

An Examination of Prescription Stimulant Misuse and Psychological Variables Among Sorority and Fraternity College Populations

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Abstract

Objective: The objective of this study was to examine nonmedical stimulant use among fraternity/sorority members and nonmembers and whether psychological variables (e.g., internal restlessness, depression, anxiety, and stress) were related to nonmedical stimulant use. **Method:** The sample consisted of 1,033 undergraduate students from five universities located in the northeastern, southeastern, northwestern, southwestern, and midwestern regions of the United States. **Results:** The findings revealed that fraternity and sorority members reported a higher rate of nonmedical stimulant use than nonmembers. In addition, regression analyses revealed that higher ratings of anxiety, stress, internal impulsivity, and internal restlessness significantly predicted nonmedical stimulant use. **Conclusion:** Current findings support further examination of nonmedical stimulant use among other college student subpopulations (i.e., athletic teams, honor societies, residence halls). In addition, there is a strong need to develop research-based intervention and preventive measures that target college populations identified as being at risk for nonmedical stimulant use. (*J. of Att. Dis.* XXXX; XX(X) X-XX)

Keywords

ADHD, adult, stimulant abuse

Introduction

ADHD is characterized by inattentiveness, hyperactivity, and impulsivity (Barkley, 2006; Weyandt, 2006). The symptoms of ADHD manifest in childhood; however, symptoms continue into adulthood for approximately 30% to 60% of children diagnosed with ADHD (Biederman, Mick, & Faraone, 2000; Torgersen, Gjervan, & Rasmussen, 2006). Research estimates that approximately 2% to 10% of college students display symptoms of ADHD (Garnier-Dykstra et al., 2010; Weyandt, Linterman, & Rice, 1995). Recent studies suggest that college students with ADHD are at an increased risk for social, psychological, and academic difficulties compared with college students without ADHD (DuPaul, Weyandt, O'Dell, & Varejao, 2009; Gropper & Tannock, 2009; Overbey, Snell, & Callis, 2011; Wolf, Simkowitz, & Carlson, 2009). For example, Lewandowski, Lovett, Coddington, and Gordon (2008) investigated academic difficulties among college students with ADHD. Results revealed that students diagnosed with ADHD reported “having to read material over and over to understand it” (80.6%), “taking longer to complete assignments than others” (78.4%) and “rarely reading in spare

time” (73%; Lewandowski et al., 2008). In addition to academic difficulties, preliminary research suggests that college students with ADHD may also experience more psychological and social difficulties when compared with non-ADHD peers (Barkley, 2006; DuPaul, Weyandt, O'Dell, et al., 2009; Shaw-Zirt, Leelawatte, Chaplin, & Bergman, 2005). To further examine difficulties regarding self-esteem and social skills among college students with ADHD, researchers Shaw-Zirt et al. (2005) assessed college adjustment, social skills, and self-esteem in a sample of college students with ADHD. The results indicated that students with ADHD symptoms demonstrated decreased functioning in academic achievement, social adjustment, personal-emotional adjustment, goal commitment, and institutional attachment. In addition, participants with ADHD also demonstrated lower levels of self-reported

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social skills and self-esteem when compared with participants without ADHD symptoms (Shaw-Zirt et al., 2005).

Pharmacological interventions, such as stimulant medications, are most often used to treat ADHD symptoms in college students (Advokat, 2010; Conner, 2006; DuPaul, Weyandt, & Booster, 2009). Although stimulants are often highly effective at reducing ADHD symptoms, the non-medical use of prescription stimulants among college students has become evident in recent years (DeSantis, Noar, & Webb, 2010; DuPont, Coleman, Bucher, & Wilford, 2008; Judson & Langdon, 2009; Rabiner et al., 2009a; Weyandt et al., 2009). For instance, Babcock and Byrne (2000) surveyed 283 students regarding the nonmedical use of prescription stimulants. The results found that 16% of students reported taking Ritalin for “fun” and only less than 2% of the sample currently had a prescription for Ritalin (Babcock & Byrne, 2000). McCabe, Knight, Teter, and Wechsler (2005) also examined the prevalence of nonmedical stimulant use among a national sample of randomly selected students attending 4-year colleges. Results indicated that 6.9% of the sample reported lifetime, nonmedical use of prescription stimulants. These findings are slightly lower than the prevalence rates reported by Babcock and Byrne (16%). A more recent study by DuPont et al. (2008) investigated motives behind nonmedical use of prescription methylphenidate (MPH) among college students. The results indicated that 5.3% reported using MPH nonmedically at least once (DuPont et al., 2008). This rate is similar to the prevalence rates reported by McCabe, Knight, et al. (6.9%). The most frequently reported motive for use was for “work/study” and to “party” (DuPont et al., 2008). Judson and Langdon (2009) also examined reported motives for nonmedical use of prescription stimulants among college students. Approximately 18.3% of non-prescription holders reported nonmedical stimulant use (Judson & Langdon, 2009). This rate is higher than the prevalence rates reported in previous research such as those conducted by DuPont et al. (5.3%), and McCabe, Knight, et al. (6.9%). The most frequently reported motives for misuse were to improve concentration (28.8%) and to increase alertness or to stay awake (23.4%).

