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Personality or pathology? Predictors of early substance use in first-year college students

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ABSTRACT

Research suggests that students entering their first year of college may be at significant risk for developing substance use problems by relying on substances to regulate their emotions.

Objective: The aim of the current study was to examine the dual role of personality and psychopathology in predicting substance use among first-year students.

Participants: 103 first-semester undergraduate students were recruited via the university subject pool.

Methods: Participants completed personality questionnaires, structured clinical interviews, followed by the completion of diary entries each week reporting on substance use throughout their first semester.

Results: Results indicated that a *past* diagnosis of an affective (mood/anxiety/stress) disorder was the most significant predictor of substance use. Personality and current psychopathology had no association to substance use.

Conclusion: This finding is consistent with developmental models of substance use relating to emotion-related disease and suggests that greater nuance is needed in understanding substance use risk in college students.

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Introduction

There is a growing consensus that substance use among college students is a significant problem. According to a recent national survey, 76.1% of college students reported drinking alcohol, 35% reported binge drinking, and 38.6% reported using illicit drugs within the past year.¹ Moreover, at least 31% of college students met diagnostic criteria for alcohol abuse.² Indeed, research indicates that students transitioning out of high school into their first year of college are at a heightened risk for using substances.^{3–5} In addition, a larger proportion of college students drink during the first year compared to any other subsequent year of college.⁶ Furthermore, first-year college students are more likely to experience alcohol-related consequences that necessitate emergency room visits, and represent a disproportionate amount of alcohol-related deaths.^{7,8} Thus, the first year of college may present a period of greatest risk for substance use and related problems.

The first year of college presents as a period of considerable transition with novel stressors such as newfound independence, loneliness, peer-pressure, academic workload, that coincide with emerging mental health issues.^{9–12} Some of these stressors have been shown to be associated with increased substance use. For example, research has established an association between peer-pressure and college substance use, as well as mental health concerns and college

substance use, suggesting that college students may have difficulties finding alternate methods for managing negative emotions related to these novel stressors, or may find previous methods ineffective.^{13–17}

While most universities endorse substance use treatment and prevention efforts, the effectiveness of these programs may be limited. The available evidence suggests that some interventions are associated with decreased substance use; however, effects are modest and tend to decline over time.^{18–20} Many universities rely upon brief, computer-based interventions and webinars for incoming first-year students.²¹ While some of these interventions can reduce substance use, there is evidence that they have little effect on high risk groups such as individuals involved in social organizations such as Greek life.²² Indeed, it is clear that additional efforts are required to improve upon existing methods, in order to better determine for whom prevention and treatment programs may be most appropriate and effective.

The motivations demonstrated to underlie substance use among college students are heterogeneous, therefore a “one-size-fits-all” approach may be insufficient to tackle the problem.²³ It is therefore necessary to consider the role of individual differences when assessing risk for elevated substance use and related problems. Personality traits offer a descriptive measurement that can help elucidate the underlying affective and motivational forces behind behavior.^{24–26} To this end, researchers have examined differences in

personality and how they are related to patterns of substance use in college students. Reinforcement Sensitivity Theory (RST) has been widely examined in this context.²⁷ This model consists of two dichotomous neurobiological systems—the Behavioral Inhibition system (characterized by sensitivity to punishment, avoidance, and neuroticism) and the behavioral activation system (characterized by sensitivity to reward, approach motivation, and positive affect)—and has been prominently used to assess risk for substance use. For example, O'Connor and Colder²³ identified a number of drinking patterns and found that students who scored higher on the behavioral activation system (BAS) drank larger quantities, drank more frequently, and experienced greater alcohol-related problems. In addition, higher BAS was associated with drinking motives of enhancement, coping, and social desirability, indicating a wide range of motivations for drinking. Indeed, there is a compelling body of research identifying elevated BAS as a risk-factor for problematic substance use in college student samples.^{28–31} This accumulation of research suggests that college students who score higher on traits related to reward sensitivity are more likely to use substances. This is unsurprising given the rewarding nature of substances and the social culture of drinking on campuses.

