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The Illicit Use of Prescription Stimulants on College Campuses: A Theory-Guided Systematic Review

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Abstract

The illicit use of prescription stimulants (IUPS) is a substance use behavior that remains prevalent on college campuses. As theory can guide research and practice, we provide a systematic review of the college-based IUPS epidemiological literature guided by one ecological framework, the Theory of Triadic Influence (TTI). We aim to assess prevalence, elucidate the behavior's multi-etiological nature, and discuss prevention implications. Peer-reviewed studies were located through key phrase searches (prescription stimulant misuse and college; "prescription stimulant misuse" and "college"; illicit use of prescription stimulants in college; nonmedical prescription stimulant use in college students) in electronic databases (PubMed, PubMed Central, and EBSCO Host) for the period 2000 to 2013. Studies meeting inclusion criteria had their references reviewed for additional eligible literature. Statistically significant correlates of IUPS in the 62 retrieved studies were organized using the three streams of influence and four levels of causation specified in the TTI. Results show the prevalence of IUPS varies across campuses. Additionally, findings suggest the behavior is multifaceted, as correlates were observed within each stream of influence and level of causation specified by the TTI. We conclude that IUPS is prevalent in, but varies across, colleges, and is influenced by intrapersonal and broader social and societal factors. We discuss implications for prevention and directions for future research.

Keywords

Prescription stimulants; college health; systematic review; behavioral theories; health behavior

The illicit use of prescription stimulants (e.g. amphetamines such as Adderall[®], dextroamphetamines such as Dexedrine[®], and methylphenidates such as Ritalin[®]), defined here as "use of *any* prescription stimulant without a prescription from a health care provider, use for nonmedical purposes, and/or use in excess of what is prescribed," is a substance use behavior that remains prevalent on college campuses. Trend analyses using six independent cross-sectional samples from one university showed significant increases in past-year and lifetime IUPS prevalence between 2003 (past-year: 5.4%; lifetime: 8.1%) and 2013 (past-

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year: 9.3%; lifetime: 12.7%; McCabe, West, Teter, & Boyd, 2014). Regardless of behavioral motives (i.e., academics (e.g., Judson & Langdon, 2009; DuPont, Coleman, Bucher, & Wilford, 2008; Teter, McCabe, LaGrange, Cranford, & Boyd, 2006; Low & Gendaszek, 2002)) or recreation (e.g., Bavarian, Flay, Ketcham, & Smit, 2013)), the growing prevalence is cause for concern; namely, trend data from the Drug Abuse Warning Network show statistically significant increases in the number of emergency room visits related to non-prescribed use of these drugs between 2005 and 2010 (Substance Abuse and Mental Health Services, 2013). Given the relatively recent emergence of IUPS as a field of study, and its impact on the public's health, a more comprehensive understanding and synthesis of the research on risk factors for IUPS is needed to guide prevention efforts. As theory is critical to explaining and predicting behavior, and behavior is multifaceted, the use of ecological theories that unite existing theories should provide insight into optimal prevention strategies. The purpose of this study, therefore, is to guide research and practice by framing the behavior of IUPS by college students within the context of the Theory of Triadic Influence (TTI; Flay, Snyder, & Petraitis, 2009; Flay & Petraitis, 1994).

Theoretical Lens

The theoretical frame organizing this systematic review is the TTI (Flay et al., 2009; Flay & Petraitis, 1994), an integrated, ecological approach to explaining and predicting health behaviors. Although a multitude of theories of health behavior are available, each with their own merits, the TTI was selected based on its unification of multiple theories into a single framework (Flay et al., 2009). Specifically, the TTI allows for inclusion of constructs from theories including, but not limited to, the theory of planned behavior (Ajzen, 1985), social control theory (Hirschi, 1969), social cognitive theory (Bandura, 1986), personality theory (Zuckerman, 1971), and expectancy theory (e.g., Feather, 1982; as cited in Flay et al., 2009). Moreover, past studies have applied the TTI to examine health behaviors such as alcohol use, physical activity and delinquency (Dusseldorp et al., 2014). As the goal of this paper is *not* to test a model, but rather to organize statistically significant correlates as a means of elucidating the multi-etiological nature of IUPS, the TTI provides an appropriate theoretical guide.

