were considered with the best model determined using Bayesian Information Criteria (BIC) and Akaike's Information Criteria (AIC) assessment of class profile, latent profile sizes, and parsimony (Vermunt & Magidson, 2021). Model fit information and selection criteria for latent profile models are presented in Table 6.2. Although the BIC and AIC continued to decrease as profiles were added, additional latent profiles created in each successive model were of very small size. Therefore, given the fit criteria assessment and in the interest of parsimony and providing a useable model, a three-profile model was identified as the most suitable. Individuals were assigned to the profile with the highest posterior probability, with the largest profile was that of Profile 1 (0.4674), followed by Profile 2 (0.4350), and finally Profile 3 (0.0976). The three-profile model profile is visible in Figure 6.1. Doping SRE (Wald = 395.34, p-value = <.05) and empathy (Wald = 39.19, p-value = <.05) and doping MD (Wald = 66.48 p-value = <.05) were all significant in the development of the profile model. To assess the distal outcome variables of anticipated guilt and reported use of both PED and CE the bias adjusted 3-step process was used. The distal outcome model profile is visible in Figure 6.2. Anticipated guilt PED (Wald = 97.77, p-value = <.05), anticipated guilt CE (Wald = 70.84, p-value = <.05), and reported CE (Wald = 7.87, p-value = <.05) were all significant but reported PED (Wald = 1.90, p-value = <.05) was not. Table 6.2 displays the variable statistics data for each of the three profiles. Based on the indicator variables and distal outcomes the profiles were labelled as follows.

Table 6.2

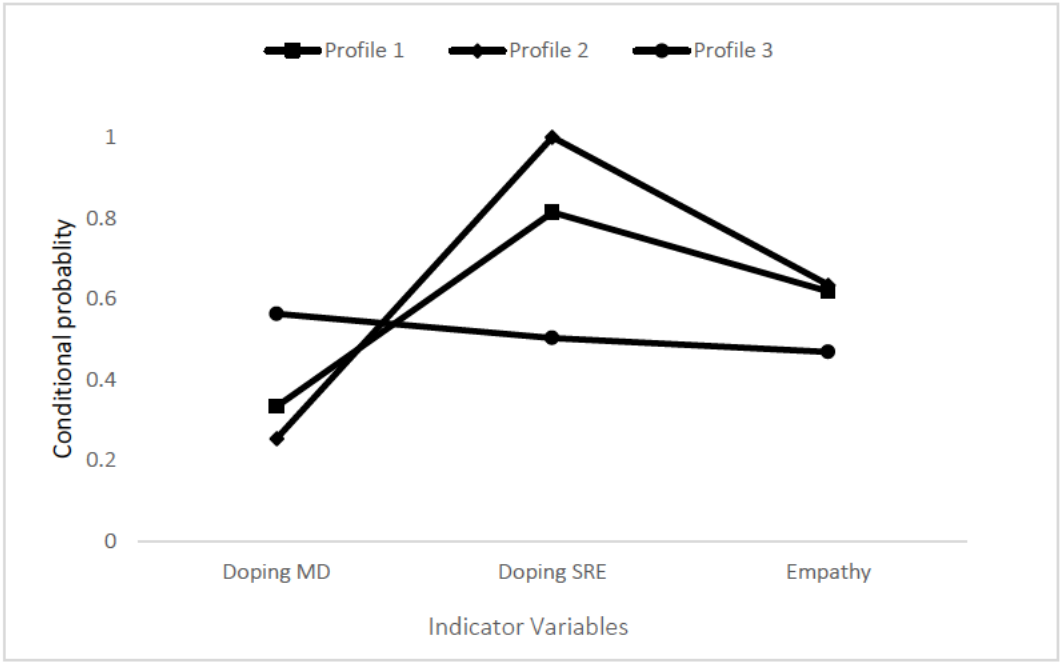
Model fit information and model selection criteria.

Profiles	Log-Likelihood (LL)	BIC	AIC	AIC3	Class Error	Entropy R-squared
1	-2613.1279	5265.6810	5238.2557	5244.2557	0.0000	1.0000
2	-1874.6780	3834.7776	3775.3561	3788.3561	0.0107	0.9336
3	**-1703.2564**	**3537.9304**	**3446.5128**	**3466.5128**	**0.0429**	**0.8608**
4	-1599.8306	3377.0750	3253.6612	3280.6612	0.0658	0.8523
5	-1551.5198	3326.4497	3171.0396	3205.0396	0.0526	0.8241

BIC, Bayesian information criterion; AIC, Akaike information criterion; AIC3, AIC with penalty 3 for LCA

Figure 6.1

Latent profile analysis for indicator variables of doping MD, doping SRE and empathy.



MD, Moral disengagement; SRE, Self-regulatory efficacy.

Table 6.3

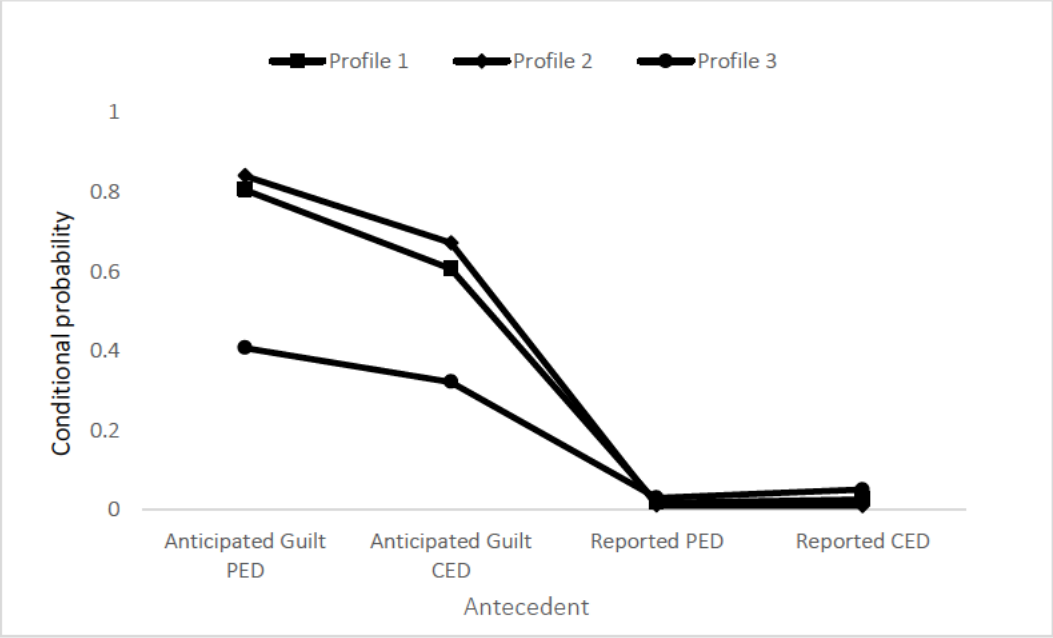
Profile data for latent profiles including cluster size.

	Profiles			
	Profile 1	***Profile 2***	**Profile 3**	**Overall**
Cluster Size	0.4674	0.4350	0.0976	-
Variable	**M *(SE)***	**M *(SE)***	**M *(SE)***	**M *(SE)***
(1) Doping moral disengagement	2.59 (0.05)	2.21 (0.04)	3.69 (0.20)	2.53 (0.03)
(2) Doping self-regulatory efficacy	4.26 (0.04)	5.00 (0.00)	3.01 (0.19)	4.46 (0.03)
(3) Empathy	4.95 (0.05)	5.04 (0.05)	4.15 (0.13)	4.91 (0.03)
(4) Anticipated Guilt PED	4.21 (0.04)	4.36 (0.05)	2.62 (0.17)	4.12 (0.03)
(5) Anticipated Guilt CE	3.42 (0.06)	3.68 (0.07)	2.28 (0.15)	3.43 (0.04)
(6) Reported doping PED	1.05 (0.02)	1.03 (0.01)	1.09 (0.04)	1.05 (0.01)
(7) Reported doping CE	1.08 (0.02	1.03 (0.01)	1.15 (0.06)	1.06 (0.01)

M, Mean; SE, standard error; PED, performance enhancing drugs; CE, cognitive enhancement.

Figure 6.2

Latent Profile analysis following 3-step process showing distal outcomes of anticipated guilt and reported use for both PED and CE.



MD, Moral disengagement; PED, performance enhancing drugs; CED, cognitive enhancing drugs.

Profile 1. The Reduced Risk

The student-athletes assigned to Profile A, titled '*The Reduced Risk'*, formed the largest group of the three profiles, with a probability of membership 0.4504. As per the Figure 6.1, this group sat between Profile 2 and Profile 3 in terms of doping MD, doping SRE, and empathy but were closer in profile to those in Profile 2. The paired comparisons information in Table 6.4 demonstrates that there were significant differences between Profile A and Profile B in all indicator variables, apart from empathy. Profile A differed significantly in all indicators from Profile C. With regards to distal outcomes, *The Reduced Risk* anticipated guilt was higher for PED than it was for CE and the profile differed significantly between to Profile 2 in all but reported PED use and differed significantly from Profile 3 in all outcome variables apart from reported PED *and* reported CE (see Table 6.4).

The profile was low in doping MD, high in doping SRE, high in empathy, high in anticipated guilt for PED use, and relatively high in anticipated guilt for CE use. Anticipated guilt was higher for PED than it was for CE. This profile did evidence reported doping in both contexts, including current users, higher reported use than Profile 3. Reported use was higher for CE and then PED. Current reported users of PED and CE had the highest conditional probability for profile membership in Profile 1.

Profile 2. The Protected

The student-athletes classified in Profile 2, titled '*The Protected'* formed the second largest group with a membership probability of 0.4351. This group displayed the highest levels of SRE such that members of Profile 2 have a conditional probability of 0.9832 to score the highest level of doping SRE, essential the profile mean is 5.00. This profile also has the lowest levels of doping MD and highest levels of empathy. Table 6.4 shows that differences between both Profile 1 and 3 are all significant, apart from empathy with comparison to Profile 1, in which they score very similar. In regard to distal outcomes, *The Protected* profile

displayed the highest levels of anticipated guilt in both PED and CE, and the lowest levels of reported PED and CE use. Reported PED was not significantly different, but reported CE was between Profile 2 compared to 1 and 3.

Profile 3. The At Risk

The smallest profile with a membership probability of 0.0976, Profile 3 was titled '*The At Risk'*. The profile demonstrated the lowest levels of doping MD, doping SRE, and empathy across the model, all of which were significant. Within the distal outcomes, *The At Risk* demonstrated the lowest levels of anticipated guilt for both PED and CE, both of which was significant. And although they had the highest proportion of users, the differences in PED use was not significant. Of interest, no student-athletes in this group reported use of PEDs in the past three months or currently. There were also no current users reported for CE use. That said, differences in reported CE use were significant between Profile 2 and 3.

Table 6.4

Paired comparisons for models for indicators and models for dependants, (distal outcomes).

Models for Indicators				**Wald**	**df**	**p-value**
Doping MD						
	Cluster	1	2	32.1762	1	1.4e-8
	Cluster	1	3	30.5676	1	3.2e-8
	Cluster	2	3	51.4362	1	7.4e-13
Doping SRE						
	Cluster	1	2	387.8921	1	2.4e-86
	Cluster	1	3	47.8265	1	4.7e-12
	Cluster	2	3	107.6856	1	3.1e-25
Empathy						
	Cluster	1	2	1.6659	1	0.20
	Cluster	1	3	33.5492	1	6.9e-9
	Cluster	2	3	38.7894	1	4.7e-10

Model for Dependent			Wald	df	p-value
Anticipated guilt PED					
Cluster	1	2	4.4353	1	0.035
Cluster	1	3	72.8864	1	1.4e-17
Cluster	2	3	95.1624	1	1.8e-22
Anticipated guilt CE					
Cluster	1	2	7.5147	1	0.0061
Cluster	1	3	43.9846	1	3.3e-11
Cluster	2	3	70.1145	1	5.6e-17
Reported PED					
Cluster	1	2	0.6116	1	0.43
Cluster	1	3	0.6690	1	0.41
Cluster	2	3	1.6348	1	0.20
Reported CE					
Cluster	1	2	4.0007	1	0.045
Cluster	1	3	1.2640	1	0.26
Cluster	2	3	3.9834	1	0.046

SRE, Self-regulatory efficacy; MD, Moral disengagement; PED, performance enhancing drugs; CE, cognitive enhancement.

Gender as a Covariate of Profile Membership

The results of Wald test[17] (Wald = 16.14; $p = <.05$) showed that gender was a significant predictor of profile membership. The proportion of women to men was higher in Profile 1 and Profile 2 than in Profile 3 ($Wald_{1–3} = 14.30$; $p = <.05$; $Wald_{2–3} = 16.02$; $p = <.05$). Table 6.5 shows profile-specific probabilities of the covariate and the latent profile distribution for different gender values.

Individual or Team Sport as Covariate of Profile Membership

[17] The Wald test (Wald Chi-Squared Test) is a way to find the significance of covariate effects in latent class and profile models (see Vermunt & Magidson, 2021)

The results of Wald test (Wald = 7.84; p = <.05) showed that whether a participant played an individual or team sport was a significant predictor of profile membership. The significant difference was between Profile 1 and Profile 2 where the proportion of participants that played team sport was higher than in individual in Profile 1 and the proportion of participants that played an individual sport was higher than team in Profile 2 (Wald = 5.76; p = <.05). Table 6.5 shows profile-specific probabilities of the covariate and the latent profile distribution for sport played values.

Table 6.5

The results of step-three analysis for gender and sport played as covariates of profile membership

	Profile 1 **The Reduced Risk**	**Profile 2** **The Protected**	**Profile 3** **The At Risk**
Profile specific probabilities of gender and sport			
Female	0.58	0.58	0.23
Male	0.42	0.42	0.77
Individual Sport	0.34	0.43	0.30
Team Sport	0.66	0.57	0.70
Latent profile distribution for genders			
Female	0.49	0.46	0.04
Male	0.44	0.40	0.17
Individual Sport	0.42	0.50	0.08
Team Sport	0.50	0.39	0.11

6.4 Discussion

There is a growing area of literature demonstrating the potential importance of doping MD in the regulation of performance enhancement in sport and exercise (Boardley & Grix, 2014; Boardley et al., 2014, 2015, 2017, 2018; Hodge et al., 2013, Lucidi et al, 2014, 2008), and more recently in cognitive enhancement in academia (Heyes & Boardley, 2019). Recent work from Boardley et al. (2017) highlighted the importance of other variables within Bandura's (1991) theory when considering doping MD, namely SRE, empathy, and anticipated guilt. The antecedents (doping SRE & empathy) have been shown to influence reported doping through effects mediated by doping MD and anticipated guilt in sport and exercise. This current investigation sought to profile student athletes based on levels of doping MD, doping SRE and empathy through the use of latent profile analysis, and compare these profiles on two outcomes relating to anticipated guilt and reported use. Thus, the present study, underpinned by Bandura's (1991) theory, sought to provide an exploratory classification for student-athletes based upon doping MD, doping SRE and empathy.

The primary aim of the current research was to provide an exploration into doping MD, doping SRE and empathy, and whether these three variables could be used in conjunction as indicator variables to provide meaningful classifications for student-athletes across two doping contexts, PED and CE use. Grounded in Bandura's (1991) theory, it was proposed that if classifications were modelled, those individuals classified together with higher rates of doping MD and lower rates doping SRE and empathy would likely demonstrate lower levels of anticipated guilt for both PED and CE use, and higher reported use of PED and CE. Through latent profile analysis, a three-profile model was identified that classified individuals into one of three groups: Profile 1. *The Reduced Risk*, Profile 2. *The Protected*, and Profile 3, *The At Risk*. The meaning and implications of the findings are subsequently discussed.

One of the major contributions of this study was the strong support for the main tenets of Bandura's (1991) theory. Doping MD, doping SRE, and empathy were statistically significant in producing a three-profile model that divided the student-athlete participants such that there were significant differences in the distal outcomes of anticipated guilt in both a PED and CE context. Profile 1, *The Reduced Risk,* demonstrated low levels of doping MD and high levels of doping SRE and empathy. This profile integrates MD, SRE, and empathy such that the combined effects should lead to a reduction in risk of engagement in transgressive behaviour. As per Bandura's (1991) theory increased levels of SRE, empathy will be linked with a reduced likelihood of engaging in a transgressive behaviour in question with low levels of MD suggesting the profile may not be able to successfully rationalise the behaviour. This profile evidenced high levels of anticipated guilt, but still reported some engagement in PED and CE use.. Of interest, this profile presented very similar scores to the overall means for the variables measured, including overall use in both PED and CE. Although the profile appears well protected from the risk of illicit performance enhancement, some did still engage. This presents interesting questions as to whether student-athletes might still use such substances given the potential protective factors demonstrated in the profile.

