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Motives for Alcohol and Marijuana Use as Predictors of Use and Problem Use Among College Students in Georgia

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Objectives: Due to the high prevalence of alcohol and marijuana use on US college campuses, it is important to better understand what motivates students to use alcohol and marijuana and the various factors associated with use behaviors and problem use behaviors. Furthermore, more research is needed in understanding differences in substance use behaviors among alcohol only users and alcohol and marijuana co-users.

Methods: The current study is a secondary data analysis of an online six-wave survey that began in the Fall of 2014 and was administered to six Georgia colleges and universities. Overall, 3,574 participants enrolled in the study (with a confirmation rate of 95.6% (n=3,418) yielding a response rate of 22.9%. Bivariate and multivariate analyses were conducted to assess alcohol and marijuana use behaviors.

Results: The average number of days of alcohol use in the past 4 months among the sample was 15.33 (SD=18.68) and the average number of days of marijuana use in the past 4 months was 29.81 (SD=39.03). Significant differences were found between alcohol only users and alcohol marijuana co-users including sociodemographic factors, psychosocial factors, substance use behaviors and problem substance use behaviors (p's<.05). After controlling for sociodemographic and psychosocial factors, higher number of days of marijuana use, higher alcohol use Coping motives, higher Self-enhancement motives, and lower Conformity motives were associated with higher number of days of alcohol use (p's<.001). Furthermore, higher Coping motives and higher Self-enhancement motives were associated with problem alcohol use (p's<.05). Additionally, higher marijuana use Coping motives was associated with higher number of days of marijuana use, and higher Expansion motives was associated with both higher number of days of marijuana use and problem marijuana use (p's<.05).

Conclusions: Addressing Coping and Self-enhancement motives may be particularly critical in intervention efforts aimed at reducing alcohol use related risks, while addressing Expansion motives may be critical in reducing marijuana use related risks.

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INTRODUCTION

With about 60% of college students reportedly drinking alcohol and about 30% reportedly binge drinking, alcohol use remains an important health concern among college students (American College Health Association, 2018; Schulenberg et al., 2018). Furthermore, marijuana use has also become a priority for health among college students with 22% reportedly using marijuana (American College Health Association, 2018; Schulenberg et al., 2018). Alcohol and marijuana use among college students can result in unintentional injuries and bodily harm (e.g. motor vehicle accidents), negative effects on physical and mental health outcomes, and lower grade point averages among other negative outcomes (Arria, Caldeira, Bugbee, Vincent, & O'Grady, 2015, 2016; Hingson, Zha, & Weitzman, 2009; White & Hingson, 2014). Binge drinking (i.e., having ≥4 drinks on a single occasion among females or ≥5 among males) is a noteworthy concern on college campuses with more than a third of college students participating in binge drinking behaviors (American College Health Association, 2018; Schulenberg et al., 2018).

Important indicators of alcohol and marijuana use behaviors include the co-use of alcohol and marijuana, problem alcohol and marijuana use and risk factors such as sociodemographic, contextual, and psychosocial factors. Moreover, motives for use are also an important contributor to alcohol and marijuana use behaviors and have been used in research to better understand what provokes individuals to use alcohol and/or marijuana (Cooper, 1994; Cooper, Russell, Skinner, & Windle, 1992; Cox & Klinger, 1988; Simons, Correia, Carey, & Borsari, 1998). Such motives may include a range of outcome expectancies, social influences and reinforcements, making Social Cognitive Theory (SCT) particularly relevant for this study (Bandura, 1977).

While substance use among college students have been researched widely, there is a paucity of research on college students' motives for use; particularly among alcohol and marijuana co-users. This research study aims to fill this gap by providing insight into Georgia students' alcohol and marijuana use behaviors and their motives for use. Better understanding of these motives, behaviors, and associated factors can lead to targeted health education programs designed to improve health outcomes among college students.

LITERATURE REVIEW

Prevalence and Negative Outcomes of Alcohol and Marijuana Use

Alcohol and marijuana use continue to impact the lives of college students in the United States (US). The 2018 *National College Health Assessment II (NCHA II)* indicated that 60% of college students reported drinking alcohol in the previous 30 days and 37% reported binge drinking (i.e., having ≥4 drinks on a single occasion among females or ≥5 among males) the last time they "partied or socialized" (American College Health Association, 2018). The 2018 *Monitoring the Future* survey documented similar alcohol use prevalence in college students (i.e., 62% past 30-day use and 33% binge drinking in the past two weeks) (Schulenberg et al., 2018)**.** In addition, these 2018 surveys indicated that 21-22% of college students reportedly used marijuana in the prior 30 days (American College Health Association, 2018; Schulenberg et al., 2018). Peers tend to overestimate use, with college students perceiving that 93% of their peers drank alcohol and 88% used marijuana in the prior 30 days, compared to the documented rates of 60% and 22%, respectively (American College Health Association, 2018).