According to the TTI (Figure 1), independent variables are organized by streams of influence (i.e., intrapersonal, social situation/context, and sociocultural environment) and levels of causation (i.e., ultimate, distal, proximal, and immediate precursor). With respect to IUPS, the intrapersonal stream of influence focuses on characteristics of one's biology, personality, and demography that ultimately influence feelings of IUPS-related self-efficacy. Ultimate-level variables (e.g., biological sex, race/ethnicity) are furthest removed from the behavior, whereas correlates encompassing the student's affective state and behavioral skills that influence internal motivation for IUPS represent distal-level influences. Beliefs about the ability to use, avoid, or access prescription stimulants represent proximal-level influences.

With respect to the social stream of influence, correlates in the individual's immediate social setting that could contribute to social normative beliefs regarding IUPS represent ultimate-level influences. Distal-level influences include those measures that influence a student's

emotional attachments (e.g., interpersonal bonding and motivation to comply) and the behavior of influential role models. Correlates reflecting social normative beliefs regarding IUPS reflect proximal-level influences.

In the sociocultural environment stream of influence, ultimate-level influences include characteristics of the student's campus culture and broader environment that increase the risk of developing positive attitudes towards IUPS (e.g., campus grading policies that promote competition). Distal-level influences reflect the nature of the student's interactions with his/her environment as well as expectancies related to IUPS. Moreover, proximal-level influences represent the student's knowledge, attitudes, and beliefs about IUPS.

Lastly, immediate precursors encompass behavioral intentions, engaging in related behaviors, trial IUPS, and/or experiences or feedback gained from trial behavior.

Purpose

We organize findings from the IUPS literature by the TTI's streams of influence and levels of causation; doing so should provide an understanding of the processes by which risk factors interact to influence the behavior of IUPS (Coie et al., 1993). Having this comprehensive understanding should, in turn, assist professionals serving the college population who plan to design and evaluate programs and policies intended to prevent IUPS.

METHOD

Search Process

Keywords/key phrases (i.e., prescription stimulant misuse and college; "prescription stimulant misuse" and "college"; illicit use of prescription stimulants in college; nonmedical prescription stimulant use in college students) were entered into three electronic databases (PubMed, PubMed Central, and EBSCO Host). Titles, abstracts, and/or complete manuscripts were reviewed to determine whether they were published between 2000 and 2013, focused on college students or college-aged young adults, included a form of IUPS behavior as the dependent variable, and involved a quantitative analysis examining IUPS correlates. The search period allowed for the inclusion of the most current research; focus on the college population is based on research showing the behavior of IUPS is initiated primarily after a student enters college (Arria et al., 2008a; Bavarian et al., 2013; Teter, McCabe, Boyd, & Guthrie, 2003); the focus on IUPS behavior specifically, as opposed to illicit use of any prescription drug, is due to the unique motives driving IUPS; lastly, although qualitative analyses provide critical insight into IUPS, our focus was on organizing statistically significant correlates of IUPS within the framework afforded by the TTI. Articles were excluded if they: were not peer-reviewed manuscripts (e.g., periodicals, theses), were not primary research (e.g., commentaries, review articles), focused on non-college populations (e.g., adolescents), or focused only on students with Attention Deficit Hyperactivity Disorder [ADHD]. Our search strategy was led by the first author. The search was done in steps (See Table 1), with the articles retrieved in each step reviewed for eligibility and uniqueness. Each article's publication date was first reviewed to determine eligibility. Next, titles of all eligible articles were reviewed. If the title did not make clear

whether the study met inclusion criteria, the abstract was reviewed. If the abstract did not make clear whether the study met inclusion criteria, the article was reviewed in its entirety. Articles meeting all inclusion criteria were reviewed in their entirety to determine IUPS prevalence and behavioral correlates. Overall, 1,285 articles were retrieved; of these 1,285, a total of 129 articles were eligible for inclusion. After reviewing the 129 eligible articles for duplicates, 46 articles remained. As a final step, the reference section of these 46 articles were reviewed for additional eligible and unique articles; doing so resulted in the retrieval of 16 additional studies (final N=62 manuscripts).

