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The Difference is Research

Illicit use of prescription cognitive enhancing (CE) drugs among regular psychostimulant users

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KEY FINDINGS

- Illicit use of at least one prescription drug for the purpose of enhancing either cognitive ability or study was reported by 18.2% of regular psychostimulant users in the last six months, with dexamphetamine being the most commonly used drug (9.8%).
- 36.4% of these participants reported experiencing at least one negative side effect on the last occasion of illicit prescription cognitive enhancer (CE) use.
- Recent illicit use of any prescription CE was predicted by younger age and greater recent poly drug use.

INTRODUCTION

What are cognitive enhancing drugs?

Cognitive enhancers (CEs; also called 'smart drugs', 'study drugs' and 'nootropics') are those that are used for the purpose of improving intellectual abilities in healthy individuals (Smith & Farah, 2011). Commonly researched potential CEs are prescription amphetamines (e.g., Adderall, dexamphetamine), anti-dementia drugs, methylphenidate (Ritalin), caffeine and racetams; a broad class of drug comprising several stimulants. Newer drugs such as modafinil, a prescription stimulant used in the treatment of narcolepsy and shift work sleep disorder, as well as herbal supplements including ginkgo biloba and omega 3 (fish oil) have been investigated as potential CEs (Mazanov, Dunn, Connor, & Fielding, 2013).

Do cognitive enhancing drugs improve cognition in healthy people?

Previous studies have provided very mixed evidence of the effectiveness of CEs in healthy people and their efficacy beyond laboratory settings is unknown (Smith & Farah, 2011). The prescription drugs modafinil and methylphenidate (Ritalin) have the most established evidence suggesting that they may improve abilities in some cognitive domains in healthy people (see Repantis et al, 2010). Several studies have found that CEs may be most efficacious at improving cognitive abilities in individuals with lower baseline cognitive abilities or cognitive impairment related to sleep deprivation, depression, ADHD, traumatic brain injury and stroke (Logan, 2004; Malykh & Sadaie, 2010; Smith & Farah). Despite mixed evidence of the efficacy of study drugs in enhancing cognitive abilities in healthy individuals, there is evidence that users tend to perceive them as effective (Ragan, Bard, Singh, & Drugs, 2013). A recent qualitative study of Australian University students found that users of prescription CEs tended to use avoidance as a strategy to cope with study related stress and when this was ineffective used other strategies, such as CEs, to try to reduce stress and focus on the task at hand (Jensen, Forlini, Partridge, & Hall, 2016).

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What is the prevalence of the use of cognitive enhancing drugs?

The vast majority of rates of use in the existent literature are from studies that have examined use among US university students. Estimates of rates of use in this population vary widely, with lifetime use estimated to be as low as 5.3% (DuPont, Coleman, Bucher, & Wilford, 2008) and as high as 55% (Desantis, Noar, & Webb, 2009). Only two existing Australian studies have examined rates of CE use among university students, with lifetime use rates estimated at 4% and 8.5% (Joshi, 2010; Mazanov et al., 2013). Recent studies of prevalence of prescription drugs for CE by university students in various schools found a lifetime prevalence of 6.6% in a New Zealand study (Ram, Hussainy, Henning, Jensen, & Russell, 2016) and a past 12 month prevalence of 5.8% in a French study (Micoulaud-Franchi, Macgregor, & Fond, 2014). Previous studies have suggested that rates of illicit use of prescription drugs as CEs may be higher among individuals reporting higher frequency alcohol, tobacco and illicit drug use (McCabe, Knight, Teter, & Wechser, 2005).

What are the potential harms of cognitive enhancing drug use?

All CEs carry a risk of adverse side effects and toxicity. While most adverse side effects are rare, minor and transitory, modafinil has been associated with a severe skin reaction and cardiac abnormalities (European Medicines Agency, 2010; Oskooilar, 2005). Long term risks and harms remain unknown. Prescription drugs purchased illicitly online may be counterfeit and/or contain known potentially harmful substances (McConnell, 2013; U.S. Food and Drug Administration, 2013). Further, harms may also occur as a result of legal consequences of illicitly obtaining CEs online or via others' diverted prescription medications (Ragan et al., 2013).