Studies have shown that alcohol and marijuana use can negatively affect US college students by contributing to unintentional injuries and bodily harm (including those related to motor vehicle accidents), negative effects on physical and mental health outcomes, negative

effects on neurocognitive development, polysubstance use, addiction, and negative academic outcomes such as lower grade point averages (Arria et al., 2015, 2016; Hingson et al., 2009; White & Hingson, 2014). Regarding alcohol use, participating in binge drinking has life threatening risks including unintentional injuries (i.e., car accidents and falls), alcohol poisoning, unintended pregnancy, and violence (i.e., homicide or suicide). In particular, heavy alcohol use (i.e. binge drinking on 5 or more days in one month) has been identified as a risk factor for suicide among US college students (Dvorak, Lamis, & Malone, 2013; U.S. Department of Health and Human Services, 2017). In 2018, 13% of college students indicated physically injuring themselves while drinking alcohol, and 29% reported forgetting where they were or what they did following a night of drinking (American College Health Association, 2018; Buckner, Ecker, & Cohen, 2010; Degenhardt, Hall, & Lynskey, 2003; Hall & Degenhardt, 2009; Ramo, Delucchi, Hall, Liu, & Prochaska, 2013; World Health, 2016; Zalesky et al., 2012).

As previously indicated, people often engage in multiple substance use behaviors, which is indeed the case for alcohol and marijuana (Brière, Fallu, Descheneaux, & Janosz, 2011). Moreover, the co-use of alcohol and marijuana (defined as the use of both substances during a specific time period but not necessarily simultaneously) is common. Among US college students, a 2013 research study of 3,146 students found that among marijuana users, 88% reported alcohol use (Suerken et al., 2014). Alcohol and marijuana co-use is associated with a variety of negative outcomes, such as increased risk of substance use disorders, motor vehicle crashes, physical injury, and blackouts (Haas et al., 2015; Harrington et al., 2012; Keith, Hart, McNeil, Silver, & Goodwin, 2015). Furthermore, the co-use of these substances simultaneously is associated with higher consumption of either substance when compared to using each substance (Patrick, Kloska, et al., 2018; Patrick, Veliz, & Terry-McElrath, 2017; Subbaraman & Kerr, 2015). The co-use of

these substances on a regular basis can impact substance use disorders. The daily use of marijuana has been found to be associated with daily alcohol intake, and those with an alcohol use disorder are more likely to binge drink on days they also use marijuana (Gunn et al., 2018; Metrik, Gunn, Jackson, Sokolovsky, & Borsari, 2018).

Problem alcohol and marijuana use are risk factors that may indicate future individual health outcomes. Indicators of problem alcohol use include using alcohol use before work and/or school, passing out from drinking, getting in trouble with the law while drinking, and various other markers (U.S. Department of Health and Human Services, 2017). Problem marijuana use is marked by health problems due to marijuana use, persistent and increasing marijuana use, injuries as a result of marijuana use, memory loss from using marijuana, and failure to meet major responsibilities at work, school, or home caused by consistent use of marijuana (among other indicators) (Adamson & Sellman, 2003; Substance Abuse and Mental Health Services Administration, 2017).

Motives for Alcohol and Marijuana Use as a Risk Factor for Use and Problem Use

Motives for alcohol use have been studied utilizing a four-factor theoretical model to indicate motives for use including Social, Coping, Self-enhancement, and Conformity motives (Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988). Measures for assessing motives for alcohol use have been adapted and tested to assess motives for marijuana use. This adaptation has added a fifth factor, Expansion (Simons, Correia, & Carey, 2000; Simons et al., 1998; Zvolensky et al., 2007). Social motives for use involves using alcohol and/or marijuana to obtain social rewards or to be sociable (Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988; Van Damme et al., 2013). Coping motives are characterized as using alcohol and/or marijuana to handle negative emotions, and Self-enhancement motives involve using alcohol and/or marijuana

to enhance positive effect (Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988). Conformity is characterized as drinking and/or using marijuana to avoid social costs or rejection (Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988). Expansion involves using to expand one's ideas and/or awareness (Simons et al., 1998). The four and five factor model in assessing motives has been used and tested among college students and college-aged adults in the US (Cooper, 1994; Lee, Derefinko, Davis, Milich, & Lynam, 2017; Simons et al., 2000; Simons et al., 1998).

