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Substance use to enhance academic performance among Australian university students

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ABSTRACT

Use of substances to enhance academic performance among university students has prompted calls for evidence to inform education and public health policy. Little is known about this form of drug use by university students outside the US. A convenience sample of $n = 1729$ Australian university students across four universities responded to an exploratory on-line survey. Students were asked about their lifetime use of modafinil, prescription stimulants (e.g. methylphenidate), supplements (e.g. ginkgo biloba), illicit drugs (e.g. speed), relaxants (e.g. valium) and caffeine in relation to enhancing study performance. The results show that Australian students report using substances for study purposes at a higher lifetime rate than observed among US or German students. The main reasons for use were to improve focus and attention, and to stay awake. Use of substances to enhance study outcomes was correlated with faculty of study, attitude and use of other substances. These results point to the need to develop Australian evidence to guide policy or regulatory responses to student use of substances to enhance academic performance.

1. Introduction

The evidence base to suggest that students are using various substances to enhance their cognitive performance is growing (Housden, Morein-Zamir, & Sahakian, 2011, chap. 7), prompting calls for regulation by educational (Greely et al., 2008) and public health policy makers (Smith & Farah, 2011). Substances used by students to enhance academic performance include stimulants such as caffeine (CAF), methylphenidate (MPH) and modafinil (MOD). In addition to the ethical harms that may arise from such substance use (e.g. coercion, authenticity and justice; Sandberg & Savulescu, 2011, chap. 6), public health discourses argue significant known health risks exist (e.g. caffeine toxicity; Reissig, Strain, & Griffiths, 2009) alongside unknown health risks (e.g. long term off-label use of MPH or MOD; McCabe & Teter, 2007; Teter, Falone, Cranford, Boyd, & McCabe, 2010). The evidence base for substance use to enhance academic performance is largely constrained to data from the United States (US) examining the non-medical use of prescription stimulants (NMUPS) such as MPH among college students, prompting calls for data to be collected outside the US (Smith & Farah, 2011; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006) and using different methods (DeSantis, Webb, & Noar, 2008; Rabiner et al., 2009). Lucke and Hall (2012) indicate the need for such research in the Australian context is pressing. The current paper reports data from an exploratory study of Australian university student use of substances to enhance academic performance.

Substance use by students to enhance academic performance is commonly thought of as cognitive enhancement, also described as neuroenhancement, cosmetic neurology or brain doping (Partridge, Bell, Lucke, Yeates, & Hall, 2011). Cognitive enhancement is generally thought of as "the amplification or extension of core capacities of the mind, using augmentation or improvements of information processing systems" (Sandberg, 2011, chap. 5, p. 72). The cognitive skills enhanced have been defined as perception, attention, memory, comprehension, use of speech and executive function (planning, problem solving and self monitoring) (Housden et al., 2011, chap. 7, p. 113). Cognitive enhancement includes tools (e.g. an abacus), training (e.g. study), brain–computer interfaces (e.g. cochlear implants) and new senses (e.g. magnetic field perception) (Sandberg, 2011, chap. 5). It also includes natural substances demonstrated to influence cognition (e.g. CAF) along with pharmaceutically refined (e.g. Omega 3 (OM3)) or derived substances (e.g. MPH and MOD). Pharmaceutically derived substances are typically developed to treat neurological conditions such as attention deficit disorder or narcolepsy (Lanni et al., 2008) and adapted for cognitive enhancement through diversion to off-label use (Greely et al., 2008).

There is mixed evidence that the substances presumed to influence cognitive function and enhance academic performance do

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achieve this intention, and no evidence it meets the inflated claims of effect made in some parts of the literature (see Schermer, Bolt, de Jongh, & Olivier, 2009). While CAF has a long history of human physical and mental performance enhancement, there is mixed evidence of the effects of nutritional supplements Ginkgo Biloba (GBI) and Omega-3 (OM3) as cognition enhancers (e.g. Elsabagh, Hartley, Ali, Williamson, & File, 2005; Kalmijn, Feskens, Launer, & Kromhout, 1997; Kennedy et al., 2009; Snitz et al., 2009). There are equally mixed results reported in contrasting reviews of pharmaceutically derived cognitive enhancers. There is general agreement that such substances rarely improve performance across the spectrum of cognition, and instead have niche effects for learning over time (Smith & Farah, 2011) or overcoming cognitive impairments due to sleep deprivation (Repantis, Schlattman, Laisney, & Heuser, 2010). One suggestion for such variability has been the lack of controlled randomised studies to assess the effects accounting for dose response, genetics, personality, prevailing ability and task characteristics (Smith & Farah, 2011). In the absence of reliable evidence that the substances do enhance cognition, the issue may be less about actual cognitive enhancement, and more on the belief of enhancement (Repantis et al., 2010). Irrespective of actual or perceived effect, an observable trend towards increasing use of these substances for performance enhancing purposes has emerged.