Profile 2, titled *The Protected*, evidenced the highest levels of SRE, highest levels of empathy, and the lowest levels of MD of the three profiles. Profile 1 and Profile 2 differ in some interesting nuances, with significantly different in both doping MD, doping SRE. Based upon Bandura's (1991) theory, Profile 2 should have a great level of protection from the risk of engaging in transgressive behaviours. This is demonstrated by Profile 2 having the highest levels of anticipated guilt for both PED and CE. In addition to this, Profile 2 also differed significantly in their reported use of CE. In the current study, the student-athletes classified in *The Protected* profile evidenced the least likelihood to engage in either PED or CE, with the lowest reported use. Therefore, the psychosocial risk profile here appears to protect from

engagement in transgressive behaviour. In addition to this, the current investigation suggests that the doping focused instruments to model the profiles (doping MD & doping SRE) appeared to be successful in predicted CE-focused outcomes.

In stark contrast, was Profile 3, titled *The At Risk*. This profile has the lowest levels of doping SRE and empathy, as well as the highest levels of doping MD. From a variable perspective such scores in the psychosocial factors would suggest possible factors that might facilitate engagement in transgressive behaviour and combined in this profile does present the profile most at risk. As such, the name derived from that fact that those classified here lacked what might be considered protective antecedents in SRE and empathy, and this group also demonstrated the highest levels of doping MD within the three profiles. As an outcome of this profile, the lowest levels of anticipated guilt and highest probability of reported PED and CE use was evidenced. Those that have little confidence in their ability to resist transgressive behaviour, a reduced ability to see the world from another's perspective, and greatest ability to rationalise transgressive behaviour were therefore the most likely to feel less guilt, and most likely to engage in doping.

A noticeable facet of the investigation was the overall low levels of reported PED and CE. Recent research in the UK via direct questioning has suggested the prevalence to be as high as 19% (McDermott et al., 2020). Despite this most of the sample in the current study reported never having used PED (96.0%) and CE (94.0%). This presents challenges for detecting any significant differences, and as such only Profile 2 *The Protected* demonstrated significance in their lower reported CE use. Given this, anticipated guilt for both PED and CE may provide us with a better indication as a risk factor for PED and CE. What is clear is that the self-regulatory processes that facilitate doping in sport, could potentially lead to CE use in education. A greater awareness of illicit performance enhancement from sport could potentially place student-athletes at a greater risk than non-athletes.

Gender was a significant predictor of profile membership, and when compared to Profile 3, the *At Risk* profile, female student-athletes were more likely to be found within Profile 2, with Profile 3 primarily comprising of males. This is consistent with the research that highlights possible gender differences in performance enhancing drug use in both sport (e.g., Boardley et al., 2019; Overbye et al., 2013), education (e.g., Dietz et al., 2013a; Mache et al., 2012; Maier et al., 2013) with males more likely to engage in PED and CE use. In summary of *The Protected* profile, the classification finding in the current study provides further support to the literature evidencing Bandura's (1991) theory related to the antecedents of MD.

It is also the case that CE drug use in sport is a growing concern (Smith et al., 2020). The population of student-athletes was investigated as these individuals are seeking achievement outcomes both in sport and education and are therefore at risk for both forms of enhancement drug use. Across all three profiles reported CE use was higher than that of reported PED, while anticipated guilt was lower for CE use than PED use. This raises interesting questions as to why participants might feel less guilt for this form of enhancement drug use. The qualitative investigation of MD in students may provide some support to this as CE using participants would advantageously compare the use of CE in education to that of PED in sport and exercise (Heyes & Boardley, 2019). There was a perception that CE use was more acceptable than PED and therefore possibly easier to rationalise. Student-athletes may have similar opinions, especially considering they are likely more exposed to the rules, regulations, and negative media coverage surrounding PED use and its impact on clean athletes.

Limitations and Future Research Directions

By being the first person-centred study to examine PED and CE use simultaneously, this study made significant contributions to our understanding on the psychological profiles of

student athletes who may be at most risk for both forms of enhancement drug use. However, as with any research, the results should be considered alongside limitations tied to the research design. One limitation was the use of direct-question self-report, which may have led to some under reporting of PED and CE use. Due to low levels of reported use, it was challenging to demonstrate significant differences in PED and CE use between profiles, particularly *The At Risk* and *The Reduced Risk*. Considering the low levels of reported use of both PED and CE in the direct-questioning self-report method used within this study a measure of doping susceptibility (Gucciardi et al., 2010) might have been a useful addition to the questionnaire. When considering lower reported use in previous literature, doping susceptibility has been used as an alternative measure in the past for reported doping (Boardley et al., 2017). Including a measure of doping susceptibility may have been beneficial in the current sample given the low levels of doping behaviour. In addition to this, an avenue for future researchers could look at the presence or level of anti-doping education in such a population and whether this may influence how participants respond when surveyed on such a topic.

The current investigation was cross-sectional in nature. Although we have been able to model profiles such as those *At Risk* and those that are *Protected,* we do not have information as to how the student-athletes participants got there. Therefore, a future longitudinal investigation would be of benefit when using latent profile analysis. This would allow the assessment of changes in profile membership over time. CE use may also vary throughout the academic calendar, with many qualitative investigations suggesting use often coincides with dissertation deadlines or exam time (e.g., Steward & Pickersgill, 2019; Vargo & Petróczi, 2016). A final limitation here is that the current profiles are sample specific and may not be stable. As such, replication of the study is required to confirm the profiles evidenced here.

Conclusion

This study examining a sample of student-athletes from a person-centred approach to generate risk profiles for the use of PED and CE. Using latent profile analysis on a sample of student-athletes from several UK universities we were able to identify a three-profile model based upon responses to scales measuring doping SRE, doping MD, and empathy. This three-profile model was used to assess distal outcome variables in anticipated guilt and reported doping in both PED and CE use highlighting important differences between the profiles. Profile 2, *The Protected*, in which there were higher levels of doping SRE, and empathy demonstrated lower levels of doping MD, and evidenced the highest levels of anticipated guilt in both PED and CE, with the lowest levels of PED and CE use. Concurrently, those in Profile 3, *The At Risk* who demonstrated the lowest levels of doping SRE and empathy were more likely to score highly on doping MD and lower on anticipated guilt in both PED and CE use. This study provides further support to key elements of Bandura's (1991) theory as a profile combining high SRE and empathy with low doping MD was significantly more likely to have higher levels of anticipated guilt in both contexts. As such, the combination may provide 'protection' for individuals, deterring them from engaging in transgressive behaviour such as doping. Future research is encouraged to build upon these findings through longitudinal designs and may also allow for such insight to be applied to designing any possible future interventions that may either work with individuals to reduce or avoid such substance use in such contexts.

Chapter 7: Study 5. Institutional Policies Regarding Nonmedical use of Prescription Stimulants for Cognitive Enhancement in U.K. Higher Education

7.1 Introduction

The use of prescription stimulant medications to enhance performance in academia has been a topic of debate in the normative literature (e.g., Greely et al. 2008; Maher, 2008; Wolff & Brand, 2013) and mainstream media (e.g., Marsh, 2017) due to the ethical, health, and legal concerns surrounding access and use. Cognitive enhancement (CE) refers to the use of prescription drugs to augment cognitive capabilities such as memory, attention, and wakefulness (Schelle et al., 2014) or as Franke et al. (2014a: p83) define, 'the use of any psychoactive drug by healthy subjects with the aim of enhancing cognitive abilities such as vigilance, attention, concentration or memory.' Although the true cognitive advantages provided by CE drugs in healthy individuals remain equivocal (Roberts et al., 2020; Vrecko, 2013) many users perceive that stimulants aid in academic performance (Vargo & Petróczi, 2017; Steward & Pickersgill 2019) thanks to increases in focus, wakefulness, or possible aspects of motivation. There is a stark contrast in the attitudes held by nonusers and users in attitudes regarding CE use (see Schelle et al., 2014), and this appears particularly in the concept of fairness, as to whether CE is a form of cheating and therefore academic misconduct. The Aikins et al. (2017) review of academic integrity policies, across 200 institutions within the USA found only one had a specific policy aimed at deterring CE by making consumption a violation of academic standards. To date, a similar review of UK institutions has yet to be conducted.

Prescription stimulants such as amphetamine (Adderall), methylphenidate (e.g., Ritalin), and modafinil (Provigil) tend to be the most commonly used substances for CE. These are prescribed medically for attention deficit hyperactivity disorder (ADHD) or as treatments for narcolepsy, though have become readily available on campuses across the

world. The issue of CE use is not a trivial one. A systematic review conducted by Wilens et al. (2008) found 12-month prevalence rates of between 5% and 35% within 113,000 US-based students across 21 studies. However, rates are typically lower in Europe (Franke, et al., 2014a). Within Swiss students, a 7.6% lifetime prevalence of substances used for CE was estimated via direct questioning (Maier et al., 2016) while de Bruyn et al. (2019) found that 8.7% of Belgian students reported CE use in the previous year with prescription stimulant use higher during examination periods. Research has been limited within the UK. A lifetime prevalence of 10% was reported for UK students by Singh et al. (2014) and more recent studies via direct-question self-report have evidenced even higher prevalence of 17.10% (Champagne et al., 2019) and 19.20% (McDermott et al., 2020).

As highlighted within the scoping review conducted in Chapter 3, a broad motivator for CE in students could be classed as 'managing academic demands.' Several large quantitative studies suggest that the primary motivation for use of CE was academic performance within exam periods and competitive situations (Blevins et al., 2017; De Bruyn et al., 2019; Forlini et al., 2015). There is also extensive evidence, particularly in qualitative studies as to the motivations for CE use. The semi-structured interview approach allows for a deep exploration of motivations of use and often it is clear that CE isn't merely just about 'academic performance' in which students wish to perform to their best, often in competitive academic situations. It also represents students managing stresses from either extensive workloads or poor study practices, associated more typically with students struggling with lower grades or time pressures for assignments (see Vargo & Pretózci, 2016; Steward & Pickersgill, 2019; McDermott et al., 2020). In summary, motivations for use are often centred on improving academic performance in either competitive situations, dealing with extensive workloads, or providing an 'aid' to poor study practices.

Within the literature, there has been extended discussion as to whether CE by students represents a form of cheating given it may be deemed a form of academic dishonesty (Cakic, 2009; Vargo & Petróczi, 2016) and as part of the review conducted by Schelle et al. (2014), fairness was one of the major concerns surrounding CE. Academic dishonesty represents '…any deceitful or unfair act intended to produce a more desirable outcome on an exam, paper, homework assignment, or other assessment of learning' (Miller et al., 2017: p121). Thus, the use of CE to improve performance may constitute academic dishonesty, even when students are assessed on individual performance rather than against peers (Whetstine, 2015). More specifically, an improved university degree classification may increase a student's chance of success within a competitive job market post-university. Accordingly, non-CE using students themselves are often critical of neuroenhancement, judging pharmacologically enhanced performances as unfair and inauthentic (Forlini, & Racine, 2009; Forlini et al., 2015).

Institutional policies that govern academic conduct and sanction student misconduct are common prevention strategies in higher education for alcohol and drug use, and integrity issues such as plagiarism and cheating (McCabe, 2001; Thomas & Scott, 2016). Although there is literature investigating the institutional deterrents within academic integrity issues such as plagiarism (McCabe, 2001) and contract cheating (Newton, 2018), aside from the Aikins et al. (2017) review of US university policies, there continues to be a scarcity in CE policy research. Mazanov (2019) provided an interesting discussion as to how institutions could respond to increasing use of CE, pointing to the challenges associated with ethical debates, public health, and macroeconomic questions. To highlight this complexity of the debate, Dunn et al. (2021) interviewed 14 participants members of staff from five Australian universities to examine their opinion on CE regulation. The study findings suggested study drugs were seen as a health problem rather than a threat to academic integrity. However,

there was no reference made to whether the participants had any experience of CE use which could potentially influence their attitudes towards such behaviour. Despite this, many student non-users see CE as both a health and fairness concern (Schelle et al., 2014) with some users themselves being aware of the perception that such behaviour is considered cheating (Vargo and Petróczi, 2015; Heyes & Boardley, 2019). It, therefore, remains open for debate as to where possible CE regulation may sit.

Within the Aikins et al. (2017) review of academic integrity policies, across 200 institutions across the USA, only one (Duke University) had a specific policy aimed at deterring demand for CE by making consumption a violation of academic standards. However, nonmedical use of prescription stimulants was addressed in all but two of the 200 institutions as part of general drug policies. The degree to which this was focused on CE was varied and often it was blanket statements focusing on compliance with State or Federal laws around nonmedical prescription stimulants and therefore unlawful CE use. The current understanding within the literature is that it is extremely rare for CE use to be explicitly included within an academic integrity policies in higher education.

Considering both the academic/fairness concerns coupled with those surrounding health and side effects, the present study seeks to replicate the approach taken by Aikins et al. (2017) and investigate the institutional policies that potential address CE use at UK university institutions. This would increase our understanding of the policy and regulatory context beyond just the US and provide an interesting discussion regarding how best to manage the use of CE within UK academic institutions. Two main research questions were used to guide the study. First, how many university institutions have ‘academic integrity’ and ‘alcohol and drug’ policies that are publicly available online? Second, how many university institutions explicitly prohibit the academic use of CE?

7.2 Methods

The investigation of Aikins et al. (2017) provided a framework and overarching structure for the current study. Content analysis was used to examine the publicly available institutions' policies on academic integrity and alcohol and drug use (Saichaie & Morphew, 2014). The full sample was of all institutions that are listed as recognised bodies representing higher learning institutions that can award degrees (UK Government, n.d.), totalling 174 institutions. This represented a similar sample size as Aikins et al. (2017) who investigated 200 institutes drawn from a larger database within the USA. The names of the institutes included in the study are shown in the Appendix H.

Employing text search engines to perform 'text searches' for specific queries is an accepted approach for systematically locating pertinent online data (Krippendorff, 2004). The locating and searching of institution documents related to academic misconduct was conducted between April 2021 and August 2021. A systematic approach was taken to identify academic integrity and misconduct policies that were published in the public domain. The main undergraduate student handbook or document that outlines the institutes code of conduct or academic integrity policy was located and identified. Including in this search were the terms 'academic misconduct', 'academic regulation', 'academic integrity', 'cheating', and 'plagiarism.' In cases where an academic misconduct policy or code of conduct could not be found, a repeat search was carried out to verify its absence. After locating the institution's academic misconduct policy, the documents were searched for language related to 'nonmedical' use of 'prescription stimulants/medications,' and other keywords related to 'cognitive enhancing drug' such as 'study drug', 'smart drug', 'stimulant', 'modafinil', 'study pill', 'Modafinil', Adderall, 'Ritalin', and 'cognitive enhancing drug'. All data was taken from publicly available information and did not involve human subjects, therefore institutional ethical approval was not required.

As with Aikins et al. (2017), in addition to searches relating to CE drug use, searches were carried out for institution policies relating to alcohol and other drugs (AOD) using the same terms as within the academic integrity policy documents. Additional search terms used to locate alcohol and drug policies included, 'student conduct policy', 'substance misuse policy', and 'health and safety'.

7.3 Results

Within the sample of 174 degree-awarding institutions, a publicly available academic integrity policy information was found in 161. These were referred to a variety of titles such as 'Academic Misconduct Policy', 'Academic Integrity Policy', 'Academic Misconduct Procedures', 'Academic Integrity Procedure', and 'Academic Offences'. Of those policies, not one included an explicit reference to the use of pharmacological cognitive enhancement, prescription stimulants, or CE in the academic misconduct/integrity documents.

The definition and criteria of 'cheating' or 'academic misconduct' were overall similar for many of the policies with references to plagiarising, contract cheating, collusion, and dishonesty. An example of such a definition was:

> Academic misconduct' is gaining or attempting to gain, or helping others to gain or attempt to gain, an unfair academic advantage in formal University assessment, or any activity likely to undermine the integrity essential to scholarship and research. (The University of Cambridge).

Some policies did not explicitly include the word cheating, referring instead to academic misconduct or 'examination irregularities' (University of Birmingham). Often the academic integrity policy would include an additional phrase or reference to misconduct that might be considered cheating or dishonest that was not explicitly included within the policy. For example, 'Any attempt to gain an unfair advantage in an assessment.' (Cardiff University), and 'Other conduct likely to give an unfair advantage to the student.' (Imperial College). Therefore, cheating or misconduct could be any attempt that might provide a student with an unfair advantage over their peers whether that unfair advantage was gained or not.

In addition to assessing academic integrity policies, alcohol and other drug policies were examined. Policies relating to alcohol and other drugs were more challenging to locate than those relating to academic misconduct. AOD were found on 125 institutes websites or online documents. Alcohol and Drug policies are varied in content with some institutions having a specific policy document while others having a subsection on their website dedicated to alcohol and drug misuse or welfare and student wellbeing. As such, these documents presented a mix of formal policy in line with the academic integrity documents stating alignment with the Misuse of Drugs Act (1971), zero-tolerance approaches to drug misuse, and some with extensive signposting to websites focused on student wellbeing and substance misuse.