While differences in personality may be useful for determining risk for substance use among first-year college students, psychopathology is another factor that should be considered. Emerging adulthood is a developmental period where the first onset of psychological disorders is most common, which may manifest in part because of the transition to independence and to college.³² Moreover, there is a high prevalence of co-occurrence among substance and emotion-related or affective disorders (mood, anxiety, and stress disorders), and research has shown that the presence of these disorders may both intensify substance use problems, and precede them.^{4,33–35} For example, major depressive disorder, generalized anxiety disorder, and panic disorder have been demonstrated to have specific links to substance use problems in college students.^{16,17,34} Indeed, students often endorse coping as a primary motivation for drinking, suggesting that the presence of emotional distress may be what is underlying much of the problematic substance use.^{23,36,37} Moreover, research has also shown that initial substance use and early affect-dysregulation symptoms can coincide developmentally during early adolescence.^{32,38–40} Therefore, there may also be a relationship between *past* affective disorder and substance use. When considering the role of affective disorders, there may be two potential pathways that lead to early substance use in college: 1) substances are used to cope with current symptoms of emotional distress, or 2) patterns of substance use developed prior to college in association with previous experiences with affective disorders, triggering more use in college. Considering these two trajectories, it is, therefore, possible that redirecting interventions toward improved mental health may reduce and/or prevent some of the truly problematic substance use among incoming college students. Taken together, reward-sensitivity and current and past psychopathology are two risk factors for substance use problems that can be assessed to help students who might need assistance.

The primary aim of the current study was to investigate the dual role of personality, past, and present psychopathology in predicting substance use among first year college students by using experience sampling methods and clinical interviews. We relied on experience sampling methodology, via weekly diaries, to acquire a more accurate reporting on substance use. Compared to retrospective reports on substance use collected during a visit to the lab, an experience sampling method allows for multiple reports of recent experiences over time and minimizes the inaccuracy associated with an individual retrospective report. In addition, to assess current and past affective disease, the Structured Clinical Interview for DSM-5 (SCID) was administered by clinicians.⁴¹ Finally, the personality dimensions of the RST were measured using the Behavioral Inhibition Scale and Behavioral Activation Scale (BIS/BAS).⁴² Our hypotheses were as follows: 1) elevated BAS will predict higher rates of substance use, 2) the presence of current and/or past affective psychiatric disorders will independently predict greater reported substance use, and 3) an interaction will be observed between the personality measures and measures of psychopathology, such that the presence of psychiatric disorders would moderate the relationship between BAS and substance use.

Materials and methods

Participants

One-hundred and fourteen first-year college students (21.9% men; 77.2% women; 0.9% other) were recruited by fliers and the Psychology Department research subject pool at a large, public university in the Midwest for a study investigating how first year college students transition to college. English speakers and traditional college freshman 18–21 years old ($M = 18.16$, $SD = 0.39$) were eligible for the study. Participants were recruited during the first six weeks of the 2016–2017 (Cohort 1), 2017–2018 (Cohort 2), and 2018–2019 (Cohort 3) academic school years. Thirteen participants were recruited for Cohort 1, 55 participants were recruited for Cohort 2, and 46 were recruited for Cohort 3. Eleven participants were excluded from the current study¹, resulting in a final sample $n = 103$ (See [Table 1](#) for demographic characteristics).

Procedure

The current investigation is part of a larger longitudinal investigation examining how college freshman adjust to their first year of college. The larger study consists of two laboratory sessions, weekly online diaries, and an online follow-up survey at the end of the academic year. The following procedure provides details relevant to the current study. During the first laboratory session, completed during the first two to six weeks of the fall semester, participants completed a diagnostic interview administered by doctoral candidates in clinical psychology, and completed several questionnaires assessing personality. In addition, participants were trained to complete the weekly diaries. Following the diagnostic interview session, participants received via email

Table 1. Descriptive characteristics (n=103).

Descriptive Characteristics	Mean	Standard Deviation	Number of Participants	Percent of sample
Age	18.16	0.39		
Gender				
Male			21	20.40%
Female			80	77.70%
Other			2	1.90%
Race				
Caucasian			71	68.90%
African American			18	17.50%
Asian			5	4.90%
Other			9	8.80%
Ethnicity				
Hispanic or Latino			5	4.90%
Not Hispanic or Latino			98	95.10%
Diaries Completed (out of 15)	8.91	3.25		
Substance Use Frequency Score (Number of diaries reporting substance use divide by number of total diaries completed)	0.11	0.2	41	40.00%
BAS	41.55	5.32		
BIS	21.93	4.13		
Met Criteria for Past Affective Disorder			66	64.10%
Percentage Meeting the Diagnostic Threshold for Current DSM-V Disorders				
Major Depressive Episode			15	14.60%
Post-Traumatic Stress Disorder			10	9.70%
Generalized Anxiety Disorder			21	21.40%
Social Anxiety Disorder			27	26.20%
Panic Disorder			6	5.80%
Agoraphobia			10	9.70%
Obsessive Compulsive Disorder			0	0%
Substance Use Disorder			5	4.9%
Percentage Meeting the Diagnostic Threshold for Past DSM-V Disorders				
Major Depressive Episode			49	47.60%
Post-Traumatic Stress Disorder			19	18.40%
Generalized Anxiety Disorder			21	20.40%
Social Anxiety Disorder			35	34.00%
Panic Disorder			14	13.60%
Agoraphobia			6	5.80%
Obsessive Compulsive Disorder			4	3.90%
Substance Use Disorder			2	1.90%

a link each week to complete the experience sampling diary during the Fall Semester. Participants were compensated with course-credit, cash, or a combination of course credit and cash. All participants provided written informed consent and all parts of this research were approved by the university institutional review board for human research.

Measures

Behavioral Inhibition System (BIS) and Behavioral Activation System (BAS)

The Behavioral Inhibition Scale and Behavioral Activation Scale (BIS/BAS) was used to index behavior motivation.⁴² The BIS/BAS is a well-validated measure used to measure

variations in individuals' avoidant tendencies and sensitivity to punishment (BIS) and variations in individuals' appetitive goal-oriented motivation and sensitivity to reward (BAS).⁴⁴⁻⁴⁶ Original factor analyses found a single factor for BIS, and three sub-factors for BAS (Drive, Fun Seeking, and Reward Responsiveness). For the current study, the BAS subscales were averaged into a BAS total scale in order to be consistent with other studies examining BAS in college samples.^{30,47} For the current sample, mean scores on both the BIS (M=21.93, SD = 4.13) and BAS (M=41.55, SD = 5.32) were comparable to other college samples.^{30,42} Internal consistency for the BIS ($\alpha=0.81$) and BAS ($\alpha=0.77$) scales were good.

Structured Clinical Interview for the Diagnosis of DSM-5 (SCID)

The Structured Clinical Interview for the Diagnosis of DSM-5 (SCID) was administered by Masters level clinicians.⁴¹ In this investigation, interviewers administered the following modules: depression, panic, agoraphobia, generalized anxiety disorder, social anxiety disorder, post-traumatic stress disorder, obsessive-compulsive disorder, and substance use. We extracted two key variables from the SCID: 1) a history of psychiatric disease (yes/no) and 2) current SCID diagnoses, a sum of the number of disorders for which participants met criteria at the time of the interview. This sample had a high incidence of past psychopathology where 64.1% met the diagnostic threshold for at least one past psychiatric illness. Seven participants met the diagnostic threshold for a current or past substance use disorder, and three additional participants had at least one symptom. See Table 1 for a breakdown of current and past diagnoses. Reliability for SCID diagnosis was assessed by having all interviewers code a random set of five interviews and test for inter-rater reliability at both the symptom and diagnostic level. Rater reliability was good, average Kappa=.82 (range .77-.85).

Experience sampling diary

All participants received a weekly diary via email (<http://www.qualtrics.com/>) during the fall and spring semesters. Only fall diary entries were used for the present investigation because generally compliance was higher. Participants were asked to report how they are currently feeling, as well as a range of behaviors and activities since the previous diary (e.g., sleep, exercise, and substance use). Each diary took approximately 10 minutes to complete. Participants were instructed to complete each diary as soon as possible after receiving the signal link. Average diary completion was M=8.91 (SD = 3.25) out of 13 possible diaries. Compliance rate was adequate at 68.54%.

In each diary, substance use was measured when participants were asked to indicate whether they engaged in substance use "in the previous week," using the following scale: "Yes," "No," or "No but I had the urge" to use substances during the previous week. "No" responses and "No but I had the urge" responses were merged into one no response. An overall rate of substance use was derived by dividing

the total number of “Yes” responses from each participant and dividing it by the total number of diaries that individual completed. This “rate” was used in all analysis. Approximately 60% of participants reported no substance use at all. Of those that did report substance use, the mean rate was 11% (SD = 0.20, range 0%–100%). Given the skewed structure of the substance data², we transformed the substance variable using a square root transformation. Following transformation, skewness of the dependent variable was within normal limits (skew = 1.09).

Results

Ordinary Least Squares (OLS) Regression was used to examine the association between psychopathology (current and past diagnosis of an affective disorder) and personality characteristics (BIS/BAS) as predictors of substance use. A summary of analyses is in Table 2. Results indicated that a past diagnosis of an affective disorder was a significant predictor of substance use ($\beta = .130$, $p = .044$), uniquely predicting 20% of the variance in substance use, $sr^2 = .199$. Results also indicated that ethnicity was a significant predictor ($\beta = .254$, $p = .045$)³, such that individuals self-identifying as Hispanic were higher users of substances. Inconsistent with prior research, BAS scores ($\beta = .003$, $p = .534$) and BIS scores ($\beta = .003$, $p = .765$) did not reach significance. Moreover, age, sex, current diagnoses and number of diaries did not enter significantly into the model. To test whether past psychopathology diagnosis moderated the association between BAS and substance use, a moderation analysis was conducted. Results yielded no significant interaction.

We reran these analyses covarying substance use symptoms derived from the SCID-5 substance module as a continuous index (a sum of symptoms across all possible

substance categories, this included a total of 10 participants who had greater than 0 symptoms) in order to confirm that our findings were not being driven by high substance users or individuals with past/current substance dependence. The association between past affective disorder remained significant, $\beta = .22$, $p = .055$ and the size of the effect was largely unchanged, $sr^2 = .189$, and there were no other significant predictors.

Discussion

The purpose of the current study was to examine the dual role of personality and psychopathology in predicting substance use among college freshmen during their first semester. Indeed, this transitional period from high school to college can be stressful for many students. Moreover, substance use and mental health problems are a significant challenge for many first-year college students, and it is important for universities to effectively assess risk in order to provide treatment for these emerging problems. Universities often report long waitlists for their mental health centers, and that the available resources are insufficient to meet the demand.^{48–50} Having a nuanced and comprehensive understanding of risk should be a priority for universities in order to distribute services more efficiently. Indeed, while previous research has looked at personality and psychopathology individually as predictors of substance use, few have looked at these two variables together. Doing so here yielded novel, potentially vital clinical information. In sum, our results suggest it was not personality, but rather past affective disease (mood, anxiety, or stress disorders) that was the single strongest predictor of substance use in the early months of college, offering an

Table 2. Results of regression analysis by step.

		B	SE	β	p-value	95% CI		sr ²	R ²
						Lower	Upper		
Step 1.	Constant	0.661	0.404		0.105	-0.141	1.462		.059
	Diaries	-0.005	0.008	-0.058	0.557	-0.021	0.011	.058	
	Age	-0.075	0.068	-0.109	0.274	-0.211	0.06	.108	
	Sex	-0.015	0.065	-0.022	0.825	-0.144	0.115	.022	
	Ethnicity	-0.248	0.124	-0.198	0.048	-0.495	-0.002	.196	
Step 2.	Constant	0.860	0.272		0.002	0.320	1.400		.105
	Diaries	-0.007	0.008	-0.081	0.411	-0.023	0.009	.080	
	Age	-0.072	0.068	-0.103	0.293	-0.203	0.063	.102	
	Sex	-0.056	0.067	-0.085	0.410	-0.190	0.078	.080	
	Ethnicity	-0.255	0.124	-0.203	0.042	-0.501	-0.009	.199	
Step 3.	Current Diagnosis	-0.009	0.023	-0.043	0.692	-0.055	0.036	.038	.109
	Past Diagnosis	0.134	0.062	0.239	0.033	0.011	0.258	.208	
	Constant	0.839	0.273		.003	0.298	1.380		
	Diaries	-0.006	0.008	-0.074	0.436	-0.023	0.010	.072	
	Age	-0.060	0.072	-0.087	0.407	-0.204	0.083	.081	
	Sex	-0.063	0.074	-0.096	0.392	-0.210	0.083	.084	
	Ethnicity	0.254	0.125	-0.203	0.045	-0.502	-0.006	.198	
	Current Diagnosis	-0.007	0.026	-0.034	0.777	-0.058	0.044	.028	
	Past Diagnosis	0.130	0.064	0.232	0.044	0.004	0.257	.199	
BAS Score	0.003	0.005	0.065	0.534	-0.007	0.014	.061		
BIS Score	0.003	0.008	0.039	0.765	-0.014	0.019	.029		

Note. B=unstandardized coefficient; SE=standard error; CI=confidence interval.

important new target for risk assessment and substance use intervention efforts.

The results suggested that pathology rather than personality was the most robust predictor of substance use as neither BIS nor BAS predicted substance use. This is surprising given the profusion of studies that have found BAS to be a predictor of substance use. However, this finding is highly consistent with developmental research suggesting that substance use behaviors do appear to emerge in adolescence at the same time as the early manifestation of emotion-related symptoms and disease.^{32,33,51} This is also consistent with dominant affect-regulation theories of substance use and suggests the possibility of a sensitive developmental period in which habits are forming. For example, Hussong et al.⁵² proposed a developmental model of an internalizing pathway to alcohol use problems, where early emotional distress predicts alcohol use shortly thereafter. This is distinct from the commonly cited externalizing pathway, where early behavioral problems are posited to be a primary mechanism behind substance use. Indeed, the current results support the existence of this developmental, internalizing pathway, by demonstrating that past, but not present, diagnosis of an affective disorder predicts substance use during the first semester of college. Indeed, research has shown that early-onset mood disorders often precede the first use of substances.³³ It is possible that individuals with a history of affective disorders are more likely to have already been regular substance users prior to entering university, and therefore early intervention may be necessary upon arrival. Surprisingly, current diagnoses were not associated with substance use, indicating that coping with current psychopathology may not be as impactful in substance use behavior.

Taken together, when assessing risk for substance use among incoming freshmen college students, an assessment of psychiatric history may be of primary importance for prevention measures. Moreover, the results suggest that personality traits such as BIS/BAS may not present as great of a risk factor as previously thought relative to psychological health. Indeed, research has found that the presence of affective disorders are associated with lower levels of BAS.^{53,54} Thus, at best, there could be an interaction between BAS and psychiatric history. Although, we did not find evidence of this in our sample, future research should continue to evaluate an association in broader more diverse samples.

In addition to past SCID diagnosis, ethnicity significantly predicted substance use. More specifically, participants who identified as Hispanic were more likely to report using substances. However, little conclusions can be drawn from this result given that only five of the 103 participants were Hispanic in this sample. However, some research does suggest that individuals of Hispanic descent may be at higher risk for substance use perhaps in part because of their relative under-representation on college campuses, particularly in the Midwest of the United States.⁵⁵⁻⁵⁷ Future research should target larger samples so as to better test for true rather than potentially spurious associations.