Across various research studies, motives for alcohol use have been found to correlate with or predict increased consumption of alcohol and increased risk of alcohol problems (Bray, Dziak, Patrick, & Lanza, 2018; Cooper, 1994; Cox & Klinger, 1988; Patrick, Rhew, et al., 2018; Patrick, Schulenberg, O'Malley, Johnston, & Bachman, 2011; Van Damme et al., 2013). Social and Self-enhancement motives are more frequently identified as motives associated with heavier alcohol consumption among college students (Foster & Neighbors, 2013; LaBrie, Hummer, & Pedersen, 2007). Motives for marijuana use have also been found to have an impact on current and future use behaviors; in particular, coping motives have been shown to predict problems associated with marijuana use (Bonn-Miller, Zvolensky, & Bernstein, 2007; Buckner, 2013; Moitra, Christopher, Anderson, & Stein, 2015; Patrick et al., 2011). Motives for alcohol and marijuana among co-users have also been studied, indicating that Social motives correlated more with alcohol use behaviors when compared to marijuana use behaviors (Simons et al., 2000). Additionally, Self-enhancement and Expansion motives were greater indicators of marijuana use behaviors when compared to alcohol use behaviors (Simons et al., 2000).

Risk Factors for Alcohol and Marijuana Use and Problem Use

Outside of motives for use, a body of research has documented various risk factors for alcohol and marijuana use, such as sociodemographic factors, contextual factors, and psychosocial factors. Sociodemographic factors such as age, sex, sexual orientation, race, ethnicity, and parental education or income, as well as community-level factors such as school type, and rural or urban school location, have impacted college students' alcohol and marijuana use behaviors. In regards to sociodemographic factors, studies have found varying results linking these characteristics to alcohol and marijuana use. For example, some studies have found non-Hispanic White males are more likely to engage in alcohol and marijuana use and at higher rates while in college (Keith et al., 2015; Luo, Agley, Hendryx, Gassman, & Lohrmann, 2014; Siebert, Wilke, Delva, Smith, & Howell, 2003).

In regard to psychosocial factors, Adverse Childhood Experiences (ACEs), Attention Deficit Hyperactivity Disorder (ADHD), depression, and parental substance use, have been associated with alcohol and marijuana health behaviors. ACEs (i.e., exposure to physical, emotional, sexual abuse and/or household dysfunction during childhood) have been shown to predict negative health behaviors in adults (Anda et al., 2002; Bynum et al., 2010; Chapman et al., 2004; Chatterjee et al., 2018; V. J. Felitti et al., 1998), including initiation of alcohol and drug use at an earlier age, increases in alcohol risk behaviors (e.g., binge drinking), and increased likelihood of alcohol and drug misuse and abuse (Crouch, Radcliff, Strompolis, & Wilson, 2018; Douglas et al., 2010; LeTendre & Reed, 2017; Pilowsky, Keyes, & Hasin, 2009; Rothman, Edwards, Heeren, & Hingson, 2008). Prior research indicates that individuals diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) are more likely to abuse alcohol and drugs as adolescents, initiate drinking earlier in life (Molina & Pelham Jr, 2014), binge drink, and use marijuana (Green & Rabiner, 2012; Mochrie, Whited, Cellucci, Freeman, & Corson, 2018;

Rooney, Chronis-Tuscano, & Yoon, 2012). Depression is the most common mental health concern reported among US college students (American College Health Association, 2015) and is shown to have an impact on alcohol and marijuana use (Buckner et al., 2010). Finally, parental alcohol and marijuana use is correlated with increased risk of alcohol and marijuana use (e.g., earlier initiation, greater use levels) (Alati et al., 2014; Van Der Vorst, Vermulst, Meeus, Deković, & Engels, 2009; Vermeulen-Smit et al., 2012) which may also be in part due to genetic predisposition (Agrawal & Lynskey, 2008; Brook, Arencibia-mireles, Richter, & Whiteman, 2001; Enoch & Goldman, 1999).

Social Cognitive Theory

Social Cognitive Theory (SCT) is a health behavior theory that has been widely applied to substance use behaviors and has a particular focus on personal and environmental factors that lead to health behaviors (Bandura, 1977). Particularly relevant to this study, SCT emphasizes social influences, reinforcements, and outcome expectancies, all of which may be reflected in motives for use (Bandura, 1977).