METHODS

This bulletin presents the rates, patterns and predictors of use of illicit prescription CE use among regular psychostimulant users (RPU), defined as those who had used ecstasy or related drugs at least once a month in the previous six months.

Data were collected as part of the 2015 Ecstasy and Related Drugs Reporting System (EDRS). The EDRS is a national illicit drug monitoring study aimed at detecting emerging trends in the use of ecstasy and other 'dance drugs'. It has been conducted annually in all Australian capital cities since 2003. The EDRS has received ethical approval from the relevant ethics committees in each jurisdiction. Participants consisted of a non-random self-selected sample recruited through advertisements in street-press and online, and peer referral. Eligibility criteria were; (1) at least monthly use of ecstasy or psychostimulants in the preceding six months, (2) 16 years of age or older, and (3) residence in the city of interview for at least 12 months prior to the interview. Face-to-face structured interviews of about one hour in length were conducted with current RPU, detailing demographics, recreational drug use history and bingeing behaviour. Participants completed measures of alcohol risk behaviours (AUDIT; Bohn et al., 1995) and psychological distress (K10; Kessler et al., 2000). To ascertain CE use history, participants were presented with a list of over-the-counter and prescription drugs and asked to indicate if they had used any of those drugs for the purpose of cognitive or study enhancement in the last six months. In this bulletin we present only the data related to prescription CE use. All information was confidential and anonymous. A more detailed explanation of the EDRS methodology can be found elsewhere (see Stafford and Breen, 2017).

RESULTS

The sample comprised 763 RPU (286 females, 476 males and one transgender participant) with a mean age of 22.7 years (range 16-55). Thirty-three percent of respondents stated that they were either part-time or full-time students.

Less than one-fifth of the sample (18.2%, n=139) reported recent (last six months) illicit use of any prescription CE. There were significant differences in the rate of use across EDRS jurisdictions (see Table 1). While the rate of use between ACT and VIC was not significantly different, rates of use were significantly different between all other jurisdictions. Participants in WA reported the highest rate of use, mostly accounted for by a significantly larger proportion of illicit dexamphetamine use in WA relative to other jurisdictions. Rates of illicit use for individual prescription CE drug in the six months preceding interview are shown in Table 2; dexamphetamine was the most commonly used prescription CE.

Table 1: Recent illicit use of at least one prescription CE

Jurisdiction	Rate of use (%)
WA	33.8
NSW	17.3
QLD	15.8
ACT	12.2
VIC	10.8
SA	6.5
TAS	2.9
NT	0.7

Table 2: Recent illicit use of prescription CE drugs

Drug	Rate of use (%)
Dexamphetamine	9.8
Methylphenidate	8.6
Modafinil	6.0
Racetams	1.7

Respondents who reported prescription drugs as the last CE that they had used in the last six months (n=77) were asked to indicate their motivations for use on the last occasion (see Table 3). More than one-third (36.4%, n=28) reported experiencing at least one negative side effect on the last occasion of use, with anxiety and headache being the most frequently reported (see Table 4). Participants also reported where they had sourced illicit prescription CEs on the last occasion (see Table 5).

Table 3: Motivations for use on the last occasion

Motivation	%
To improve concentration	42.9
To improve academic performance	37.7
To improve motivation for study	29.9
To complete an assignment/task on time	28.6
To offset sleep deprivation	18.2
To decrease fatigue	16.9
Curiosity	14.3
To improve memory	13.0
To enhance mood	10.4
Other*	10.4

*Textual data to enable re-coding of this category was not available at the time of analysis.

Table 4: Negative side effects on the last occasion of use

Side effect	%
Anxiety	29.6
Headache	29.6
Loss of appetite	25.9
Depression	11.1
Sleeping difficulties/insomnia	11.1
Nausea	7.4
Rapid/irregular heartbeat	7.4
Stomach problems	7.4
Urination problems	7.4
Dizziness	3.7
'Jolt and crash'	3.7
Heart palpitations	3.7
Increased speed of speech	3.7
Tics and/or twitching	3.7
Tremor	3.7
Vomiting	3.7
Other*	29.6

*Textual data to enable re-coding of this category was not available at the time of analysis.

Table 5: Source of illicit prescription CEs on the last occasion

	Dexamphetamine (%)	Methylphenidate (%)	Modafinil (%)	Racetams (%)
Internet	-	3.1	33.3	84.6
Shop	-	1.5	-	-
Dealer	6.8	1.5	2.2	-
Friend	90.5	84.6	53.3	15.4
Gift	2.7	6.2	4.4	-
Other	-	3.1	6.7	-

A logistic regression was conducted to predict recent illicit use of any prescription CE. Predictors were age, gender, student status, recent bingeing behaviour (in the preceding 6 months), total number of non-CE drugs used in the preceding six months, AUDIT scores and K10 scores. Age and total number of non-CE drugs used in the preceding six months were the only significant predictors. The likelihood of use decreased as age increased by year (OR=0.95, CI: 0.91 to 0.99) and increased as the total number of non-CE drugs used in the preceding six months increased (OR=1.15, CI: 1.09 to 1.21).

DISCUSSION

The rates of illicit use of prescription CEs in the current sample of RPU were higher than those reported in previous studies with Australian university students; this is consistent with previous research linking CE use and illicit drug use (McCabe et al., 2005). Our findings suggest that younger regular illicit drug users, particularly those who are engaged in more extensive poly drug use, might be an important at-risk target group for potential harm reduction interventions targeting CE users. Participants in WA reported higher rates of illicit prescription CE use relative to other jurisdictions, which may reflect greater availability of diverted prescription stimulants in WA stemming from increasing prescribing rates, particularly for medications such as dexamphetamine prescribed for the treatment of Attention-Deficit Hyperactivity Disorder (Department of Health, 2016).

It is somewhat surprising that student status was not a significant predictor of illicit prescription CE use, given that previous analysis of data from this sample found that being a student was the strongest predictor of any recent (prescription or non-prescription) CE use (Nelson and Lenton, 2015). However, post-hoc examination of the data revealed that student status is a strong predictor of over-the-counter CE use, particularly the use of beverage coffee and energy drinks, but not illicit prescription CE use. Indeed, the most frequently reported motivation for illicit use of prescription CEs was 'to improve concentration', a motivation related to cognitive enhancement in general rather than improving academic performance in particular.

A relatively large proportion of illicit prescription CE users in our sample reported experiencing a negative side effect on the last occasion of use. An understanding of the prevalence, type and predictors of negative side effects of CE use has implications for the design of potential targeted harm reduction interventions. Researchers might consider investigating predictors of negative side effects for specific CEs to better elucidate these relationships. A large proportion of participants reporting recent illicit racetam use reported sourcing racetams from the internet on the last occasion, as did a smaller but substantial proportion of participants reporting recent illicit modafinil use. This suggests a substantial number of these users may be at risk of using counterfeit drugs containing unknown substances.

These results are limited because EDRS participants are not randomly selected. These findings may not accurately represent patterns or predictors of use among RPU and further research with representative samples is required to confirm the results. While these findings appear to support a link between poly drug use, illicit drug use and CE use, questions remain around the nature of this relationship. Further research is required, for example, to determine whether regular illicit drug users are more likely to use CEs simply because they are using a wide range of drugs or whether CEs are used to mitigate cognitive or other symptoms associated during 'come down' from other drug use.

REFERENCES

Bohn, M. J., Babor, T. F., & Kranzler, H. R. (1995). The Alcohol Use Disorders Identification Test (AUDIT): validation of a screening instrument for use in medical settings. J Stud Alcohol, 56(4), 423-432.

Department of Health. (2016). Western Australian Stimulant Regulatory Scheme: 2015 Annual Report. Retrieved 30 June, 2016, from ww2.health.wa.gov.au/Articles/S_T/Stimulant-medicines

Desantis, A., Noar, S. M., & Webb, E. M. (2009). Nonmedical ADHD stimulant use in fraternities. J Stud Alcohol Drugs, 70, 952-954.

DuPont, R. L., Coleman, J. J., Bucher, R. H., & Wilford, B. B. (2008). Characteristics and Motives of College Students Who Engage in Nonmedical Use of Methylphenidate. The American Journal on Addictions, 17, 167-171.

European Medicines Agency. (2010). Questions and answers on the review of medicines containing modafinil. Retrieved 30 June, 2016, from http://www.ema.europa.eu/docs/en_GB/document_library/Referrals_document/Modafinil_31/WC500099177.pdf

Farah, M. J., Smith, M. E., Ilieva, I., & Hamilton, R. H. (2014). Cognitive enhancement. Wiley Interdisciplinary Reviews-Cognitive Science, 5, 95-103.

Jensen, C., Forlini, C., Partridge, B., & Hall, W. (2016). Australian University Students' Coping Strategies and Use of Pharmaceutical Stimulants as Cognitive Enhancers. Frontiers in Psychology, 7, 277.

Joshi, P. (2010). Use of cognitive enhancing substances by University students : a cross-sectional study / Paliza Joshi. Thesis (M.Pharm.)--Curtin University.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., . . . Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychol Med, 32(6), 959-976.

Logan, A. C. (2004). Omega-3 fatty acids and major depression: A primer for the mental health professional. Lipids in Health and Disease, 3(1), 25.

Malykh, A., & Sadaie, M. (2010). Piracetam and Piracetam-Like Drugs From Basic Science to Novel Clinical Applications to CNS Disorders. Drugs, 70(3), 287-312.

Mazanov, J., Dunn, M., Connor, J., & Fielding, M.-L. (2013). Substance use to enhance academic performance among Australian university students. Performance Enhancement & Health, 2(3), 110-118.

McCabe, S. E., Knight, J. R., Teter, C. J., & Wechser, H. (2005). Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. Addiction, 100, 96-106.

McConnell, A. (2013). Keeping it real - The fight against counterfeit medicines in the US. Regulatory Rapporteur, 10(11), 15-18.

Micoulaud-Franchi, J. A., Macgregor, A., & Fond, G. (2014). A preliminary study on cognitive enhancer consumption behaviors and motives of French Medicine and Pharmacology students. European Review for Medical and Pharmacological Sciences, 18(13), 1875-1878.

Nelson, M., & Lenton, S. (2015). Cognitive ehancing drug use among regular psychostimulant users.

Oskooilar, N. (2005). A case of premature ventricular contractions with modafinil. Am J Psychiatry, 162, 1983-1984.

Ragan, C., Bard, I., Singh, I., & Drugs, I. S. C. (2013). What should we do about student use of cognitive enhancers? An analysis of current evidence. Neuropharmacology, 64, 588-595.

Ram, S., Hussainy, S., Henning, M., Jensen, M., & Russell, B. (2016). Prevalence of cognitive enhancer use among New Zealand tertiary students. Drug and Alcohol Review, 35(3), 345-351.

Repantis, D., Schlattmann, P., Laisney, O., & Heuser, I. (2010). Modafinil and methylphenidate for neuroenhancement in healthy individuals: A systematic review. Pharmacological Research, 62, 187-206.

Smith, M. E., & Farah, M. J. (2011). Are Prescription Stimulants “Smart Pills”? The Epidemiology and Cognitive Neuroscience of Prescription Stimulant Use by Normal Healthy Individuals. Psychological Bulletin, 137, 717-741.

Stafford, J., & Breen, C. (2017). Australian Trends in Ecstasy and Related Drug Markers 2016: Findings from the Ecstasy and Related Drugs Reporting System Australian Drug Trends Series no. 172. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.

U.S. Food and Drug Administration. (2013). Counterfeit Drugs Questions and Answers. Washington: Retrieved from http://www.fda.gov/Drugs/DrugSafety/ucm169898.htm.

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