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Abstract

Nonmedical use of prescription stimuluants (NMUS) can cause adverse outcomes for college students including academic impediments, such as a lowered GPA, and polyuse of illicit substances (Garcia et al., 2021; Holt & McCarthy, 2019; Norman & Ford, 2018). The current study investigated the demographics, academics, stress, and polysubstance use between students who endorsed NMUS and those who did not in an undergraduate college population sample at a large public university in the Southeast. The sample consisted of 429 undergraduate students who completed online measures of demographics, perceived stress, stressful life events, and substance use. Overall, 3.4% of the sample reported NMUS within the past two weeks. Chi-square analyses suggested that the two groups did not differ in gender, ethnicity, and year in school. A significant difference between groups was found for race (p = .002). Students who self-identified as White were more likely to report NMUS as compared to students self-identifying as another race. No significant difference between groups was found for credit hours or GPA. Additionally, no significant differences were observed between groups regarding stress and stressful life events. Concerning overall substance use, approximately 70% of the sample endorsed no drug use. Notably, students who endorsed NMUS were more likely to report some use of another non-stimulant type of drug, suggesting that NMUS may occur in the context of polyuse for some students.

Nonmedical Stimulant Use in an Undergraduate College Student Sample: Demographics, Academics, Stress, and Other Substance Use

Substance use among undergraduate college students has been extensively studied, with a significant amount of the research investigating the correlation between substance use, in general, and academics (Gallucci et al., 2016; Norman & Ford, 2018; Schepis et al., 2021; Thornton et al., 2020). Research focusing specifically on stimulant misuse in undergraduate college students is more limited and has largely highlighted specific college populations, such as Greek life-affiliated students or student-athletes, or has focused mainly on gender differences (Gallucci et al., 2015; Hachtel & Armstrong, 2019; Norman & Ford, 2018; Wilens et al., 2017; Witcraft et al., 2019). Studies on specific subgroups of students can help inform hypotheses concerning demographics, academics, stress, and polysubstance use for the general undergraduate population. Previous literature examining NMUS in the college population has found an association between NMUS and these factors (Blevins et al., 2016; Garcia et al., 2021; Holt & McCarthy, 2019; LaBrie et al., 2011; McCabe et al., 2007; Norman & Ford, 2018; Thornton et al., 2020; Wilens et al., 2020). The experience of certain college populations (i.e., Greek life-affiliated students, student athletes) may translate into the general undergraduate college sample, however, further investigation is required.

Demographics are factors such as gender, age, race, ethnicity, and can include academic demographics such as year in school, grade point average (GPA), and credit hours. Previous literature has found that certain demographics correlate with NMUS, notably that men are more likely to report nonmedical use (Hachtel & Armstrong, 2019; McCabe et al., 2007; Wilen et al., 2017). Additionally, studies have found that NMUS

does not vary by race or ethnicity, however few studies have investigated race and ethnicity regarding NMUS thus highlighting the need for replication of these findings (Goodhines et al., 2020; Mendez et al., 2023). Regarding academic factors, research suggests that students experience stress associated with their GPA; students with a lower GPA were more likely to report misuse (Gallucci et al., 2016; Gallucci et al., 2018; Norman & Ford, 2018). A search for relevant literature regarding NMUS and additional academic demographics of year in school, and credit hours, did not produce sufficient results. One can infer that further investigation into these academic factors due to the lack of literature is warranted. Given the differences in GPA, it is hypothesized that other academic demographics (i.e., year in school, and credit hours) may also differ between those who report prescription stimulant misuse and those who do not.

College is a time of transition and independence for many students. This change can cause a large amount of stress in students and adjusting to new stressors may increase the likelihood of NMUS (Blevins et al., 2016; Garcia et al., 2021; Norman & Ford, 2018; Schepis et al., 2021). Students are expected to maintain a school and life balance while experiencing numerous stressors. College students may turn to NMUS to eliminate some of their stress (Garcia et al., 2021; Wilens et al., 2020). Certain student groups, such as Greek Life-affiliated students and student athletes are more likley to report NMUS for academic benefit, energy, relaxation, or to cope with stress (Gallucci et al., 2015; Hachtel & Armstrong, 2019; Norman & Ford, 2018; Witcraft et al., 2019). Given the impacts of stress on NMUS in these student groups, it is hypothesized that stressors and general life stress may be impacting NMUS in a broader undergraduate population as well (Blevins et

al., 2016; Garcia et al., 2021; Holt & McCarthy, 2019; Norman & Ford, 2018; Schepis et al., 2021; Thornton et al., 2020; Wilens et al., 2020).