Alcohol and marijuana use, as well as the co-use of these substances, continue to be a significant concern on college campuses across the US. It is important to assess not only the prevalence of use among college students but to also better understand the motives and factors that are associated with or may influence alcohol and marijuana use and problem use among students. Moreover, there is a need to further understand how motives for use may differentially impact use and problem use among single substance users versus co-users. Drawing from SCT, this study aims to examine the associations of motives for use, as well as sociodemographic, contextual, and psychosocial characteristics, to alcohol and marijuana use frequency and problem use behaviors among college students. More specifically, we will examine the

participants in a longitudinal study of college students in Georgia who reported using alcohol only, marijuana only, and use both alcohol and marijuana.

METHODS

Project DECOY (Documenting Experiences with Cigarettes and Other Tobacco in Young Adults), a longitudinal cohort study, took place throughout the course of two years. Data collection began in Fall 2014 and was collected every four months for two years which allowed individual assessments to be collected during Fall, Spring and Summer semesters (C. J. Berg et al., 2016). Project DECOY was approved by Emory University and ICF Institutional Review Boards along with IRB approval from each participating college and university.

Participants

This six-wave study included a diverse sample of 3,418 students (ages 18 to 25) from seven universities and colleges across the state of Georgia including two private universities, two public universities, one historically Black university (HBCU), and two community/technical colleges with representation of schools in rural and urban settings. Inclusion criteria for participants required an age of 18 to 25 years and the ability to read English.

Sample and Recruitment

Each university registrar's office provided a list of university email addresses for each student who fit the inclusion criteria. We randomly selected 3,000 email addresses from each of the three largest campuses and emailed a census of students at the four smaller campuses with fewer than 3,000 students who fit the inclusion criteria. A Community Advisory Board (CAB) was created to assist in the facilitation of recruitment strategies. The CAB consisted of key contacts at each university who obtained contact information of potential participants, promoted

participation with flyers across campus including online platforms, and assisted with retention efforts.

Enrollment was conducted at each school separately and was staggered. Recruitment began at the two technical colleges and lasted one week. Recruitment efforts at the remaining schools lasted only two to three days because the recruitment goals had been met. The total response rate for the study was 22.9% (N=3,574/15,607) and met the predetermined targets sample size. Response rates for school type varied; private universities response rates ranged from 18.8% and 59.4%, public colleges/universities response rates ranged from 12.0% to 19.2%, the historically Black university had a response rate of 23.1%, and technical colleges response rates ranged from 15.4% to 27.6%.

Seven days after completing the baseline survey, participants were asked to confirm their participation through an email sent to them by clicking a confirmation button. This email reminded participants about the study timeline and instructions for future survey waves. This confirmation also initiated their $30 electronic gift card incentive. The confirmation rate was 95.6% (N=3,418/3,574). This confirmation process was utilized in order to potentially retain participants in the following waves of the study.

Additional strategies were also put in place to retain participants throughout the two-year study (e.g., obtaining alternate contact information including secondary email addresses and Facebook account, providing participants with the study's contact information to report changes of contact information). One month prior to each survey wave, participants were reminded of the upcoming survey through text message in which a mass text message service was utilized (Trumpia by DoCircle, Inc. in Anaheim, CA). Compensation for participation was increased at every other survey wave to retain participants (i.e., $30 for the first two assessments, $40 for the

third and fourth,$50 for the fifth and sixth). Current analyses focus on participants who completed the wave 5 assessment (N=2,689 or 78.7% of the baseline sample), who also reported any use of alcohol in the past 4 months (N=1,870, or 69.5% of wave 5 participants).

Measures

Various factors were assessed throughout the survey including alcohol and marijuana use and problem use, motives for use, sociodemographic, and psychosocial factors (i.e., ACEs, ADHD, depression, parental substance use). Sociodemographic information and wave 1 substance use behaviors were collected at the baseline and additional measures were collected at waves two through six. Participant's substance use behaviors were assessed at each wave of the study in order to assess substance use behaviors throughout the entire two-year study. Factors are described in detail below:

Primary Outcomes: The four primary outcomes included past 4-month use of alcohol and marijuana, respectively, assessed at wave 5, and problem use of alcohol and marijuana, respectively, assessed at wave 6.

Past 4 Month Substance Use. Past 4 month use alcohol was measured by asking, "In the past 4 months, on how many days did you drink alcohol?" with selection options of 0 days to 120 days. Marijuana use was measured similarly, specifically by asking, "In the past 4 months, on how many days did you use marijuana?" with selection options of 0 days to 120 days.

Alcohol and Marijuana Problem Use. Behaviors that indicate problem alcohol and marijuana use were assessed at wave 6 in this study. The Alcohol Problems Index (Windle & Windle, 2005) and CUDIT (Cannabis Use Disorder Identification Test) (Adamson & Sellman, 2003) were used to measure alcohol and marijuana problem use among the sample . An example question for assessing problem alcohol use is, "Have any of the following happened to you in the

past 4 months?" with a select all option that included options such as "drank before or during work or school", "missed work or school because of drinking" and "had a fight with members of my family about drinking" among other selection options. An example of a question from the CUDIT is, "On a scale of 0 to 10, how confident are you that you could quit using marijuana if you wanted to, with 0 being not at all confident and 10 being absolutely confident?"

Primary Predictor of Interest: ***Motives for Alcohol and Marijuana Use.*** Motives for alcohol and marijuana use were assessed at wave 5 utilizing a five-factor theoretical model (Cox & Klinger, 1988) (Simons et al., 1998) (Simons et al., 2000). These motives include Social, Coping, Self-enhancement, Conformity, and Expansion. In the survey, the wording to assess these motives were identical for both measures; just the substance (i.e., alcohol vs. marijuana) distinguished the measures. Participants were asked, "Thinking of all the times you drink, how often would you say that you drink for each of the following reasons?" and responded to the 25-item scale by selecting from a set of options on a Likert scale. An example of an item assessing Social motives is, "Because it makes social gatherings more fun". An example of an item assessing Coping motives is, "To forget about your problems". An example of an item assessing Self-enhancement motives is, "Because you feel more self-confident and sure of yourself". An example of an item assessing Conformity motives is, "So you won't feel left out". An example of an item assessing Expansion motive is "So I can understand things differently".

Covariates: Covariates included in this study included sociodemographic and psychosocial factors.

Sociodemographics. Various sociodemographic factors were assessed at the baseline. Current analyses accounted for: age, sex, sexual orientation (recategorized to heterosexual, sexual minority), race (i.e., White, Black, Asian, Other), ethnicity (i.e., Hispanic, non-Hispanic),

parental education (recategorized to < Bachelor's degree, ≥Bachelor's degree), school type (i.e., private, public, technical college, HBCU), and school location (i.e., rural, urban).

Psychosocial Factors. Psychosocial factors assessed included ACEs and symptoms of ADHD and depression, as well as parental alcohol and marijuana use. *ACEs* were measured at wave 2 utilizing a ten-item scale developed by the Centers for Disease Control and Prevention (CDC) (Vincent J. Felitti et al., 1998) (Centers for Disease Control and Prevention, 2014). *ADHD symptoms* were measured at wave 2 utilizing the six-item Adult ADHD Self-Report Scale Symptom Checklist (Kessler et al., 2005). *Depressive symptoms* were assessed at wave 5 using the PHQ-9, a 9-item scale that indicates major depressive disorder if 5 or more of the 9 depressive symptoms are present more than half the days of the last 2 weeks and if depressed mood is one of the symptoms (Kroenke, Spitzer, & Williams, 2003). *Parental alcohol and marijuana use* was assessed at wave 1 by asking, "Does any one of your parental figures: use alcohol? use marijuana?"

Data Analysis

Analysis was completed utilizing SPSS version 25. Bivariate analyses (specifically chi-square tests, t-tests, and one-way ANOVA tests) were conducted examining 1) differences between alcohol-only users and alcohol-marijuana co-users; 2) correlates of wave 5 alcohol and marijuana use levels; and 3) predictors of wave 6 problem use. Multivariable regression models were then conducted to examine factors associated with wave 5 alcohol and marijuana use levels and wave 6 alcohol and marijuana problem use outcomes, entering all correlates of interest. (Note: Given high collinearity among use motives subscales, we also modeled each motive separately, controlling for all other factors, indicated as notes for Tables 4 and 5.)

RESULTS

Of the 1,870 participants, 63.6% were female (n=1190), 91.7% were heterosexual (n=1701), 69.1% were White (n=1277), and 8.0% were Hispanic (n=149; see Table 1). The mean age of the sample was 20.70. Within the sample, 57.1% had parents who received a Bachelor's or higher (n=1058), 48.1% of participants attended a private school (n=899), and 50.7% attended school in an urban environment (n=948). The mean scores on psychosocial scales were: ACEs (M=1.24, SD=1.69), ADHD symptoms (M=9.70, SD=4.17), and depressive symptoms (M=5.45, SD=5.56).

In regard to alcohol use outcomes, the average number of days of alcohol use in the past 4 months (at W5) was 15.33 (SD=18.68), with 25% using ≤4 days, 50% using ≤10 days, and 75% using ≤20 days. The average problem drinking score at W6 was 1.11 (SD=1.22). In regard to marijuana use outcomes, 18.4% (N=345) reported any use of marijuana in the past 4 months at W5. Among marijuana users, the average number of days of marijuana use was 29.81 (SD=39.03), with 25% using ≤2 days, 50% using ≤8 days, and 75% using ≤50 days. The average CUDIT score at W6 among marijuana users was 4.20 (SD=4.56).

Bivariate Analyses Comparing Alcohol Only and Alcohol and Marijuana Co-Users

Table 1 shows results of bivariate analyses comparing alcohol-only users, marijuana-only users, and co-users. Predictors of being alcohol-marijuana co-users (vs. alcohol-only users) included being younger (p=.013), identifying as a sexual minority (p=.004), being non-White (p=.001), attending private school (p=.001), higher ACEs (p=.004), higher ADHD symptoms (p=.005), higher depressive symptoms (p=.023), having a parent who uses marijuana (p=.001), higher number of days of alcohol use (p<.001), higher number of days of marijuana use (p<.001), higher problem drinking scores (p<.001), and higher problem marijuana use scores

(p<.001). Additionally, compared to alcohol-only users, alcohol marijuana co-users had significantly higher motives scores for all alcohol use motives (Social: p<.001, Coping: p<.001, Self-enhancement: p<.001, Conformity: p=.003, Expansion: p<.001). Among co-users, Social motives scores for alcohol use was significantly higher than Social motives scores for marijuana use (p<.001), but Self-enhancement and Expansion motives scores for alcohol use were both significantly lower than those for marijuana use (both p values <.001).

Correlations Among Motives for Use Subscales and Alcohol and Marijuana Use Outcomes

Among co-users, scores on each of the alcohol use motive subscales were correlated with one another (p's<.001; Table 2). Scores on each of the marijuana use motives subscales were correlated with one another (p's<.001), with the exception of scores on the Self-enhancement and Conformity subscales (p=.154; Table 2). All five motives for alcohol use correlated with all five motives for marijuana use (p's<.05).

Among alcohol only users (Table 3), wave 5 days of alcohol use correlated with four motives for alcohol use (Social: p<.001, Coping: p<.001, Self-enhancement: p<.001, Expansion: p<.001). Additionally, among alcohol only users, wave 6 problem alcohol use also index scores correlated with all motives for alcohol use (p's<.001). Among co-users, wave 5 alcohol use correlated with Self-enhancement motives (p=.002), while problem alcohol use correlated with four motives for use (Social: p=.008, Coping: p<.001, Self-enhancement: p=.008, and Expansion: p=.029). Among co-users, wave 5 days of marijuana use correlated with four motives for use (Social: p<.001, Coping: p<.001, Self-enhancement: p<.001, Expansion: p<.001). Wave 6 problem marijuana use (CUDIT scores) correlated with four motives for use (Social: p<.001, Coping: p<.001, Self-enhancement: p<.001, Expansion: p<.001).

Multivariable Analyses Predicting Alcohol Use Outcomes

Higher number of days of alcohol use in the past 4 months at wave 5 were associated with higher number of days of marijuana use in the past 4 months ($p<.001$), higher Coping ($p<.001$) and Self-enhancement ($p<.001$) motives, but lower Conformity motives ($p < .001$; Table 4). *Higher number of days of alcohol use was also associated with* older age ($p<.001$), being male ($p<.001$), being White ($p=.031$ compared to being Black, $p<.001$ compared to being Asian, $p=.049$ compared to being Other race), having parents with a Bachelor's degree or higher ($p=.001$), attending private school ($p<.001$ compared to attending a public college/university, $p=.001$ compared to attending a technical college), rural school location ($p=.001$), and having parents who use alcohol ($p=.020$). *Problem drinking at wave 6* was associated with higher Coping ($p<.001$) and higher Self-enhancement motives ($p=.002$; Table 4), as well as being male ($p=.014$), attending private school when compared to attending a technical college ($p=.045$), rural school location ($p=.009$), and higher ACEs score ($p<.001$).

Multivariable Analyses Predicting Marijuana Use Outcomes

Higher number of days of marijuana use in the past 4 months at wave 5 were associated with higher Coping ($p<.001$) and Expansion motives ($p=.018$; Table 5), as well as identifying as a sexual minority ($p=.009$), being White when compared to Black ($p=.020$), and lower depressive symptoms ($p=.025$). *Problem marijuana use at wave 6* was associated with higher Expansion motives ($p=.005$; Table 5), as well as being male ($p=.015$) and attending a HBCU ($p=.047$).

DISCUSSION

The current study examined correlates of alcohol and marijuana use behaviors among diverse college students. In particular, this study focused on motives for use in relation to single-product use and polysubstance use and overall outcomes related to levels of use and problem use.

Among the most noteworthy of findings are related to these nuances. In particular, although marijuana use among alcohol users did not predict subsequent problem drinking, level of marijuana use did correlate with higher alcohol use cross-sectionally. On the other hand, alcohol use levels did not correlate with marijuana use levels or subsequent problem use of marijuana. Collectively, these findings only to some extent coincide with the literature that suggests that alcohol and marijuana co-use may serve as a catalyst for increased use of both substances (Patrick, Kloska, et al., 2018; Patrick et al., 2017), with the caveat that this seems to hold true for the effects of marijuana on alcohol use.

In addition, higher Coping and Self-enhancement motives for alcohol use were related to both alcohol use outcomes (i.e., higher use levels and greater problem use), while lower Conformity motives was associated with lower alcohol use levels among co-users. For marijuana use outcomes, higher Expansion motives for marijuana use was associated with both marijuana use outcomes, while higher Coping motives was associated with only with use levels. These results align with prior research indicating that use motives are associated with alcohol and marijuana use outcomes (Bonar et al., 2017; Bonn-Miller et al., 2007; Bray et al., 2018; Buckner, 2013; Cooper, 1994; Cox & Klinger, 1988; Moitra et al., 2015; Patrick, Rhew, et al., 2018; Patrick et al., 2011; Van Damme et al., 2013). These findings also indicate that co-use may not be highly important in terms of identifying high-risk alcohol or marijuana users. Rather, intervention strategies to address problem use of alcohol should target Coping and Self-enhancement motives, and interventions to address marijuana use should address Expansion motives.

In terms of correlations among motives, in co-users, all alcohol and marijuana use motives were correlated with each other with varying levels of strength ranging from weak (i.e.,

≤.20) to strong (i.e., ≥.80) (Cohen, 1988). These results highlight that motives for alcohol use, marijuana use and co-use are related but also distinct; moreover, our findings indicated that motives are differentially related to overall use outcomes.

Predictors of alcohol-marijuana co-use included being younger, a sexual minority, non-White, attending private school, higher ACEs, higher ADHD symptoms, higher depressive symptoms, having a parent who uses marijuana, higher number of days of alcohol and marijuana use, and higher problem drinking and marijuana use scores (Table 1). Some of these findings are consistent with the literature in that age, sexual orientation, ACEs, ADHD, number of days of alcohol and marijuana use and problem alcohol and marijuana use, are predictors of alcohol and marijuana use (Bidwell, Henry, Willcutt, Kinnear, & Ito, 2014; Crouch et al., 2018; Forster, Grigsby, Rogers, & Benjamin, 2018; Goldbach, Tanner-Smith, Bagwell, & Dunlap, 2014; Gunn et al., 2018; LeTendre & Reed, 2017; Metrik et al., 2018; Mochrie et al., 2018; Nelson, Van Ryzin, & Dishion, 2015; O'Neil, Conner, & Kendall, 2011; Patrick, Kloska, et al., 2018)

Conversely, in the literature, non-Hispanic White males have been found to be more likely to use alcohol and marijuana and use at higher rates (Keith et al., 2015; Luo et al., 2014; Siebert et al., 2003) which was not the result of the current study and may be due to past studies considering alcohol and marijuana use separately and not as co-usage of these substances. Furthermore, although the current study shows an association between parental marijuana use and their child's marijuana use behaviors, additional research is needed to assess this association.

Other important findings in the current study reflected prior research conducted in the field. Average number of days of alcohol use was significantly higher among co-users (~23 days) compared to alcohol-only users (~14 days). This outcome reflects the literature that suggests that co-users are more likely to use alcohol at higher rates than alcohol-only users

(Gunn et al., 2018; Metrik et al., 2018). Also consistent with prior research, co-users reported higher scores on the Expansion motives for marijuana use compared to Expansion motives for alcohol use (Simons et al., 2000).

Our analysis also uncovered that both higher Coping and Self-enhancement motives were associated with higher number of days of alcohol use among the sample. This result is consistent with prior research indicating that Self-enhancement motives are more frequently associated with heavier alcohol consumption among college students and supports the notion that coping with something in one's life may lead to an increase in alcohol use (LaBrie et al., 2007) (Foster & Neighbors, 2013) (Patrick et al., 2011). These results related to alcohol use are especially important to consider when planning interventions on drugs and alcohol use on college campuses. By knowing the associations between number of days of alcohol and marijuana use and the correlates of co-use including Coping and Self-enhancement motives, interventions focused on addressing these motives and co-use of substances can help mitigate increase of substance use on college campuses. Conversely, higher number of days of alcohol use was associated with lower Conformity motives. Future research needs to further examine the underlying mechanisms for this association.

Higher ACEs, higher Coping, and higher Self-enhancement motives were associated with higher problem drinking among the sample. This positive association between ACEs and problem drinking is consistent with the literature in that ACEs are associated with an increase in risky alcohol behaviors including binge drinking and an increased likelihood of alcohol and drug misuse and abuse (Rothman et al., 2008) (Douglas et al., 2010) (Pilowsky et al., 2009) (LeTendre & Reed, 2017) (Crouch et al., 2018), thus it is not surprising that problem drinking was associated with both higher ACEs and higher Coping motives.

Our analysis of marijuana use outcomes indicated an association between higher number of days of marijuana use and lower depressive symptoms, higher Coping motives, and higher Expansion motives. This association between higher number of days of marijuana use and lower depressive symptoms is inconsistent with prior literature that indicates marijuana use being linked to higher depressive symptoms (Buckner et al., 2010), (Phillips, Phillips, & Duck, 2018). This result may be attributed to self-medication of depression or other related psychosocial factors (e.g. anxiety). This result may also be related to the association between higher number of days of marijuana use and higher Coping motives reported. It should be noted that the cross-sectional nature of our data may limit the ability to further interpret the directionality of these associations.

Furthermore, the association between higher number of days of marijuana use and higher Expansion motives is also consistent with prior literature. Expansion motives which are categorized as the expansion of ideas and/or one's awareness after substance use has been shown to be a greater indicator of marijuana use behaviors when compared to alcohol use behaviors and thus is not surprising that it is associated with higher number of days of marijuana use in the current study (Simons et al., 2000) (Bonn-Miller et al., 2007) (Chabrol, Ducongé, Casas, Roura, & Carey, 2005).

Problem marijuana use was associated with being male, attending a HBCU and higher Expansion motives. Prior research has shown males are more likely to engage in alcohol and marijuana use and at higher rates, especially while in college (Keith et al., 2015) (Luo et al., 2014) (Siebert et al., 2003). As previously mentioned, Expansion motives have been found to have an association with marijuana use (Simons et al., 2000) (Bonn-Miller et al., 2007) (Chabrol et al., 2005) however, more research is needed to better understand the association between

Expansion motives and problem marijuana use. While attending an HBCU was associated with problem marijuana use, being Black was not a predictor in any analysis in the current study. This association was not found in the literature and may be due to it not being assessed by researchers in the field. While Black students may be included in research studies assessing marijuana use, students attending HBCUs specifically may not be included in these studies. Furthermore, it may be important to analyze marijuana use behaviors, specifically problem marijuana use behaviors, among students attending HBCUs.

This study's findings have implications for research and practice. In regards to research, these findings indicate that these motives are important predictors of alcohol and marijuana use behaviors and may inform targeted interventions to prevent or reduce increases in use or problem use. For college-attending co-users, interventions should target both alcohol and marijuana use and the various underlying motives for use.

Limitations

There are a few limitations to the current study. In the study sample, there is a higher representation of female participants as well as a smaller sample of marijuana users. However, the sample is diverse in regards to gender, race, ethnicity, and school location (urban vs rural). The study sample was drawn from colleges and universities in Georgia and thus may not be generalizable to all young adults in the US, particularly young adults who are not enrolled in college. Furthermore, there is potential for response bias due to the self-report features of the online survey assessment. Although rigorous recruitment and retention methods were employed, the current study had a low response rate (albeit intentional and after meeting our target recruitment) and did involve some attrition (albeit it relatively minimal) throughout the 6-wave study (Carla J. Berg et al., 2016).

Conclusion

Key factors that increase alcohol and marijuana use and motivate US college students to use these substances have been indicated in this study. Factors such as Coping motives, