

The non-medical use of prescription stimulants by Australian university students for cognitive enhancement

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Introduction The use of prescription stimulants by university students has been called ‘cognitive enhancement’ (CE) and is defined as the nonmedical use of prescription stimulants by healthy persons aiming to enhance cognitive abilities such as focus, alertness, and memory⁽¹⁾.

Students can also use a range of purported CE substances such as coffee, energy drinks, non-stimulant medications, and illicit street drugs⁽²⁾.

There is considerable variation in the reported prevalence of CE in developed countries such as US (0-34%)^(3, 4), Germany (20%)^(2, 5), Switzerland (4%)⁽⁶⁾, UK (8%)⁽⁷⁾, Italy (16%)⁽⁸⁾, New Zealand (7%)⁽⁹⁾, and Australia (6-10%)^(10, 11). We need further investigation in Australia given limited understanding of CE and large increases in stimulant prescribing^(12, 13).

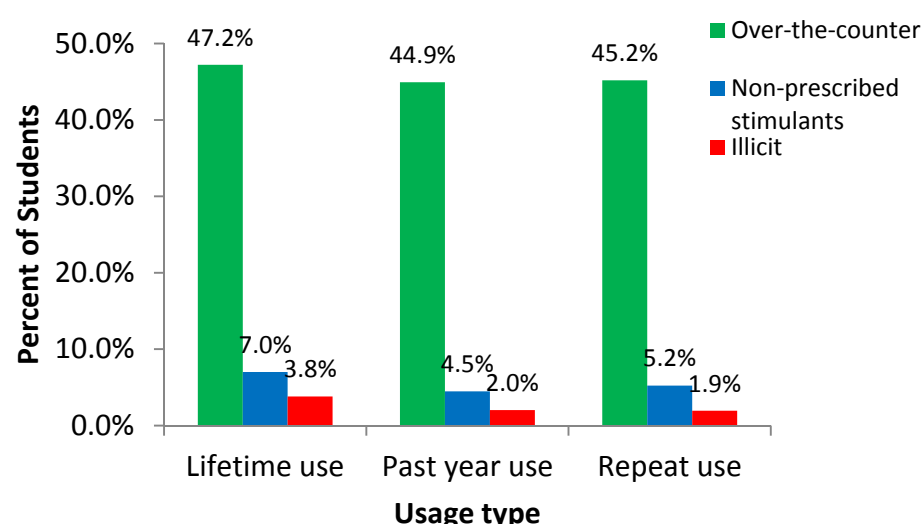
We surveyed multiple universities on the Australian east-coast in 2015 to better assess: 1) substances students report using for CE; 2) the lifetime, past year, and repeat use of prescription stimulant use for CE among students; and, 3) the predictors of CE prescription stimulant use.

Method We recruited students between 18-29 years of age. An online survey was posted on student accounts or emailed to a representative sample of students. A prize-draw consisting of 1 x Apple iPad Air 16GB, 2 x Apple iPad Minis 16GB, 3 x \$50 Coles Myer vouchers, and 4 x \$20 Coles Myer vouchers was offered. Survey items covered: demography; education; health habits; attitudes towards stimulant use for CE; personal experience with CE substances; and study habits. Students were asked “Have you ever used substances to help you perform better at university?” Thirty-one substances across 3 categories (over-the-counter, prescription medication, and illicit drugs) and 6 ‘other’ options were provided.

Results 1,184 university students with a mean age of 21.3 years ($SD=0.08$) completed this survey. 713 (61.1%) were female. Most were undergraduates (86%) in full-time study (90.6%) including 165 (14.2%) international students. Students with prescriptions for stimulant medications ($n=18$) were included.

Prevalence of stimulant use for CE Only 7% ($n=83$) of students reported using any prescription stimulant for CE at least once in their lifetime (see Figure 1 below).

