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Aided by Adderall: Illicit Use of ADHD Medications by College Students

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INTRODUCTION

“I don’t know that many kids that have done coke, none that have tried crack, and only a few that have dropped acid. I can’t even count all of the ones who’ve taken Adderall” (Stice). This statement made in an interview by a freshman art history major at the University of Maryland, College Park, in 2007 effectively highlights a still growing problem among undergraduate students in the United States: the nonmedical use of stimulant medications prescribed to treat Attention Deficit Hyperactivity Disorder (ADHD) as “study aids.” Even as early as 2004, up to twenty percent of college students had used Adderall or Ritalin, both drugs used to treat ADHD, according to a report released by the National Center on Addiction and Substance Abuse (Stice). This phenomenon of abusing prescription stimulant medications is

well-documented not only in research literature but also in numerous news articles.

A 2009 NPR article documented the increasingly prevalent use of ADHD medications by college students to help them study and included commentary from Martha J. Farah, director at the Center for Cognitive Neuroscience at the University of Pennsylvania, who described the behavior as “worrisome” due to the drugs’ serious side effects and the potential for addiction (Trudeau). In 2012 *The New York Times* published just a small fraction of the submissions they received after inviting students to share personal accounts of taking prescription medications for academic purposes, and almost all of them were written by high school students or recent graduates (Schwartz). In 2016, CBS News published a story titled “Adderall misuse rising among young adults,” making it clear that this problem has not lessened in the decade or so that has passed since publication of the 2007 article describing the growing trend of “young people taking prescription drug abuse to college” (Kraft; Stice).

Overwhelmingly the most common reasons given for the nonmedical use of ADHD medications involve academic studies as students use them to stay up all night to study (Arria, Caldeira et al. 162; Benson et al. 62; Garnier-Dykstra et al. 230; Cook 32; Herman et al. 15; Teter, McCabe, et al. 1501; Webb, Valasek, and North 30). This behavior has proved to be more prevalent among students attending colleges with the most competitive admission standards and academic environments (McCabe et al. 100; Webb, Valasek, and North 28). Additionally, certain dimensions of perfectionism are positively correlated with illicit use of prescription stimulants (Stoeber and Hotham 173). ADHD medication misuse has also been found to peak during periods of high academic stress, and students who engage in this behavior are significantly more likely to report higher levels of stress, test anxiety, and psychological distress as well as have more extensive histories of mental health disorders, including anxiety and depression (DeSantis, Webb, and Noar 317; Hanson et al. e62; Moore et al. 990; Burgard et al. 247; Bidwal et al. 538; Dussault and Weyandt 92; Thomas 10; Teter, Falone, et al. 294; Ford and Schroeder 32; Sattler and Wiegel 221; Sattler, Mehlkop, et al. 14; Messer 16).

Students participating in honors programs and colleges are often held to higher academic standards due to rigorous admission criteria and the GPA requirements for retention, which can lead to increased levels of stress (“Basic Characteristics of a Fully Developed Honors Program”). The high standards might suggest that honors students and high-achieving students are at greater

risk for abusing ADHD medications. However, research on the abuse of ADHD medications among honors and high-achieving students is lacking. Our study thus investigates the interplay between mental health issues (e.g., stress, anxiety, and depression), prevalence of and motivation for illicit use of ADHD medications, and enrollment in a program with high academic performance expectations, including honors programs, residential colleges, and scholarships.

Attention Deficit Hyperactivity Disorder (ADHD) Diagnosis and Common Treatments

According to the National Institute of Mental Health, ADHD is a brain disorder that interferes with functioning or development and is characterized by ongoing inattention and/or hyperactivity-impulsivity, which typically persists throughout one's lifetime ("Attention Deficit Hyperactivity Disorder"; Staufer and Greydanus 71). ADHD diagnoses are rapidly rising in the U.S., where 11% of children aged 4 to 17 years old have been diagnosed (Blank 36). Stimulant medications used to treat ADHD include dextroamphetamine (Adderall and Adderall XR, Dexedrine, ProCentra, Zenzedi), methylphenidate (Concerta, Daytrana, Metadate CD and Metadate ER, Methylin and Methylin ER, Ritalin, Ritalin SR, Ritalin LA, Quillivant XR), lisdexamfetamine (Vyvanse), dexamethylphenidate (Focalin and Focalin XR), and amphetamine sulfate (Evekeo) ("Drug Treatments for ADHD"). The most easily recognizable are likely Adderall and Ritalin, which work to stimulate neurotransmitter activity in the central nervous system that results in increased alertness, reduced fatigue, and improved attention ("Adderall Prescribing Information"; "Ritalin and Ritalin-SR Prescribing Information"). These effects of ADHD prescription medications are the reason for their abuse by students who are not diagnosed with ADHD because the drugs enable them to focus better and stay up all night to study and complete assignments.

Health Risks Associated with Misuse of ADHD Medications

Aside from ethical considerations regarding whether the use of ADHD medications for academic purposes should be considered cheating, there are numerous health-related reasons to be concerned about students abusing these drugs. Due to their high potential for abuse, both methylphenidates (Ritalin) and dextroamphetamine-amphetamines (Adderall) are classified as schedule II substances in the Controlled Substances Act (Chen et al. e1).

Structurally, Adderall is extremely similar to methamphetamine, more commonly known simply as meth or crystal meth, differing only by a methyl group (one carbon atom bonded to three hydrogen atoms). A study published in 2012 revealed that intranasal self-administered methamphetamine and dextroamphetamine produced a similar dose-related profile of acute effects in humans, with the primary difference being that meth produced more prominent effects on some measures of mood and cardiovascular activity (Kirkpatrick et al. 786). Additionally, many cardiovascular risks and unpleasant side effects are associated with ADHD medications, including abdominal pain, appetite loss, weight loss, insomnia, headache, increased heart rate, nervousness, and anxiety (“Adderall Prescribing Information”; “Ritalin and Ritalin-SR Prescribing Information”). Cases of acute myocardial infarctions induced by mixing Adderall with alcohol have been reported (Sharma et al. 84). Even more worrisome is the consistent finding that students who abuse these medications know very little about the drugs or the potential health risks involved (DeSantis, Webb, and Noar 317; Owoeye 6).

Prevalence Rates of Illicit Use of ADHD Prescription Stimulant Medications

Much research has been conducted to assess the prevalence of illicit use of ADHD prescription medications by American undergraduate students. These studies rely primarily on self-reported data collected from survey respondents and occasionally on in-person interviews structured to varying degrees. In 2001 McCabe et al. administered a survey to a representative sample of 10,904 randomly selected American undergraduate students from 119 four-year universities to assess the nonmedical use of Ritalin, Dexedrine, and Adderall. Their analysis indicated the overall mean rates of lifetime, past-year, and past-month illicit use were 6.9%, 4.1%, and 2.1%, respectively (McCabe et al. 98), which equates to approximately 752 students having illicitly used these ADHD medications at least once in their lives. However, between individual universities, past-year rates varied as widely as 0% to 25%, thus demonstrating the importance of conducting this kind of study at a greater number of colleges to more reliably determine the prevalence of illicit use (McCabe et al. 99).

Researchers from the Center for Substance Abuse Research (CESAR) at the University of Maryland College Park published their findings from two separate surveys in 2008 showing that out of a sample of 1,208 first-year college students without ADHD diagnoses, 18.0% reported illicit use (Arria,

Caldeira, et al. 156). Benson et al. conducted a comprehensive review and meta-analysis of the existing literature and found the average lifetime rate for prescription stimulants to be 17% (Benson, Flory, and Humphreys 60). A systematic literature review of 21 studies representing 113,104 individuals found past-year illicit use rates ranging from 5% to 35% in college students (Wilens et al. 21). These findings speak to considerable variation in the prevalence of illicit use between individual institutions despite the general overall trend of increasing rates.

However, this variation is not that surprising and should in fact be expected. The characteristics of both the academic environment and the students differ widely between individual universities, and students are motivated to illicitly use ADHD prescription medications for different reasons. Thus, the drastic variation in the prevalence of this behavior, reported in the literature, makes sense. In general, though, research shows an overall increase in prevalence rates over time.

Demographic Factors

The scope of the existing literature has not been limited solely to the assessment of the overall prevalence of this behavior among college students as one large group; interest has also focused on identifying correlates of illicit use of ADHD medications. Specifically, studies have been done on prevalence rates for illicit use for subgroups defined by age, gender, and race. Research has consistently shown that males report illicit use at significantly higher rates than females (Hall et al. 169). A survey conducted among 1,216 undergraduate students at James Madison University, for instance, revealed significantly higher rates of illicit use among males than females (40.5% vs. 23.0%, $p = 0.000$) (Dwyer 12). McCabe et al. found higher rates of use among males and also significantly higher instances of Caucasians reporting illicit use compared to other races. Their analysis revealed past-year and past-month rates for whites to be 4.9% and 2.5%, respectively. By comparison, only 1.6% of African-Americans and 1.3% of Asians reported illicitly using prescription stimulants during the past year, and past-month prevalence rates were 0.4% for African-Americans and 0.7% for Asians (McCabe et al. 99). Numerous other studies have supported these findings. Teter et al. reported that Caucasians were more than three times as likely as African-Americans and more than twice as likely as Asians to report illicit use within the past year (Teter, McCabe, et al. 1501).

Extracurricular Involvement

The relationship between illicit use and extracurricular involvement, such as membership in a Greek organization and participation on a varsity athletic team, has also been well-documented in the literature. In 2015, Gallucci and Martin administered a survey to 200 varsity athletes and 482 non-athletes and found varsity athletes to be significantly less likely to illicitly use prescription stimulant medications, with past-year rates of 16.6% for non-athletes compared to just 7.5% for athletes (47). However, the rate among these athletes was still within the range of illicit use found in the general college population.

An earlier survey conducted by Gallucci et al. in 2014 found that illicit users were more likely to be affiliated with a Greek organization (Gallucci et al. 186). This result has been found in numerous research projects at many different universities, including the 2005 study representing 10,904 undergraduate students from 119 colleges, the 2015 comprehensive review and meta-analysis, and the 2008 literature review of 21 studies representing 113,104 individuals (McCabe et al. 99; Benson et al. 62; Wilens et al. 21). Among college students in southern California, fraternity and sorority members were found to be more likely to report illicit use of Ritalin and/or Adderall in both the past year and past month (Shillington et al. 999). Dussault and Weyandt administered a survey to 1,033 undergraduate students from five universities in different regions of the U.S. specifically to determine differences in illicit use of prescription stimulants between fraternity/sorority members and those unaffiliated with Greek life, and they found higher rates reported by Greek students (91). More recently, involvement in Greek life was even found to negate the protective influence of religiosity on illicit use of prescription medications (Snipes et al. 93).

Misuse by College Students with ADHD

Research has shown a strong correlation between higher rates of reported illicit use of prescription stimulant medications and current prescription holders or those who have been diagnosed with ADHD. Illicit use by those with a prescription for ADHD stimulants may consist either of overusing one's own medication or using another's prescription for nonmedical purposes. In a study with a sample of 1,253 college students, 45 of whom had been diagnosed with ADHD, 26.7% (N = 12) of the students with ADHD reported having overused their own medication before, and 15.6% (N = 7) also admitted using another person's medication for nonmedical purposes at

least once. In comparison, the overall rate of illicit use for the entire sample was just 18.0% (Arria, Caldeira, et al. 156).

Mental Health

Research has also shown positive correlations between illicit use of ADHD medications and a history of mental health disorders and issues. Illicit users have been shown to experience higher levels of perceived stress and extensive histories of both anxiety disorder and depression. In the study involving 589 students studying to be doctors, physician assistants, and pharmacists, where medical and physician assistant students were more likely to report illicit use, these same students were also more likely to report a history of anxiety disorder (12.1% vs. 18.6% vs. 5.9%, respectively) and major depressive order (9.4% vs. 8.1% vs. 3.3%, respectively) (Bidwal et al. 535). Additionally, the Perceived Stress Scale (PSS) scores for all three groups of students, which ranged from 21.9 to 23.3, were approximately twice as high as those reported for the general adult population (Bidwal et al. 535).

Dussault and Weyandt found that illicit use of prescription stimulants was associated with higher ratings of anxiety, stress, internal impulsivity, and internal restlessness (92). After controlling for differences with respect to both gender and Greek organization membership, they found a connection between those scoring higher on the Self-Reported Prescription Stimulant Use subscale and those scoring higher on the Stress and Anxiety subscales (Dussault and Weyandt 93). Thomas also reported that students who indicated illicit use also self-reported higher symptoms of anxiety, depression, and impulsivity (30).

Analysis of survey responses from 3,639 undergraduate students revealed that approximately 50% of those who admitted to being frequent illicit users also reported having a depressed mood. After controlling for other variables, the researchers found that the adjusted odds of depressed mood were more than two times greater for students who engaged in frequent monthly illicit use (Teter, Falone, et al. 294). The findings reported by Ford and Schroeder implicate general strain theory. The college students in their study who indicated feeling academic strain also reported higher levels of depression, and those who reported higher levels of depression were found to be more likely to admit to using prescription stimulants illicitly (Ford and Schroeder 26). Overall, the research clearly shows that students who illicitly use ADHD medications experience higher levels of mental health issues, stress, and anxiety. In contrast to the connections between different subgroups divided by

demographic factors and extracurricular involvement, these findings provide clearer insight into the reasoning behind these students' choice to illicitly use ADHD medications.

Peaks of Illicit Use During Periods of High Academic Stress

Multiple studies using different methods have all arrived at the conclusion that students who illicitly use ADHD medications do so primarily in periods of high academic stress. DeSantis, Webb, and Noar reported in 2008 that the 34% of students who admitted to illicit use did so mainly during the week of final exams or during other periods throughout the academic year when they were experiencing high levels of academic stress. In administering surveys and conducting in-depth interviews, they also discovered that the first instance of illicit use for most students ($N = 1,811$) almost always occurred when students were feeling the most stressed and anxious because of school (DeSantis, Webb, and Noar 319).

Another research team conducted an innovative study in which they analyzed a grand total of 213,633 tweets containing the term "Adderall" from 132,099 unique accounts over a period of roughly six months from November 2011 to May 2012. During this time, the number of "Adderall" tweets peaked during typical college final exam schedules in both December and May (Hanson et al. e62). The researchers also found that "Adderall" tweets peaked during the middle of the academic week and declined on the weekends. The authors of the study tracked many other terms and information in these tweets and found that 60.7% ($N = 2,335$) of the 3,698 Twitter users with GPS data enabled included at least one student-related term, such as "homework," "class," "final," "test," "exam," and "study." One tweet read, "Adderall stockpile for finals" (Hanson et al. e62).

