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CORRELATIONAL STUDY OF SUBSTANCE USE DISORDERS AND UNDIAGNOSED NEURODEVELOPMENTAL DISORDERS IN YOUNG ADULT COLLEGE STUDENTS

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Abstract

In the last 2 years, in the United States, there has been a significant increase in substance abuse for young adults. Individuals with neurodevelopmental disorders (i.e., Attention Deficit/Hyperactive Disorder [ADHD], Autism Spectrum Disorder [ASD]) are often diagnosed with co-occurring substance use disorders. This study is focused on screening 200 young adults (ages 18 to 25) who are college students in the USA for substance use disorders [SUD] and for ADHD and ASD (the measures will be presented in the native language of the participants-English with an option for Spanish). The hypothesis is that scores on the *TAPs Tool 1 & 2*, which measure symptoms of SUDs, will be positively correlated to screening measures for ADHD and ASD (*ASRS-vI.I and AQ-10 short*). There is a strong positive correlation between substance use and neurodevelopmental disorder symptoms.

Keywords: *Substance abuse, neurodevelopmental disorders, ADHD, ASD, young adult.*

1. Introduction

Substance abuse is a pressing issue in the United States. With high rates of substance use, binge drinking, opiate use, and hallucinogen use, this issue only continues to get worse. The highest population of those who use are those in college age (early to mid-20s). Alongside these issues, there has been a surge in the diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD).

2. Hypotheses

There will be a positive correlation between ADHD symptoms with substance abuse symptoms.
There will be a positive correlation between ASD symptoms and substance abuse symptoms.

3. Literature review

According to the American Psychological Association, roughly 10% of Americans suffer from attention deficit hyperactivity disorder with 2.5% being adults (Simon et al., 2009) and 1 in 36 children have been identified with autism spectrum disorder (Maenner et al., 2023). Substance use disorders (SUDs) are increasingly prevalent in the United States with 18–25-year-olds being the age group that is most likely to initiate in substance use and, subsequently, experience SUDs (Lu et al., 2023). These populations are very susceptible to substance use disorders (Ressel et al., 2020; Srichawla et al., 2022).

Attention deficit hyperactivity disorder (ADHD) is characterized by its debilitating nature as it impacts aspects of daily life including interpersonal relationships, academic and professional achievements, and daily living skills (Harpin, 2005).

Autism spectrum disorder (ASD) is characterized by its deficits in social communication and the presence of restricted interests and repetitive behaviors (Hodges et al., 2020). Something that makes ASD special is the range with which the symptoms can vary (thus being a “spectrum”).

Substance abuse, as defined by the DSM-5, is a series of disorders of varying severity with the main characteristic being taking a substance (alcohol, cannabis, caffeine, hallucinogens, inhalants, opioids, sedatives, hypnotics, or anxiolytics, tobacco, or other/unknown substances) in excess (American Psychology Association, 2022).

ADHD and Autism are severely underdiagnosed in both children and adults and there is very limited research on the subject of these neurodevelopmental disorders. According to a study addressing the demographic differences with and without ASD, approximately 25% of the 4,498 children (1,135) had ASD indicators without an ASD diagnosis (Wiggins et al., 2019). These values are taken from diagnosed individuals under the age of 18. An estimated 4.4% of people ages 18 to 44 have ADHD but have not been diagnosed (Barterian, 2024) and autism spectrum disorder is severely under-diagnosed in both children and adults.

In 2022, there was an 8% increase in the prevalence of alcohol use in college students between the ages of 18-22 (80.5 % vs 72.7 %) in the United States (Pasman et al., 2024). With substances being a common way of engaging socially in college, the use of substances is incredibly high (Welsh et al., 2019). Substance use disorders have been found to be extremely common in those with ADHD with Nicotine dependence being substantially more common in adults with ADHD (40%) compared to the general population (26%) (Sullivan & Rudnik-Levin, 2001). The risk of substance related problems in patients with ASD is almost twofold compared to non-ASD populations with ADHD only worsening the risks (Walhout et al., 2022).

4. Objectives

The objective of this study is to identify a possible correlation between substance abuse symptoms and disorders and undiagnosed neurodevelopmental disorders (ADHD and ASD). The purpose being to identify whether a correlation exists and possible intervention and prevention methods. With the high rates of undiagnosed neurodevelopmental disorders and substance abuse disorders, the findings of this study represent an unprecedented necessity to reassess and evaluate neurodevelopmental disorders as they pertain to substance abuse disorders.

5. Methods

This correlational study consists of a survey that seeks to identify possible substance abuse issues coupled with undiagnosed neurodevelopmental disorders, namely, autism spectrum disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). The target population is 200 young adults within the ages of 18-25 from the United States. Participants were recruited using CloudResearch. Those who were recruited via CloudResearch and received $1.33 cents to complete the survey. The survey was completed entirely online, presented all at once, and completely anonymous. The participants were asked to complete several validated measures as detailed below.

The ***Tobacco, Alcohol, Prescription medications, and other Substance (TAPS) Tool (Part 1)*****:** The measure consists of a 4-item screening for tobacco use, alcohol use, prescription medication misuse, and illicit substance use in the past year. The responses range from “Daily to Almost Daily” to “Never”. Question 2 is only answered by males and Question 3 was only answered by females. The TAPS-1 tool is a screener adapted from the National Institute on Drug Use (NIDA). It is a quick screen with items assessing the frequency with which one partakes in tobacco, alcohol (4+ or 5+ drinks for females and males, respectively), prescription medication, and illicit substances (e.g., marijuana, cocaine, methamphetamine, hallucinations) (Carter et al., 2021). Any responses besides “never” on the TAPS-1 will indicate a positive screen usually requires the TAPS-2 but for the sake of data collection, both were utilized in tandem (McNeely et al., 2016). The TAPS-1 tool is highly accurate in identifying unhealthy substance use habits with high reliability and validity. The frequency-of-use cut-points on the TAPS-1 tool for identifying Substance Use Disorders were greater than or equal to monthly use for tobacco and alcohol (sensitivity = 0.92 and 0.71, specificity = 0.80 and 0.85, AUC = 0.86 and 0.78, respectively) and any reported use for illicit drugs and prescription medication misuse (*sensitivity* = 0.93 and 0.89, *specificity* = 0.85 and 0.91, *AUC* = 0.89 and 0.90, respectively) (Gryczynski et al., 2017). The reliability was reported as sensitivity and was showed after the first and second administration of the measure for tobacco (0.93/0.81 vs. 0.90/0.79) alcohol (0.73/0.83 vs. 0.69/0.87), illicit drugs (0.91/0.84 vs. 0.95/ 0.87), and prescription medication misuse (0.86/0.87 vs. 0.93/0.94). The predictive validity of the self-administered TAP for alcohol was 0.47/0.97, tobacco was 0.70/0.99, 0.32/0.99, illicit drugs was 0.63/0.98.

The ***Tobacco, Alcohol, Prescription medications, and other Substance (TAPS) Tool (Part 2)*****:** The measure consists of a 9-item “Yes” or “No” questionnaire for tobacco, alcohol, and illicit substance use and prescription medication misuse in the past 3 months only. The TAPS-2 tool is a continuation of the TAPS-1 that is administered after any response besides “never” is chosen in the TAPS-1. The TAPS-2 is adapted from the Alcohol, Smoking, and Substance Involvement Screening Tool (ASSIST)-Lite including 3-4 yes/no questions for each class of substances assessing level of use, dependence, and concern from

others (McNeely et al., 2016). The reliability was reported as sensitivity and showed administration for tobacco (0.93/0.81 vs. 0.90/0.79) alcohol (0.73/0.83 vs. 0.69/0.87), illicit drugs (0.91/0.84 vs. 0.95/ 0.87), and prescription medication misuse (0.86/0.87 vs. 0.93/0.94). The predictive validity of the self-administered TAP for alcohol was 0.47/0.97, tobacco was 0.70/0.99, 0.32/0.99, illicit drugs was 0.63/0.98 (Gryczynski et al., 2017).

***Adult ADHD Self-Report Scale (ASRS-v1.1)*:** The measure consists of 18-items split into two parts (A and B). Parts A and B consist of multiple-choice questions asking how the participant has felt with responses ranging from "never" to "very often" in the past 6 months. The ASRS-v1.1 is an instrument consisting of the 18 DSM-IV-TR criteria with 6 of the 18 questions being found to be the most predictive of symptoms consistent with ADHD (van de Glind et al., 2013). The reliability was reported as having Cronbach's α for the factor-based scales in the range 0.63–0.72 (Kessler et al., 2007).

***Adult Autism Spectrum Quotient (AQ-SHORT) – Self-administered*:** The measure consists of a 28-item survey that utilizes a 4-degree Likert Scale (Definitely Agree, Slightly Agree, Slightly Disagree, Definitely Disagree) with only 1 point being scored for each question (Kent et al., 2018). Reliability was reported as Cronbach's α being between .77 and .86 the broad Social behavior factor (α between .79 and .86) and the Numbers/patterns factor (α between .67 and .73) (Hoekstra et al., 2011).

Participants were recruited using CloudResearch. The participants were directed to SurveyMonkey to issue their consent to be in the study as well as be presented with an exclusionary question to be redirected outside the survey. The question prevents anyone outside the ages of 18 and 25 from participating. Demographic questions regarding age, education level, employment status, ethnic background. Two questions regarding an existing history with neurodevelopmental disorders are issued. The participants were then provided with 3 separate pages of multiple choice and yes/no items for a total of no more than 40 questions from the TAPS-1, TAPS-2, ASRS v1.1, and the AQ-10. The entire survey took 5-10 minutes to complete.

6. Results

193 participants were surveyed (*n*=79 (female), *n*=70 (male), *n*=6 (non-binary), *n*=3 (trans male), *n*=1 (trans female)). The participants ranged in age from 18 to 25 (most participants reported being between the 24 years of age). The particpants reported having experience in college (*n*=165, *n*=90 (current student), *n*=5 (not current/never attended), *n*=11 (some experience), *n*=58 (have completed/have some college experience), *n*=1 (no answer)).

Using Pearson Correlation, there was a significant positive correlation between the TAPS Tool 1 and ASRS, $r(193)= .36$, $p < .001$. There was a significant positive correlation between the TAPS Tool 1 and AQ-10, $r(193)= .355$, $p < .001$. There was a significant positive correlation between the TAPS Tool 2 and ASRS, $r(193)= .437$, $p < .001$. There was a significant positive correlation between the TAPS Tool 2 and AQ-10, $r(193)= .371$, $p < .001$. Table 1 shows these results.

Table 1. Correlations.

		TAPS1TOTAL	TAPS2TOTAL	ASRSTOTAL	AQTOTAL
TAPS1TOTAL	Pearson Correlation	1	.761**	.361**	.355**
	Sig. (1-tailed)		<.001	<.001	<.001
	N	193	193	193	193
TAPS2TOTAL	Pearson Correlation	.761**	1	.437**	.371**
	Sig. (1-tailed)	<.001		<.001	<.001
	N	193	193	193	193
ASRSTOTAL	Pearson Correlation	.361**	.437**	1	.561**
	Sig. (1-tailed)	<.001	<.001		<.001
	N	193	193	193	193
AQTOTAL	Pearson Correlation	.355**	.371**	.561**	1
	Sig. (1-tailed)	<.001	<.001	<.001	
	N	193	193	193	193

**. Correlation is significant at the 0.01 level (1-tailed).

7. Discussion

This study found that there is a strong, positive correlation between substance use and neurodevelopmental disorders in the young adult, college student population, making young adult college students an at-risk population. Those who show signs of neurodevelopmental disorders have a higher likelihood of exhibiting signs of substance use problems. Implementation of screenings, prevention, and

intervention programs is necessary for halting this issue and sets the groundwork for future studies in substance abuse and neurodevelopmental disorders.

The *National Institute on Drug Abuse* (NIDA) has multiple prevention programs for different age levels. A promising intervention form is "***Classroom-Centered Intervention***" which focuses on the behavioral needs of students to assist in their scholarly achievements (Storr et al., 2002; Furr-Holden et al., 2004). Although it is mainly used in first-grader populations, it is possible to adapt this intervention strategy for use in college while also providing resources for those who show symptoms of neurodevelopmental disorders (Meinzer et al., 2020; Chandrasekhar, 2019).

8. Conclusions

Young adult college students are an at-risk population in need of specific resources in the United States to ensure their safety and success. The high likelihood of developing substance use problems when presenting symptoms of neurodevelopmental disorders is dangerous considering the growing number of undiagnosed and diagnosed neurodevelopmental disorders in the U.S. Prevention, screening, and interventions require more research to help protect the at-risk populations of college students.

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