



Dispelling the myth of “smart drugs”: Cannabis and alcohol use problems predict nonmedical use of prescription stimulants for studying

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HIGHLIGHTS

- ▶ Nonmedical prescription stimulant use (NPS) for studying among 984 college students
- ▶ Four-year trajectories of cannabis/alcohol use problems, skipping class, GPA
- ▶ Increasing cannabis use problems predicted declining GPA via skipping class
- ▶ Indirect path: cannabis trajectory to skipping trajectory to GPA trajectory to NPS
- ▶ Results were similar for separate models on alcohol and cannabis use problems

ARTICLE INFO

Available online 8 October 2012

Keywords:

Academic Performance
Alcohol
Cannabis
College students
Nonmedical use of prescription stimulants

ABSTRACT

This study tested the hypothesis that college students' substance use problems would predict increases in skipping classes and declining academic performance, and that nonmedical use of prescription stimulants (NPS) for studying would occur in association with this decline. A cohort of 984 students in the College Life Study at a large public university in the US participated in a longitudinal prospective study. Interviewers assessed NPS; *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) cannabis and alcohol use disorders; and frequency of skipping class. Semester grade point average (GPA) was obtained from the university. Control variables were race, sex, family income, high school GPA, and self-reported attention deficit hyperactivity disorder diagnosis. Longitudinal growth curve modeling of four annual data waves estimated the associations among the rates of change of cannabis use disorder, percentage of classes skipped, and semester GPA. The associations between these trajectories and NPS for studying were then evaluated. A second structural model substituted alcohol use disorder for cannabis use disorder. More than one-third (38%) reported NPS for studying at least once by Year 4. Increases in skipping class were associated with both alcohol and cannabis use disorder, which were associated with declining GPA. The hypothesized relationships between these trajectories and NPS for studying were confirmed. These longitudinal findings suggest that escalation of substance use problems during college is related to increases in skipping class and to declining academic performance. NPS for studying is associated with academic difficulties. Although additional research is needed to investigate causal pathways, these results suggest that nonmedical users of prescription stimulants could benefit from a comprehensive drug and alcohol assessment to possibly mitigate future academic declines.

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Abbreviations: NPS, nonmedical use of prescription stimulants; GPA, grade point average; ADHD, attention deficit hyperactivity disorder; Y₁, Year 1; IRB, Institutional Review Board; NSDUH, National Survey on Drug Use and Health; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; LVGCM, latent variable growth curve modeling; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation.

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1. Introduction

Nonmedical use of prescription stimulants (NPS), defined as use without one's own legitimate prescription or using the drug in a way that is inconsistent with a doctor's orders, is quite prevalent among college students (Arria, Caldeira, O'Grady, Vincent, Johnson, et al., 2008; Arria & DuPont, 2010; Arria, O'Grady, Caldeira, Vincent, & Wish, 2008; Carroll, McLaughlin, & Blake, 2006; DeSantis, Webb, & Noar, 2008; Garnier-Dykstra, Caldeira, Vincent, O'Grady, & Arria, 2012; McCabe, West, & Wechsler, 2007), and is now the second most

common form of illicit drug use after cannabis (Johnston, O'Malley, Bachman, & Schulenberg, 2012). An earlier report by our group observed that more college students initiated NPS between their freshman and sophomore year than any other drug (Arria, Caldeira, O'Grady, Vincent, Fitzelle, et al., 2008). Lifetime prevalence estimates of NPS vary, but are as high as 35% at some US universities (DeSantis et al., 2008; Low & Gendaszek, 2002).

While several cross-sectional research studies have found that nonmedical users of prescription stimulants tend to have lower grade point averages (GPA) than non-users (Clegg-Kraynok, McBean, & Montgomery-Downs, 2011; McCabe, Knight, Teter, & Wechsler, 2005; McCabe, Teter, & Boyd, 2006), media reports (Carey, 2008; Talbot, 2009) and some scientific commentaries (Greely et al., 2008; Maher, 2008) have debated the potential benefits of prescription stimulant use for individuals without attention deficit hyperactivity disorder (ADHD) to improve concentration and academic performance. Although these purported benefits have yet to be substantiated scientifically, research with college student samples has shown that the most frequently reported reason for NPS is to purportedly improve concentration so as to enhance academic performance (Clegg-Kraynok et al., 2011; DeSantis, Noar & Webb, 2009, 2010; DeSantis et al., 2008; Garnier-Dykstra et al., 2012; Low & Gendaszek, 2002; Rabiner et al., 2009; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006; White, Becker-Blease, & Grace-Bishop, 2006). Yet the academic motives for NPS contrast with a pattern of other associated behaviors that would appear to impede nonmedical users' of prescription stimulants academic performance, such as spending less time studying, skipping more classes, and spending more time socializing than their counterparts (Arria, O'Grady, Caldeira, Vincent, & Wish, 2008).