Perhaps the most compelling findings were reported by a team of researchers from both the chemistry and psychology departments at the University of Puget Sound located in Tacoma, Washington. Using the traditional method of analyzing self-reported data, they administered a survey to undergraduate students during the first week of the semester ($N = 676$), during midterms ($N = 468$), and during the week of final exams ($N = 400$) (Moore et al. 988). They also conducted a concurrent study of the wastewater from four residence halls on campus, with a known population of 476 undergraduate students, performing a quantitative chemical analysis for amphetamine and ritalinic acid, the metabolites of Adderall and Ritalin, respectively. There were significant differences in the self-reported data collected during the first

week and midterms, with the prevalence rate of illicit use of Adderall increasing from 0.8% to 3.2% of respondents and from 0.3% to 3.4% with respect to Ritalin (Moore et al. 989). These findings were corroborated by the chemical sample data, which contained significant differences in the levels of Adderall and Ritalin metabolites between the first week and midterms and between the first week and finals week. The researchers achieved these results by performing solid phase extraction and liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis, and samples were normalized with creatinine, a byproduct of muscle metabolism excreted by the kidneys, to account for variations in dilution and to provide an estimate of uncertainty (Burgard et al. 244). Amphetamine was found to be present at 74 ± 51 nanograms (ng) per milligram (mg) of creatinine during the first week, and this level increased to 240 ± 55 at midterms and to 110 ± 50 during finals week. The presence of ritalinic acid increased more consistently from 36 ± 63 to 170 ± 67 to 310 ± 63 (Moore et al. 990). Burgard repeated this experiment the following semester, this time increasing the number of sampling periods to include the week following midterms and the last week of class before final exams. The presence of both ADHD medication metabolites decreased between the week of midterms and the following week, from 120 ± 51 to 110 ± 50 and from 100 ± 62 to 54 ± 62 (all reported as ng of metabolite per mg of creatinine) for amphetamine and ritalinic acid, respectively. A particularly drastic increase was seen in the level of amphetamine between the last week of class and the week of final exams from 190 ± 50 to 570 ± 51 ng/mg creatinine (Burgard et al. 247). Thus, the trend of increased use of ADHD medications during periods of high academic stress has been clearly shown in the literature.

Competitive College Admission Standards and Highly Competitive Academic Environments

Further cementing the connection between illicit use of prescription stimulant medications and stress that results from the pressure to succeed academically is the finding from McCabe et al.'s nationally representative study that significantly higher rates of illicit use were found at colleges with more competitive admission standards (100). Robitaille and Collin assert that use of prescription stimulant medications among young adults "cannot be separated from the developing performance ethic" prevalent throughout our society that is becoming normative (357). Webb et al. also suggest that the cognitive enhancement effects afforded by these drugs lead to their "illicit use in more demanding academic environments" (28). In an article for the

South Atlantic Quarterly, Bousquet states that students illicitly use ADHD medications primarily to “keep up with . . . performance pressure in a high-stakes culture” and that these drugs are best suited to “the disciplinary and spectacular matrix of their lives, framed by performance culture and high-stakes assessment” (633).

The Ivy League college campuses have the most notoriously demanding academic environments. These prestigious universities consistently accept well below 10% of applicants each year, and the culture of competition does not end upon admission (P. Jacobs). The attempted suicide rate among students at Harvard is almost twice the national rate, and 35% of Princeton students reported that they developed mental health issues after coming to campus (Hatoff; Mazarakis). A *New York Times* reporter interviewed two dozen Columbia students in 2005 and reflected that “the prevailing ethos is that Adderall, the drug of choice these days, is a legitimate and even hip way to get through the rigors of a hectic academic and social life” (A. Jacobs). Several students commented on the influence of the cutthroat environment at Columbia on the illicit use of ADHD medications on campus. “The culture here actually encourages people to use stimulants,” one student claimed. Another student, who said he used to believe that studying harder was all that was necessary to do better in school before coming to Columbia, said, “The environment here is incredibly competitive. If you don’t take [stimulants], you’ll be at a disadvantage to everyone else” (A. Jacobs).

Primary Motivations for Illicit Use

The anecdotal evidence provided by these statements from Ivy League students combined with research establishing peak illicit use of prescription stimulants during periods of high academic stress points to academics as the primary motivator for students to engage in such behavior. The majority of illicit users in multiple studies have reported that they did not use stimulants prior to beginning college, that they do not take these drugs while classes are not in session, and that “improved attention/concentration” and “improved study habits” are their primary motivations for taking them (Arria, Caldeira, et al. 166; Benson et al. 62; Garnier-Dykstra et al.; Teter, McCabe, et al. 1501; Thomas 31; Webb et al. 30).

Kadison and DiGeronimo assert that the stress and anxiety resulting from the immense pressure to perform well and to complete assignments on time may lead college students to abuse drugs like Adderall in order to cope (116).

Students obsessed with getting high grades are more motivated to seek out means of accomplishing this goal without having to admit their failures, and drugs like Adderall are the perfect fit for students who are driven to maintain their identity as high-achieving (Kadison and DiGeronimo 116). Connecting this characterization of some high-achieving students as reluctant to seek help and determined to perform well is the evidence that students who illicitly use ADHD medications may, in fact, be self-medicating.

Perfectionism and Parental Pressures

High-achieving students with high standards and “self-critical perceptions of inadequacy in meeting performance expectations” have also been shown to experience higher levels of perceived stress, depression, and hopelessness, as revealed by a study involving two successive cohorts of honors students (Rice et al. 524). These kinds of students often are perfectionists, and various dimensions of perfectionism have been positively correlated with favoring the use of cognitive enhancers like ADHD medications. Stoeber and Hotham (2016) found that students with external pressures for perfectionism were more likely to see using these kinds of drugs as acceptable. In contrast, students who applied internal pressures for perfectionism were less likely to find use of “smart drugs” acceptable (Stoeber and Hotham 173).

Academic Factors

Given the findings associating increased illicit use with high levels of academic stress, competitive environments, high admission standards, and perfectionism, prevalent illicit use might also be expected with membership in a program that has high requirements for admission and continued enrollment, such as an honors program, and with award of an academic scholarship. The results of the study conducted at James Madison University, however, in which many students in the sample were enrolled in the honors program, failed to show that illicit use was more common among honors students as anticipated (Dwyer 14).

Bousquet suggests that “continuous assessment of scholarship recipients leads to usage” (633), a claim that is supported anecdotally by a University of Maryland, College Park, student who, when interviewed, stated, “I don’t know what I would do without [Adderall]. There’s no way I could have kept my scholarship if I didn’t use it” (Stice). These statements, the primary motivations reported by illicit users, and the known effects of increasing cognition,

memory, and concentration are paradoxically in direct contrast with the consistent, established correlation of illicit use with lower GPA.

Social Perceptions of and Justifications for Illicit Use

Research has also been conducted to assess the perception of the behavior and reasoning given for justification by illicit users. DeSantis et al. reported that most students who admitted to illicit use found procurement of the drugs to be stigma-free (DeSantis, Webb, and Noar 322). A later study conducted by DeSantis and Hane to assess justification found that students framed the use of prescription stimulants “as both physically harmless and morally acceptable.” They justified their illegal behavior through four different themes: 1) by comparing and contrasting with “party drugs,” 2) invoking the “all-things-in-moderation” argument, 3) claiming self-medication, and 4) minimizing the drugs as benign and socially acceptable (DeSantis and Hane 35). Judson and Langdon also reported that illicit users had a greater perception of the behavior as socially acceptable and were less concerned with the ethics and safety of use while also reporting more reasons to use and more instances of self-diagnosing an attention disorder compared to non-illicit users (101). Illicit use was shown to be higher among students who perceived the behavior to be common among friends and others on campus (Moore et al. 991; Reisinger, Rutledge, and Conklin 73). These findings indicate that social perceptions and norms are indeed influential on this illegal behavior.

Summary of Literature

Extensive research has been conducted investigating the prevalence of, contributing factors of, and motivations for illicit use of ADHD prescription stimulant medications. Findings correlating prevalent illicit use with competitive college admission standards and environments, certain dimensions of perfectionism, periods of high academic stress, and extensive histories of mental health disorders and issues, including test anxiety, psychological distress, anxiety disorder, and depression, are of particular interest for the purposes of the present study (McCabe et al. 100; Webb, Valasek, and North 28; Stoeber and Hothan 173; DeSantis, Webb, and Noar 317; Hanson et al. e62; Moore et al. 990; Burgard et al. 247; Bidwal et al. 535; Dussault and Weyandt 93; Thomas 30; Teter, Falone, et al. 294; Ford and Schroeder 26; Sattler and Wiegel 220; Sattler, Mehlkop et al. 14; Messer 16). Despite the wealth of reliable information associated with illicit use of ADHD medications available in the

literature, there is still a serious lack of research on the prevalence of this phenomenon among distinct undergraduate subpopulations, aside from Greek members and athletes. The wide variation in prevalence rates of illicit use between individual institutions clearly demonstrates that this phenomenon presents differently in college environments with unique student characteristics. Consequently, it seems likely that illicit use also fluctuates between subgroups of students on the same campus.

Illicit use among students who are high-achieving and/or held to higher academic expectations has not been well-studied. This type of student may include those enrolled in honors, those receiving academic scholarships, and those participating in residential colleges and programs. Honors and residential college students find themselves in highly competitive environments, and students receiving scholarships are evaluated on their academic performance on a regular basis. High-achieving students also typically experience much higher levels of pressure to achieve academic success and may develop unhealthy dimensions of perfectionism and other mental health disorders as a result (Cross and Cross 165). These factors can lead to heightened levels of academic stress indicative of increased potential for engaging in illicit use of ADHD medications. The present study thus investigates the association between mental health issues (e.g., stress, anxiety, and depression) and prevalence, frequency, and motivation for illicit use of ADHD medications among students held to above-average academic performance expectations, including academic scholarship recipients and honors and residential college students.

METHODS

Design

A 21-item survey was constructed in Qualtrics based on two surveys administered previously by separate research groups and on information available in the published literature (Dwyer 16; Moore et al. 988). Survey question topics included basic demographic information (age, ethnicity, and gender), academic information (class rank, cumulative GPA, major concentration college, enrollment in the honors college or another residential college or program at UCA, scholarship status, and housing arrangement), history of mental health (anxiety, depression, stress, and ADHD), frequency of illicit use of ADHD medications not prescribed to respondents themselves (admission of illicit use, occurrence of the first instance of illicit use, general

statement of frequency, and prevalence of illicit use within lifetime, past 12 months, past 30 days, and past 2 weeks), and motivation for such behavior. This study was approved by the Office of Research Compliance institutional review board at the University of Central Arkansas and was conducted at UCA during a 2-month period in November and December of 2015.

Sample

The final sample consisted of 230 UCA undergraduate students, with 70.9% female, 27.8% male, and 1.3% identifying as either nonbinary or gender-fluid. The sample consisted of 83.5% Caucasians, 6.1% African-Americans, 4.8% Hispanics, 5.5% Asian, and other racial categories. All four class ranks were fairly equally represented: 25.7% freshmen, 20.4% sophomores, 22.6% juniors, and 31.3% seniors. Survey respondents ranged in age from 18 to 32, with the mean being 20.5 and with 94.3% falling within the traditional college age range of 18 to 22 years old. No students under 18 years of age were allowed to take the survey, as 18 was the lowest value accepted in response to the question regarding age.

The mean cumulative GPA was 3.559, with 83.9% of survey respondents reporting a cumulative GPA greater than 3.000. Of the survey respondents, 14.8% were or had been enrolled in a residential college program, 58.7% were enrolled in the honors college, and 26.5% had never been a member of any residential college or program at UCA. Slightly more than three-quarters of the sample (76.5%) were scholarship recipients. There was approximately equal representation among housing arrangements, with 56.5% living on-campus (48.7% in a residence hall and 7.8% in an apartment) and 43.5% living off-campus (8.3% with family and 35.2% with friends or alone).

Slightly less than one-quarter (22.4%) of the sample had been diagnosed with anxiety disorder, with 9.6% currently taking prescribed medication and 12.7% not. In regard to depression, 8.8% reported having been diagnosed and currently taking prescribed medication, and 10.1% had been diagnosed but were not currently being treated (18.9% overall with a depression diagnosis). The mean self-reported stress level on a scale of 1 to 10, with 1 being the least stressful and 10 the most, during a typical semester was 6.75, with 78.1% of the sample reporting a stress level of 6 or higher. A small percentage of the sample (7.0%) had been diagnosed with ADHD, with 3.9% overall currently taking prescription medication and 3.1% not.

The sample was representative of the general UCA undergraduate population with respect to class rank and gender according to enrollment data for

the fall 2015 semester. However, Caucasians were overrepresented (83.5% vs. 69.6%) and African American students underrepresented (7.8% vs. 20.0%) in the sample. Additionally, among the six academic colleges, health & behavioral sciences and natural sciences & mathematics were overrepresented (47.0% vs. 29.1% and 24.3% vs. 13.1%, respectively), while undeclared students were underrepresented (1.3% vs. 22.0%) (“Institutional Research”).

Statistical Analysis

The initial analysis consisted of determining the overall prevalence rate for illicit use of ADHD medications as well as the effect of cumulative GPA, enrollment in the honors college or a residential college, scholarship status, and mental health history. Prevalence rates for illicit use among subgroups were calculated according to age, ethnicity, class rank, gender, cumulative GPA, college housing the major concentration, enrollment in the honors college or another residential college or program, housing arrangement, scholarship status, stress level, and mental health history. Within the group of respondents reporting illicit use, prevalence rates for general, lifetime, past-year, past-month, and past-two-weeks were determined as well as the timing of the first instance and motivations of illicit use. Chi-squared tests of independence were performed to test for differences in illicit use, cumulative GPA, enrollment in the honors college or a residential college, and mental health history by all of the aforementioned parameters. A *p* level of 0.05 was used for each statistical test. The average cumulative GPA and reported stress level were also calculated for both illicit users and non-users in regard to diagnosis of anxiety disorder, depression, and/or ADHD; stress level; first instance of illicit use; motivations for illicit use; and prevalence rates of general, lifetime, past-year, past-month, and past-two-weeks illicit use.