The majority of data on the use of cognitive enhancing substances is from public health research exploring the NMUPS among US college students. A systematic review of US data by Wilens et al. (2007) put past year non-medical use of prescription stimulants (NMUPS) by college students at between 5% and 35%. For example, where McCabe, Knight, Teter, and Wechsler's (2005) survey of $n = 10{,}904$ US college students showed lifetime and past year rates for NMUPS at 6.9%, the multimethod study reported by DeSantis et al. (2008) yielded a 34% lifetime rate ($n = 175$). By comparison, a study of $n = 1547$ German high school and university students found the lifetime rate of NMUPS for cognitive enhancement was 1.3% (Franke et al., 2011). A small study of $n = 77$ Italian university students reported a lifetime use of 16% (Castaldi et al., 2012). By comparison, a survey of prescription drug use to enhance normal level of concentration or alertness in the Australian general population found a lifetime use rate of 2.4% (Partridge, Lucke, & Hall, 2012). The variation in NMUPS lifetime use rates suggests results may be sensitive to context. The evidence base for policy discussion in the Australian context therefore needs to be expanded to account for local conditions (Lucke & Hall, 2012; Partridge, Bell, Lucke, & Hall, 2013).

The current study started as a pilot for a larger scale investigation of substance use to enhance academic performance by Australian university students. The unexpectedly enthusiastic response from $n = 1729$ Australian university students saw the study change in scope from a pilot to exploratory. The sample size enables the study to give a general indication of prevalence and correlates for substance use to enhance academic performance to inform future research.

2. Method

2.1. Sampling frame

Following approval from two university human research ethics committees (HREC), students at four large South Eastern Australian universities were invited to participate in the online "Study Drugs Study". The universities represented a mix of research and teaching intensive, and urban and rural campuses. Use of an online convenience sample represents a cost-effective way to collect data about stigmatised behaviour such as drug use appropriate to the original pilot study design. While the sample is likely to be non-representative, it means collecting sufficient data to assess whether the phenomenon is worth investigating further (even if only with specific sub-populations) and a general indication of where correlations may lie to inform future research.

2.2. Materials

The online survey consisted of three sections.

2.2.1. Section 1: demographics

Standard demographic information (age, gender, English-speaking background) were collected. Following Franke et al.'s (2011) observation of differential use across field of study, students were asked to identify degree enrolment.

2.2.2. Section 2: drug use history

Participants were asked whether they had ever used a range of substance classes including Provigil (MOD), natural supplements (GBI and OM3), prescription amphetamines including Ritalin (MPH) and Adderall (mixed salts amphetamines (MSA)), illicit substances (cocaine, cannabis, ecstasy or speed), relaxants (valium, benzodiazepines or prescription opioids), and CAF (No Doz tablets, high energy drinks or coffee). Illicit drugs were included given the poly drug use observed in US samples (McCabe & Teter, 2007). Relaxants were included as a potential correlate, primarily due to their role counteracting stimulant effects (e.g. upper/downer cycles) (Teter et al., 2010), which created the opportunity to explore whether students use them to enhance academic performance. Broadly speaking, the substances can be divided into over-the-counter preparations (supplements and caffeine), prescription substances (MOD, MPH, MSA and relaxants) or illicit drugs.

Those indicating use were asked a series of questions. Probing context of use (medical, non-medical, study or other; multiple responses allowed) was consistent with Smith and Farah's (2011) recommendation to differentiate medically prescribed from ergogenic use. Frequency was assessed using a daily, weekly, fortnightly, monthly, or once or twice a year forced choice question.

Motivations to use were based on Rabiner et al.'s (2009) 11 reasons for NMUPS and informed by other studies (DeSantis et al., 2008; Judson & Langdon, 2009; White, Becker-Blease, & Grace-Bishop, 2006). The questions included functional outcomes such as maintaining focus or concentration, or staying awake, avoiding distractions (e.g. going to the toilet or feeling hungry). Two items were included to capture use to "get high" or to "enjoy the feeling". Discussions around the use of cognitive enhancing substances in academic contexts suggest use may be motivated by post-study outcomes; for example, the relationship between marks and a prestigious internship for law students (cf Cakic, 2009). Outcome motivations were expressed as using for better marks, a better job, or winning a scholarship.

2.2.3. Section 3: attitudes and individual differences

The role of attitude and social norms in drug use is well established with evidence both influence using substances to enhance academic performance among US students (Judson & Langdon, 2009). Evidence emerging after the survey was conducted demonstrates attitudes influence use among Australian university students (Partridge et al., 2013). Attitudes were measured by asking whether "taking study drugs is. . ." or "buying study drugs is. . ." followed by the response set moral, slightly moral, slightly immoral and immoral. Social norms were measured by a question relating to the perceived normalisation of study drug use (open field).

Attention deficit disorder (ADD) diagnosis (medically diagnosed, self-diagnosed, don't know, or no) was requested as a control for later analyses, especially with regard to prescription amphetamine use. Positive and negative effects of using substances