Of the 125 accessible AOD policies, nine made explicit reference to the use of CE, commonly referred to within the policies as 'study drugs' (Imperial College London; Keele University; University College London; NCG at Northeastern, University of Portsmouth; University of Roehampton; University of Strathclyde; University of Warwick; University of York). These statements highlight the equivocal evidence relating to actual performance enhancement of study drugs, the possible risk to health or mental wellbeing as well as highlighting the legal concerns surrounding the use of prescription drugs without prescription.

The UCL AOD policy provides the most extensive reference to study drug use, including such use within the 'substance misuse' definition. The AOD policy includes a specific section dealing with CE use:

> Students should be aware that the possession of some non-prescribed study drugs are a criminal offence. Some drugs are illegal to possess without a prescription and most are illegal to supply or give away. You should treat the possession and use of study drugs with the same caution recommended for controlled drugs and psychoactive substances.

As with the general statements identified by Aikins et al. (2017) many of the policies explicitly stated conformity to drug legislation, specifically in reference to the Misuse of Drugs Act (1971) and included as part of their regulations the misuse of prescription drugs and legal highs. An example of this was seen from King's College London:

> The misuse of substances known as 'drugs' is against the criminal law. The term 'drugs' covers a wide range of substances, including cannabis, cocaine, and heroin, together with the many derivatives or hybrids of these drugs. It refers to any substance controlled by the Misuse of Drugs Act 1971 and the Psychoactive Substances Act 2016. The term 'misuse' includes the use, possession, trade, distribution, selling, offering for sale, and purchase of drugs, as well as the illegal use of prescription drugs (i.e. the use of prescription drugs that have not been legally obtained, or have been used in a manner or for a purpose other than as prescribed.)

Though some institutions do go further and have an explicit zero-tolerance approach toward substance misuse. For example, St George's London explicitly states:

> As a healthcare university, St George's operates a zero-tolerance policy towards illegal drugs (their use and/or possession). Any student found to be breaching this policy may have their registration terminated, the matter reported to professional registration bodies and the police notified.

St George's may hold students on a professional course to a higher standard of conduct as programmes such as medicine are accredited and/or regulated by professional, statutory, or regulatory bodies which seek to ensure that students comply with professional codes of conduct. However, other institutions held this zero-tolerance approach regardless of degree:

> The University of Derby…operates a policy of 'No Tolerance' towards the use of illegal drugs on all premises. This policy is effective for all Further and Higher Education students across university sites and is inclusive of university employed student/staff members (e.g., Student ambassadors, Residential Assistants and support workers). Any and all uses of illegal drugs on our premises will be referred to the Police and will be subject to our university disciplinary procedures.

In several cases, there was no specific reference to an AOD policy document, rather a website that detailed the University's stance on AOD. In these cases, many of the statements were

centred around the concept of student welfare and health and safety. This concern for student welfare and a 'harm reduction approach' was exemplified by The University of Bristol:

> The University of Bristol understands that students use alcohol and other drugs. We also understand that a zero-tolerance stance is harmful and damaging as it prevents students reaching out as they may fear being punished.

This harm-reduction or 'supportive approach' (Queen's University Belfast) was often listed as the primary approach taken by institutions until circumstances dictated that potential criminal action had taken place, such as the sale of controlled drugs to fellow students.

7.4 Discussion

Guided by the review of Aikins et al. (2017) into institutional policies, the current investigation demonstrates that inclusion of CE within academic integrity regulation is exceedingly rare, such that no UK university explicitly referred to CE or prescription stimulants as a form of academic misconduct. Although many of the academic integrity policies do include reference to any behaviour that may provide an unfair advantage over another student, whether that advantage is achieved or not. It appears clear that universities are unanimous in not addressing CE as a matter of academic integrity.

The current findings add to the debate on how interventions may manage the increasing trend of students using CE in academia. On the more extreme end of the hypothetical intervention spectrum, Dunn et al. (2021) reference the idea that within the UK there is a possibility of drug testing students prior to exams, in a similar vein to drug testing in sport. However, the current review of academic integrity policies suggests that this is far from likely considering the current situation in which CE is not considered a form of misconduct worthy of inclusion within academic integrity policies. Instead, it appears that UK institutions are more inclined to tackle CE use as part of AOD with reference to the Misuse of Drugs Act (1971). Although the majority of the AOD policies reviewed do not explicitly reference CE, nine institutions refer to the term 'study drug'. This was most often

associated with highlighting the limited evidence for performance benefit, potential health concerns, and legal issues regarding the use of prescription drugs without prescription, rather than highlighting the ethical debate surrounding CE.

Some AOD policies appear to be harm reductionist, highlighting the serious health and wellbeing risks that are associated with drug misuse. For example, Keele University explicitly state they 'aim to follow a tiered approach as per the Public Health Model' beginning with prevention and education strategies before more targeted intervention and support. Keele University makes recognition of their legal duty both to care for students and their legal duty to inform police of any incident involving illegal drugs. Many of the AOD polices referenced the legal aspect of substance misuse, and in one case this extends explicitly to CE use with the UCL policy informing students that possession and use of study drugs should be treated with the caution recommended for controlled drugs and psychoactive substances.

The current study provides an additional perspective to the CE debate within the literature. While the ethical debate surrounding CE use has been covered extensively elsewhere (e.g., Cakic, 2006; Coveney & Bjønness, 2019a; Greely, 2008; Racine et al., 2021). On one side of this debate, there is a push to see the possibility of CE use explored and discussed because of the potential advantages to human enhancement that such substances might bring (e.g., Greely, 2008). While on the other side there is extensive literature surrounding concerns related to health, legality, coercion, and fairness (Schelle et al., 2014). Stakeholder attitudes such as the public (e.g., Coveney et al., 2019b; Dubljević, 2019; Fitz et al., 2014), health professionals (e.g., Banjo et al., 2010; Franke et al., 2014b), and as highlighted by the scoping review of Chapter 3, students do raise concerns relating to CE use in academia. In research on CE attitudes held by students, the concerns surrounding health implications are important (Schelle et al., 2014). However, there is also a feeling among

nonusers that CE use represents a form of cheating (Barvarian et al., 2018; Maier et al., 2015; McDermott et al., 2020). Even CE users are aware that the behaviour may be considered as such (Heyes & Boardley, 2019; Vargo & Petróczi, 2016). Such attitudes and the wider ethical debate within the literature may be of helpful for any institutions that wish to further consider the issue of CE use in students. Concerns around CE use may also raise questions as to whether there is the potential rationale for academic institutions to establish CE policies specifically within academic integrity policies in addition to AOD policies relating to alcohol and drug use. UK institutions are similar to those in the US in avoiding any explicit reference to CE within academic integrity policies. Instead, institutions are more likely to make include prescription stimulant use within an alcohol and drug policy with a focus on negative health consequences (e.g. Keele University). As highlighted by Aikins et al. (2017), it may not be safe to assume that college students will know to associate CE with the broader policies governing alcohol and drug use, yet concerns remain surrounding fairness. Moving forward, institutions should be informed by the prevailing attitudes held by different stakeholder groups and the wider normative literature surrounding CE use.

Since the COVID pandemic there has been an increased interest in student wellbeing in the university environment (e.g., Burns et al., 2020; Copeland et al., 2020; Schwartz et al., 2021). With much of teaching having moved online and the closures of campuses in the early part of the pandemic, students were expected to navigate university life without access to their usual support networks or student services. Given these challenges, it is unsurprising that Cao et al. (2020) evidenced that 24.9% of college students were found to be experiencing anxiety due to the COVID outbreak in China while Copeland et al. (2020) demonstrated high levels of COVID related disruptiveness and persistent negative effects on students' behavioural and emotional functioning, particularly the externalising of problems and attention problems. The COVID pandemic has led to a lack of physical contact with

academic staff and a dramatic change in service provision, which has potentially put students under increased pressure to meet deadlines without the typical access to support that they would normally experience. Research investigating motivations for CE use has highlighted the drive from students to engage in such behaviour to manage academic demands (see Chapter 3). For example, students may use CE as a study aid to improve focus and deal with convergence of pressures (Steward & Pickersgill, 2019) or as a quick fix to help meet deadlines (McDermott et al., 2020; Vargo & Petróczi, 2016). Although the PhD candidate is unaware of any current research investigating CE use in students during the pandemic, such use may potentially have been explored by some students to handle such pressures. To highlight this, a recent Vice article discussing CE use in students discussed use driven by such motivations (Ashley, 2022). Interestingly, the article also included comments from three universities all of which provided statements that underlined commitment to the health, safety, and wellbeing of their students. With the lack of explicit academic regulations relating to CE use and a greater focus on student wellbeing and health providers, the post-COVID management of CE drug use in universities will be an interesting context to see develop. Many of the academic misconduct policy documents will likely have been developed before the COVID pandemic. Universities should be aware of the potential factors that may facilitate students to use of CE in the first place and should take the opportunity to consider their responses from both an academic and student welfare perspective.

Limitations

The study examined only publicly available information relating to institutional policies on 'academic integrity' and 'alcohol and other drug use'. Although each of the policies were located and examined twice, it may be the case that some information was missed. In addition, some alcohol and other drug policies identified were related to halls of residence rather than institutional policies for the university as a whole, as such these were not

included. Of the collegiate universities investigated (e.g., Cambridge, Durham, Oxford) the specific college policies were not included in the investigation.

Implications for Future Research

As highlighted in the scoping review of Chapter 3 much of the research investigating attitudes, motivations, and prevalence of CE use in academic involve discussions on possible interventions within a university setting. Much of these suggestions are based on the development of workshops on learning styles (Adamopoulos et al., 2020), or on the possible health implications of prescription stimulant use (e.g., Bavarian et al., 2018; London-Nadeau et al., 2019). As part of these discussions, institutional policies are referenced as a possible avenue. This study adds to that of Aikins et al. (2017) in providing evidence of what those current institutional policies are, particularly within the UK.

One area of research that may provide an avenue in the future is whether the current stance of UK universities not to include CE use as academic misconduct is perceived as tacet reinforcement of the behaviour by students or if a policy change would influence the behaviour. There is some evidence that the lack of explicit standpoint may influence the rationalisation of CE using students (Heyes & Boardley, 2019). Although in their recent interviews of CE using participants, McDermott et al. (2020) evidenced attitudes that even if UK universities were to include policies prohibiting the behaviour, many would simply ignore such standpoints.

The current study looks solely at CE, however, there are other forms of cognitive enhancement technology such as transcranial direct current stimulation, and it cannot be ruled out that such technological, or further pharmacological methods do not continue to improve. As things progress there are likely to be even more questions to ask surrounding safety, fairness, and academic competition.

Conclusion

Evidence suggests that the main attitudes surrounding concerns the use of CE in education are over health and safety, fairness, and coercion (Schelle et al., 2014). Given this context, the current study found that none of the degree-awarding institutions within the UK has academic integrity policies that prohibit the use of CE on fairness grounds. Rather, if CE was explicitly dealt with by institutes, it is within AOD policies and primarily based on aspects of health or legality. For those, many institutions that did not explicitly mention 'study drugs' there was often a blanket statement referring to the Misuse of Drugs Act (1971). Although the actual cognitive enhancing properties of the current prescription stimulants used for such means are debatable (see Vrecko, 2013), this may not always be the case. As Mazanov (2019) suggests, there is a possibility of a crisis if student use of CE is not addressed. How this happens through policy decisions will likely influence the future of how CE use is seen, not just in an educational context, but also in wider 'sectors' that are facing similar questions of how to manage the use of human enhancing technologies. With the current climate of CE not being included in academic integrity, universities may have decisions to make as to what extent CE is tolerated rather than whether CE is part of academia at all. This does pose interesting questions considering the attitudes surrounding fairness that many non-using students hold.

This study provides a cross-sectional review of the policy evidence that CE is not explicitly considered an academic integrity issue within the UK in the same way as plagiarism and contract cheating. However, the majority of AOD policies will either implicitly refer to CE use via the Misuse of Drugs Act (1971) or explicitly in the case of nine institutions. Despite this, there is a growing trend for CE use in university students and the ethical and fairness questions surrounding use are unlikely to go away anytime soon. With the increased focus on student wellbeing, particularly post the start of the COVID pandemic,

there will be interesting decisions for universities to make regarding how it is most appropriate to respond to CE use in academia.

Chapter 8: General Discussion

8.1 Thesis Summary

The principle aim of this thesis was to investigate psychosocial factors that facilitate enhancement drug use in sport and education. This included the use of PED in sport and CE in education. To achieve its primary aim, this thesis sought to: (a) review evidence related to rationalisation and justification of CE use in students, (b) explore whether student users of CE evidenced specific psychosocial mechanisms when explaining their reasons for CE, (c) estimate the prevalence of PED and CE use in UK student-athletes through the use of indirect questioning approaches, (d) and provide an exploratory analysis to identify and characterise profiles with student-athletes based on psychosocial factors that might facilitate or deter use of PED and CE.

Chapter 1 provided an introduction into both PED and CE and highlighted three considerations that may act as deterrents for use in either context: detrimental health consequences, legal implications, and ethical concerns. This introduction also provided background to a theory that has been useful in understanding how people psychologically bypass constraints and engage in transgressive behaviour, Bandura's (1991) social cognitive theory of moral thought and action. In particular, the mechanisms of MD and possible antecedents, SRE and empathy. Following on from this, Chapter 2 provided an overview of the methods chosen in the later empirical studies and outlined the theoretical frameworks which underpinned them.

Chapter 3 provided a scoping review of the literature, focusing on the rationalisation and justification of CE use in students. This was achieved by examining attitudes and motivation research in the literature to assess what may deter the use of CE, what drives users to engage in the behaviour, and what research highlights as the rationalisation and justification for CE use. Although there is limited research explicitly investigating

rationalisation and justification, several aspects of such did emerge from the studies reviewed.

Chapter 4 qualitatively explored whether student users of CE evidenced MD when explaining their reasons for CE. Deductive analyses revealed the use of all MD mechanisms aside from dehumanisation and attribution of blame. Through the application of Bandura's (1991) theory, this is the first study to present research which demonstrates how student users of CE may use MD to rationalise and justify their off-label use of stimulant drugs to support their academic studies.

To add to our understanding of the prevalence of both PED and CE use in the UK, the major objectives of Chapter 5 were to: (a) estimate the 12-month prevalence of PED and CE use in UK student-athletes, including possible gender differences, and (b) compare estimates using randomised (UQM) and non-randomised (SSC) indirect approaches. Although prevalence estimates for PED and CE were inconsistent between UQM and SSC, the prevalence estimates for both PED and CE in student athletes were non-trivial, raising questions about how institutions should tackle the issue of both PED and CE. Non-trivial is defined as being both above zero and of concern given the health, legal, and ethical considerations surrounding use in either context.[18]

Chapter 6 built upon the recent work of Boardley et al. (2017) through the use of LPA to examine possible psychological profiles of student athletes using psychosocial variables based on Bandura's (1991) theory. Based upon a sample of student-athletes from several UK universities, this study identified a three-profile model based upon levels of doping SRE, doping MD, and empathy. This three-profile model was used to assess the distal outcome variables of anticipated guilt and reported PED and CE use, revealing significant differences between profiles for these outcomes. Two profiles demonstrated how high levels of doping

[18] See footnote 9

SRE and empathy along with low levels of doping MD were associated with high levels of anticipated guilt for both PED and CED. The smallest profile grouped individuals with lower levels of doping SRE and empathy as well as higher levels of doping MD. This third profile demonstrated significantly lower levels of anticipated guilt for PED and CE use compared to the other two profiles.

Finally, to add to our knowledge and understanding of relevant policy, Chapter 7 explored UK university institutional policies related to CE. Driven by Aikins et al.'s (2017) equivalent analysis of these policies in the USA, an assessment of current academic integrity policies, and drug policies was conducted for the 170 registered institutions in the UK. This analysis revealed that no UK university institutions explicitly prohibited the use of CE as a form of academic misconduct. If CE were included within regulations, it would form part of the drug policy within the university, often based solely on the Misuse of Drugs Act (1971).

8.2 Discussion of Findings

The scoping review of Chapter 3 demonstrated that although specific investigations of rationalisation and justification for CE use have not been conducted, the research studies into motivations often exhibit emergent information related to rationalisation and justification. Attitudes held by nonusers also provide support to some of the societal concerns, primarily, concerns of medial safety and health, and concerns regarding fairness. As highlighted in Chapter 3, researchers have qualitatively investigated the motivations and explored psychosocial factors that influence students' use of CE, and although not grounded in Bandura's (1991) theory, there was some support for use of MD to rationalise and justify CE in students. Therefore, Study 2 looked to answer the following research questions: (a) do university students evidence MD when explaining their CE drug use (b) and if so, which of the eight MD mechanisms are used. Overall, deductive data analyses revealed that the students interviewed evidence of six mechanisms of MD: diffusion of responsibility,

advantageous comparison, distortion of consequences, displacement of responsibility, moral justification, and euphemistic labelling; no evidence of dehumanisation or attribution of blame was identified. In addition to this, the inductive analysis revealed three further data themes: Self-medication, friends and family, and institutional position. These findings are comparable to the mechanisms of MD evidenced for PED use in team and individual sports and exercise (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015).