Research Questions

1. What is the overall prevalence rate of illicit use of ADHD medications at UCA?
2. What is the relationship, if any, between mental health disorders and issues (e.g., anxiety, stress, depression, and ADHD) and illicit use?
3. Is there a significant difference in illicit use among learning community participants or scholarship recipients (i.e., those in the honors college, in the residential colleges, and/or receiving academic scholarships)

compared to students neither enrolled in a learning community nor receiving a scholarship?

4. Is there a correlation between GPA and illicit use?
5. What are the primary motivations for illicit use?
6. What factors are supported as predictive for illicit use from the survey responses?

Admission and Renewal Requirements for the Honors College

To be eligible for admission to the UCA Honors College, high school students must have a minimum cumulative high school GPA of 3.500 at the end of their seventh semester and must require no remediation based on ACT scores. The average GPA of students admitted, however, is a 3.90. No minimum composite ACT score is required, but the average score for students admitted is a 29.7. Additionally, applicants are evaluated based on class rank, a teacher recommendation letter, writing skills, and participation in a small group discussion (“Application Process”). The requirements for matriculating into the Honors Interdisciplinary Minor program at the end of the second semester of the sophomore year include 60 hours of completed course credit, a minimum overall GPA of 3.250, and a minimum GPA of 3.500 in all honors courses (“Matriculation Requirements”). All honors students are awarded an honors college scholarship (“Scholarship Information”).

Admission and Renewal Requirements for the Residential College Program

The Residential College Program at UCA is made up of five living and learning communities and one learning community of commuting students. These include the Health Promotion & Wellness (HPaW) Residential College in Baridon Hall; EDGE Residential College in Hughes Hall; The Stars Residential College in Short/Denney Hall; Science, Technology, Engineering & Mathematics (STEM) Residential College in Arkansas Hall; Entrepreneurship, Public Scholarship, Innovation, Community Engagement (EPIC) Residential College in Bear Hall; and Minton Commuter College in Old Main Hall (“Residential Colleges”). The retention and graduation rates are 12% and 10% higher, respectively, among students participating in the Residential College Program at UCA than among those who do not participate (“STEM Residential College”).

Admission and Renewal Requirements for Academic Scholarships

Six academic scholarships, defined by ACT/SAT scores within the last five years, are available to eligible entering freshmen at UCA. The minimum cumulative high school GPA for all these scholarships is 3.250 as of the sixth or seventh semester, and the award varies based on standardized test scores (“Academic Scholarships”). Students who receive one of these scholarships must enroll in a minimum of 12 credit hours each semester and earn a minimum of 9 credit hours at the end of each fall semester to meet renewal requirements. All scholarship students must earn a minimum of 27 credit hours during the first year, a minimum of 30 credit hours during each of the next three years, and either a 3.00 or 3.250 based on the scholarship category (“Academic Scholarships”).

RESULTS

Prevalence of Illicit Use of ADHD Medications by Student Characteristics

Approximately 18.0% (N = 41) of students reported lifetime illicit use of ADHD medications, 13.2% (N = 30) reported illicit use in the past year, 10.1% (N = 23) reported in the past month, and 8.3% (N = 19) within the past two weeks. Tables 1, 2, and 3 illustrate the differences in the prevalence in lifetime, past-year, past-month, and past-two-weeks illicit use among various subgroups defined by demographic, academic, and mental health characteristics.

As illustrated in Table 1, illicit use, regardless of timeframe, was most prevalent among undergraduate students younger in age, consistent with the findings of Kaye, Darke, and Torok (111). Illicit use was also most frequently reported by Hispanic students in contrast to consistent previous findings that illicit use is significantly higher among Caucasians (McCabe et al. 99; Wilens et al. 21). However, the sample for all races other than Caucasian was quite small in this study, and the percentage of Caucasian students reporting lifetime illicit use (18.8%) is consistent with that of the entire sample in this study (18.0%). With respect to gender, illicit use was most commonly reported by respondents who identified as either genderqueer or nonbinary although the sample size for this subgroup was only 3 students. Consistent with previous findings, a higher percentage of males reported illicit use than females (Hall et

TABLE 1. PREVALENCE OF ILLICIT USE OF ADHD MEDICATIONS BY STUDENT DEMOGRAPHIC CHARACTERISTICS

Student Demographic Characteristics	N	Lifetime Use %	Past Year Use %	Past Month Use %	Past Two Weeks Use %
Age					
18	40	22.2	10.0	10.0	7.5
19	50	31.6	8.0	8.0	4.0
20	42	50.0	14.3	14.3	11.9
21	61	76.2	21.3	9.8	9.8
22	24	18.2	8.3	8.3	8.3
23	6	4.3	16.7	16.7	16.7
25	2	0.0	0.0	0.0	0.0
26	1	0.0	0.0	0.0	0.0
27	2	0.0	0.0	0.0	0.0
28	1	0.0	0.0	0.0	0.0
32	1	0.0	0.0	0.0	0.0
Race					
African American or African descent	4	25.0	0.0	0.0	0.0
Black (non-Hispanic)	14	7.1	7.1	7.1	7.1
American Indian/Native Alaskan	1	0.0	0.0	0.0	0.0
Asian	4	0.0	0.0	0.0	0.0
White (non-Hispanic)	192	18.8	13.5	9.9	8.3
Hispanic	11	27.3	27.3	27.3	18.2
Other	4	0.0	0.0	0.0	0.0
Gender					
Female	163	15.3	10.4	8.6	5.5
Male	64	23.4	18.8	12.5	14.1
Other	3	33.3	33.3	33.3	33.3
Housing Arrangement					
On-campus in a residence hall	112	11.6	8.9	8.0	5.4
On-campus in an apartment	18	16.7	16.7	16.7	11.1
Off-campus with family	19	15.8	5.3	5.3	5.3
Off-campus with friends or alone	81	27.2	19.8	12.3	12.3

al. 169; Dwyer 12; McCabe et al. 101). In regard to housing, illicit use prevalence rates were much higher among students living off-campus alone or with friends than among students with any other arrangement, consistent with a previous finding that illicit use was higher among students living in personal residences as opposed to residence halls (Clegg-Kraynok et al. 599).

As illustrated in Table 2, the prevalence rate of illicit use generally increased with class rank, a higher percentage of upperclassmen (juniors and seniors) reporting illicit use than underclassmen (freshmen and sophomores), consistent with previous findings (Dwyer 12; Gallucci, Usdan, et al. 186; Kaye, Darke, and Torok 113). Although findings reported previously in the literature consistently correlate more frequent illicit use with lower GPA, illicit use prevalence rates fluctuated with respect to GPA in this study (Garnier-Dykstra et al. 230; McCabe et al. 99; Shillington et al. 999). Of the six colleges at UCA, illicit use within all timeframes considered was more frequently reported by students majoring in a field of study housed within the business college. The prevalence rate of illicit use was consistent across all timeframes considered for college of education students. Of students with a declared major, only those in fine arts & communication did not report any illicit use within the past month or past two weeks. The majority of natural sciences & mathematics students reported illicit use within the past year. The prevalence rate of illicit use during the past year and past month did not differ much among the health & behavioral sciences students.