The results of the current study should be considered in light of the unique features of the sample. First, only 40%

of participants reported substance use. Although this number seems relatively small, it does reflect substance use in the very earliest weeks of college life, extracted via random weekly sampling, and hence has high levels of external validity. Additionally, a staggering 64.1% of participants in this sample were determined to have a past psychiatric diagnosis. Recent research has suggested that typically college students report rates of past diagnoses closer to 35%.⁵⁸ However, that study is based on student report, rather than a clinician administered diagnostic interview. Had these data been collected from one student cohort, it could be considered perhaps an unusual pool. However, these data were amassed across three different freshman cohorts and may instead reflect the population of students presenting for this research. Nevertheless, it is possible that the high proportion of past psychiatric disease and the low proportion of substance use facilitated the detection of the reported effects. Hence, it will be essential to replicate these findings in future research.

Another limitation is that male participants were under-represented in our sample (21.9%). While this gender skew is not unusual for undergraduate samples in psychological research,^{59,60} research has shown that males use more substances than females, on average,⁶¹ and that females are more likely to be diagnosed with affective disorders.⁶² Thus, although we did include sex as a covariate in our analyses, the underrepresentation of males (and overrepresentation of females) in our sample may have affected our results, and it will be important to replicate these findings in a more gender-balanced sample. In addition, the current study did not evaluate the role that involvement in sororities/fraternities might play in predicting substance use. While involvement in Greek life may be less common in the first few weeks of the first semester of college, future research should assess early *intentions* to get involved with a sorority or fraternity, as this demographic has been shown to engage in high rates of substance use.^{4,63} Moreover, because research has shown that there is often a social motive for college students to drink,^{13,23} future research should also evaluate the role of living situation (e.g., living on campus with friends) in predicting early substance use among first-year students. Finally, future research should also consider the role of family history of substance use, as substance use, a behavior that often emerges during adolescence, may be learned via parental modeling.⁶⁴

The current findings suggest that past psychopathology, as opposed to current, is an underlying factor associated with substance use among college-aged adults. Therefore, individuals who experience clinical levels of psychological distress during their teenage years may be on a trajectory toward substance use problems. Prior research has demonstrated this association in younger teens and our results support this trajectory in freshman students.^{32,33,51} Alcohol and substance use may be adopted during early adolescence as a means to cope with increasing negative emotions and psychological distress, which might advance as a persistent habit. Addressing mental health issues early before they reach clinical threshold may be necessary to prevent future co-morbid substance use problems. Moreover, evaluating psychiatric history may help universities tailor interventions efficiently.

Notably, clinical interviews are both time-consuming and expensive, thus future research could also focus on additional measures that could be more practically used for a comprehensive assessment of risk for incoming first-year college students. More specifically, research focusing on dimensional models that measure multiple aspects of personality and psychopathology may yield interesting findings within this context (e.g., Minnesota Multiphasic Personality Inventory-2-Restructured Form).⁶⁵

Conclusion

Substance use has long been a problem on college campuses, and first-year students are particularly vulnerable to the development of substance use problems. Previous research suggested that BAS is a personality trait that significantly predicts substance use among college students. However, limited research looked at BAS as a predictor of substance use when also considering the role of current and past affective disease. Overall, the current study expanded on previous research by evaluating the roles of both personality and psychopathology in predicting substance use among first-year college students. The results suggest that BAS may be less significant than previous research has suggested, and that psychiatric history may be the most important predictor—more important than current symptomology—in determining who is more likely to use substances in the first weeks of college.

Notes

1. Six participants were excluded due to insufficient diary completion. Based on recommendations, participants who completed less than 2 SDs below the mean were excluded.⁴³ Five additional participants were excluded due to insufficient completion of baseline questionnaires. There was no difference between participants excluded or included based on demographics or key outcome indicators.
2. We did test a Zero-Inflated Poisson distribution in our analysis to address the high proportion of zeros. However, the zero-inflated Poisson distribution did not significantly improve model fit so we discarded it.
3. We did rerun the analysis without the participants who self-identified as Hispanic and the results were nearly identical.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States of America and received approval from the Kent State University.

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