For each unique and eligible study, we first noted the prevalence estimate provided. Next, significant correlates were classified by the lead author based on the stream of influence and level of causation in the TTI deemed appropriate. The correlate matrix was then reviewed by B.F., the co-developer of the TTI, for accuracy. Discrepancies in classification were discussed until a decision regarding accurate placement was made. Table 2 organizes correlates found to be statistically significant in each study via the TTI, and Table 1S (online supplement) provides the following information for the 62 peer-reviewed studies: author(s), study methods, year of study, population studied, study location, sample size, prevalence estimate(s), and statistically significant TTI-matched correlates of use.

RESULTS

Prevalence

For studies reporting lifetime estimates, prevalence of IUPS ranged from the 3.4% reported by Sweeney and colleagues (2013) in a national study, to 60.8% reported by Kelly and Parsons (2007) in a New York City-based study. Past-year prevalence estimates ranged from the 0% reported by one college participating in the 2001 College Alcohol Study (McCabe, Knight, Teter, & Wechsler, 2005) to 26% reported by students participating in one mid-Atlantic university's study (Lookatch et al., 2012). Lastly, past-month prevalence estimates ranged from 4.15%, reported by Shillington and colleagues (2007) in their study set in one Southern California university, to 22.7%, reported by Kaloyanides and colleagues (2007) in their study set in one Midwestern university.

Significant Correlates

Correlates of IUPS were found in each stream of influence and level of causation of the TTI. Findings are presented in Table 2. Below, we summarize results by stream of influence and level of causation.

The Intrapersonal Stream of Influence

Ultimate-level influences of the intrapersonal stream found to be associated with an increased likelihood of IUPS include ADHD-symptomology (e.g., Arria et al., 2008b; Judson & Langdon, 2009; Rabiner et al., 2009a; Rabiner et al., 2009b; Upadhyaya et al., 2010), internal restlessness (Dussault & Weyandt, 2013; Weyandt et al., 2009), and sensation seeking (Hartung et al., 2013; Herman-Stahl, Krebs, Kroutil, & Heller, 2007, Low & Gendaszek, 2002; Weyandt et al., 2009). With respect to demographics, IUPS was found to

be associated with being an upperclassmen under 24 years of age (e.g., Babcock & Byrne, 2000), male (e.g., Hall et al., 2005), and identifying as White (e.g., DuPont et al., 2008).

Distal-level influences associated with an increased likelihood of IUPS included greater academic concern, strain, or stress (Bavarian, Flay, & Smit, 2013; Ford & Schroeder, 2008; Rabiner et al., 2009a), and lower grade point average (e.g., Arria, O'Grady, Caldeira, Vincent, & Wish, 2008d; Clegg-Kraynok McBean, & Montgomery-Downs, 2011; Lord et al., 2009; McCabe, Teter, & Boyd, 2006c). Also, psychological distress (e.g., Weyandt et al., 2009), having an ADHD diagnosis (e.g., Tuttle, Scheurich, & Ranseen, 2010) and receiving mental health treatment (Wu et al., 2007) were associated with the behavior.

Prescription stimulant access self-efficacy is a proximal-level influence directly correlated with IUPS (Hall, Irwin, Bowman, Frankenberger, & Jewett, 2005; Judson & Langdon, 2009; Novak, Kroutil, Williams, & Van Brunt, 2008; Stone & Merlo, 2011). Avoidance self-efficacy, contrarily, was found to be inversely associated with IUPS (Bavarian et al., 2013).

The Social Stream of Influence

Residence is an ultimate-level influence in the social stream of influence associated with IUPS (e.g., Clegg-Kraynok et al., 2011; DeSantis, Noar, & Webb, 2009; Lord et al., 2009; McCabe, Teter, & Boyd, 2006b; McCabe et al., 2006c; Shillington, Reed, Lange, Clapp, & Henry, 2006). Specifically, living off-campus (e.g., DeSantis et al., 2009; Lord et al., 2009), and in Greek housing (e.g., McCabe et al., 2006b; McCabe et al., 2006c; Shillington et al., 2006), were found to be associated with an increased likelihood of IUPS.