Primary motives with regard to nonmedical use of stimulant medication among college students appear to be related to academic and social needs (DuPont et al., 2008; McCabe, Knight, et al., 2005; Teter et al., 2005). In addition, research suggests that the nonmedical use of stimulants tend to be higher among college students who are Caucasian, who are members of a sorority or fraternity, and who have a lower grade point average (GPAs; DuPaul, Weyandt, O’Dell, et al., 2009; Rabiner et al., 2009a). For example, Rabiner, Anastopoulos, Costello, Hoyle, and Swartzwelder (2009) found that nonmedical use of stimulant medications was more common among those who identified as Caucasian compared with non-Caucasians (7.2% vs. 1.8%), among

males more than females (7.2% vs. 4.5%), and among students in the Greek system than students not part of the Greek system (10.5% vs. 4.2%). Self-reported GPAs were lower among nonmedical stimulant users than nonusers and concerns regarding academic performance were higher (Rabiner et al., 2009). A qualitative study conducted by DeSantis et al. (2010) examined motives and perceived benefits of nonmedical stimulant use specifically among fraternity members. Participants reported that nonmedical prescription stimulant use was common on-campus, in general, but even more common inside the fraternities. For instance, one participant reported that when he moved into the fraternity house “it seemed like everyone was on it. Sometimes, everyone was on it. It was something that nobody hid at all” (DeSantis et al., 2010, p. 161). In addition, participants reported that using stimulants increased their ability to be productive. For example, one participant reported that “when I take Adderall, I am really productive; I can get so much done, like a week’s worth of stuff in one day” (DeSantis et al., 2010, p. 163). Although participants reported using stimulants primarily for academic purposes, other participants reported using stimulants for nonacademic purposes. For example, one participant reported, “Partying is draining. If you have a big night and you are tired, you just take Adderall and you are set to go” (DeSantis et al., 2010, p. 164).

Preliminary research suggests that psychological factors such as internal restlessness may also increase the risk of nonmedical stimulant use. Previous research suggests that ADHD symptoms manifest differently in adulthood than in childhood (Barkley, 2006; Wolf et al., 2009). For example, hyperactivity experienced in childhood typically decreases as one enters adolescence and adulthood and is replaced with a sense of internal restlessness (Weyandt et al., 2003; Wolf et al., 2009). Internal restlessness is defined, by the research, as cognitive or mental restlessness experienced by adults with ADHD (Biederman et al., 2000; Weyandt et al., 2003). Additional psychological variables such as depression, anxiety, and stress may also be related to nonmedical stimulant use (Rabiner et al., 2009b; Teter, Falone, Cranford, Boyd, & McCabe, 2010; Weyandt et al., 2009). For instance, a recent study conducted by Weyandt et al. (2009) found that participants who reported higher rates of nonmedical stimulant use also reported higher rates of psychological distress specifically related to somatization, obsessions, compulsions, sensitivity, depression, anxiety, hostility, phobia, paranoia, and psychoticism. A study by Janusis and Weyandt (2010) found a relationship between stress and nonmedical stimulant use among college students with disabilities. Results indicated that students with disabilities who reported a higher level of stress also reported a higher level of stimulant misuse (Janusis & Weyandt, 2010). These findings suggest that individuals with disabilities experiencing high rates of stress may also be a population

considered to be at risk for stimulant misuse. To further examine nonmedical stimulant use and psychological variables, Teter et al. (2010) examined the relationship between nonmedical stimulant use and depressed mood. Results indicated that the past-year prevalence rate of nonmedical stimulant use was 6%. Among those 6%, approximately 50% also reported past-month depressed mood (Teter et al., 2010). A recent study by Rabiner et al. (2009b) also examined depressive symptoms of college students who use prescription stimulant medications for nonmedical purposes. Results revealed that those who reported stimulant misuse and attention difficulties had lower GPAs, more academic concerns, and higher levels of depressive symptoms than individuals who reported less attention difficulties (Rabiner et al., 2009b). These findings suggest that individuals who report a higher rate of attention difficulties and depressive symptoms may also be at an increased risk for nonmedical stimulant use (Rabiner et al., 2009b).

In summary, research estimates that between 4% and 18% of college students report the nonmedical use of prescription stimulants (Babcock & Byrne, 2000; Judson & Langdon, 2009). Previous research has found that college students who are members of a fraternity or sorority are more likely to report a higher rate of nonmedical use of prescription stimulants than nonfraternity or nonsorority members (Rabiner et al., 2009a; Weyandt et al., 2009). Few studies, however, have examined the nonmedical use of prescription stimulant medications specifically among fraternity and sorority members in comparison with nonfraternity and nonsorority members, and of those that have been conducted, most have limited their sample to only one college campus in one region of the United States (Lewandowski et al., 2008; Weyandt et al., 2009). In addition, preliminary research suggests that psychological variables may be related to nonmedical stimulant use among college students (Teter et al., 2010; Weyandt et al., 2009); however, no studies have explored these factors with regard to social sorority and fraternity membership. The purpose of the present study was to examine the prevalence of self-reported nonmedical prescription stimulant use among fraternity and sorority members. Specifically, the present study sought to address the research question "Do students who are members of a fraternity or a sorority report more nonmedical prescription stimulant use than nonmembers?" The present study also sought to examine whether psychological variables were related to self-reported nonmedical stimulant use. Based on previous research, it was hypothesized that sorority and fraternity members would report higher ratings on the Self-Reported Prescription Stimulant Use factor, Perception of Prevalence of Prescription Use Among Peers factor, Knowledge of Atypical Stimulant Use Among Peers factor, and the Perception of Safety of Stimulants factor on the Stimulant Survey Questionnaire (SSQ; Weyandt et al., 2009) than nonsorority and nonfraternity members. In

addition, it was also hypothesized that college students who reported higher ratings on the Depression, Anxiety, and Stress subscales of the Depression Anxiety Stress Scales–21 (DASS-21; Lovibond & Lovibond, 1995) would also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009). Furthermore, college students who reported higher ratings on the Internal Distractibility factor, Internal Restlessness factor, Internal Impulsivity factor, and Internal Disorganization factor on the Internal Restlessness Scale (IRS; Weyandt et al., 2003) were hypothesized to also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009).

Method

Participants

Participants consisted of male and female undergraduate students who were enrolled in a variety of courses during the fall of 2010 at five universities located in the northeastern, southeastern, northwestern, southwestern, and midwestern regions of the United States. A total of 1,065 participants completed the survey questions; 32 participants answered "yes" to the item inquiring whether they are currently taking stimulant medications that have been prescribed to them by a health care provider, and were therefore excluded from the analyses yielding a sample of 1,033 participants, including 114 from a university located in the southwestern region of the United States, 289 from a university located in the southeastern region of the United States, 144 from a university located in the midwestern region of the United States, 291 from a university located in the northeastern region of the United States, and 195 from a university located in the northwestern region of the United States. Approximately 19.9% of participants identified as social sorority/fraternity members and 79.2% identified as non-social sorority/fraternity members. In addition, 300 participants identified as male, 723 as female.

Measures

IRS. The IRS (Weyandt et al., 2003) is a 24-item self-report measure that was designed to assess internal (i.e., mental) restlessness. Responses to the IRS are made on a 7-point Likert-type scale ranging from 1 (*none of the time*) to 7 (*all of the time*). The IRS generates a total score and preliminary factor analyses revealed a 4-factor structure consisting of Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization (Weyandt et al., 2003). Previous research has found the test-retest reliability of the IRS to be high over a 4-week time period (.89). In addition, previous research has also examined the concurrent validity of the IRS based on correlations

with instruments used to assess ADHD in adults—the Adult Rating Scale and the Young Adult Rating Scale—and concurrent validity was found to be high, .85 and .86, respectively (Weyandt et al., 2003; Weyandt, Hays, & Schepman, 2005). Previous research has also supported the construct validity of the IRS (Weyandt et al., 2005).

DASS-21. The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item self-report scale that measures states of depression, anxiety, and stress. Respondents are asked to rate statements based on the extent to which they have experienced each state over the past week on a 4-point Likert-type scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*; Lovibond & Lovibond, 1995). The Depression subscale assesses feelings of hopelessness, self-deprecation, lack of interest/involvement, and low positive affect (Lovibond & Lovibond, 1995). Previous research has found that the internal consistency of the DASS-21 subscales are as follows: the Depression subscale ranging from .91 to .97, the Anxiety subscale ranging from .81 to .92, and the Stress subscale ranging from .88 to .95 (Antony, Bieling, Cox, Enns, & Swinson, 1998; Lovibond & Lovibond, 1995). Previous research has also examined the concurrent validity of the DASS-21 based on correlations with other measures. The DASS-21 Depression subscale significantly correlated with the Beck Depression Inventory (.79) and the DASS-21 Anxiety subscale significantly correlated with the Beck Anxiety Inventory (.85) demonstrating adequate concurrent validity (Antony et al., 1998).