Figure 1: Prevalence of all cognitive enhancing substances



Students reported using seven types of prescription stimulants for CE, with some students having experience with multiple stimulants. These are shown in Table 1 along with *time of last use* as listed in Table 1. Adderall, Concerta and Modafinil were the most popular prescription stimulants. Most were used within the last week/month or over more than a year ago. Recent use was most common in students with a prescription for stimulants. They accounted for 1.4% of the sample. Over half (58.8%) reported using their prescription stimulants off-label for CE as defined in this survey.

Table 1: Recency of student use of prescription stimulants (%)

| Prescription Stimulant | >1 year | <1 year | <6 months | <3 months | <1 month | <1 week | Lifetime Total |
|------------------------|---------|---------|-----------|-----------|----------|---------|----------------|
| Adderall | 2.28 | 0.25 | 0.25 | 0.25 | 0.51 | 0.42 | 3.97 |
| Concerta | 1.1 | 0.34 | 0.25 | 0.17 | 0.17 | 0.93 | 2.96 |
| Modafinil | 0.25 | 0.25 | 0.17 | 0.25 | 0.51 | 1.1 | 2.53 |
| Racetams | 0.42 | 0.08 | 0 | 0.17 | 0.17 | 0.17 | 1.01 |
| Other | 0.08 | 0 | 0 | 0 | 0 | 0.16 | 0.24 |
| Total | 4.14 | 0.93 | 0.68 | 0.84 | 1.35 | 2.79 | - |

Note: ‘Other’ prescription stimulants include Strattera, and Phentermine.

Other substances used for CE Non-prescription stimulants such as caffeine and energy drinks were much more commonly used for CE (see Table 2). Illicit drugs were used for this purpose by fewer than 5%, with cannabis and illicit stimulants such as speed (amphetamine), cocaine, and ice (crystal methamphetamine) the most commonly reported (1.8%)

Table 2: Licit and illicit substances students reported using for CE

| Licit | % | Illicit | % |
|---------------------|------|----------|-----|
| Coffee | 41.8 | Cannabis | 2.1 |
| Tea | 28.6 | Speed | 0.8 |
| Energy drinks | 24.9 | Cocaine | 0.5 |
| Coca-cola | 17.0 | Ice | 0.5 |
| Caffeine pills | 9.9 | LSD | 0.5 |
| Omega 3 | 8.1 | Other | 1.3 |
| Alcohol | 7.5 | | |
| Cold & flu tablets | 4.7 | | |
| Tobacco | 4.7 | | |
| Ginko Biloba | 3.2 | | |
| Nicotine | 1.4 | | |
| Vitamin supplements | 1.0 | | |
| Other | 0.8 | | |

Predictors of prescription stimulant CE Being male (OR = 2.73, 95% CI = [1.56, 4.79], $p < .001$), having a prescription for stimulants (OR =46.76, 95% CI = [11.34, 192.87], $p < .001$), and associating with other CE users (OR =7.84, 95% CI = [3.86, 15.94], $p < .001$), were factors associated with prescription use for CE.

Discussion Lifetime prevalence of prescription stimulant use for CE purposes among Australian university students was only 7% (1 in 15). This rate was comparable to results from an Australian general population sample (6.2%)⁽¹⁰⁾ and a little lower than an earlier survey of Australian students (10%)⁽¹¹⁾. It is within the range reported by studies in other developed nations (between 2-8%). The use of stimulants for CE in the past-year was 4.5% and a similar proportion reported use in the previous week/month. Students were much more likely to have used and to be currently using coffee, tea, and energy drinks for CE. The prevalence of use of these substances was much higher (1 in 3 students) and use was much more frequent. Characteristics that predicted use of prescription stimulants for CE were similar to those in other studies^(13, 14). Association with peers who have used these drugs was the strongest and males with a history of illicit drug use were more likely to use prescription stimulants for CE.

Limitations The sample response rate cannot be easily estimated but our results are very comparable to those of similar studies in Australia and other similar developed nations^(7, 9-11). We also relied upon self-reports of drug use, as have all other studies. Self-report is reasonably valid when participants have been given assurances of confidentiality⁽¹⁵⁾.

Conclusions The use of prescription stimulants for CE by university students in Australia is far less common than the use of coffee and energy drinks.