The major mechanisms evidenced are of interest as they appear prominently in the qualitative investigations into motivations towards CE use, specifically interview data with CE users. Diffusion of responsibility can occur through collective action, or group decision making, leading to responsibility for transgressive acts and/or their consequences being diffused within the broader group (Bandura, 1991). Many of the participants in Study 2 were quick to reference their close social group in which CE use was common. This is similar to the qualitative investigation of McDermott et al. (2020) in which several users felt CE had become more 'accepted' and in which they also felt more comfortable when people were talking about the use. Users here who perceived the behaviour of CE had become normalised led to the ability to reduce personal responsibility for engaging in the behaviour. This also evidences the friends and family theme from Study 2, in which students categorisation of associates into fellow CE users, non-using subject peers, and family members, with students discussing CE only with those in the first category. Vargo and Petróczi (2016) evidenced that the perceived growing popularity of CE may lead to its wider adoption and such DR through collective action has also been evidenced with IPDE use in sport and exercise (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015).

Modafinil is often compared advantageously to either other prescription CE substances, such as amphetamine and methylphenidate, or to other recreational drugs. This rationalisation was evidenced in Steward and Pickersgill (2019) and Champagne et al.,

(2019) where modafinil is presented by users as non-addictive and more acceptable. The mechanism of AC takes advantage of the contrast principle by making a transgressive act appear inconsequential or less harmful when comparing it to more heinous behaviours (Bandura, 1991).

Within Study 2, AC was frequently evidenced be it through comparison to other drugs, other illegal activity, and PEDs in sport and exercise. Distortion of consequences is a mechanism that occurs when individuals actively avoid and/or cognitively minimise the harmful outcomes resulting from their actions (Bandura, 1991). Within Study 2 this was evidenced by students downplaying the harms to themselves or others because of use, such as suggesting the safety of CE substances due to their controlled and prescription drug status. Most commonly this rationalisation of use appeared when Participants also downplayed the academic advantage CE gave them over students not using CE, arguing the educational environment is not competitive. Often this was coupled with participants also comparing the effect of CE to that of caffeine or other licit behaviour such as paying a dissertation tutor for essay coaching. As such, participants found numerous ways in which to downplay the consequences of their CE use.

The comparison to the legal behaviour of drinking coffee presenting CE equally ethically acceptable is typified by Vargo and Petróczi (2016) and Steward and Pickersgill (2019), where the participants interviewed compared use to drinking coffee during study sessions and use did not change an individual's capabilities. A primary motivation for CE use in students is managing academic demands. Often this is to complete coursework within a short window of time, either due to poor study practices or implicit or explicit social pressures.

The final mechanism to highlight here is that of displacement of responsibility, where individuals can rationalise a transgressive behaviour due to seeing such actions stemming

from implicit or explicit pressures (Bandura, 1991). Participants in Study 2 felt pressurised to 'catch up' with university assignments and CE was perceived as an effective way of achieving this and this motivation to 'catch up' using CE has been evidenced elsewhere (Vargo & Petróczi, 2016; Vrecko, 2013). Such pressures only appeared to increase through the course of their academic studies. Accordingly, students in Study 2 appeared to rely even more on CE during their final study year. This supports evidence that more senior students, such as final year undergraduates and those in postgraduate study, have been shown to be more likely to use illicit drugs and CE (Maier et al., 2013). Despite the ongoing normative debate surrounding CE use, the evidence for MD provides an interesting demonstration that when explaining reasons for CE use, students evidence clear mechanisms of MD in a similar way to users of PED. As such, MD may be central to how student users of CE rationalise and justify their off-label use of drugs to support their academic studies.

To support the qualitative research assessing MD in students, and to help investigate further comparisons between PED and CE, Study 2 sought to provide estimations of the 12-month prevalence of PED and CE use in UK student-athletes. As part of this aim, we sought to examine gender differences in both forms of drug use. Specific hypotheses were not formed regarding overall expected levels of PED and CE use. However, based on the evidence available, we did hypothesise that prevalence estimates for both PED and CE use would be higher for males than for females (Boardley et al., 2019; Dietz et al., 2013a). A second aim was to compare prevalence estimates for PED and CE use using two indirect approaches, the UQM and the SSC. Based on the single study from James et al. (2013) that has compared estimates derived with these two techniques, we tentatively hypothesised that UQM estimates would be higher than SSC estimates. For PED use, 12-month prevalence estimates were 14.02% (11.60-16.45) and 7.83% (0.00-16.54), respectively, using the UQM and SSC; direct questioning lifetime prevalence was 2.77% (1.57-3.96%). For CE use, 12-

month prevalence estimates were 16.26% (13.78-18.73) and 7.00% (0.00-15.55), respectively, for UQM and SSC. While direct questioning lifetime prevalence was 5.10%. This was the first study to assess PED and CE use using two indirect approaches simultaneously. Although we were able to provide estimates for PED and CE within the assessed student population, due to the overlapping confidence intervals. This was also the case with the gender comparisons, as although point prevalence estimates for both PED and CE use was higher for males than females, the overlapping confidence intervals preclude the detection of significant gender difference for either form of drug use. Despite this, gender differences have been reported in studies using direct questioning methods (e.g., McDermott et al., 2020; Shah et al., 2019) and this is also consistent with anti-doping literature on gender differences in which male athletes generally report both a more positive attitude toward doping and a more frequent use of substances than female athletes (e.g., Backhouse et al., 2016). Further work is needed in this area to increase the confidence in assessing a sensitive subject such as substance use in students. This is an extra challenge considering the nature of the participants investigated here. Student-athletes will likely have had some form of anti-doping education and be aware of the possible implications of an anti-doping rule violation. As such, student-athletes may be tentative about responding truthfully to a survey investigating doping. Given that, this is an interesting population to study as student-athletes aiming to achieve *positive* outcomes both in sport and education are possible at risk for both forms of enhancement drug use, PED and CE. This study using both the UQM and SSC to explore PED and CE use in UK student-athletes does provides important and novel contributions to our understanding of the prevalence of these behaviours in this population and should raise questions and concerns for those involved with the governance of university sport and education in the UK.

In Study 4, a sample of student-athletes was examined to identify and characterise profiles with student-athletes based upon doping SRE, empathy, and doping MD using latent profile analysis (LPA). Based on Bandura's (1991) theory it was predicted that individuals with high levels of doping SRE and empathy would also display low levels of doping MD, while the reverse also being true, individuals with low doping SRE and empathy would evidence high doping MD. Once profiled, analysis on distal outcomes demonstrated that those with low doping MD would display high levels of anticipated guilt in both PED and CE. Using LPA on a sample of student-athletes from several UK universities we were able to identify a three-profile model based upon the indicator variables. Doping SRE, empathy, and doping MD were all significant indicator variables in generating a three-profile model of the student-athletes investigated. As predicted, the participants with the highest levels of doping SRE also displayed the lowest doping MD and high levels of empathy. While the participants with the lowest levels of doping SRE and empathy also had the highest scores for doping MD. This three-profile model was used to assess distal outcome variables in anticipated guilt and reported doping in both PED and CE highlighting the difference between the profiles.

With Study 2 providing qualitative evidence supporting the use of six MD mechanisms in CE using students, Study 4 was able to add to this and recent work from Boardley et al. (2017) highlighting the importance of other variables within Bandura's (1991) theory when considering doping MD, namely SRE, empathy, and anticipated guilt. The investigation in Study 4 provides further support to the proposed relationship between such variables. Gender was also identified as a significant covariant that determined profile membership, with the *At Risk* profile (low SRE, low empathy, high MD) having proportional more males than females. This profile also had the highest levels of reported PED and CE, though PED was not significantly different. As with Study 3, this provides further support as to the presence of gender differences within the PED and CE investigation.

The profile that displayed the lowest levels of MD was titled *The Protected* due in large part to the fact that membership of this group was associated with the highest possible scores for SRE. As per Bandura's (1991) theory, individuals with high SRE are likely to pose stronger beliefs in their capacity to withstand personal and social influences encouraging doping. This may explain why levels of doping MD were low, those in classified in this profile do not exhibit the mechanisms of MD as they do not need to rationalise the transgressive behaviour, they are highly unlikely to engage in. What should be noted, despite the obvious interest there may be in the *At Risk* profile, is that much of the sample of student-athletes scored high in doping SRE and empathy and low in doping MD. Based on Bandura's (1991) theory, this psychological profile should provide some protection from individuals engaging in doping as a transgressive behaviour. Supported by the information in Study 3, the prevalence of PED and CE use is modest and the number of participants that were classified in the *At Risk* profile was less than 10%. This does not mean such information should be ignored. Doping in both PED and CE does exist in UK universities, and a non-trivial. As such, questions should be raised for institutions, both academic and sporting, as to how to manage the issue of performance enhancement.

Two further points should be raised from Study 4. Firstly, reported doping in both PED and CE was not high. However, Study 3 raises the fact that prevalence was not seen to be as extensive as some of the literature in the UK (McDermott et al., 2020), there is a proportion of students that are engaging in both PED and CE use. Taken together, Study 3 and 4 demonstrate that not only is there the presence of a small but non-trivial group, but the profiling studies demonstrate what combination of psychosocial factors are represented in this group. This profile or group are significantly likely to have low levels of doping SRE and empathy and display higher levels of doping MD. Study 2 had already demonstrated evidence of the mechanism of MD in students, and it is likely that many of this At Risk profile would

display such mechanisms across both contexts. Taken together the two studies should raise questions for universities from both a sport and education perspective.

Student-athletes may have had exposure to at least some anti-doping education and are therefore cautious to answer truthfully direct questions on substance use. This was of particular interest given the lack of statistical difference between Profile 1 and Profile 3, as although Profile 3 did have a high proportion of users classified here, not a single Profile 3 participant reported current use of either PED or CE. Finally, there appears to be a difference in terms of anticipated guilt related to PED and CE use. In all profiles anticipated guilt was higher for PED use than CE. This could have been due to several reasons. Doping in sport stories are far more prevalent in the media than CE, and most often PED use is met with a negative response. There are also more explicit regulations that govern PED use in sport. It would be interesting to assess whether this anticipated guilt in CE is even less for student participants that aren't also athletes. Study 4 provides further support to key elements of Bandura's (1991) and presents some interesting further questions considering the membership of each profile and how it relates to reported doping.

As a final addition to the thesis beyond the three empirical studies, Chapter 7 sought to investigate institutional policies related to CE use in students. This was partly driven by one of the inductive themes of Study 2, *Institutional position.* Emerging from the qualitative semi-structured interviews, some students suggested an explicit standpoint against CE use from the university they were attending might reduce engagement in the behaviour. There may be a potential that without an explicit standpoint from institutions some students may see this as possible tacit reinforcement. The scoping review of Chapter 3 highlighted that motivations and rationalisations from some students may be centred on performance outcomes, they want to compete and score highly in degree classifications. Students could

potentially a lack of explicit policy from universities as 'turning a blind eye' allowing students to continue to rationalise based on achieving good grades.

In the USA, Aikins et al. (2017) assessed current academic integrity policies and drug policies, finding that only a single university in their sample (Duke) explicitly prohibited CE as part of academic misconduct. The policy investigation of Chapter 7 demonstrated that of the 170 registered university institutions in the UK, not one included CE as academic misconduct. Despite the normative debate surrounding CE as cheating (e.g., Cakic, 2009; Whetstine, 2015) and attitudes held by students on fairness (e.g., Schelle et al., 2014), it is interesting to note that universities are hesitant to provide an explicit statement on CE use as possible academic dishonesty. As prevalence data increases globally, it is possible more institutions may start to question how best to manage CE use, and some may decide to follow the approach of Duke. Although participants in Chapter 4 suggest such an approach may reduce use Steward and Pickersgill (2019) comment that care should be taken if and when university institutions decide on CE policy. Most commonly, universities that have sought to tackle the issue have done so from a harm reductionist approach of via prohibition in a separate drug policy reinforcing legal considerations. A focus on student wellbeing post-COVID pandemic has also created an interesting environment in which universities may wish to revisit policy and how best to manage student use of CE drugs.

The current thesis investigated PED and CE use in students and student-athletes underpinned by Bandura's (1991) social cognitive theory, primarily investigating the mechanisms of moral disengagement. Chapter 3 evidenced rationalisation and justification in CE using students and the current thesis demonstrates how research underpinned by Bandura's (1991) theory provides a lens with which to investigate such behaviours. Given this, the qualitative investigation of Chapter 4 extends the relevance of the theory to a new form of drug use, CE. The thesis provides support for six of the eight mechanisms of MD in

CE use and builds upon previous research investigating MD within sport. And as with the recent investigation of MD in cocaine use (Sumnall et al., 2021), the current thesis increases understanding of MD in substance use. Study 2 also identifies new ways in which the mechanisms of MD are applied, with the same mechanisms being used by the student participants in different ways. For example, CE using student participants evidenced the MD mechanisms of distortion of consequence in different ways. Some students downplayed how there was no harm to others, potential ignorant of possible psychological harm caused to family members if CE ultimately resulted in harm to the user, whereas other students downplayed any academic advantage CE gave them over non-CE using students. In addition to these two examples, some students would also use analogies to caffeine use to distort any negative consequence. Several other mechanisms of MD were also used in different ways by students.

The latent profiling investigation in Study 4 also provides new knowledge contributions to the underpinning theory. The study demonstrated how three significant profiles were identified with combinations of doping MD, SRE, and empathy. This three profile model was used to assess distal outcome variables in anticipated guilt for both PED and CE. Those in the Protected profile had higher levels of SRE and empathy coupled with the lowest levels of doping MD and evidenced the lowest levels of anticipated guilt in both PED and CE. This study provides further support for key elements of Bandura's (1991) theory demonstrating a profile high in self efficacy and empathy with low doping MD was significantly more likely to higher anticipated guilt in both contexts.

The current research was underpinned by Bandura's (1991) mechanisms of MD however, there are potentially other complementary theoretical conceptualisations that may prove interesting to investigate within PED and CE behaviours and are relevant to the findings of the current thesis. One such example is the process of moral licensing, in which

an individual's previous actions establish a baseline of a positive moral self-image or one of ethical behaviour (Blanken et al., 2015; Merritt et al., 2010). An individual may accrue moral 'credits' for engaging in positive actions, and these such credits may be perceived as offsetting a subsequent transgressive or harmful action (Merritt et al., 2010). 'Moral credentialing' has already been investigated within academic misconduct, with Brown et al. (2011) demonstrating that participants who had credentialed themselves via a set of hypothetical moral dilemmas were more likely to cheat on a subsequent maths task, but only if they were able to rationalise such cheating. Moral credentialling does not appear to have been investigated in either a PED or CE context. Given the evidence already provided for moral credentialing in a *cheating* task, it may provide an interesting avenue to explore how athletes may rationalise the use of PED when committing anti-doping rule violations. If an individual may accrue credits for good behaviour, be it in sport or elsewhere, these could offset doping behaviour. CE use may be closer in context to the Brown et al. (2011) cheating in academia task, but the debate around CE as a specific form of explicit cheating is less clear (see Schermer, 2008). That said, there are legal, health, and ethical concerns as highlighted in this thesis that mark out CE use a potentially transgressive behaviour. There is an opportunity to further explore CE use in several ways underpinned by moral licensing. Firstly, do student users of CE perceive use as cheating, are the able to rationalise such use, and do participants evidence moral credentialing that allows for engagement in a transgressive behaviour such as CE use. Given the current thesis provides evidence as to how student-athletes may rationalise the use of CE in academia and further supports the rationalisation of PED use in sport, an interesting approach for further research would be to investigate this behaviour in relation to moral credentialing.