SSQ. The SSQ (Weyandt et al., 2009) is a 40-item instrument designed to measure the use and misuse of prescription stimulant medications as well as knowledge about prescription stimulants among college students (Weyandt et al., 2009). The survey contains 30 statements in which responses are rated on two 5-point Likert-type scales with items 1 to 20 ranging from 1 (*never*) to 5 (*always*) and items 21 to 30 ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The final 10 items (31-40) are presented in a yes/no forced-choice format. The SSQ generates a total score and measures four factors: Self-Reported Prescription Stimulant Use, Perception of Prevalence of Prescription Use Among Peers, Knowledge of Atypical Stimulant Use Among Peers, and Perception of Safety of Stimulants. Weyandt et al. (2009) found the SSQ to have adequate internal consistency with a Cronbach's alpha coefficient of .85 for all items (Weyandt et al., 2009). A principal-axis factor analysis revealed four factors accounting for 51.11% of the total variance. Previous research has found the internal consistency of the four factors to be as follows: Factor 1, Cronbach's alpha coefficient = .92; Factor 2, Cronbach's alpha coefficient = .43; Factor 3, Cronbach's alpha coefficient = .61; and Factor 4, Cronbach's alpha coefficient = .61 (Weyandt et al., 2009).

Demographic survey. A demographic survey was developed by the investigator to assess participants' gender, class status (freshman, sophomore, junior, senior, other), college major, age, ethnicity, and current GPA. Students were also asked to indicate whether they were currently a member of a social, academic, or professional fraternity/sorority. In addition, participants were asked whether they have been diagnosed with ADHD and whether they have a medical prescription for stimulant medication. Participants who reported having a prescription for stimulant medication were excluded from the analyses. Participants who reported having a diagnosis of ADHD (2.5%) but not having a prescription for stimulant medication were included in the analyses.

Procedure

In all, 1,033 male and female participants were recruited from five universities located in five different regions of the United States. Professors and Greek affairs staff members were contacted via email with an explanation of the study. A link was included in the email leading to the informed consent document and survey measures. Professors and Greek affairs staff were asked to distribute the email containing the link to students who may choose to participate. If students chose to participate, they were instructed to enter the Google Documents website and were asked to read the informed consent document which was provided with an option to print. Next, they were presented with the demographic survey, the SSQ (Weyandt et al., 2009), the IRS (Weyandt et al., 2003), and the DASS-21 (Lovibond & Lovibond, 1995). On completion, students were provided with a debriefing of the study that they could print and submit as proof of participation for extra credit purposes or community service if offered by professors or Greek affairs staff.

Results

The demographics of the sample were compared with the reported demographics of each university from the 2009-2010 Common Data Set (CDS). The sample, overall, was consistent with the demographics of the individual university population with respect to age, ethnicity, and social sorority membership. Gender and social fraternity membership was not representative of the individual university population; a disproportionate number of participants identified as female ($n = 723$) rather than male ($n = 300$). The percentage of participants from each of the five universities that reported using prescription stimulants for nonmedical purposes was 19.8%. With regard to social versus academic sorority/fraternity membership, 35.6% of social sorority/fraternity members, 25% of participants who reported being members of social sororities/fraternities and academic sororities/fraternities, 19.7% of academic sorority/

Table 1. Reported Motives for Nonmedical Stimulant Use Among Social Fraternity/Sorority Members, Academic Sorority/Fraternity Members, Nonmembers, Participants Identified as Both Social and Academic Sorority/Fraternity Members, Male, and Female Participants

Motive	Social members (%)	Academic members (%)	Both academic and social members (%)	Nonmembers (%)	Males (%)	Females (%)
"To focus better in class"	64.5 ^a	35.7 ^b	62.5 ^b	57.0 ^a	64.1 ^a	55.2 ^a
"To perform better on tests"	87.0 ^c	42.9 ^c	25	100 ^c	73.1 ^b	68.0 ^c
"To help socialize better"	14.5	21.4 ^a	0	15.1	17.9	13.6
"To help me lose weight"	16.1	14.3	25	24.3	7.7	30.4
"To perform better in my schoolwork"	82.3 ^b	42.9 ^c	75.0 ^c	66.4 ^b	78.2 ^c	65.6 ^b
"To feel more energetic"	37.1	35.7 ^b	50.0 ^a	47.9	42.3	45.6
"To feel better about myself"	4.8	14.3	0	10.9	10.3	8.8
"To get 'high'"	25.8	14.3	0	44.5	51.3	25.6

^aDenotes third most frequently reported reason.

^bDenotes second most frequently reported reason.

^cDenotes first most frequently reported reason.

fraternity members, and 15.9% of participants who were neither social nor academic sorority/fraternity members reported having used prescription stimulants for nonmedical purposes. With regard to gender, 26.0% of males and 17.3% of females reported having used prescription stimulants for nonmedical purposes. Overall, the three most frequently reported reasons for the nonmedical use of stimulants were academically related (see Table 1).

Preliminary Data Analysis

The hypotheses were tested using MANCOVA and standard multiple regression analyses. Preliminary assumption testing for MANCOVA and regression analyses were conducted following guidelines detailed by Tabachnick and Fidell (2007c) with regard to unequal sample sizes missing data, multivariate normality, linearity, outliers, homogeneity of covariance, homogeneity of regression, ratio of cases to independent variables, normality, linearity, homoscedasticity, outliers, multicollinearity, and singularity. Violations were committed with regard to normality, linearity, and outliers. To account for this violation, outliers were recoded as one unit larger than the highest non-outlier (Tabachnick & Fidell, 2007a). After making these outlier adjustments and running the assumption testing a second time, normality, linearity, and outlier assumptions were no longer violated.

Sorority/Fraternity Members and Nonmedical Stimulant Use

To test Hypothesis 1 that sorority and fraternity members would report higher ratings on the four factor scores (Self-Reported Prescription Stimulant Use, the Perception of

Prevalence of Prescription Use Among Peers, Knowledge of Atypical Stimulant Use Among Peers, and Perception of Safety of Stimulants) of the SSQ (Weyandt et al., 2009) than nonsorority and nonfraternity members, a one-way between-groups MANCOVA was conducted to adjust for potential covariates, age, and ethnicity. Nonmembers were defined as individuals who did not identify themselves as being social sorority/fraternity members only. As a result of recoding, Factor 3 on the SSQ—Knowledge of Atypical Stimulant Use Among Peers—became a constant and was therefore not included in the analyses. There was a statistically significant difference between participants who identified as social fraternity/sorority members and nonmembers on the combined dependent variables: $F(3, 969) = 12.76$, $p < .001$, Wilks's $\lambda = .96$, partial $\eta^2 = .038$. The results for the dependent variables were considered separately through the use of follow-up ANCOVAs; age and ethnicity were included as potential covariates. The Self-Reported Prescription Stimulant Use factor of the SSQ reached a level of statistical significance after using a Bonferroni adjustment (Tabachnick & Fidell, 2007c) of $p = .017$: $F(1, 994) = 37.57$, $p < .001$, partial $\eta^2 = .036$. For the ratings on the Self-Reported Prescription Stimulant Use factor of the SSQ, social sorority/fraternity members ($M = 19.13$, $SD = .13$) scored significantly higher than nonmembers ($M = 18.20$, $SD = .07$), indicating that social sorority/fraternity members report a higher rate of nonmedical stimulant use than nonmembers. The Perception of Prevalence of Prescription Use Among Peers factor of the SSQ also reached a level of statistical significance after using a Bonferroni adjustment level (Tabachnick & Fidell, 2007c) of $p = .017$: $F(1, 972) = 9.209$, $p = .002$, partial $\eta^2 = .009$. For the ratings on the Perception of Prevalence of Prescription Use Among Peers factor of the SSQ, social

Table 2. Summary of Standard Multiple Regression Analyses for Depression, Anxiety, and Stress Subscales of the DASS-21 and Summary of Standard Multiple Regression Analyses for the Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization Subscales of the IRS Predicting the Self-Reported Prescription Stimulant Use Factor of the SSQ

Predictor	B	SE B	β	p value	R^2	Adjusted R^2
Step 1					.026	.023
Stress	.035	.026	.067	.170		
Depression	.000	.034	.000	.993		
Anxiety	.090	.036	.108	.014		
Step 1					.045	.041
Internal Distractibility	.013	.009	.063	.152		
Internal Restlessness	.027	.014	.079	.079		
Internal Impulsivity	.074	.029	.100	.010		
Internal Disorganization	.013	.021	.020	.535		

Note: DASS-21 = Depression Anxiety Stress Scales–21; IRS = Internal Restlessness Scale; SSQ = Stimulant Survey Questionnaire.

sorority/fraternity members ($M = 25.27$, $SD = .41$), scored significantly higher than nonmembers ($M = 23.87$, $SD = .21$), indicating that social sorority/fraternity members perceive a higher rate of nonmedical stimulant use among peers than nonmembers. In addition, the Perception of Safety of Stimulants factor of the SSQ also reached a level of statistical significance after using a Bonferroni adjustment level (Tabachnick & Fidell, 2007c) of $p = .017$: $F(1, 995) = 12.197$, $p < .001$, partial $\eta^2 = .012$. For the ratings on the Perception of Safety of Stimulants factor of the SSQ, social sorority/fraternity members ($M = 15.00$, $SD = .31$) scored significantly higher than nonmembers ($M = 13.78$, $SD = .15$), indicating that social sorority/fraternity members have a higher perception of safety of nonmedical prescription stimulant use than nonmembers.

Depression, Anxiety, and Stress and Nonmedical Stimulant Use

The second hypothesis that college students who reported higher ratings on the Depression, Anxiety, and Stress subscales of the DASS-21 (Lovibond & Lovibond, 1995) would also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009) was tested via standard multiple regression analyses to determine which independent variable most strongly predicted self-reported prescription stimulant use (Tabachnick & Fidell, 2007b). The full model explained a small (Cohen, 1988) amount of variance in the criterion variable (adjusted $R^2 = .023$), $F(3, 1022) = 9.033$, $p < .001$. Results revealed that the only significant predictor was the Anxiety subscale of the DASS-21, $t(1022) = 2.472$, $p = .014$ (see Table 2), with those reporting higher rates of anxiety also reporting higher rates of nonmedical stimulant use. In addition to standard multiple regression analyses,

hierarchical regression analyses were used to assess the amount of prediction added to self-reported prescription stimulant use by Depression, Anxiety, and Stress while controlling for gender and Greek status. The total variance explained by the model as a whole was 8.8%, $F(5, 1015) = 20.704$, $p < .001$. The independent variables, depression, anxiety, and stress explained an additional 3.0% of the variance in self-reported prescription stimulant use, after controlling for gender and Greek status, R^2 change = .030, F change (3, 1015) = 11.099, $p < .001$. In the final model, only two independent variables were statistically significant, with the Stress subscale recording a higher beta value ($\beta = .093$, $p < .05$), than the Anxiety subscale ($\beta = .086$, $p < .05$; see Table 3). These findings suggest that when differences with regard to gender and Greek status are controlled for, participants who score higher on the Stress and Anxiety subscales also tend to score higher on the Self-Reported Prescription Stimulant Use subscale.

Internal Restlessness and Nonmedical Stimulant Use

The third hypothesis that college students who reported higher ratings on the Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization factors of the IRS (Weyandt et al., 2003) would also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009) was tested via standard multiple regression analyses to determine which independent variable most strongly predicts self-reported prescription stimulant use (Tabachnick & Fidell, 2007b). The full model explained a small (Cohen, 1988) amount of variance in the criterion variable (adjusted $R^2 = .041$), $F(4, 1021) = 11.965$, $p < .001$. Results revealed that the only significant predictor was the Internal Impulsivity factor of

Table 3. Summary of Hierarchical Multiple Regression Analysis for Greek Status, Gender, and the Depression, Anxiety, and Stress Subscales of the DASS-21 and Summary of Hierarchical Multiple Regression Analysis for Greek Status, Gender, and the Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization Factors of the IRS Predicting the Self-Reported Prescription Stimulant Use Factor of the SSQ

Predictor	B	SE B	β	p value	R ²	Adjusted R ²
Step 1					.063	.061
Social fraternity/sorority membership	1.003	.145	.210	.001		
Gender	-.547	.127	-.131	.001		
Step 2					.093	.088
Social fraternity/sorority membership	1.039	.143	.218	.001		
Gender	-.568	.126	-.135	.001		
Stress	.049	.025	.093	.048		
Depression	.009	.033	.012	.785		
Anxiety	.072	.035	.086	.042		
Step 1					.063	.061
Social fraternity/sorority membership	1.003	.145	.210	.001		
Gender	-.547	.127	-.131	.001		
Step 2					.111	.105
Social fraternity/sorority membership	1.029	.142	.215	.001		
Gender	-.563	.126	-.134	.001		
Internal distractibility	.013	.009	.061	.158		
Internal restlessness	.034	.014	.098	.016		
Internal impulsivity	.071	.028	.096	.011		
Internal disorganization	.005	.020	.007	.823		

Note: DASS-21 = Depression Anxiety Stress Scales-21; IRS = Internal Restlessness Scale; SSQ = Stimulant Survey Questionnaire.

the IRS (Weyandt et al., 2003), $t(1021) = 2.572$, $p = .010$ (see Table 2), with those reporting higher rates of Internal Impulsivity also reporting higher rates of nonmedical stimulant use. In addition to standard multiple regression analyses, hierarchical regression analyses were used to assess the amount of prediction added to self-reported prescription stimulant use by Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization while controlling for gender and Greek status. The total variance explained by the model as a whole was 11.1%, $F(6, 1014) = 21.004$, $p < .001$. The independent variables, Internal Distractibility, Internal Restlessness, Internal Impulsivity, and Internal Disorganization explained an additional 4.8% of the variance in self-reported prescription stimulant use, after controlling for gender and Greek status, R^2 change = .048, F change (4, 1014) = 13.613, $p < .001$. In the final model, only two independent variables were statistically significant, with the Internal Restlessness factor recording a higher beta value ($\beta = .098$, $p < .05$), than the Internal Impulsivity factor ($\beta = .096$, $p < .05$; see Table 3). These findings suggest that when differences with regard to gender and Greek status are controlled for, participants who score higher on the Internal Restlessness and Internal Impulsivity factors also tended to score higher on the Self-Reported Prescription Stimulant Use factor of the SSQ.

Discussion

The present study is among the first to examine nonmedical stimulant use among social sorority and fraternity members and the relationship between nonmedical stimulant use and psychological variables. The first hypothesis, that sorority and fraternity members would report higher ratings on the Self-Reported Prescription Stimulant Use factor, Perception of Prevalence of Prescription Use Among Peers factor, and the Perception of Safety of Stimulants factor on the SSQ (Weyandt et al., 2009) than nonsorority and nonfraternity members was supported. Results revealed that social sorority/fraternity members reported a higher rate of nonmedical stimulant use than nonmembers. This finding supports previous research that has also found that social sorority/fraternity members report a higher rate of nonmedical stimulant use than nonmembers (DeSantis et al., 2010; Weyandt et al., 2009). Overall, these results suggest that social sorority/fraternity members may be at a greater risk for misusing prescription stimulants than nonmembers. Furthermore, social sorority/fraternity members also reported a higher rate of perception of prevalence of stimulant use among peers than nonmembers, suggesting that social sorority and fraternity members perceive nonmedical stimulant use as a common occurrence among their peers. Social sorority/fraternity members also reported a higher

rate of Perception of Safety of Stimulants than nonmembers, suggesting that the nonmedical use of prescription stimulants is perceived by social sorority/fraternity members as being safer in comparison with alcohol and marijuana use, a finding that is consistent with previous research (Weyandt et al., 2009). It is difficult to interpret these findings; however, they may be related to social-psychological influences of selection and socialization (Borsari & Carey, 1999; Capone, Wood, Borsari, & Laird, 2007; Park, Sher, & Krull, 2009). For example, alcohol and substance abuse research examining selection effects has found that individuals who engage in heavy drinking or drug use prior to college may choose to join a fraternity or sorority that is known for engaging in these behaviors (McCabe, Schulenberg, et al., 2005; Park et al., 2009). Socialization effects suggest that becoming a member of a fraternity or sorority may increase heavy drinking behaviors or substance abuse as a result of being around others who engage in the same behavior (Capone et al., 2007; McCabe, Schulenberg, et al., 2005; Park et al., 2009). This interpretation is speculative, however, and future research should further examine selection and socialization effects with regard to nonmedical stimulant use among social sorority and fraternity members.

The second hypothesis, that college students who reported higher ratings on the Depression, Anxiety, and Stress subscales of the DASS-21 (Lovibond & Lovibond, 1995) would also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009) was mostly supported; anxiety was found to significantly predict nonmedical stimulant use. Furthermore, when differences with regard to gender and social sorority/fraternity membership were controlled for, both anxiety and stress significantly predicted self-reported nonmedical stimulant use indicating that participants who reported a higher rate of stress or anxiety also reported a higher rate of nonmedical stimulant use. These findings are also consistent with previous research that has also found a relationship between anxiety and nonmedical stimulant use and stress and nonmedical stimulant use (Janusis & Weyandt, 2010; Teter et al., 2010; Weyandt et al., 2009). Although not causal, these findings suggest that individuals who are experiencing a higher rate of anxiety or stress may be at greater risk for misusing prescription stimulant medication. When these findings are considered in conjunction with academic success being the most frequently reported reasons students report using prescription stimulants, it is possible that students who experience higher rates of anxiety or stress related to academic success may be at an increased risk for using stimulants to help focus on schoolwork and improve academic performance.

The third hypothesis, that college students who reported higher ratings on the Internal Distractibility factor, Internal Restlessness factor, Internal Impulsivity factor, and Internal

Disorganization factor on the IRS (Weyandt et al., 2003) would also report higher ratings on the Self-Reported Prescription Stimulant Use factor on the SSQ (Weyandt et al., 2009) was partially supported; internal impulsivity significantly predicted self-reported prescription stimulant use. Further analyses revealed that when gender and social sorority/fraternity membership were controlled for, internal impulsivity and internal restlessness significantly predicted self-reported nonmedical stimulant use indicating that participants who reported a higher rate of internal impulsivity or internal restlessness also reported a higher rate of non-medical stimulant use. These findings are consistent with previous research that has also found internal impulsivity and internal restlessness to be related to self-reported non-medical stimulant use (Weyandt et al., 2009). Overall, these results suggest that college students who are experiencing feelings of impulsivity and restlessness may be at a greater risk for misusing prescription stimulant medication. Previous research has suggested that internal restlessness is a symptom of ADHD in adults (Biederman et al., 2000; Weyandt et al., 2003). In addition, studies have shown that college students who report a high rate of ADHD symptoms may struggle more academically than individuals who do not report ADHD symptoms (Barkley, 2006; Fischer, Barkley, Smallish & Fletcher, 2002; Weyandt & DuPaul, 2006), therefore, it may be inferred that participants who are reporting a higher rate of internal impulsivity and internal restlessness may be struggling more academically as a result of the ADHD symptomology, and are using prescription stimulants in an attempt to increase their likelihood of academic success.

Limitations

The present study has several limitations that need to be considered when interpreting the findings. The first limitation concerns the nature of the sample. Although the number of participants recruited from five universities was a relative strength ($N = 1,033$), representativeness of the population may be a concern. For instance, the sample consisted primarily of female participants (70.0%). Future research should address differences in nonmedical stimulant use specifically targeting a comparative sample of female and male college students to better analyze gender differences. In addition, although the number of participants identified as social sorority members was consistent with university demographics, there is no way of knowing which sororities or fraternities are represented in the sample. Given the disproportionate number of female participants, it is likely that fraternities, in particular, were underrepresented. Future research should consider acquiring a more proportionate number of students from each sorority and fraternity on-campus through a stratified sampling technique to more profoundly examine differences in

nonmedical stimulant use among sorority and fraternity members. Although most of the measures used in this study demonstrated adequate reliability and validity, there were three subscales that demonstrated low internal consistency in the present study (i.e., Perception of Safety of Stimulants subscale: .62, Internal Impulsivity subscale: .66, and the Internal Disorganization subscale: .51). Consequently, there is a possibility that some other construct is actually being measured rather than the one intended. A more thorough examination of these subscales and factor loadings may offer direction for future research.

Future Directions

Future research should consider examining nonmedical stimulant use among other college student subpopulations (i.e., athletic teams, honor societies, clubs, residence halls) to explore whether college student populations other than sorority/fraternity members have an increased risk of non-medical stimulant use and their associated motives. In addition, future research may consider including participants who have a prescription for stimulant medications to examine potential misuse among this population; despite having a prescription, students may be using their stimulant medications for reasons they were not intended. Further examination of the relationship between psychological variables “internal restlessness” and “nonmedical stimulant use” is warranted to further understand the potential relationship. For instance, do individuals who have a diagnosis of anxiety demonstrate an increased rate of nonmedical stimulant use? Or do individuals who have undiagnosed ADHD present as an at-risk group for nonmedical stimulant use? In addition, previous research (e.g., Rabiner et al., 2009b; Teter et al., 2010; Weyandt et al., 2009) has found a relationship between depression and nonmedical stimulant use; however, the present study did not. Future research should further examine the potential relationship between depression and nonmedical stimulant use. Future investigations should develop research-based intervention and preventive measures that target and educate college populations identified as being at risk for nonmedical stimulant use.

Conclusions

A major strength of this investigation is that it is one of the first to explore nonmedical stimulant use among sorority/fraternity members and nonmembers and the relationship with psychological variables. In addition, a relative strength of this study is that the sample was drawn from five different universities, each located in a different region of the United States and the sample size ($N = 1,033$) was larger than previous studies.

Overall, the results of the present study support previous research that indicates nonmedical stimulant use is

prevalent among undergraduate college students, and the present study indicates that misuse may be more common among social sorority and fraternity members than nonmembers than previously reported. Alarming, social fraternity/sorority members also report perceiving stimulant medications as being safer to use than alcohol and other illegal substances. The most frequently reported motives for nonmedical use were related to academic performance. Psychological variables such as stress, anxiety, internal restlessness, and internal impulsivity predicted nonmedical stimulant use among college students in the present study. Intervention and preventive measures need to be developed to increase knowledge and awareness of nonmedical stimulant use among higher risk populations on college campuses.

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