Earlier cross-sectional studies have also consistently shown that nonmedical users of prescription stimulants have a history of heavy alcohol use and illicit drug involvement, particularly cannabis use (Arria, Caldeira, O'Grady, Vincent, Johnson, et al., 2008; DeSantis et al., 2009; McCabe et al., 2005; Teter, McCabe, Boyd, & Guthrie, 2003). McCabe et al. (2005) found that students who engaged in NPS were more than ten times more likely to use cannabis during the past year than non-users. Other correlates of NPS include demographic characteristics, with minorities being at lower risk than whites (DuPont, Coleman, Bucher, & Wilford, 2008; McCabe et al., 2005, 2006; Teter et al., 2006). Although men are more likely to engage in NPS, there are no significant sex differences in the motivations for use (Low & Gendaszek, 2002; Teter et al., 2005). Fraternity/sorority membership and high levels of parental education are also significantly associated with NPS (McCabe et al., 2005).

The aim of the current study was to extend previous cross-sectional findings by using latent growth curve modeling to explicate the longitudinal relationships between cannabis/alcohol use disorder, skipping class, and academic performance. Furthermore, using this statistical modeling approach, we attempted to investigate the relationship between the various rates of change over time in cannabis/alcohol use disorder, skipping class, and GPA and NPS. We tested the following hypotheses: a) increases in cannabis use disorder predict increases in skipping class, which in turn predict decreases in academic performance as measured by a declining GPA; and b) NPS for study purposes occurs in association with these cannabis-related decreases in academic performance. Given that students who engage in NPS are likely to have alcohol-related problems, we also evaluated parallel models substituting alcohol use disorder for cannabis use disorder.

2. Methods

2.1. Study design

This study uses data from the College Life Study, a longitudinal prospective study of college students (Arria, Caldeira, O'Grady, Vincent,

Fitzelle, et al., 2008; Vincent et al., 2012). Sample selection took place in two stages. First, a screening survey was administered to 3401 incoming first-time, first-year students ages 17 to 19, during new-student orientation in 2004 at one large, public university in the mid-Atlantic region of the US. The first stage response rate was 89%. Next, a stratified random sample of screener participants was selected to participate in a longitudinal study, beginning with a two-hour baseline interview administered during their first year of college by a trained interviewer (Year 1: Y_1). Purposive sampling strategies were employed to oversample students who had used an illicit drug or nonmedically used a prescription drug at least once prior to study entry. The second-stage response rate was 87% and yielded a sample size of 1253, which was representative of the first-year class with respect to race, sex, and socioeconomic status (Arria, Caldeira, O'Grady, Vincent, Fitzelle, et al., 2008). Similar interviews were administered annually. Participants received \$5 and \$50 for participating in the screener and each annual interview, respectively. The study was approved by the university IRB. Informed consent was obtained for participation in all data collection waves and a federal Certificate of Confidentiality was acquired.

2.2. Participants

Out of the original 1253 participants, the present analytic sample consisted of the 984 (78.5%) individuals who were enrolled at the home university for at least one semester during all four years, completed at least one follow-up assessment (Y_2 through Y_4), and had non-missing data on all independent variables in the structural equation model (see Section 2.4.). The remaining 269 individuals were excluded as follows: 185 with gaps in enrollment at the home university, 35 with no follow-up assessments, and 49 missing data on one or more independent variables. The inclusion sample was not significantly different from the excluded subset with respect to sex or family income, but was slightly younger and overly representative of whites.

2.3. Measures

2.3.1. NPS for studying

Annually, from Y_1 through Y_4 , students were asked about their past-year NPS via items adapted from the National Survey on Drug Use and Health (NSDUH; Substance Abuse & Mental Health Services Administration, 2003). Participants were given show cards with drug names and color photos of various pills, including Ritalin®, Adderall®, Adderall XR®, Concerta®, and others. Methamphetamine and amphetamine use were excluded from this series of questions on NPS, but were assessed with separate questions. Interviewers explained that NPS involved taking any prescription stimulant “that was not prescribed for you or that you took only for the experience or feeling they caused,” excluding any over-the-counter medications.

Participants were asked the reasons they had for using each prescription stimulant, and interviewers later recoded the verbatim responses into categories, one of which was to “improve focus/study/work.” We operationalized our dichotomous dependent variable as any NPS to improve focus/study/work at any point from Y_1 through Y_4 . Notably, NPS motives were not mutually exclusive; 24% of individuals in our “NPS for studying” group also reported motives related to partying or getting high. Because our hypotheses concerned academic difficulties that might be related to NPS, it was important that our outcome variable reflect use for study purposes. The small minority of individuals who engaged in NPS only for recreational reasons (i.e., to party or get high, but not for studying) were coded as “0” on the outcome variable. Henceforth, we use the term “NPS” to denote NPS for studying (regardless of other possible motives).

2.3.2. Cannabis use disorder

Annually, students who used cannabis five or more times during the past year were assessed for cannabis use disorder, using questions

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