Participation in Greek Life was a distal-level correlate associated with IUPS in multiple studies (e.g., DeSantis, Webb, & Noar, 2008; Lord et al., 2009; McCabe, 2008; McCabe et al., 2005). Another college-specific group found to be more likely to engage in IUPS was student-athletes (Bavarian et al., 2013). Additional distal-level influences include behavior of others (e.g., Hall et al., 2005) and relationship status (e.g., Huang et al., 2006; Wu et al., 2007). For example, in one study located at a university in the Midwest, knowing students who engage in the behavior was a predictor of IUPS for both males and females (Hall et al., 2005). Results related to relationship status suggest being single is associated with misuse (e.g., Sweeney, Sembower, Ertischeck, Shiffman, & Schnoll, 2013; Wu et al., 2007).

At the proximal level, social normative beliefs have been associated with IUPS (Bavarian et al., 2013; Judson & Langdon, 2009). That is, students who reported believing a greater percentage of their friends engaged in IUPS were more likely to themselves engage in IUPS (Bavarian et al., 2013; Judson & Langdon, 2009).

The Sociocultural Environment Stream of Influence

Findings related to ultimate-level behavioral correlates in the sociocultural environment stream have been mixed. For example, Herman-Stahl and colleagues (2007) concluded that college-attending youth, as compared to their non-college attending peers, were more likely to engage in IUPS. Durell and colleagues (2008), however, reported that past-year and past three-year misuse was more likely among non-college attending youth aged 18–25. Results related to geography have also been mixed. In one study using a national dataset,

nonmedical use of amphetamines was greatest amongst persons in the Western region as compared to those in the Northeast, Midwest, or South (Huang et al., 2006). However, in a multi-campus study involving 39 states, nonmedical use was most likely at schools located in the Northeast (McCabe et al., 2005). A separate study involving 18 campuses found the behavior to be more likely at Southern schools, as compared to Western schools (Bavarian et al., 2013). Findings related to socioeconomic status have also been mixed. Specifically, students reporting a higher income have been found more likely to engage in IUPS in some studies (e.g., Huang et al., 2007; Teter et al., 2003), whereas students reporting greater levels of financial stress have been found more likely to engage in IUPS in additional studies (Bavarian et al., 2013). One finding that has remained consistent is the direct relationship between indicators of academic demand/competition and IUPS. For example, rates of IUPS in one multi-campus study were shown to be higher at colleges with more competitive admissions standards (McCabe et al., 2005); similarly, students attending schools where class rank is identified were more likely to engage in IUPS (Emanuel et al., 2013).

At the distal-level, misuse opportunities and IUPS expectancies have been associated with IUPS. For example, being offered prescription stimulants was shown to predict misuse amongst female college students in one study (Hall et al., 2005). Also, beliefs that prescription stimulants help with studying were found to be associated with IUPS in a separate study (Carroll, McLaughlin, & Blake, 2006). Moreover, likelihood of the behavior has been found to decrease as students' anticipation of negative consequences increases (Lookatch et al., 2012).

Greater prescription stimulant knowledge (e.g., Habibzadeh et al., 2009; Judson & Langdon, 2009), less perceived harm (Arria et al., 2008c; Judson & Landon, 2009; Stone & Merlo, 2011), and more positive attitudes towards the behavior of IUPS (Bavarian et al., 2013; Judson & Langdon, 2009) are proximal-level influences associated with IUPS. For example, students engaging in IUPS have been found to be more knowledgeable about the adverse effects of IUPS, but less concerned with health risks (Judson & Langdon, 2009). Additionally, students engaging in IUPS, as compared to prescription holders, are less likely to view IUPS as unethical behavior (Judson & Langdon, 2009).

Immediate Precursors

The most reoccurring immediate precursor associated with IUPS was engaging in other substance use (e.g., Advokat, Guidry, & Martino, 2008; Arria et al., 2008b; Barrett, Darredeau, Bordy, & Pihl, 2005; DeSantis et al., 2009; McCabe & Teter, 2007; McCabe et al., 2006b; Shillington et al., 2006). Engaging in other high-risk behaviors (Teter, McCabe, Boyd, & Guthrie, 2003), having a criminal record (Wu et al., 2007), consuming energy drinks (Arria et al., 2010), and having a substance use disorder (e.g., Wu et al., 2007) were also associated with IUPS. Additional immediate precursors associated with IUPS included trial behavior (Arria et al., 2008c; Teter et al., 2006), particularly if there is an early age of initiation (McCabe, West, Morales, Cranford, & Boyd, 2007; McCabe et al., 2006c), prescription stimulant dependence (Judson & Langdon, 2009), and being satisfied with the academic impact of IUPS (Rabiner et al., 2009a). The most proximal immediate precursor,

IUPS intentions, was examined in only one study (Bavarian et al., 2013), and found to be strongly associated with IUPS.

DISCUSSION

This review has highlighted the prevalence of IUPS as well as the multifaceted etiology of this substance use behavior, both of which have implications for practice and future research. With respect to prevalence, we observed variation in prevalence across studies. One implication of this finding for future studies is to determine the campus-level policies (e.g., campus health center policies that limit availability, student conduct policies that specifically identify IUPS as academic dishonesty) and broader characteristics (e.g., state-level controlled substance policies) that may be influencing this variation. This review also elucidated the multi-etiological nature of IUPS, illustrating the intrapersonal factors associated with use, as well as the broader, societal influences that help explain why this behavior has emerged among 21st century college students. Below, we highlight preventative action that could be taken based on reoccurring behavioral correlates in each stream of influence within the TTI (Table 2).

Prevention Implications

The Intrapersonal Stream of Influence—In the intrapersonal stream of influence, ADHD symptomology, a diagnosis of ADHD, and lower grade point average were correlates of IUPS found in multiple studies. Given that students exhibiting signs of inattention and hyperactivity may seek assistance from health professionals on campus, these professionals can not only continue providing guidance on behavioral strategies to address symptoms, but they can also be trained to identify and act upon signs of IUPS (Greydanus, 2006). Furthermore, given the consistent finding that lower grade point average was associated with IUPS, academic advisors can also be trained to identify symptoms of IUPS and provide referrals as needed. For students diagnosed with ADHD, a group at higher-risk for IUPS, campus professionals (e.g., disability services, resident advisors, pharmacists) can discuss proper medication management. These students should also be made aware of the risks associated with medication diversion (Arria & DuPont, 2010), and be taught refusal skills, as they may be approached most frequently with diversion requests (McCabe & Boyd, 2005).

The Social Stream of Influence—One reoccurring finding across studies was that students participating in Greek Life were more likely to engage in IUPS. Moreover, at the proximal level, social norms were found to be directly associated with IUPS. Taken together, these findings suggest the importance of targeted messaging to Greek students that correct normative misperceptions. Programs should be designed that overcome limitations of past interventions designed to reduce other forms of substance use in this population. For example, a recent intervention using peer-facilitation and normative feedback with Greek students was found to have no influence on alcohol use behaviors; it was later determined that students receiving the intervention questioned the credibility of the peer facilitators and normative data (Wilke, Mennicke, Howell, & Magnuson, 2014).

The Sociocultural Environment Stream of Influence—Action can also be taken based on findings from the sociocultural environment stream of influence. For example, anticipating negative consequences was found to serve as a deterrent to IUPS (Lookatch et al., 2012). One implication of this finding is that partnerships can be made between law enforcement and media to highlight the fact that the buying and selling of prescription drugs is an illegal offense (Arria & DuPont, 2010; Vance & Weyandt, 2008). Also, because the expectation that IUPS will improve academic performance was found to be associated with misuse (Carroll et al., 2006), social marketing campaigns could be introduced that dispel myths related to the academic abilities of misuse (Arria & DuPont, 2010) and highlight healthy ways to improve academic performance (e.g., avoiding procrastination).

Immediate Precursors—The most frequent correlate of IUPS was engaging in other forms of substance use. Given that substance use prevention efforts pre-exist on campuses, schools that have not yet done so should incorporate IUPS prevention messages into their comprehensive substance use prevention programming. In addition, health care providers who screen briefly for alcohol and other drug use could also inquire about IUPS, should a student indicate use of these other drugs. Screening for IUPS may result in early intervention (Arria & DuPont, 2010), thereby possibly preventing future morbidity.