Another complementary theoretical conceptualisation that may be of relevance to the current thesis is the theory of normative social behaviour (TNSB; Rimal & Real, 2005). The

TNSB proposes that group identity, outcome expectations, and injunctive norms moderate the influence of descriptive norms and behaviours (Rimal & Real, 2005). Group identity represents the strength of affiliation with one's reference group (Tajfel, 1982) while outcome expectations are the belief that engaging in a behaviour will confer positive outcomes (Bandura, 1986). Descriptive norms refer to individuals' beliefs regarding the prevalence of a behaviour while injunctive norms refer to the extent to which individuals perceive that certain others expect them to behave in a certain way. The TNSB has already been used in the PED context to predict anabolic steroid use in adolescent athletes (Woolf et al., 2014). Applying the TNSB to CE in academia, students may be more likely to engage in CE use if they perceive that its use is high among social referents. This influence of social referents will also be strengthened if the students also believe that their important referents approve of their CE use and they believe they will benefit from use. Supporting the TNSB as a potential theory for investigating CE use in students, Ram et al. (2017) demonstrated that students who perceived CE use to be socially and ethically acceptable were more likely to use and students who believed that CE use was approved were more likely to use them. As highlighted in Study 1 and the review of Schelle et al. (2014), CE users often hold positive attitudes towards the beneficial outcomes of CE use, and this will influence outcome expectation. Within this thesis, Study 2 demonstrated that a primary mechanism of MD to rationalise CE use was the diffusion of responsibility, in which interviewed student users referenced the importance of their close social group and a perceived ubiquity of CE use at university, potentially creating a high descriptive norm. In addition to this, an emergent theme within Study 2 was students' categorisation of associates (Family and Friends) and only discussing their use with other users, potentially strengthening the injunctive norm. Therefore, future research into CE use may seek to investigate the TNSB within a student context.

8.3 Methodological Strengths and Limitations

The results provided within this thesis make several unique contributions seeking to add to our understanding and knowledge of PED and CE use. Study 2 investigated whether student users of CE evidenced specific psychosocial mechanisms (i.e., mechanisms of moral disengagement) when explaining their reasons for CE through the use of semi-structured interviews. Although this approach has been used in PED in sport and exercise, this is the first study to explicitly investigate the mechanisms of MD in CE use. Study 3 sought to estimate the 12-month prevalence of PED and CE use in UK student-athletes through the application of two indirect methods and a direct-question self-report. Student-athletes targeting achievement outcomes both in sport and education are potentially at risk for both forms of enhancement drug use. Previous work has investigated prevalence via these means but not in the population of UK student-athletes. Finally, Study 4 provided a latent profile analysis of student-athletes seeking to profile the participants into the profiles based upon doping MD, doping SRE, and empathy. Although these variables have been investigated in a student-athlete population before, this approach to profiling has not been conducted within students investigating the psychosocial factors that facilitate PED and CE use.

Despite making some important contributions to knowledge, as with any investigation there were some inherent limitations that should be acknowledged. Although Study 2 sample size is in line with those used in similar investigations at this stage of enquiry (Boardley & Grix, 2014; Vargo & Petróczi, 2016) and provided in-depth data that evidenced the mechanisms of MD in CE, it may have been beneficial to have a larger sample size. The study only included a single female participant, and although male students are more likely to evidence CE (e.g., Maier et al. 2016; 2017), the limited female representation is a limitation within this study. In addition to this, although there was a range of subjects represented, no single subject was represented by more than three students and therefore it was to investigate

the possibility of nuanced themes specific to particular degree programmes. In addition, as the participants within the present investigation all resided within the UK, and thus any cultural differences in the rationalisation of CE drug use will not have been captured.

In Study 3 it should be noted that whilst indirect methods are widely acknowledged to provide more accurate prevalence estimates than direct questioning approaches in sensitive subjects, the lack of any objective indices of PED or CE means we had no means of verifying the accuracy of the estimates derived through the UQM and SSC. Next, when wording our direct question, we measured PED and CE use currently, during the past three months, and prior to the past three months. Whilst this was to provide us with a better understanding of PED and CE use in our sample, it meant we could not make direct comparisons between direct question estimates and those from the two indirect methods. Future researchers could align direct and indirect approaches so values obtained can be directly compared.

Within Study 4, a limitation or consequence of how the questionnaire was designed may have led to a reduced level of reported doping, both PED and CE. Study 3 and Study 4 were conducted at the same data collection for both ease of recruitment by reducing the impact on team training. However, this meant that participants completed an indirect measure of prevalence before the direct-question self-report in Study 4. This may have led to some students questioning the anonymity of the reported doping question as it was within the questionnaire pack that include their demographic information. Although anonymity and confidentially were explained to the participants, the design may have potentially led to an under-reporting of PED and CE use. In addition to this, although the measures for doping MD and doping SRE were appropriate for student-athletes in a PED context, these scales are specific to doping in a sport and exercise setting (e.g., Athletes shouldn't be blamed for doping if training partners/teammates pressure them to do it.) and a more tailored scale measuring MD and SRE in CE might be appropriate when progressing this research.

A shared limitation across studies is the cross-sectional nature. CE use is potentially focused on certain times of the academic year, such as during dissertation deadlines and exam periods. As such, interviewing students at certain points may reveal different information as to CE use, while A longitudinal investigation would also be of benefit when using latent profile analysis to assess changes in profile membership over time. Finally, a further limitation is that of recall bias. This may influence the information that participants provide in the qualitative interview study, and particularly might be the case when considering self-report measures. This may have led to a lack of reporting specific use data related to dosages and frequencies when surveying students on previous substance use.

8.4 Future Research Implications

The studies presented within this thesis provide several findings which could be further examined in future research. The qualitative study provided evidence for the mechanisms of MD in nine students, supporting research findings within sport and exercise (Boardley & Grix 2014; Boardley et al., 2014; Boardley et al., 2015). Although the sample size is similar to those used in investigations at this stage of enquiry (Boardley & Grix, 2014; Vargo & Petróczi, 2016) it does provide a future direction for a larger scale qualitative investigation that may encompass students from different universities. Through this, a greater number of female students would hopefully be included within the sample, and larger numbers of users from different subjects could be recruited, allowing for any subject-specific, university-specific or gender-specific, themes to emerge. In addition, future research may also investigate any cultural differences that may be present by extending the sample beyond just UK based students. This may provide interesting findings as legal status and government or institution policy on the relevant medications varies across countries, with legal status known to influence morality (Wingrove et al., 2011). A future qualitative investigation could also be conducted to investigate CE use beyond university. This could take a form of a longitudinal

approach in which student users may continue to use after entering the job market or further education. In addition, CE use has already been highlighted as a possibility in doctors (Sugden et al., 2010) and university staff (Sahakian & Morein-Zamir, 2007). Therefore, future investigation may seek to explore the CE use within professions further, particularly ground in Bandura's (1991) theory. All these avenues would add to the literature of psychosocial factors that facilitate the use of CE, and particularly our understanding of the mechanisms of MD involved in rationalising CE use in a students and different populations.

Chapter 5 sought to compare prevalence estimates from two indirect approaches, the UQM and SSC. Although this work provided interesting results, as to evidencing PED and CE use to be non-trivial in a UK student-athlete population through an approach to provide anonymity to a sensitive subject, there are avenues to progress this area of investigation. As highlighted in Chapter 5, indirect methods used to assess prevalence have received growing attention within sport (de Hon et al., 2014; Gleaves et al., 2021). When designing Study 3 covered in Chapter 5 the primary focus within the literature had been on the UQM and the more recent SSC, the two indirect methods used in that study. Since carrying out that investigation there has been increased focus on another indirect method, that of the crosswise model (CM: Yu et al., 2008). This is another fuzzy response method similar to SSC, again with support for the superiority of CM over direct-questioning methods in assessing sensitive/transgressive behaviour (Sagoe et al., 2021). However, the CM may also be advantageous over the SSC as only a single nonsensitive question is used, rather than four in the SSC. Participants are presented with a sensitive target question paired with a nonsensitive question. In responding, participants are then presented with two response options: 1) one 'yes' and one 'no' answer, or 2) two 'no' or two 'yes' answers. Like the SSC, the nonsensitive question having a known probability of an affirmative response (e.g., P = 0.25) means it is possible to determine the overall number of 'yes' responses to the sensitive

question. This approach is gaining popularity partly due to its increased simplicity, but also because large confidence intervals are less of an issue due to the low number of nonsensitive questions. Thus, a potential future research avenue would be an investigation using the CM to assess PED and CE use in students within the UK. Prompted by experience conducting Study 3 in Chapter 5, the addition of a question regarding preferred method when examining different types of indirect data collection methods in future would be useful when comparing two or more methods of prevalence estimation. This could always allow for a qualitative short answer to allow for participants to explain why they preferred a certain method over another. This addition would strengthen the understanding around which method may be best suited to exploring prevalence in such subjects and could be used in a future investigation comparing the CM to one of the other indirect methods.

Beyond the methodological future direction for assessing a sensitive subject such as doping in either PED or CE use, an area for future reflection is the comparison between the two contexts, sport and education, which would be in terms of whether these are equally sensitive subjects. Doping in sport is explicitly regulated (WADA, 2021a) with anti-doping rule violation sanctions often carrying serious implications for an athlete's career. Similar explicit regulation is absent from enhancement in academia, particularly from a possible academic integrity or misconduct perspective. Predominant attitudes to PED use and CE use are also different, with much of the sport literature focused on the pursuit of 'clean sport' (Petróczi et al., 2021; Woolway et al., 2020). Within CE in academia, attitudes vary considerably between non-users and users (Schelle et al., 2014) and there is debate within the ethics literature around the acceptance of CEs within academia (see Greely et al. 2008; Maher, 2008). Chapter 8 demonstrated a generally low level of reported doping in both PED and CE contexts, supporting Boardley et al. (2017) with students possibly hesitant to respond to a direct-question self-report on a sensitive subject such as drug use. Further investigation

into a possible sensitivity comparison between the two contexts would be useful and would broaden the debate surrounding the often-comparative analogy drawn between PED and CE use in the literature.

The difference between PED and CE use was also evident in Study 4 (Chapter 6). Of the three profiles evident in that investigation, there were significant differences between anticipated guilt for PED use and CE, with lower levels of guilt seen in the latter over all three profiles. Future research may seek to investigate this difference further by assessing the degree to which students feel PED use and CE is transgressive. Given the qualitative support in Chapter 4 for the mechanisms of MD within CE use, such future work may involve the development of a specific measure of moral disengagement in CE. Recently, Sumnall et al. (2021) used an adapted version of the doping MD scale (Boardley et al., 2018) to assess MD within cocaine use. A similar approach could be utilised in future research, adapting a current MD measure to make it specific to CE use. Therefore, there may be potential in the future to adapt the doping MD scale specifically for CE use, and this may be a more appropriate approach when investigating CE use in a general student population. In addition to this, Study 4 was based on a cross-sectional approach. Longitudinal research would present an interesting avenue for the future, particularly considering that CE use may vary throughout the academic calendar, with many qualitative investigations suggesting use often coincides with dissertation deadlines or exam time (e.g., Steward & Pickersgill, 2019; Vargo & Petróczi, 2016). Given this, a longitudinal investigation would also be of benefit when using latent profile analysis to assess changes in profile membership over time. A potential investigation that was considered for this thesis[19] is that of ecological momentary assessment (EMA). This approach involves the repeated sampling of participants, normally through a mobile phone app, to assess current behaviours and experiences in real-time and in situ.

[19] Prior to the COVID pandemic.

Collecting longitudinal data through EMA allows for a reduction in recall bias and the ability to maximise ecological validity. Research using EMA in the context of this thesis would have sought to investigate students use of PED and CE over a period of time, most likely around an examination or dissertation period to assess changes in psychometric measures such as doping MD and doping SRE.

8.5 Implications for Policy and Interventions

Academic investigation into psychosocial factors that facilitate the use of performance enhancing substances, regardless of context, provides major considerations for ethical discussions, policy, and practice. Several concerns may act as deterrents to performance enhancing drug use in sport, exercise, and education: that of legal, health, and ethical implications. Despite this, non-trivial prevalence rates supported by Chapter 5 and the ability for individuals to circumvent such deterrents raise questions as to how to tackle PED and CE use.

Although similar, the contexts do have different regulatory considerations. Doping in sport falls under tighter regulation than that of CE, with WADA, the WADA code and national anti-doping agencies regulating the use of PEDs for health and fairness reasons, with many of the substances also tightly controlled (WADA, 2021b). Within the UK, UKAD has a university accreditation scheme for anti-doping education, however as BUCS is not the ruling body for any sport and therefore is not a National Governing Body, there is no In-Competition or Out-of-Competition testing of Athletes under the auspices of BUCS (Private communication, 2019). The current thesis highlights the need to investigate PED use at the UK university level to a greater degree and whether the current university accreditation scheme and anti-doping education is potentially fit for purpose.

CE in academia is a slightly ‘greyer’ area in terms of regulation and policy. Building upon the work of Aikens et al. (2017) in the USA, the findings in Chapter 7 particularly

demonstrate the various ways in which institutions within the UK handle the issue of CE, with no single university regulating against CE as a form of academic misconduct. If reference is made to 'study drugs' it will most likely be within a separate drug policy or prohibited on campus through the Misuse of Drugs Act (1971). If the evidence continues to suggest that CE use is not only non-trivial but is on the increase, universities must be willing to consider and explore the concerns that surround CE. This becomes even more pertinent should new substances come to market with CE applications above and beyond the current stimulant medications, with any potential new substances possessing noticeable performance advantageous for users. One future avenue for research would be to conduct a Delphi study, or the 'Delphi consensus method' (Dalkey, 1969; Jones & Hunter, 1995). This method involves identifying and recruiting a panel of experts in the field of interest, in this case CE use, and through a series of questionnaires in two or more rounds, allows for a converge on a consensus approach to the topic at hand. Within a doping context, this has been recently used in the development of a social science research agenda for clean sport (Boardley et al., 2021) and has been used in other drug abuse areas (Jillson, 1975). As mentioned earlier regarding the impact of COVID on the thesis, the scoping review study in Chapter 3 was carried out after the completion of all the studies in Chapter 4, 5, and 6. If the review had been conducted as the first study chronologically then it may have informed a Delphi method study as part of the current thesis rather than as a future proposal. This approach could be useful when assessing policy challenges and possible approaches to intervention for CE use and would allow for the collection of a variety of different opinions within the normative debate. A Delphi approach would hopefully lead to some agreeable consensus within the area. Of importance that expert panels should include students themselves as major stakeholder in such a consultation. As discussed in Chapter 7, there has been a changing policy tone

particularly post-COVID with a greater focus on student wellbeing, and such a voice would be important in deciding future directions in the area.

The current thesis has been careful to avoid casting too much moral judgement, particularly given the extensive nature of the normative debate on the ethics of 'neuroenhancement' (see Cakic, 2009; Coveney & Bjønness, 2019a; Greely et al. 2008; Maher, 2008; Racine & Forlini, 2010; Racine et al., 2021; Sahakian & Morein-Zamir, 2010). Other articles have sought to provide comments on ethical considerations such as the framing of the debate (Outram, 2012), public attitudes (Coveney et al., 2019b; Dubljević, 2019; Fitz et al., 2014), or how neuroscientific research may advance the ethical debate particularly on justice, fairness, and cheating (Maslen et al., 2014). Yet much of the research and normative debate into CE typically frame comparisons with illicit drug use (Svetlov, Kobeissy, & Gold, 2007) or doping (Bell, Partridge, Lucke, & Hall, 2013). This is best exemplified in the ethical discussion literature by the fantastic article of Schermer (2008) analysing the *enhancement-is-cheating* argument by comparing sport and education and evaluating how the argument can be interpreted in each context. As highlighted by Vargo et al. (2015), comparisons inevitably provide contextual valence, being exemplified through use of terms such as 'brain doping' and 'smart drugs'. The difference in facilitating factors and regulation between sport doping and CE use in academia may provoke different considerations when discussing interventions. In addition to those and given the potential health consequences associated with the use of stimulant medications (Finger et al., 2013; Hysek et al., 2014) along with legal considerations, educational workshops looking to reduce possible harmful use may present a sensible approach for intervention. In lieu of institutional policymakers appearing reluctant to introduce explicit regulations prohibiting the use of CE such educational workshops may have a role in both highlighting the health consequences and providing students with an avenue to develop better study practices. Such educational workshops have previously been

implemented at Oxford (Fullerton, 2017) , although as far as the author is aware, the effectiveness of these workshops was not evaluated.

Interventions informed by our growing understanding of the mechanisms of MD in sport and education may provide interesting opportunities to manage the behaviours away from explicit regulation. Recently research has investigated the potential of anticipated guilt, MD, and SRE based interventions in sport underpinned by Bandura's (1991) social cognitive theory (Kavussanu et al., 2021). The Kavussanu et al. (2021) investigation compared a psychological intervention to an educational intervention in UK and Greek athletes. Both interventions demonstrated a reduction in MD pre to post, and these effects were maintained at follow-up while the psychological intervention was more effective at increasing anticipated guilt than the educational intervention. No increase was observed in SRE in the psychological intervention. Although the Kavussanu et al. (2021) intervention provides a promising avenue, no control group was present, and it would have potentially been of interest to investigate a blended intervention approach combining both psychological sessions and the more practical aspects of the educational intervention. Although there has been research evidencing the reduction of MD related to stealing in teenagers through MD focused interventions (Bustamante & Chaux, 2014), future research may seek to investigate this within a CE use context. As a cautionary note surrounding potential interventions that may target guilt, this should focus on *anticipated guilt*, rather than seeking to make people feel guilt itself. The anticipation of guilt is a normal regulatory process that should prevent people from acting in transgressive ways. Therefore, highlighting where and when people may *anticipate* experiencing guilt could potentially form part of an intervention based on MD. In summary, the current thesis adds to our understanding of PED and CE use among university students and in doing so raises several questions as to how universities will handle the concerns that continue to surround performance enhancement in this way.