Polysubstance use is defined as the use of more than one drug (Centers for Disease Control and Prevention, 2022). Polysubstance use can result in several adverse consequences, including unintentional injury, poorer psychological functioning, persistent patterns of substance misuse and substance-related problems, and nonfatal and fatal overdose (Connor et al., 2014; Peppin et al., 2020). Researchers have found support for a correlation between tobacco use and stimulant use, such that those who used tobacco were more likely to engage in NMUS (Gallucci et al., 2015; Goodhines et al., 2020). Additionally, those who used marijuana also reported NMUS (Boulton & O'Connell, 2017; Willens, 2020). Multiple studies concluded that students who endorsed NMUS were more likely to also misuse other substances (Blevins et al., 2016; Boulton & O'Connell, 2017; Gallucci & Martin, 2015; Garcia et al., 2021; Holt & McCarthy, 2019; Thornton et al., 2020; Wilens et al., 2020). Accordingly, it is hypothesized that the broader college population may also exhibit misuse of other substances in combination with prescription stimulants.

Method

Participants

Participants were undergraduate students at a large public university in the Southeast. The sample consisted of 429 undergraduate students between 18 and 51 years old (M_{age} = 19.79, SD = 4.16). The study asked participants to self-identify their gender and participants identified as male (23.0%), female (73.5%), transgender (0.2%), or genderqueer (3.3%). Participants then self-identified their race/ethnicity as White (88.2%), Black (6.7%), Asian (1.7%), American

Indian/Alaska Native (0.2%), Middle Eastern (0.2%), Hispanic or Latino (6.4%), other (0.5%), or multi-ethnic (2.4%). Participants were asked to self-identify their sexual orientation and reported heterosexual (82.4%), homosexual (1.9%), bisexual (12.0%), asexual (1.2%), or other (2.6%). The study had participants identify their grade level with freshmen/1st year (63.8%), sophomore/2nd year (16.4%), junior/3rd year (11.0%), senior/4th year (7.2%), or senior/5th year or more (1.6%). Participants reported an average GPA of 3.5 (*SD* = .52).

Procedure

The study was approved by the University Institutional Review Board before data collection. Flyers were distributed around the campus and advertisements in the Department of Psychology subject pool system were used to recruit participants. The eligibility criteria for the study consisted of being an undergraduate student at ETSU, being at least 18 years old, and being physically present in the United States. Electronic data capture tools (REDCap) were utilized to obtain and record study consent. Participants who consented and met eligibility requirements were directed to the survey questionnaire. After completing the study, participants were eligible for random drawing of a $50 gift card. Students who were enrolled in the survey via the Department of Psychology subject pool system and had completed the survey were awarded 1.5 SONA credits, which translates to course credit or extra credit. Participants were able to skip questions or discontinue participation at any time without penalty.

Materials

Demographics Questionnaire

The demographics questionnaire assessed students' information regarding gender, age, race, ethnicity, sexual orientation, year in school, GPA, and credit hours.

Perceived Stress Scale (Cohen & Williamson, 1988)

The 10-item scale assessed stress levels in participants in the past month. Using a Likert scale that ranged from 0 (Never) to 4 (Very often), the measure assessed stress levels on a continuous scale, with higher scores indicating greater perceived stress.

Life Events Stress Scale (Brown, 1989)

A 36-item scale that measured stress exposure by assessing the number of stressful life events a participant experienced within the past year. The scale coded 1 = "yes" and 2 = "no" responses to determine if the participant was exposed to certain stressful events in the past year. Examples of stressful events were "Getting lower grades than expected" and "Death of a close friend." To calculate scores, the total number of stressful events endorsed was summed for each question with higher scores indicating greater life event stress.

Level 2 Substance Use Adult (American Psychiatric Association, 2016)

This measure is from the NIDA-modified ASSIST version (National Institute on Drug Abuse, 2016). The 10-item scale was used to identify the use of stimulants, painkillers, methamphetamine, inhalants, solvents, marijuana, cocaine, crack, heroin, club drugs, sedatives, and tranquilizers during the past two weeks. Participants responded with their usage of each substance on their own (without a prescription) or in greater amounts than prescribed and/or longer than prescribed. A Likert format coded participants' responses within a two-week period ranging from 1 = "being no use" to 5 = "being most days." For the purpose of analyses, each substance was dichotomously coded as 0 = no use and 1 = reported use.

Statistical Analysis

Statistical analyses were conducted using SPSS version 28.0. Descriptive characteristics such as gender, ethnicity, sexual orientation, grade level, and GPA were calculated, as well as

means and standard deviations of variables of interest within the sample. Chi-square tests of independence and independent t-tests were used to analyze variables of interest.

Results

Hypothesis 1: Demographics and Academics

Overall, 3.4% (n = 15) of the sample endorsed NMUS. Chi-Square tests were conducted to analyze differences among gender, race, ethnicity, and year in school between students who endorsed NMUS and students who did not endorse NMUS. No significant differences were found for gender, ethnicity and year in school among groups. A significant difference was observed regarding race (p = .002), such that students who self-identified as White were more likely to report nonprescription stimulant use as compared to students who self-reported being of a different race.

A significant difference between groups was not found for GPA, $t(382) = 0.16$, p = .876. On average, students who endorsed NMUS reported a GPA of M = 3.53 (SD = 0.30) and students who did not reported a GPA of 3.55 (SD = 0.53). A significant difference between groups was not found for credit hours, $t(381) = 1.08$, p = .876. On average, students who endorsed NMUS reported taking an average of 14.27 (SD = 2.017) credits hours and students who did not endorse NMUS reported an average of 14.98 (SD = 2.503) credit hours. The total number of students that endorsed NMUS and who who did not are listed in Table 1 by demographic.

Table 1

Demographics Frequencies of Undergraduates who Do and Do Not Report Past Two Week Nonmedical Use of Stimulants

	No Use	NMUS

American Indian/ Alaskan Native	1	0
White	331	10
Asian	5	0
Middle Eastern	1	0
Black	20	5
Race not otherwise listed	10	0
Hispanic or Latino	24	0
Not Hispanic or Latino	350	14
Year 1	244	7
Year 2	60	5
Year 3	41	1
Year 4	29	2
Year 5	6	0

Note. NMUS = nonmedical use of stimulants.

Hypothesis 2: Stress

A significant difference between groups who endorsed past two week NMUS and those who did not was not found for perceived stress, $t(394) = -0.14$, $p = .888$. On average, students who endorsed NMUS reported an average score of 31.07 ($SD = 4.847$), and students who did not reported an average score of 30.81 ($SD = 6.857$). A significant difference between groups was not found for stressful life events, $t(393) = -1.45$, $p = 0.444$. On average, students who endorsed

NMUS reported an average of 11.07 (*SD* = 5.133) life events, and students who did not endorse NMUS reported an average of 9.29 (*SD* = 4.637) life events.

Hypothesis 3: Substance Use

Undergraduate students reported their stimulant and substance use. 69.9% (*n* = 277) of students in the sample endorsed no drug use, 26.3% (*n* = 104) of students endorsed exclusive non-stimulant use, 0% (*n* = 0) of students endorsed exclusive stimulant use, and 3.8% (*n* = 15) of students endorsed using both stimulants and non-stimulants. Descriptive analyses were also conducted to analyze students' specific drug use and are presented in Table 2.

Table 2

Past Two Week Substance Use Among Sample of Undergraduates

Drug	0	1	2	3	4
Painkillers	86.5%	3.3%	2.1%	0.5%	0.2%
Stimulants	89%	2.3%	0.9%	0%	0.2%
Sedatives	86.2%	3.5%	1.6%	0.2%	0.7%
Marijuana	72.5%	7.9%	5.6%	2.1%	4%
Cocaine/Crack	91.8%	0%	0.2%	0.2%	0%
Club Drugs	91.4%	0%	0.2%	0.2%	0%
Hallucinogens	91.1%	0.2%	0%	0.5%	0%
Heroin	91.6%	0.2%	0%	0.2%	0%
Inhalants/Solvents	91.6%	0%	0.2%	0.2%	0%
Methamphetamine	91.8%	0%	0%	0.5%	0%

Note. 0 = Not at all, 1 = One or two days, 2 = Several days, 3 = More than half the days, 4 = Nearly every day

Discussion

In the current study we investigated the demographics, academics, stress, and polysubstance use between students who endorsed NMUS and those who did not in an undergraduate college population. The sample consisted of 429 undergraduate students. Overall, 3.4% of the sample reported NMUS within the past two weeks. We investigated differences in academics and demographics (e.g., gender, race, GPA) between groups. No significant differences were found for ethnicity, year in school, and credit hours. This finding should be examined in future studies because of the limited amount of literature examining ethnicity, year in school, and credit hours. A significant difference was observed for self-identified race. Students who self-identified as White were more likely to report NMUS. This finding was not supported by previous literature that observed no differences among race or ethnicity (Hachtel & Armstrong, 2019; McCabe et al., 2007; Wilen et al., 2017). Results were nonsignificant among factors of grade level, number of credit hours enrolled, and GPA. This finding is not supported by previous literature stating that students with a lower GPA report more NMUS (Gallucci et al., 2016; Gallucci et al., 2018; Norman & Ford, 2018). A potential reason why we did not find a significant difference between the two groups may be because students self-reported their GPA.

We examined differences between students who endorsed NMUS and students who did not in regard to stress and life events. No significant differences were observed for perceived stress and stressful life events among groups. This finding is not supported by previous literature. Research has supported that undergraduate students may turn to NMUS due to stress (Garcia et al., 2021; Wilens et al., 2020). A potential reason that this was not found in the study may be because only a small percentage of our sample endorsed stimulant use, which could be underrepresenting the broader undergraduate population. It may also be that students engage in

NMUS specifically at times of stress that were not able to be captured during the brief "within the past two weeks" time frame our study assessed.

Finally, we were interested in learning more about the polysubstance use behavior of students given previous literature suggests students who endorse NMUS are more likely to also misuse other substances (Blevins et al., 2016; Boulton & O'Connell, 2017; Gallucci & Martin, 2015; Garcia et al., 2021; Holt & McCarthy, 2019; Thornton et al., 2020; Wilens et al., 2020). Interestingly, the present study found that 0% of the sample endorsed exclusive nonprescription stimulant use, suggesting that all NMUS was engaged in by students who at some point within the prior two weeks also engaged in at least one additional substance. However, based on our questionnaire format, we were not able to get a more fine-grained understanding of the co-use, for example, were students using multiple drugs concurrently or were students using multiple drugs across a two-week time frame in response to different situational factors (e.g., studying versus parties).

Limitations

We encountered a technical issue with REDCap and SONA linking in the survey for a period of two days. REDCap did not record survey responses from participants in the SONA sample pool (REDCap) and was taken offline until the issue was resolved. Consequently, some participants did not get to finish completing the survey. A total of 180 incomplete responses were eliminated to ensure the accuracy of the data. As addressed above, an additional limitation in the present study is that it is a majority White sample with White students representing 88.2% of the sample. It is possible that the minimal representation of racial diversity within the current sample is impacting results. A potential reason that we did not observe higher reports of nonprescription

stimulant use may be because students were afraid of the consequences associated with reporting their substance use (i.e., disciplinary action). It may also be that asking only about NMUS within the past two weeks did not capture the behavior of individuals who only infrequently engage in NMUS but could still be experiencing harm.

Summary/Conclusions

Research surrounding substance use among undergraduate college students and academics indicated that factors such as demographics, stress, and polysubstance use can increase NMUS (Blevins et al., 2016; Boulton & O'Connell, 2017; Garcia et al., 2021; Hachtel & Armstrong, 2019; Holt & McCarthy, 2019; LaBrie et al., 2011; Schepis et al., 2021; Thornton et al., 2020; Mendez et al., 2023; McCabe et al., 2007; Norman & Ford, 2018; Wilens et al., 2017; Wilens et al., 2020). Our findings indicated support for a significant difference between students who endorsed NMUS and students who did not among the factor of self-identified race, corresponding with previous literature (Hachtel & Armstrong, 2019; McCabe et al., 2007; Wilen et al., 2017), but we did not find any other significant demographic differences. The current study did not find group differences in terms of stress as measured through perceived stress and stressful life events, contrasting previous literature (Gallucci et al., 2016; Gallucci et al., 2018; Norman & Ford, 2018). The present study indicated that all endorsed NMUS occurred in students who also endorsed the use of at least one other illict drug in the past two weeks. Efforts to further investigate NMUS in the college population may benefit from targeting students engaging in polysubstance use.

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