The prevalence rates of illicit use among honors college students were consistent with those of the entire sample, with 17.0% ($N = 23$) of honors students reporting lifetime illicit use. Results from a previous study also failed to show that honors students engaged in illicit use more frequently than other students (Dwyer 14). Prevalence of illicit use was quite high among students in certain residential colleges (HPaW and EDGE), but the combined sample size for both of these populations was only 8 students in this study. Compared to honors students, residential college students (14.7%) reported less prevalent rates of lifetime illicit use. Additionally, the prevalence rate of illicit use across all four timeframes for students not enrolled either in the honors college or a residential college was higher than the overall average prevalence rates for the entire sample. The same is true of students not receiving an academic scholarship from UCA although the prevalence rates of illicit use among scholarship recipients was generally consistent with those of the entire sample.

TABLE 2. PREVALENCE OF ILLICIT USE OF ADHD MEDICATIONS BY STUDENT ACADEMIC CHARACTERISTICS

Student Academic Characteristics	N	Lifetime Use %	Past Year Use %	Past Month Use %	Past Two Weeks Use %
Class Rank					
Freshman	59	15.3	10.2	10.2	8.5
Sophomore	47	14.9	12.8	12.8	6.4
Junior	52	19.2	13.5	11.5	9.6
Senior	72	20.8	15.3	6.9	8.3
Cumulative GPA					
2.500 and below	10	10.0	10.0	10.0	10.0
2.501–2.750	8	25.0	12.5	12.5	12.5
2.751–3.000	19	15.8	5.3	5.3	0.0
3.001–3.250	17	29.4	29.4	23.5	29.4
3.251–3.500	31	19.4	9.7	6.5	3.2
3.501–3.750	48	20.8	16.7	12.5	12.5
3.751–4.000	97	14.4	11.3	8.2	5.2
College					
Business	19	36.8	31.6	31.6	26.3
Education	8	12.5	12.5	12.5	12.5
Fine Arts & Communication	17	17.6	11.8	0.0	0.0
Health & Behavioral Sciences	108	13.9	7.4	6.5	3.7
Liberal Arts	19	26.3	21.1	15.8	15.8
Natural Sciences & Mathematics	56	17.9	16.1	10.7	10.7
Undeclared	3	0.0	0.0	0.0	0.0
Honors/Residential College					
HPaW	6	50.0	33.3	33.3	33.3
EDGE	11	9.1	0.0	0.0	0.0
The Stars	3	0.0	0.0	0.0	0.0
STEM	11	0.0	0.0	0.0	0.0
EPIC	2	50.0	50.0	0.0	0.0
Minton	1	0.0	0.0	0.0	0.0
Honors College	135	17.0	13.3	9.6	7.4
Not in Honors or Residential College	61	21.3	14.8	13.1	11.5
Scholarship Status					
Recipient	176	16.5	11.9	9.1	7.4
Not a recipient	54	22.2	16.7	13.0	11.1

As illustrated in Table 3, illicit use across all four timeframes was more frequently reported by students who had been diagnosed with either anxiety or depression but were not currently taking prescribed medications to treat these mental health disorders. With respect to ADHD, the prevalence rate of lifetime illicit use was approximately equal among students who had been diagnosed with ADHD (44.4% of ADHD students with a current prescription compared to 42.9% of ADHD students not currently taking prescribed medications) and much higher than the rate of lifetime illicit use among

TABLE 3. PREVALENCE OF ILLICIT USE OF ADHD MEDICATIONS BY STUDENT MENTAL HEALTH CHARACTERISTICS

Student Mental Health Characteristics	N	Lifetime Use %	Past Year Use %	Past Month Use %	Past Two Weeks Use %
Anxiety					
Diagnosis/current prescription	22	18.2	18.2	13.6	13.6
Diagnosis/no current prescription	29	34.5	24.1	17.2	17.2
No diagnosis	177	15.3	10.7	8.5	6.2
Depression					
Diagnosis/current prescription	20	25.0	20.0	15.0	15.0
Diagnosis/no current prescription	23	43.5	34.8	30.4	26.1
No diagnosis	185	14.1	9.7	7.0	5.4
Stress Level					
1	4	0.0	0.0	0.0	0.0
2	2	0.0	0.0	0.0	0.0
3	5	20.0	20.0	20.0	20.0
4	15	26.7	6.7	6.7	6.7
5	24	20.8	12.5	12.5	8.3
6	32	12.5	12.5	9.4	9.4
7	64	17.2	9.4	7.8	7.8
8	53	13.2	13.2	5.7	3.8
9	19	31.6	26.3	12.1	15.8
10	10	30.0	30.0	30.0	20.0
ADHD					
Diagnosis/current prescription	9	44.4	22.2	0.0	11.1
Diagnosis/no current prescription	7	42.9	14.3	14.3	0.0
No diagnosis	212	16	12.7	10.4	8.5

students who had never been diagnosed with ADHD. These results support previous findings associating more prevalent illicit use with a diagnosis of ADHD (Webb, Valasek, and North 27; Gallucci, Usdan, et al 184; Judson and Langdon 100). In general, students who had been diagnosed with any of the three mental health disorders considered (anxiety, depression, and ADHD), regardless of current prescription status, more commonly reported illicit use than those students without diagnoses. These results are consistent with previous findings associating more frequent illicit use among students with more extensive histories of anxiety disorder and depression (Bidwal et al. 535). Prevalence of illicit use fluctuated with respect to average perceived stress level experienced during a typical college semester (scale of 1–10), but lifetime illicit use was by far most commonly reported by students who indicated an average stress level of 9 (31.6%) or 10 (30.0%). Students who reported the lowest average stress levels (1 or 2) did not indicate any illicit use at all. These findings are generally consistent with the results of previous studies associating illicit use with higher ratings of stress (Bidwal et al. 535; Dussault and Weyandt 93).

Frequency, Timing, and Motivation for Lifetime Illicit Use

The general frequency of illicit use, timing of the first instance of illicit use with respect to education level, and motivations for illicit use reported by the lifetime illicit users ($N = 41$) in the sample are illustrated in Table 4. The majority of survey respondents who admitted to having illicitly used ADHD medications at least once during their lifetime (41.5%) generally did so at least once per semester, with close to one-third (29.3%) reporting that they engaged in illicit use at least once per month. None of the lifetime illicit users reported a general frequency of illicit use of at least once per day. More than half of illicit users (61.0%) indicated that they had not engaged in this behavior until after they were in college, with the remainder of illicit users (36.6%) having first illicitly used ADHD medications while still in high school. This finding is consistent with the results of a previous study in which the majority of illicit users indicated that they had not used stimulant medications before college (Thomas 31).

Of the fourteen provided motivations for illicit use, the top three most commonly reported by illicit users were to improve concentration (85.4%), to do better in school (68.3%), and to increase alertness (56.1%). Each of these is related to academic performance, either directly or indirectly, echoing findings reported in the literature that have consistently associated

motivations regarding the effects of ADHD medications, such as improving concentration and increasing alertness, with students wanting to stay up all night or stay focused while studying or working on assignments. Thus, these results are consistent with the primary motivation for illicit use being related to academics as documented in previous studies (Arria, Caldeira, et al. 162; Benson, Flory, and Humphreys 62; Garnier-Dykstra et al. 230; Bossaer et al. 969; DeSantis, Webb, and Noar 318; Teter, McCabe, et al. 1501; Webb, Valasek, and North 30). Slightly less than one-quarter of illicit users (22.0%) reported a motive related to curiosity (“to see what it was like”). None of the lifetime illicit users selected either of the two provided responses comparing the safety and potential for addiction of ADHD medications and “street

TABLE 4. GENERAL FREQUENCY, FIRST ILLICIT USE, AND MOTIVATIONS OF LIFETIME ILLICIT USERS

Characteristic	N	% of Lifetime Users
General frequency of illicit use		
At least once per year	6	14.6
At least once per semester	17	41.5
At least once per month	12	29.3
At least once per week	2	4.9
First instance of illicit use		
College	25	61.0
High school	15	36.6
Motivations for illicit use		
To improve concentration	35	85.4
To do better in school	28	68.3
To increase alertness	23	56.1
To see what it was like	9	22.0
To get high	4	9.8
To feel better	4	9.8
To help lose weight	3	7.3
To escape from reality	3	7.3
To counter the effects of other drugs	2	4.9
To self-medicate	2	4.9
Because of a personal/emotional problem	2	4.9
Because of an addiction	1	2.4

drugs” as motivations for illicit use (“because ADHD medications seem safer than street drugs” and “because ADHD medications seem less addictive than street drugs”); this result is seemingly in contrast to findings from a previous study that reported comparing and contrasting ADHD medications with “party drugs” as the primary theme of justification among illicit users (DeSantis and Hane 35).

Correlates of Lifetime, Past-Year, Past-Month, and Past-Two-Weeks Illicit Use

Chi-squared tests of goodness of fit and independence performed on survey response data revealed several significant correlates ($p < 0.05$) of illicit use of ADHD medications within lifetime, past-year, past-month, and past-two-weeks timeframes, as illustrated in Table 5. Lifetime illicit use was significantly higher among students who were living off-campus with friends or alone, who had been diagnosed with either anxiety or depression but were not currently taking prescribed medications to treat these disorders, and who had been diagnosed with ADHD and were current prescription holders. Furthermore, having been diagnosed with either anxiety, depression, or ADHD was significantly correlated with lifetime illicit use, regardless of current prescription status. The relationship between diagnosis of either depression or ADHD and lifetime illicit use was even stronger when considered in this way, as evidenced by the smaller p -values associated with these diagnoses.

The prevalence of illicit use within the past year was significantly higher among students who reported an average stress level of 9 or 10. With respect to depression diagnosis and prescription status, past-year illicit use was significantly more common among students who had been diagnosed with depression but were not currently taking prescription medications to treat depression. As with lifetime illicit use, this correlation was stronger when only depression diagnosis status was considered, with the prevalence rate of past-year illicit use being significantly higher among students who had been diagnosed with depression. Likewise, when prescription status was not taken into account, a significantly higher percentage of students who had been diagnosed with anxiety disorder reported illicit use within the past year compared to students without an anxiety disorder diagnosis.

Additional findings not shown include that past-month illicit use was significantly more prevalent among students who were majoring in a field of study housed within the business college, who had been diagnosed with depression but were not current prescription holders (or who had been

diagnosed with depression compared to those who had not, without factoring in prescription status), or who reported an average stress level of 9 or 10.

Furthermore, illicit use of ADHD medications occurring within the past two weeks was significantly higher among students who had a cumulative GPA falling within the range of 3.001–3.250, who were majoring in a field of study housed within the business college, who had been diagnosed with depression but were not currently taking prescribed medication, or who

TABLE 5. CORRELATES OF LIFETIME ILLICIT USE

Characteristic	N	Illicit Use %	X ² P-value
Housing Arrangement			
On-campus in a residence hall	112	11.6	0.046 ₉
On-campus in an apartment	18	16.7	
Off-campus with family	19	15.8	
Off-campus with friends or alone	81	27.2	
Anxiety Prescription Status			
Diagnosis/current prescription	22	18.2	0.044 ₀
Diagnosis/no current prescription	29	34.5	
No diagnosis	177	15.3	
Depression Prescription Status			
Diagnosis/current prescription	20	25.0	0.001 ₇
Diagnosis/no current prescription	23	43.5	
No diagnosis	185	14.1	
ADHD Prescription Status			
Diagnosis/current prescription	9	44.4	0.020 ₇
Diagnosis/no current prescription	7	42.9	
No diagnosis	212	16.0	
Anxiety Diagnosis Status			
Diagnosis	51	27.5	0.045 ₇
No diagnosis	177	15.3	
Depression Diagnosis Status			
Diagnosis	43	34.9	0.001 ₄
No diagnosis	185	14.1	
ADHD Diagnosis Status			
Diagnosis	16	43.8	0.005 ₄
No diagnosis	212	16.0	

had been diagnosed with either anxiety disorder or depression when current prescription status was not taken into account. There was also a significant difference in illicit use within the past two weeks regarding gender, with the highest prevalence among students who did not identify as either female or male (genderqueer or nonbinary). However, only 3 students in the entire sample identified as something other than female or male. There is likely still a significant difference in past-two-weeks illicit use with respect to gender, though, as a chi-squared test yields a *p*-value of less than 0.05 if responses from only students identifying with either side of the gender binary are considered. Illicit use within the past two weeks was also significantly higher among males.

While there is a lack of associations reported between either housing arrangement or college housing, the major field of study, and illicit use in the literature, in general the results reported in Table 5 are consistent with the findings of published studies. These results echo the well-documented significant correlations between higher rates of illicit use and having a history of mental health disorders and issues (such as anxiety, depression, and stress), being diagnosed with ADHD, having a relatively “low” GPA, and being a male (Bidwal et al. 535; Dussault and Weyandt 93; Webb, Valasek, and North 27; Gallucci, Usdan, et al. 185; Judson and Langdon 100; Garnier-Dykstra et al. 230; McCabe et al. 101; Shillington et al. 999; Hall et al. 169; Dwyer 14). Being diagnosed with either depression or anxiety was significantly correlated to more prevalent illicit use over their lifetime, within the past year, and within the past two weeks, but not within the past month.

Correlation of Lifetime Illicit Use with Multiple Mental Health Disorder Diagnoses

The effect of being diagnosed with multiple mental health disorders (anxiety, depression, and ADHD) on lifetime illicit use is illustrated in Table 6. As shown, the prevalence rate of lifetime illicit use increases with the number

TABLE 6. CORRELATION OF LIFETIME ILLICIT USE WITH MULTIPLE MENTAL HEALTH DISORDER DIAGNOSES.

Number of Diagnoses	N	Illicit Use %	X ² P-value
No diagnoses	158	13.3	0.004 ₉
1 diagnosis	37	21.6	
2 diagnoses	26	30.8	
All 3 diagnoses	7	57.1	

of diagnoses of mental health disorders. Survey respondents who indicated that they had been diagnosed with anxiety disorder, depression, and ADHD were significantly more likely to have engaged in illicit use of ADHD medications at least once during their lifetime, consistent with results reported in the literature (Bidwal et al. 535; Dussault and Weyandt 93; Webb, Valasek, and North 27; Gallucci, Usdan, et al. 184; Judson and Langdon 100).

DISCUSSION

The present study found that the population of UCA undergraduate students reporting lifetime illicit use of ADHD medications was 18.0%, past-year illicit use was 13.2%, past-month was 10.1%, and past-two-weeks was 8.3%. Illicit use was higher among certain types of students, in particular those of traditional college age (18–22), Hispanic and Black students, males, students living off-campus alone or with friends, upperclassmen, business students, students not enrolled in a residential college or the honors college, students not receiving an academic scholarship, students perceiving their typical semester to be more stressful, and students diagnosed with anxiety, depression, and/or ADHD.

Of those students indicating illicit use, the majority reported that they generally engaged in illicit use at least once per semester or at least once per month, that they had not illicitly used ADHD medications until they were in college, and that they did so to improve concentration, to do better in school, and/or to increase alertness. Illicit use, regardless of timeframe, was significantly higher among students who had been diagnosed with depression but were not currently taking prescribed medications to treat it. Being diagnosed with anxiety disorder was also significantly correlated with higher prevalence rates of illicit use during lifetime, the past year, and the past two weeks. Additionally, lifetime illicit use was significantly more frequent among students living off-campus with friends or alone and among students with ADHD. Students reporting an average stress level during a typical semester of 9 or 10 (on a scale of 1–10) also reported significantly higher levels of illicit use within the past year and past month. Business students reported a significantly higher rate of illicit use within the past month and the past two weeks. Finally, males and students with a cumulative GPA falling within the range of 3.001–3.250 reported significantly higher rates of illicit use within the past two weeks.

Prevalence rates of lifetime illicit use increased significantly with increasing numbers of diagnoses of mental health disorders and issues (anxiety

disorder, depression, and ADHD). Being diagnosed with one of the three mental health disorders considered in this study was also significantly correlated to being diagnosed with each of the other two. Additionally, diagnoses of each of the three disorders were significantly more common among students not participating in a residential college or the honors college. Students who reported that they had been diagnosed with anxiety disorder were significantly more likely to be female and to not be in the honors college. Students reporting an average stress level of 9 or 10 had a significantly higher prevalence rate of both anxiety disorder and depression diagnosis. The prevalence of an ADHD diagnosis was significantly higher among seniors, students with relatively lower GPAs, students not in the honors college, students living off-campus, and students not receiving an academic scholarship.

More frequent illicit use has been consistently associated with high levels of academic stress, more competitive college admission standards and environments, certain dimensions of perfectionism, parental pressure, and motivations related to enhanced academic performance. Students enrolled in honors colleges or programs and students receiving academic scholarships are subjected to higher academic standards than their peers in order to remain competitive and/or to continue receiving their scholarship. Personal anecdotal evidence also suggests that these types of students are more likely to be involved in many extracurricular activities, to choose more difficult classes and major fields of study, and to feel considerable pressure to be perfect, either internally through comparison with their fellow high-achieving peers or externally from their parents. Thus, we anticipated that the prevalence rate of illicit use of ADHD medications would be significantly higher among students enrolled in the honors college or a residential college and among students receiving an academic scholarship from UCA, but this expectation was not supported by the results of our study.

Participating in a living-learning community such as the honors college or the residential colleges may possibly serve as a protective factor against illicit use of ADHD medications. Honors and residential college students typically live together, affording them easy access to peers having similar experiences, to faculty members and resident masters, and to other resources. This type of environment may provide a better support network for students who are having trouble coping with their hectic schedules. However, because research has shown illicit use to be strongly correlated with having friends who also engage in this behavior and with seeing this behavior as normative, these types of college communities have a high potential for widespread ADHD medication abuse.

Given the strong association between illicit use and mental health disorders, the desire to improve academic performance, and the use of ADHD psychostimulants, it is important to assess the prevalence of this problem within individual communities on college campuses. The characteristics and motivations of students who illicitly use ADHD medications must be understood before any sort of preventive strategy can be implemented, and rampant illicit use may be a sign of larger mental health issues at play within student populations.

Research Limitations

The sample used in the present study was lacking in adequate representation of all races other than Caucasian, students identifying as male or nonbinary/genderqueer, students majoring in a field of study not housed within the college of health & behavioral sciences, undeclared students, residential college students, students not enrolled in the honors college, and students not receiving an academic scholarship at UCA. While the sample was generally representative of the UCA Honors College population, a more representative non-honors and/or non-scholarship control sample is needed for better comparison to assess whether illicit use of ADHD medications is more prevalent among high-achieving students. Additionally, the survey used in conjunction with this study was administered late in the fall 2015 semester, after the honors college had already implemented a peer counseling program in addition to the long-running mentor program. Providing this type of support network among peers may have played a protective role against illicit use of ADHD medications, but any potential effect cannot be measured.

The effect of participating in a living-learning community could have been better assessed had the survey included items to gauge respondents' knowledge of peer use and perceptions of illicit use of ADHD medications as normative, safe, and/or morally and ethically acceptable. Moreover, the prevalence of academic motivation for engaging in illicit use could have been more directly evaluated by including measures to determine whether illicit users felt that the ADHD medications had a significant effect on their academic performance, either through improved GPA and/or test scores or a strengthened ability to concentrate and study.

FUTURE RESEARCH AND FINAL CONCLUSIONS

The literature has consistently reported and supported differences in illicit use of ADHD medications among college students as determined by race, gender, age, class rank, GPA, participation in Greek life, knowledge of peer use, competitiveness of admission standards and high-stakes college environments, academic and non-academic motivations, stress and academic pressure, and history of mental health disorders and issues. However, despite all the significant correlates of illicit use that have been found many times over, there is still a serious lack of research on the prevalence of this behavior among small, specialized subpopulations. Given the wide fluctuation in the prevalence rates of illicit use among individual institutions in different geographic locations and over time, basing strategies of intervention and prevention on the general college population is insufficient. While the literature ties more frequent illicit use to academic stress, highly competitive college environments, and certain dimensions of perfectionism, it needs to include studies of the prevalence of this behavior among high-achieving students.

Students in honors colleges or programs are typically “the best of the best” from their high schools, and many experience a shock once they arrive at college and realize they are surrounded by hundreds of other high-achieving students just like them. This situation typically leaves students two options: either learn to cope with not being the star student or use any means necessary to remain competitive with their peers. Often these kinds of students did not have to put forth great effort in order to excel academically in high school, and consequently their study habits and time-management skills can be undeveloped. Honors students may be more involved in extracurricular activities and organizations; be ambitious in their course load and career plans; feel parental pressure to be perfect; and experience test anxiety at levels higher than the non-honors undergraduate population. Research has also shown that “gifted individuals” are at a unique risk for developing mental health disorders such as unhealthy perfectionism, anxiety, depression, and suicidality because of “chronic, heightened expectations from others for performance” (Cross and Cross 165). The distinct experiences of gifted and high-achieving students give rise to their unique counseling needs, marking them as an undergraduate subpopulation potentially at high risk for illicit use and hence of interest and relevance to this field of research.

Further research should assess the prevalence rates, contributing and predictive factors, acceptance, and motivations for the nonmedical use of

ADHD prescription medications among American undergraduate students who are high-achieving and/or held to high academic expectations, such as honors students, scholarship recipients, and residential college/program participants. Additionally, honors directors should consider special programs for students that focus on helping students reduce anxiety, better manage their time, and find ways to reduce stress. The campus housing and residence life offices and the counseling center can be effective partners in delivering such programs. In addition to one-time programs to address these issues, mentor programs and peer coach programs have had significant success in creating environments that encourage students to approach designated student leaders with their issues, thereby increasing the chances of receiving intervention.

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