Limitations

Our systematic review is not without its limitations. Our study did not include grey literature (e.g., unpublished manuscripts, theses, and dissertations), and therefore publication bias may be present. Also, we only included statistically significant findings; this is a limitation as studies with more narrow definitions of IUPS may have lacked the sample size needed to detect significant correlates of the behavior. As a result, our review is conservative in nature.

An additional limitation is the variation in how IUPS was defined across studies. For example, some studies inquired only about methylphenidate misuse (e.g., Babcock & Byrne, 2000; DuPont et al., 2008), even though other classes of prescription stimulants (i.e., dextroamphetamines and mixed amphetamine salts) exist. In addition, some studies (e.g., Advokat et al., 2008) did not include students with a prescription for medical stimulants in their prevalence estimates, in spite of literature showing IUPS to be more likely among students with a prescription (e.g., Judson & Langdon, 2009; Tuttle, et al., 2010). This variation precluded conducting a meta-analysis. Although some researchers may be primarily interested in the strongest correlates of IUPS, the field of IUPS is a growing one, and the systematic review we provide allows the multifaceted nature of IUPS to be elucidated. A final limitation is that although integrated theories such as the TTI may predict behavior most accurately (Coie et al., 1993), the amount of information provided could be overwhelming. Our goal was to provide the information in a way that elucidates preventive action(s) that could be taken at college campuses.

Future Research Directions

A number of future research directions exist in this growing area of study. For example, the majority of the studies retrieved were cross-sectional in nature, limiting our ability to establish temporality. Moreover, the majority of the IUPS studies took place at a single

campus. Without the use of nationally representative samples, generalizations about IUPS are difficult, and the ability to determine what university-level characteristics serve as protective factors against IUPS is hindered. To address these gaps, future research could include longitudinal studies on nationally representative samples using a universal, standardized, IUPS-focused instrument.

Conclusions

The purpose of this systematic review was to organize what is currently known about IUPS in the college population using one comprehensive theory, with the goal that professionals in higher education can use this review to assist with planning prevention and intervention activities. With the increased time, financial and academic demands facing this generation's college students, IUPS is likely to remain prevalent in the college environment for years to come. As such, the need exists to address this substance use behavior as a means of maintaining a healthy learning and living environments for college students.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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THE THEORY OF TRIADIC INFLUENCE

Figure 1.

The Theory of Triadic Influence. Note: Figure adapted from: Flay, B. R., Snyder, F., & Petraitis, J. (2009). The Theory of Triadic Influence. In R.J.DiClemente, M. C. Kegler & R. A. Crosby (Eds.), *Emerging Theories in Health Promotion Practice and Research* (Second ed., pp. 451-510). New York: Jossey-Bass.

Table 1.

Search strategy summary.

Search Phrase	Search Order	Search Engine	Total Articles Retrieved	Eligible Articles	Unique* & Eligible Articles
Prescription stimulant misuse and college	1	PubMed	37	12	12
	2	PubMed Central	373	23	20
	3	EBSCO Host	11	3	0
"Prescription stimulant misuse" and "college"	4	PubMed	7	2	0
	5	PubMed Central	12	4	0
	6	EBSCO Host	11	3	0
Illicit use of prescription stimulants in college	7	PubMed	25	16	7
	8	PubMed Central	585	25	2
	9	EBSCO Host	4	1	0
Nonmedical prescription stimulant use in college students	10	PubMed	30	16	5
	11	PubMed Central	188	24	0
	12	EBSCO Host	2	0	0
Initial Totals			1,285	129	46
Reference Check	13	Not Applicable	Not Applicable		16
Final Total					62

* Unique = Not retrieved in prior step of search order

Table 2.
The Illicit Use of Prescription Stimulants in the College Population: Behavioral Correlates and Prevention Implications