8.6 Conclusion

This thesis aimed to investigate psychosocial factors that facilitated enhancement drug use in sport and education and evidenced several important findings. This has been conducted through a variety of methods. Results indicate that when rationalising the use of CE drugs, students showed clear evidence of the mechanisms of MD while findings also provide further support to key elements of Bandura's (1991) theory in which antecedents of MD, such as SRE and empathy may provide 'protection' for individuals deterring them from engaging in transgressive behaviour such as doping. Such mechanisms of MD may allow student-athletes to circumvent possible deterrents to use, such as health, legal, and ethical considerations. Regarding the scale of the concern, although there is still work to be done on improving our assessment of prevalence, the level of PED and CE use in UK students is non-trivial and estimates should raise concern for those involved with the governance of sport and education in the UK. Very few university institutions within the UK take an explicit stance on CE, and none prohibited use via policies on academic integrity. In the future, such institutions should consider the questions raised as to how to manage the use of stimulants in academia and given the level of possible PED use, how best to tackle this issue in sport and exercise. This may be through the development of policy and regulations or maybe best served within a CE context, using targeted interventions. The findings of the current thesis provide interesting future avenues for investigation, and it is hoped that through such work our understanding of the issues and ability to mitigate such challenges is addressed.

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Chapter 10: Appendix.

Appendix A Table A1

Overview of common substances used for pharmacological cognitive enhancement

Substance	***Brand Name***	***Proposed pharmacological action***	***Primary clinical indications***	***Clinical dosage***	***Common adverse side-effects***	***Contra-indications and clinical interactions***
Amphetamine	Adderall, Amfexa, Elvanse	Noradrenaline release and uptake inhibitor. Monoaime oxidase inhibitor.	Attention deficit hyperactivity disorder Narcolepsy	Initially 5 mg twice daily. Max 60mg daily	Anxiety; decreased appetite; arrhythmia; depression; headache ; nausea; sleep disorders; weight loss	Anorexia; arrhythmias; cardiomyopathies; cardiovascular disease; heart failure; hyperthyroidism; hypertension; cardiac abnormalities; suicidal tendencies. Antidepressants, opioids, anticonvulsants, anxiolytics
Methylphenidate	Concerta, Delmosart, Equsaym, Medikinet, Ritalin	Uncertain. Dopamine and noradrenaline reuptake inhibition in frontal brain regions.	Attention deficit hyperactivity disorder Narcolepsy	Initially 18 mg once daily. Max 108mg daily	Aggression, alopecia, anxiety, arrhythmias, depression, headaches; nausea; sleep disorders; weight loss	Anorexia nervosa; arrhythmias; cardiomyopathy; cardiovascular disease; psychosis; severe depression; structural cardiac abnormalities; suicidal tendencies Antidepressants, contraceptives, anticonvulsants, anticoagulants
Modafinil	Modasomi, Modiodal, Provigil, Vigil	Uncertain. Dopamine and noradrenaline reuptake inhibitor with indirect D1/D2 receptor agonist activity.	Excessive sleepiness associated with narcolepsy with or without cataplexy	200 mg daily in 2 divided doses or 200 mg once daily	Anxiety; arrhythmias; depression; headaches; nausea; sleep disorders; vision disorders	Arrhythmia history of depression. Modafinil may also reduce the effectiveness of some hormonal contraceptives. increased risk of congenital malformations. Antidepressants, contraceptives, anticonvulsants, anticoagulants

Note. Clinical indications, clinical dosage, common adverse side effects, contra-indications, and clinical interactions taken from the British National Formulary (Joint Formulary Committee, 2021)

Appendix A Table A2

Overview of common substances used for performance enhancement

Substance or method	***WADA regulation***	***Overview***	***Example***	***Clinical use***	***Illicit use***
Anabolic Androgenic agents	S1	Compounds that are structurally and functionally related to the hormone testosterone.	Nandrolone, Stanozolol, Testosterone	Combating cachexia associated with postoperational recovery and conditions such as HIV/AIDS, renal failure and COPD.	Increase muscle mass and function.
Peptide hormones and growth factors	S2	Erythropoiesis-stimulating agents that increase blood supply to muscles. Growth hormone has major influences on growth and development in humans.	Erythropoietin (EPO), Hypoxia-inducible factor, Growth hormone (GH), luteinizing hormone	EPO is used treating the anaemia of chronic renal failure. GH used in treatment of GH disorders such as dwarfism.	EPO used to increase aerobic capacity. GH used to increase muscle mass and strength, increase lean body mass.
Beta-2 agonists	S3	Selectively interact with beta-2 adrenoreceptors through which adrenaline produces its effect.	Salbutamol, Terbutaline	Asthma and exercise-induced bronchoconstriction	Performance enhancing potential dependant on dose and route of administration. Certain beta-2 agonists also posses anabolic effects.
Hormone and metabolic modulators	S4	Act by modulating various endogenous hormonal pathways and local muscle-specific transduction pathways.	Aromatase inhibitors, Anti-estrogenic substances, agents preventing activin receptor iib activation, selective oestrogen receptor modulators (SERMs)	Treatment of breast tumours. Treatment of Muscular dystrophy, cachexia (SERMs)	Inhibition of aromatase will lead to elevated levels of endogenous androgens such as testosterone. Suppressing myostatin function is a potential method for increasing growth response to training.

Diuretics and masking agents	S5	Drugs that act on kidney to increase rate of urine flow.	Acetazolamide, Desmopressin	Cardiovascular disorders	Increased urine excretion will mask the use of other prohibited substances. Used to temporarily reduce weight.
Manipulation of blood and blood components	M1	Aerobic performance is limited by oxygen delivery. 'Blood-doping' methods seek to augment the oxygen-carrying capacity such as reinfusing previously withdrawn blood.	The Administration or reintroduction of any quantity of autologous, allogenic (homologous) or heterologous blood.	Blood transfusions	Increasing oxygen-carrying capacity of blood.
Chemical and physical manipulation	M2	Procedures used by athletes who use prohibited substances to avoid detection.	Tampering, or Attempting to Tamper, to alter the integrity and validity of Samples collected during Doping Control. Intravenous infusions and/or injections of more than a total of 100 mL per 12-hour period.	N/A	Avoid detection from blood or urine testing.
Gene and cell doping	M3	Gene doping stems from gene therapy/manipulation. Gene doping involves inserting DNA for the purpose of enhancing athletic performance.	Gene editing, gene silencing and gene transfer technologies. The use of normal or genetically modified cells.	Numerous potential clinical implications and uses.	Large potential for applications. Increase muscle mass and strength. Aid repair and performance of muscle.
Stimulants	S6	Broad classification with number of clinical uses. Influence neurotransmitters within the central and autonomic nervous system.	Amfetamine, Cocaine, Methylphenidate, Modafinil	Attention deficit hyperactivity disorder, narcolepsy	Potential to improve attention, reaction time, increased HR, and possible aerobic capacity.
Narcotics	S7	Drugs that can induce narcosis, which can be defined as a state of insensibility. This class of drugs possesses significant analgesic activity.	Buprenorphine, Morphine, Oxycodone	Analgesia.	Although AAS are low, narcotics may play a role in raising performance through reducing pain.

Cannabinoids	S8	Most of these effects are not considered performance enhancing.	All natural and synthetic cannabinoids are prohibited. Natural and synthetic tetrahydrocannabinols	Recreational use in society is widespread, can be used to therapeutically treat pain	Most effects are not considered performance enhancing. AAS most likely due to recreational drug use.
Glucocorticoids	S9	Adrenal steroid hormones with diverse physiological effects that can be anti-inflammatory, immunosuppressive and metabolic in nature.	Beclometasone, Cortisone, Prednisolone	Allergies, gastrointestinal disorders, autoimmune disorders	Reduce feelings of fatigue. Weight loss
Beta-blockers	P1. Prohibited in particular sports	Antagonise beta-receptors in central nervous system and are used in wide variety of clinical conditions.	Acebutolol, Propranolol	Cardiovascular system disorders.	Beta-blockers are restricted in sports in which reduction of hand tremor and high levels of anxiety may be beneficial.

Note. Information taken from the WADA Prohibited List (2021b) and Drugs in Sport (Mottram & Chester, 2014). Human immunodeficiency viruses (HIV), Acquired immunodeficiency syndrome (AIDS), Chronic obstructive pulmonary disease (COPD), Adverse Analytical Finding (AAS)

Appendix B

Overview of the empirical studies discussed in the scoping review, Chapter 3.

Authors	Country	Research Method	Sample Size	Age (*Mean*)	Concerns	Key Findings
Adamopoulous (2020)	UK	QT, CS, QUES	179	18 to 58 (M = 23.13)	Attitudes, Learning Approaches	Being competitive or having surface motivations predicative of more positive attitude towards CE.
Aikins (2019)	USA	QL, INT	32	>18	User Typologies	CE lesser or more tenable form of cheating. Prevalence justifies CE use.
Arria (2018)	USA	QT, CS, QUES	6962	18 to 25 (M = 19.94)	Attitudes	Higher perceived benefit more likely to engage with CE.
Bavarian (2019)	USA	QT, CS, QUES	499	-	Attitudes, Abstention	Nonusers avoided CE due to non-malfeasance and disapproval of drugs.

Blevins (2017)	USA	QT, CS, QUES	199	19.7	Motivations, User Characteristics	Users more likely to use other substances, had lower risk perceptions of CE.
Champagne (2019)	UK	QT, CS, QUES	420	18 to 58 (*M* = 21.58)	Attitudes, Predictors	Attitudes predict previous and likely CE use. Positive attitudes in those that believed CE was harmless. Perceived unfairness associated with negative attitudes.
De Bruyn (2019)	Belgium	QT, CS, QUES	3159	*M* = 22.55 years	Motivations	Higher stress levels the more likely the use of CE.
De Oliveria (2020)	Brazil	QT, CS, QUES	1865	-	Prevalence, Attitudes, Motivations, Access	CE obtained through friends. Some students showed desire to use but did not due to fear of side-effects.

Forlini (2015)	Germany	QT, CS, QUES	1026	17 to 63 (M = 22.84)	Prevalence, Morality	Students were unenthusiastic and critical about neuroenhancement in the academic context. Majority of participants agreed that CE should be regulated by state.
Galluci (2015)	USA	QT, CS, QUES	682	-	Prevalence, NPS, Motivations, Athletes	Student-athletes significantly less likely to report CE use but users cited enhancing athletic performance as impetus for use.
Heyes (2019)	UK	QL, INT	9	20 to 22	Rationalisation	Students may morally disengage to justify and rationalise use of CE to minimise negative emotional responses.

Kerley (2015)	USA	QL, INT	22	19 to 24	Middle Class Background, Motivations	Students draw on beliefs of success and moderation to make sense of CE use. CE seen as functional tool.
Lazuras (2017)	Greece	QT, CS, QUES	347	M = 22.15	Users, Attitudes, Motivations (Cognitive Variables)	Three user grounds, nonusers, single use
London-Nadeau (2019)	Canada	QL, FG	45	18+ (*M* = 20.42)	Attitudes, Motivations	Participants perceived users as either struggling students or high-achieving ones. Alleged benefits of CEs included enhanced focus, attention, memorisation, and grades, but did not include increased intelligence or long-term cognitive enhancement.

Looby (2015)	USA	QT, CS, QUES	154	*M* = 19.68	Motivations, Prevalence	Strong cognitive enhancement expectancies and low academic self-efficacy were found to predict intention to engage in CE. Low GPA and strong expectancies particularly at risk.
Maier (2015)	Switzerland	QT, CS, QUES	3056	17 to 72 (*M* = 23)	Motivations, Prevalence, Attitudes	Users of pharmacological cognitive enhancers were more likely to consider CE fair compared with nonusers. Two-thirds considered performance that is obtained with CE less worthy of recognition. Additionally, 80% disagreed that CE is acceptable in a competitive environment. Nearly half claimed that unregulated access to CE increases the pressure to engage in CE and educational inequality.

McDermott (2020)	UK	MM, QUES, INT	506	18+	Prevalence, Motivation, Attitudes	Participants reported various motives for using cognitive enhancers, the most frequent being to meet the demands of coursework, to improve focus or maintain wakefulness.
Majori (2017)	Italy	QT, CS, QUES	899	18+	Prevalence, Motivation,	Most frequent academic and extra-academic reasons to use them were respectively to improve concentration while studying.
Mousavi (2019)	Iran	QT, CS, QUES	579	*M* = 25.36	Prevalence, Motivation,	Significant relationship between knowing someone who had used, stress level, and CE use.

Munro (2017)	USA	QT, CS, QUES	314	18–57 (*M* = 20.77)	NUMPS, Motivations	Participants with clinically significant executive functioning deficits reported significantly higher rates of CE use.
Norman (2018)	USA	QT, CS, QUES	924	18–25 (*M* = 19.7)	Factors influencing use - Academic Stress, Strain, Grade Impediments	Students are at an increased likelihood of engaging in CE if they experienced academic impediments and/or grade strain during the past academic year.
Pino (2017)	USA	QT, CS, QUES	2466	-	Learning Theory	There is support for learning theory, but not for strain theory, in predicting both recreational and instrumental use. Users of illicit street drugs and those possessing less of an academic ethic are more likely to engage in CE.

Pohl (2018)	Germany	QL, INT	60	18 to 45 (*M* = 26,93)	Attitudes, Morality, Motivations	Views between nonusers and users vary considerably with regard to fairness, with nonusers considering this amore critical issue than users. Decision to use or not considered part of individual freedoms.
Ponnet (2015)	Belgium	QT, CS, QUES	3589	*M* = 21.59	Motivations, Attitudes, (Subjective Norms)	Subjective norm is the strongest or of students' intention to use stimulant medication, followed by attitude and perceived behavioural control.
Ram (2017)	New Zealand	QT, CS, QUES	442	-	Prevalence, TPB, Motivations	Students who perceived CE use to be socially and ethically acceptable were more likely to use. Students who were concerned about the health impact of CE use were less likely to engage with CE

Schelle (2015)	Netherlands	QT, CS, QUES	1505	*M* = 21.8	Prevalence, Attitudes, Motivations, Polydrug use	Prescription drug use lower compared to other countries. Evidence of polydrug use in relation to CE.
Steward & Pickersgill (2019)	UK	QL, INT	15		Motivations, Attitudes	The prescription status and comparisons to other legal and illicit stimulants informed accounts of the (lack of) risks associated with CE, legitimising use.
Stoeber (2016)	UK	QT, CS, QUES	272	*M* = 20.2	Attitudes, Perfectionism	Positive correlations between socially prescribed perfectionism and perceived parental pressure with CE use.
Thiel (2019)	USA	QT, CS, QUES	668	18 to 54 (*M* = 20.10)	Motivations, other NPS, Personality (Perfectionism)	CE motives are cognitive, recreational, and appetite related.

Vargo (2016)	UK	QL, INT	13	21 to 24	Motivations, Experiences, Attitudes	CE seen as self-governing strategy to achieve continued focused productivity. Users expressed situated morality differentiating between exams and revision in terms of immoral conduct.

Notes. Quantitative (QT), Qualitative (QL), Cross-sectional (CS), Questionnaire (QUES), Interview (INT), Focus Group (FG), Cognitive enhancement (CE).

Appendix C

Study Information Sheet

Dear potential participant,

We are researchers from the University of Birmingham interested in the thoughts and opinions of students regarding the use of cognitive enhancing drugs (i.e., smart drugs). So that you are fully informed before deciding whether to take part in this research, we would like to provide you with some information regarding the study. This study is subject to ethical guidelines set out by the British Psychological Society, which include obtaining your informed consent before research starts, notifying you of your right to withdraw and protection of your anonymity.

Participation in this study involves taking part in an interview. To participate you must be currently enrolled on a university programme and have used cognitive enhancing drugs (e.g., Ritalin, Adderall, Provigil) for the purpose of facilitating academic study at some point. The interview is designed to find out what you think about the use of cognitive enhancing drugs by students and will take place in private at a time that is pre-arranged and convenient to your schedule. Information from the interview will provide insight into the thought processes of students who have taken cognitive enhancing drugs. The interview will be recorded and transcribed, and the transcribed files will be stored on one of two password-protected computers on the university campus, accessible only by the lead researcher and his supervisor.

Given the possession of certain cognitive enhancers (e.g., Ritalin, Adderall, Dexamfetamine) without a prescription is illegal in the United Kingdom, the procedures for this investigation have been designed to ensure all participants in the study will be completely anonymous. To ensure this, informed consent will be given verbally rather than in written form, and participants' names will not be recorded at any point; all collected data will be stored against a pseudonym throughout. Further, during transcription of interviews any information provided (e.g., names, personal history) that could potentially be used to identify individuals will not be included; the only personal information we require is participants' programme of study, sport participation (if relevant) and history of cognitive-enhancing drug use. In addition, all interviews will be transcribed within 48 hours of the interview, upon which time the original audio file will be deleted. Although the study is completely anonymous and confidential, if served with a production order or warrant from the authorities requiring disclosure of documents or other information, we as researchers would be forced to comply. However, the procedures outlined above will ensure no individual would be identifiable from our data if this were to occur.

If you wish to withdraw from the study you may do so at any time without having to give any reason for doing so up until the conclusion of your interview. Due to the complete anonymity of all interviews, it will not be possible for you to withdraw after this point. If the interview is to be useful, it is important that you answer each question frankly and honestly. There are no right or wrong answers to the questions, all we require are your honest opinions. Thank you for taking the time to read this sheet and for considering participating. If you have any questions or concerns regarding this research please feel free to ask the researcher who presented you with this sheet, or to contact either the researcher or his supervisor using the information presented below. If participation in this research raises any concerns regarding drug use, information and support services can be accessed by contacting Frank, a national service providing information and support on such issues(frank@talktofrank.com / 0300 123 6600). Finally, your contribution to this research study would be invaluable so we do hope you decide to take part.

Lead Researcher: Mr Andrew Heyes (
Research Supervisor: Dr Ian D. Boardley (
Research Assistants: Tsz Chan, Charlie Glanville, Daniel Lungu, and Molly Huggins
Address for all: School of Sport, Exercise & Rehabilitation Sciences, University of Birmingham
Edgbaston, Birmingham, B15 2TT.

Appendix D

Interview Protocol

1. Introductory comments and instructions

- First I would like to explain the main purpose of this interview. The aim is to provide information for a research project that is investigating student's thoughts regarding the use of cognitive enhancing drugs (smart drugs) in academia.
- You have a number of rights as a participant that I would like to make clear. First, all information that you provide will remain anonymous and will only be used for research purposes. Second, you are free to withdraw at any point without giving a reason and your treatment will not be affected by this. Finally, the only people who will see the transcript of this interview aside from yourself, are my supervisor and myself.
- There are a few terms that will be used repeatedly throughout the interview, and it is important that I define these terms for you. The first of these terms is performance-enhancing drugs. For the purposes of this interview when I use this term I am referring to "illicit substances or methods prohibited by the World Anti-Doping Agency that are used in order to facilitate the training effect". The second and final term is cognitive enhancing drugs. For the purposes of this interview, when I ask you about cognitive enhancing drugs I am referring to "prescription medication used for the purposes of enhancing cognitive performance, such as memory, attention, intellectual ability." These drugs are also known as smart drugs, nootopics, or neuroenhancers. And are typically medications that are used to treat conditions such as ADHA and Narcolepsy. The drugs include methylphenidate (Ritlain), amphetamines (Adderall), and modafinil.

2. Demographics and sport history

- What subject are you currently studying at this university?
- How long have you studied here?
    a. Have you studied anywhere else aside from here?
    b. Yes – what subject and for how long?
- Whilst a student, what specific types of sport do you do take part in?
- How long have you participated in this sport?
- What is the highest volume of training you have ever done?
- What volume of training do you do on average now?
- Have you taken part in any other sports?

3. Athlete's use of PED/CE drugs

- Have you ever taken any performance-enhancing drugs?
    a. Yes – could you please provide details of what performance-enhancing drugs you take?
    b. Yes – how frequently do you take these drugs and in what quantity?
    c. Yes – how long have you taken these drugs for?
    d. Yes – what do you think was the initial trigger for you to start taking these drugs?
    e. Yes – do you have any intention of stopping your use of performance- enhancing drugs?
        i. Yes- what do you think are the main barriers preventing you from stopping your use of performance-enhancing drugs?
    f. Yes – which came first: the use of training supplements or the use of performance-enhancing drugs?
    g. Yes – do you think your use of performance-enhancing drugs is linked to your use of supplements?
    h. Yes – where do you gain access to performance-enhancing drugs?

i. Yes – do you access information regarding performance-enhancing drugs?
    i. If so – where? (Internet, Friend, Forums)
j. Yes – are you open about your performance-enhancing drug use with other students?
    i. Yes/No – On what basis do you make the decision whether to be open about your performance-enhancing drug use with other students?
k. Yes – are you open about your performance-enhancing drug use with your family?
    i. Yes/No – On what basis do you make the decision whether to be open about your drug use with your family?
l. Yes – are you open about your performance-enhancing drug use with your friends?
    i. Yes/No – On what basis do you make the decision whether to be open about your drug use with your friends?

- Have you ever taken any cognitive-enhancing drugs?
    a. Yes – could you please provide details of what cognitive-enhancing drugs you take?
    b. Yes – how frequently do you take these drugs and in what quantity?
    c. Yes – how long have you taken these drugs for?
    d. Yes – what do you think was the initial trigger for you to start taking these drugs?
    e. Yes – do you have any intention of stopping your use of cognitive-enhancing drugs?
        i. Yes- what do you think are the main barriers preventing you from stopping your use of cognitive-enhancing drugs?
    f. Yes – which came first: the use of performance-enhancing drugs or cognitive-enhancing drugs?
    g. Yes – do you think your use of cognitive-enhancing drugs is linked to your use of performance-enhancing drugs?
    h. Yes – where do you gain access to cognitive-enhancing drugs?
    i. Yes – do you access information regarding cognitive-enhancing drugs?
        i. If so – where? (Internet, Friend, Forums)
    j. Yes – are you open about your cognitive-enhancing drug use with other students?
        i. Yes/No – On what basis do you make the decision whether to be open about your cognitive-enhancing drug use with other students?
    k. Yes – are you open about your cognitive-enhancing drug use with your family?
        i. Yes/No – On what basis do you make the decision whether to be open about your drug use with your family?
    l. Yes – are you open about your cognitive-enhancing drug use with your friends?
        i. Yes/No – On what basis do you make the decision whether to be open about your drug use with your friends?

4**. Others' use of PED/CE drugs**

- Do you think others in this university / team take performance-enhancing drugs?
    a. Yes – what would you say is the approximate percentage of students who use performance-enhancing drugs in this university?
    b. Yes – do you think performance enhancing drug use is more or less prevalent in this university compared to others you know of?
- Do you think others in this university take cognitive-enhancing drugs?
    a. Yes – what would you say is the approximate percentage of students who use performance-enhancing drugs in this university?

b. Yes – do you think cognitive-enhancing drug use is more or less prevalent in this university compared to others you know of?

5. Motivation for using performance-enhancing drugs (only for those who have said they have taken performance-enhancing drugs)

- For what reason or reasons did you start using performance-enhancing drugs?
- Are your current reasons for using performance-enhancing drugs the same as the reasons that you started?
    a. No – what are your current reasons for using performance-enhancing drugs?
    b. No – why do you think your reasons for using performance-enhancing drugs have changed since you first started?
- What were your thoughts regarding the appropriateness of the use of performance-enhancing drugs before you started using them?
- Have your thoughts regarding the appropriateness of their use changed since you started using them?
    a. Yes – how have your thoughts regarding the appropriateness of their use changed?
- Are there any side effects that you know of that are linked to the use of the performance-enhancing drugs you use?
    a. Yes – what are the side effects?
    b. Yes – why do you still take these performance-enhancing drugs given that you have this knowledge?
- As far as you know is the use of these performance-enhancing drugs illegal?
    a. Yes – what are the potential legal consequences of taking these performance-enhancing drugs?
    b. Yes – why do you still take these performance-enhancing drugs given that you have this knowledge?
- In your opinion is the use of these performance-enhancing drugs immoral?
    a. Yes/No – why do you think this?
    b. Yes – why do you still take these performance-enhancing drugs given that you have this opinion?
- In your opinion is the use of these performance-enhancing drugs cheating?
    a. Yes/No – why do you think this?
    b. Yes – why do you still take these drugs given that you have this opinion?
- Have you ever experienced any negative emotions (e.g., guilt, shame) as a result of your use of performance-enhancing drugs?
    a. Yes/No – why do you think this is the case?
- In general, what do you think are the main reasons that others in your team use performance-enhancing drugs?
- Do you think there are any ways in which you using performance-enhancing drugs can benefit others?
    a. Yes – how do you think you using performance-enhancing drugs can benefit others?
- Are there any activities that you could compare performance-enhancing drug use to that would make performance-enhancing drug use appear more acceptable?
    a. Yes – what are these activities?
- Could you describe some of the language that performance-enhancing drug users use when referring to the use of performance-enhancing drugs?
- Do you feel the atmosphere in this team contributes to the use of performance- enhancing drugs?

    a. Yes – how does the atmosphere in this team contribute to the use of performance-enhancing drugs?
- Do you feel there are people in this team who encourage the use of performance- enhancing drugs by other athletes?
    a. Yes – what are the roles of these people (e.g., athlete, supplement supplier, staff, etc.)?
    b. Yes – how do they encourage the use of performance-enhancing drugs by other athletes?
- Do you think that the negative consequences of the use of performance-enhancing drugs are exaggerated?
    a. Yes – who are they exaggerated by and in what way?
- Do you think that people who encourage performance-enhancing drug use are in any way different to those who don't?
    a. Yes – how do you think people who encourage performance-enhancing drug use are different to those who don't?
- Do you see anyone as being a victim of your use of performance-enhancing drugs?
    a. Yes – who is a victim of your use of performance-enhancing drugs?
    b. Yes – why do you think he/she is a victim of your use of performance-enhancing drugs?
    c. Yes – who is to blame for him/her being a victim of your performance-enhancing drug use?

6. Motivation for using cognitive-enhancing drugs

- For what reason or reasons did you start using cognitive-enhancing drugs?
- Are your current reasons for using cognitive-enhancing drugs the same as the reasons that you started?

a. No – what are your current reasons for using cognitive-enhancing drugs?
b. No – why do you think your reasons for using cognitive-enhancing drugs have changed since you first started?

- What were your thoughts regarding the appropriateness of the use of cognitive-enhancing drugs before you started using them?
- Have your thoughts regarding the appropriateness of their use changed since you started using them?
    a. Yes - how have your thoughts regarding the appropriateness of their use changed?
- Are there any side effects that you know of that are linked to the use of the cognitive-enhancing drugs you use?
    a. Yes – what are the side effects?
    b. Yes – why do you still take these cognitive-enhancing drugs given that you have this knowledge?
- As far as you know is the use of these cognitive-enhancing drugs illegal?
    a. Yes – what are the potential legal consequences of taking these cognitive-enhancing drugs?
    b. Yes – why do you still take these cognitive-enhancing drugs given that you have this knowledge?
- In your opinion is the use of these cognitive-enhancing drugs immoral?
    a. Yes/No – why do you think this?
    b. Yes – why do you still take these cognitive-enhancing drugs given that you have this opinion?
- In your opinion is the use of these cognitive-enhancing drugs cheating?
    a. Yes/No – why do you think this?

    b. Yes – why do you still take these drugs given that you have this opinion?
- Have you ever experienced any negative emotions (e.g., guilt, shame) as a result of your use of cognitive-enhancing drugs?
    a. Yes/No – why do you think this is the case?
- In general, what do you think are the main reasons that others in your team use cognitive-enhancing drugs?
- Do you think there are any ways in which you using cognitive-enhancing drugs can benefit others?
    a. Yes – how do you think you using cognitive-enhancing drugs can benefit others?
- Are there any activities that you could compare cognitive-enhancing drug use to that would make cognitive-enhancing drug use appear more acceptable?
    a. Yes – what are these activities?
- Could you describe some of the language that cognitive-enhancing drug users use when referring to the use of cognitive-enhancing drugs?
- Do you feel the atmosphere in this university contributes to the use of cognitive- enhancing drugs?
    a. Yes – how does the atmosphere in this university contribute to the use of cognitive-enhancing drugs?

- Do you feel there are people in this team who encourage the use of cognitive-enhancing drugs by other athletes?
    a. Yes – what are the roles of these people (e.g., student, athlete, lecturers, staff, etc.)?
    b. Yes – how do they encourage the use of cognitive-enhancing drugs by other athletes?
- Do you think that the negative consequences of the use of cognitive-enhancing drugs are exaggerated?
    a. Yes – who are they exaggerated by and in what way?
- Do you think that people who encourage cognitive-enhancing drug use are in any way different to those who don't?
    a. Yes – how do you think people who encourage cognitive-enhancing drug use are different to those who don't?
- Do you see anyone as being a victim of your use of cognitive-enhancing drugs?
    a. Yes – who is a victim of your use of cognitive-enhancing drugs?
    b. Yes – why do you think he/she is a victim of your use of cognitive-enhancing drugs?
    c. Yes – who is to blame for him/her being a victim of your cognitive-enhancing drug use?

Conclusion

- The interview is now complete. I would like to take this opportunity to thank you for your important contribution to this research project. Further, I would like to reiterate that the information gained from this interview will only be used for research purposes and interview transcripts will only be available to my supervisor and I. Finally, you will remain anonymous in any presentation and/or publication that the information you have given is used in.

Appendix E

Participant Information Sheet Study 3 and Study 4

Dear potential participant,

Student-athletes strive to maximise their performance and potential in two primary achievement contexts, sport and academic study. Although performance enhancing drugs have been used by some athletes to enhance performance in sport for some time, emerging evidence is showing that pharmaceutic substances are now being used by some students to improve academic performance within the university environment. We are researchers from the University of Birmingham interested in the views and moral cognitions of student-athletes regarding the use of both performance enhancing drugs in sport cognitive-enhancing drugs in academic study. So that you are fully informed before deciding whether to take part in this research, I would like to provide you with some information regarding the study. This study is subject to ethical guidelines set out by the British Psychological Society and the project has been approved by the University of Birmingham Ethics Committee. These guidelines include principles such as obtaining your informed consent before research starts, notifying you of your right to withdraw, and protection of your anonymity.

Eligibility criteria for the study are the involvement in sport at BUCS University level while studying at a UK institution. Participation in this study involves completing an anonymous questionnaire pack which takes approximately 15-20 minutes. The questionnaire pack assesses a series of psychological factors potentially relating to doping as well as your own use of sport and academic doping substances. It is important to note that participation is voluntary, and that participants are free to miss out any questions they do not wish to respond to without giving a reason. By completing and submitting the questionnaire, you will be consenting to participate in this research.

No personal data (e.g., name, date of birth, competitive results) will be collected that will allow identification of individuals, and completed questionnaires will be placed in blank sealed envelopes before being placed in a sealed box. These procedures are designed to emphasize the absolute anonymity of participation. Study data will only be accessible by the researcher and his supervisor. Completed questionnaires will be stored securely for ten years in a locked cabinet in the supervisor's office. Data from the questionnaires will initially be inputted and stored electronically by the researcher on a password-protected PC on campus. However, once data analysis is complete data will only be stored for ten years on his supervisor's password-protected PC before being deleted. Data collected in this study may be used in future reports such as academic journals and conference presentations. However, again, no individual will be identifiable through such publication of data.

If data are to be useful, it is important participants answer honestly. Participants are free to withdraw at any point until they place the sealed envelope containing their completed questionnaire pack in the sealed box. If a participant chooses to withdraw from the study, all he/she has to do is tell the researcher and hand back the part- completed questionnaire; at this point any the part-completed questionnaire will be destroyed immediately.

Thank you for taking the time to read this sheet and for considering participating in our research. If you have any questions or concerns regarding this research please feel free to ask the researcher who presented you with this sheet, or to contact the Principal Investigator using the details below. Finally, your contribution to this research study would be invaluable so we do hope you decide to take part.

Researcher: Mr Andrew Heyes

Research Supervisor: Dr Ian Boardley Email: [redacted] Email: [redacted]

Appendix F

Example Prevalence Question Pack

Here we are aiming to estimate in the prevalence of **performance-enhancing drug** use. We can work this out from a sample without you having to explicitly indicate whether or not you have used performance-enhancing drugs through the following procedure.

Please read the following question and ***follow the instructions carefully:***

Please consider your father's birthday (if not known, please inform the researcher).
Is this birthday in the first third of the month (1st to 10th day)?
If yes, please answer Question A; if no, please proceed to Question B.

Question A. **Is this birthday in the first half of the year (prior to the 1st July)?**	**Question B.** **Have you used performance-enhancing drugs or methods prohibited in sport (e.g., EPO, testosterone, HGH) in the last 12 months.**
Please circle your answer	
Yes	No
Note that *only you know* which of the two questions you have answered.	

Now we are aiming to estimate in the prevalence of **cognitive-enhancing drug** use. We can work this out from a sample without you having to explicitly indicate whether or not you have used cognitive-enhancing drugs through the following procedure.

Please read the following question and ***follow the instructions carefully***:

Please consider your mother's birthday (if not known, please inform the researcher)
Is this birthday in the first third of the month (1st to 10th day)?
If yes, please answer Question A; if no, please proceed to Question B.

Question A. **Is this birthday in the first half of the year (prior to the 1st July)?**	**Question B.** **Have you used cognitive-enhancing drugs (e.g., Modafinil, Adderall, Ritalin) in the last 12 months?**
Please circle your answer	
Yes	No
Note that *only you know* which of the two questions you have answered.	

Using a different method, we would again like to estimate the prevalence of **performance-enhancing drug** use. We can work this out from a sample without you having to indicate whether or not you have used performance-enhancing drugs by answering the following questions.

Think of your father's date of birth (if not known, please inform the researcher)

Please indicate how many of the following 5 statements are true. Only report the total number of 'true' answers.

- The birthday falls in the second half of the year (July – December).
- The birthday is in February, April, June, August, October, or December.
- The birthday falls in the first half of the month (1^{st}-15^{th}).
- I have used **performance-enhancing drugs** or methods prohibited in sport (e.g., EPO, testosterone, HGH) in the last 12 months.
- The birthday is on an odd day (on or ending with 1, 3, 5, 7, 9).

Please tick the box that corresponds to your total number of 'true' answers.

0 or 5 □	1 □	2 □	3 □	4 □

Now, we are again aiming to estimate the prevalence of **cognitive-enhancing drug** use. We can work this out from a sample without you having to explicitly indicate whether or not you have used cognitive-enhancing drugs by answering the following questions.

Think of your mother's date of birth (if not known, please inform the researcher)

Please indicate how many of the following 5 statements are true. Only report the total number of 'true' answers.

- The birthday falls in the second half of the year (July – December).
- The birthday is in February, April, June, August, October, or December.
- The birthday falls in the first half of the month (1^{st}-15^{th}).
- I have used **cognitive-enhancing drugs** (e.g., Modafinil, Adderall, Ritalin) in the last 12 months.
- The birthday is on an odd day (on or ending with 1, 3, 5, 7, 9).

Please tick the box that corresponds to your total number of 'true' answers.

0 or 5 □	1 □	2 □	3 □	4 □

Appendix G

Psychometric Measures Questionnaire Pack

School of Sport, Exercise, & Rehabilitation Sciences Survey

Dear Participant,

Thank you very much for agreeing to take part in our research. The purpose of this section it to ensure that you are happy to take part in the research and are aware of what is involved. By completing this question, you are confirming that:

- You have read and understood the information sheet.
- You have had the opportunity to ask questions and discuss the study.
- If you have asked questions that you have had satisfactory answers.
- You understand that you are free to withdraw from the study until you hand the sealed envelope containing your completed questionnaire to the researcher.
- You understand that you are free to choose not to answer a question without having to give a reason why.
- You agree to take part in this study.

A. Please provide some information about yourself.

1. **Age (years): _____**	2. **Sex: Male ☐ Female ☐**
3. **Please indicate which of the following activities you currently participate in and have done for a minimum of one year?**	• Individual Sport ☐ • Team Sport ☐ • Trained in Hardcore Gym (e.g., Bodybuilding) ☐ • Training in Leisure Gym (e.g., Virgin) ☐
4. **What is your main BUCS Sport:**	
5. **Years playing this sport:**	
6. **Average training/competition hours per week with your team:**	
7. **Topic of Academic Study:**	

*A number of statements describing thoughts that athletes might have about doping are listed below. Please **read these statements** carefully and indicate your **level of agreement** with each one by **circling** the appropriate **number**. Please respond honestly.*

What is your level of agreement with the following statements?	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. It is okay to dope if it helps an athlete to provide from his/her family.	1	2	3	4	5	6	7
2. Saying you "take steroids" feels worse than saying you "use some gear".	1	2	3	4	5	6	7
3. Compared to most lifestyles in the general public, doping isn't that bad.	1	2	3	4	5	6	7
4. Athletes shouldn't be blamed for doping if training partners/teammates pressure them to do it.	1	2	3	4	5	6	7
5. If most athletes in a sport dope, no one athlete should be held responsible for doing it.	1	2	3	4	5	6	7
6. Risks associated with doping are exaggerated.	1	2	3	4	5	6	7
7. Doping is okay if it helps athletes advise others on how to do it right.	1	2	3	4	5	6	7
8. Using words like "roids", "gear" and "pinning" makes doping feel more acceptable.	1	2	3	4	5	6	7
9. Compared to smoking, doping is pretty safe.	1	2	3	4	5	6	7
10. An athlete shouldn't be blamed for doping if a member of his/her training group has encouraged it.	1	2	3	4	5	6	7
11. It's not right to condemn individuals who dope when many in their sport are doing the same.	1	2	3	4	5	6	7
12. Doping doesn't really harm anyone else.	1	2	3	4	5	6	7
13. It is acceptable to dope if knowledge gained helps an athlete advise others on safe doping.	1	2	3	4	5	6	7
14. Using terms such as "gear" or "juice" makes doping sound less harmful.	1	2	3	4	5	6	7
15. Compared to physical violence, doping isn't that serious.	1	2	3	4	5	6	7
16. An athlete shouldn't be held responsible for doping if his/her coach encouraged him/her to do it.	1	2	3	4	5	6	7
17. If an athlete trains/competes in an environment in which doping is the norm, he/she shouldn't be held accountable for doing it.	1	2	3	4	5	6	7
18. The negative aspects of doping are exaggerated by the media.	1	2	3	4	5	6	7

*Here we would like to get a better **understanding** of **experiences** that can be difficult to manage. For each of the questions listed below, please **circle the number** that best corresponds to **your level** of **confidence right now**. Please respond **honestly**.*

How confident are you in your ability to...	Not at all Confident		Moderately Confident		Very Confident
1. ...resist doping even if your training group encouraged you to do it?	1	2	3	4	5
2. ...resist doping even if you knew you could get away with it?	1	2	3	4	5
3. ...ignore the temptation to dope even if you knew it would improve your performance?	1	2	3	4	5
4. ...resist peer pressure to dope?	1	2	3	4	5
5. ...reject doping even if most of your training partners did it?	1	2	3	4	5
6. ...ignore the temptation to dope when feeling down physically?	1	2	3	4	5

Please read carefully the statements below and indicate how well you think each one describes you. Please respond honestly.

How well do the following statements describe you?	Does not describe me well						Describes me very well
1. I often have tender, concerned feelings for people less fortunate than me	1	2	3	4	5	6	7
2. I sometimes find it difficult to see things from another person's point of view	1	2	3	4	5	6	7
3. Sometimes I don't feel very sorry for other people when they are having problems	1	2	3	4	5	6	7
4. I try to look at everybody's side of a disagreement before I make a decision	1	2	3	4	5	6	7
5. When I see someone being taken advantage of, I feel kind of protective towards them	1	2	3	4	5	6	7
6. I sometimes try to understand my friends better by imagining how thinks look from their perspective	1	2	3	4	5	6	7
7. Other people's misfortunes do not usually disturb me a great deal	1	2	3	4	5	6	7
8. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments	1	2	3	4	5	6	7
9. When I see someone being treated unfairly, I sometimes don't feel very much pity for them	1	2	3	4	5	6	7
10. I am often quite touched by things that I see happen	1	2	3	4	5	6	7
11. I believe that there are two sides to every question and try to look at them both	1	2	3	4	5	6	7
12. I would describe myself as a pretty soft-hearted person	1	2	3	4	5	6	7
13. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.	1	2	3	4	5	6	7
14. Before criticising somebody, I try to imagine how I would feel if I were in their place	1	2	3	4	5	6	7

Please imagine being in the following situation:

Having returned to training following a period of injury, you are feeling very out of shape. As such, you feel the need to get back in shape as soon as possible. A friend who you train with has been taking a training supplement that he/she says really helped him/her get back in shape quickly following a similar injury. He/she offers to give you some and you decide to take it. Subsequently you get back in shape much quicker than expected, but then discover the supplement you have been taking is a banned performance-enhancing substance. However, due to the improvements you have experienced, you decide to continue taking the substance.

*Now, using the following scale, please rate the **extent** to which you anticipate **you would feel in the ways described** below if you **decided to continue taking the substance**. Please answer **honestly**.*

I would anticipate feeling the following about continuing to take the substance...	***Not at All***	***A Little***	***Moderately***	***Very Much***	***Extremely***
1. I would feel remorse, regret.	*1*	*2*	*3*	*4*	*5*
2. I would feel tension about what I was doing.	*1*	*2*	*3*	*4*	*5*
3. I would not be able to stop thinking about the bad thing I was doing.	*1*	*2*	*3*	*4*	*5*
4. I would feel like apologising, confessing.	*1*	*2*	*3*	*4*	*5*
5. I would feel bad about what I was doing.	*1*	*2*	*3*	*4*	*5*

Please imagine being in the following situation:

Having returned to your studies following a period of illness, you are feeling behind on your work and unprepared for your upcoming exams. As such, you feel the need to catch up with your assignments and revision as soon as possible. A friend on your programme has been taking a revision-aid pill that he/she says really helps him/her to study more effectively. He/she offers to give you some and you decide to take them. Subsequently you get back on track with your work much quicker than expected, but then discover the pills you have been taking are a prescription-only medicine that you don't have a prescription for. However, due to the benefits you have been experiencing, you decide to continue taking the pills to help you prepare for your upcoming exams.

Now, using the following scale, please rate the ***extent*** *to which you anticipate* ***you would feel in the ways described*** *below if you* ***decided to continue taking the substance****. Please answer* ***honestly****.*

I would anticipate feeling the following about continuing to take the substance...	***Not at All***	***A Little***	***Moderately***	***Very Much***	***Extremely***
1. I would feel remorse, regret.	*1*	*2*	*3*	*4*	*5*
2. I would feel tension about what I was doing.	*1*	*2*	*3*	*4*	*5*
3. I would not be able to stop thinking about the bad thing I was doing.	*1*	*2*	*3*	*4*	*5*
4. I would feel like apologising, confessing.	*1*	*2*	*3*	*4*	*5*
5. I would feel bad about what I was doing.	*1*	*2*	*3*	*4*	*5*

*Please **indicate** which of the following **substances/methods** you **use or have used** during the **specified periods**. For those that **you have taken**, please use the **subsequent box** to provide details of the **types** and **maximum volume/frequency** used.*

	Curranty Using	**Used in the Past 3 Months**	**Used Prior to Past 3 Months**	**Never Used**
1. Ephedrine stimulants	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency				
2. DMAA (dimethylamylamine) stimulants (e.g., Jack3D)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency				
3. Oral Anabolic Androgenic Steroids	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
4. Injectable Anabolic Androgenic Steroids	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
5. Other Anabolic Agents (e.g., Clenbuterol)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency				
6. Beta-Blockers	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
7. Peptide Hormones, Growth Factor, & Related Substances (e.g., EPO, Chorionic Gonadotrophin, Corticthophin, Growth Hormone	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency				
8. Hormone and metabolic modulators (e.g., aromatase inhibitors, tamoxifen, clomiphene, myostatin inhibitors, insulin)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency				
9. Blood Manipulation	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				

Please estimate the percentage of people taking performance enhancing substances such as those listed above: (a) in general in the sport you play/train in _____% (b) in your specific team _____%

*Please **indicate** which of the following **substances/methods** you **use or have used** during the **specified periods**. For those that **you have taken**, please use the **subsequent box** to provide details of the **types** and **maximum volume/frequency** used.*

	Currently Using	Used in the Past 3 Months	Used Prior to the Past 3 Months	Never Used
1. Methylphenidate (e.g., Ritalin, Ritalin LA, Ritalin-SR, Aptensio XR, Concerta, Metadate CD, Metadate ER, Methylin, Quillivant XR)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
Is this taken on prescription?			Yes ☐	No ☐
If you have used this substance, has it ever been to help you with your academic studies?			Yes ☐	No ☐
2. Amphetamine (e.g., Adderall)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
Is this taken on prescription?			Yes ☐	No ☐
If you have used this substance, has it ever been to help you with your academic studies?			Yes ☐	No ☐
3. Modafinil (e.g., Provigil, Alertec, Modavigil)	☐	☐	☐	☐
Type/s, Maximum Volume & Frequency _____				
Is this taken on prescription?			Yes ☐	No ☐
If you have used this substance, has it ever been to help you with your academic studies?			Yes ☐	No ☐

Please estimate the percentage of people taking cognitive-enhancing substances such as those listed above: (a) in general in the university _____% (b) in your specific subject _____%

Appendix H

List of Institutions

University of Aberdeen
Abertay University (formerly University of Abertay Dundee)
Aberystwyth University (Prifysgol Aberystwyth)
Anglia Ruskin University
AECC University College
Archbishop of Canterbury, The
Arden University (formerly known as Resource Development International)
Ashridge Business School
Aston University
Bangor University (Prifysgol Bangor)
University of Bath
Bath Spa University
University of Bedfordshire
BIMM Institute
Birkbeck, University of London
University of Birmingham
Birmingham City University
University College Birmingham
Bishop Grosssteste University
University of Bolton
Arts University Bournemouth
Bournemouth University
BPP University
University of Bradford
University of Brighton
University of Bristol
Brunel University London
University of Buckingham
Buckinghamshire New University
University of Cambridge
Canterbury Christ Church University
Cardiff Metropolitan University (Prifysgol Metropolitan Caerdydd)
Cardiff University (Prifysgol Caerdydd)
University of Chester
University of Chichester
City University London
Courtauld Institute of Art, The (degrees awarded by University of London)
Coventry University
Cranfield University
University for the Creative Arts
University of Cumbria
De Montfort University
University of Derby
University of Dundee
Durham University
University of East Anglia
University of East London
Edge Hill University
University of Edinburgh, The
Edinburgh Napier University
University of Essex
University of Exeter
Falmouth University
University of Glasgow
Glasgow Caledonian University
University of Gloucestershire
Glyndŵr University (Prifysgol Glyndŵr)
Goldsmiths, University of London
University of Greenwich
Guildhall School of Music and Drama
Harper Adams University
Hartpury University
Heriot-Watt University
University of Hertfordshire
Heythrop College (degrees awarded by University of London)
University of the Highlands and Islands
University of Huddersfield
University of Hull
Imperial College of Science, Technology and Medicine (also known as Imperial College London)
Institute of Cancer Research, The (degrees awarded by University of London)
Keele University
University of Kent
King's College London
Kingston University
University of Central Lancashire
Lancaster University
University of Leeds
Leeds Beckett University (formerly Leeds Metropolitan University)
Leeds Arts University
Leeds Trinity University
University of Leicester
University of Lincoln
University of Liverpool
Liverpool Hope University
Liverpool John Moores University
Liverpool School of Tropical Medicine
University of London
London Business School
London Institute of Banking and Finance, The
London Metropolitan University
London School of Hygiene and Tropical Medicine
London School of Economics and Political Science, The (LSE)

London South Bank University
University College London
Loughborough University
University of Manchester
Manchester Metropolitan University
Middlesex University
NCG
NCG at Northeastern
Newcastle University
Newman University, Birmingham
Norland College
University of Northampton, The
Northumbria University Newcastle
Norwich University of the Arts
University of Nottingham
Nottingham Trent University
Open University, The
University of Oxford
Oxford Brookes University
Plymouth College of Art
Plymouth University
University of Portsmouth
Presbyterian Theological Faculty, Ireland (PTFI) (Union Theological College)
Queen Margaret University, Edinburgh
Queen Mary, University of London
Queen's University Belfast
Ravensbourne
University of Reading
Regent's University London
Richmond, The American International University in London
Robert Gordon University, Aberdeen
University of Roehampton
Rose Bruford College of Theatre and Performance
Royal Academy of Music
Royal Agricultural University
Royal Central School of Speech and Drama (University of London)
Royal College of Art
Royal College of Music
Royal College of Nursing
Royal Conservatoire of Scotland
Royal Holloway, University of London
Royal Northern College of Music
Royal Veterinary College, The
University of Salford
School of Oriental and African Studies (SOAS), University of London
University of Sheffield
Sheffield Hallam University
University of South Wales (Prifysgol De Cymru)
University of Southampton
Solent University
University of St Andrews
St George's, University of London
University of St Mark and St John, Plymouth (Marjon)
St Mary's University, Twickenham
Staffordshire University
University of Stirling
University of Strathclyde
University of Suffolk
University of Sunderland
University of Surrey
University of Sussex
Swansea University (Prifysgol Abertawe)
Teesside University
Trinity Laban Conservatoire of Music and Dance
University of the Arts, London
University College of Estate Management
University College of Osteopathy
University of Law, The
University of Ulster
University of Wales (Prifysgol Cymru)
University of Wales Trinity Saint David (Prifysgol Cymru Y Drindod Dewi Sant)
University of Warwick
University of the West of England, Bristol
University of West London
University of the West of Scotland
University of Westminster
University of Winchester, The
University of Wolverhampton
University of Worcester
Writtle University College
University of York
York St John University