<i>Stream of Influence/Level of Causation</i>	Correlate	Source*	Prevention Implication
Intrapersonal/Ultimate	ADHD symptoms (Inattention/Impulsivity)	3, 19, 26, 30, 46, 47, 48, 59	Findings from the Intrapersonal stream highlight the risk for IUPS posed by inattention, hyperactivity, and lower grade point average. Implications: *Train health care providers, academic advisors, and learning disability specialists to recognize the signs and symptoms of IUPS Students with a diagnosis of ADHD appear to be at high-risk for IUPS. Implications: *Train campus professionals who work with students receiving medicinal treatment how to promote proper medication management
	Age/Year in School	8, 14, 15, 16, 18, 20, 28, 33, 35, 40, 42, 53, 62	
	Disability	29	
	Ethnicity	10, 11, 16, 17, 27, 28, 33, 35, 40, 42, 43, 47, 49, 53, 55, 58, 59, 62	
	Internal restlessness	19, 60	
Intrapersonal/Distal	Sensation seeking	26, 27, 36, 60	
	Sex/Gender	16, 20, 24, 25, 26, 28, 32, 33, 36, 42, 43, 47, 53, 62	
	Academic concern/strain/stress	11, 21, 47	
	ADHD diagnosis	2, 10, 58	
	Class attendance	2	
	Grade Point Average	2, 7, 10, 11, 14, 22, 24, 35, 42, 43, 47, 51, 60	
	Mental health treatment	62	
	Psychological distress (e.g., depression, stress, anxiety)	11, 19, 27, 54, 60	
	Access self-efficacy	25, 30, 45, 52	
	Avoidance self-efficacy	10	
Social Situation-Context/Ultimate	Residence	10, 11, 14, 15, 23, 35, 41, 42, 51	Findings from the Social Situation Stream highlight the risk posed by Greek life participation. The importance of social norms was also highlighted. Implications: *Targeted prevention messages tailored for the Greek population that correct normative misperceptions
	Behaviors and Attitudes of Others	10, 25, 26	

<i>Stream of Influence/Level of Causation</i>	Correlate	Source*	Prevention Implication
	Greek Life	11, 16, 19, 35, 37, 42, 43, 46, 47, 51, 60	
	Relationship status	28, 53, 62	
	Varsity Athletics	10	
<i>Social Situation-Context/Proximal</i>	Social normative beliefs	10, 30	
<i>Sociocultural Environment/Ulimate</i>	Academic demand	20, 43	Findings from the ultimate-level of the Sociocultural Environment stream were mixed. Consistent findings were found in the distal- and proximal-levels, with positive expectancies serving to promote IUPS and negative expectancies serving to deter IUPS. Implications: *Campus-community partnerships to highlight legality and enforcement of diversion laws *Dispel myths related to academic impact of prescription stimulants for healthy individuals *Social marketing to promote healthy ways to achieve academic success
	College environment	18, 27	
	Geography	11, 20, 28, 43	
	Media	10	
	Religion	11, 42	
	Socioeconomic Status	2, 11, 28, 33, 57, 61	
<i>Sociocultural Environment/Distal</i>	Misuse opportunity	25	
	Expectancies	13, 34	
<i>Sociocultural Environment/Proximal</i>	Attitudes towards the behavior	10, 30	
	Perceived harm	6, 30, 52	
	Prescription stimulant knowledge	10, 24, 30	
<i>Immediate Precursors</i>	Age of initiation	39, 42	The most re-occurring correlate of IUPS was engaging in other forms of substance use. Implications: *Including screening for IUPS as part of a comprehensive drug and alcohol screening process
	Criminal record	62	
	Dependent on Prescription Stimulants	30	
	Energy drink use	4	
	Experiences with Prescription Stimulants	47	
	High-risk behavior	57	
	Intentions to use Prescription Stimulants	10	
	Other substance use	1, 2, 5, 9, 11, 15, 20, 26, 27, 31, 35, 38, 40, 41, 43, 45, 46, 47, 48, 50, 51, 52, 56, 57, 62	
	Substance Use Disorder	2, 22, 34, 62	

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<i>Stream of Influence/Level of Causation</i>	Correlate	Source*	Prevention Implication	
	Trial Behavior	6,55		

* Note: For sources 12 and 44, no covariates examined were significantly associated with illicit use of prescription stimulants. Sources appear in parentheses in the References section.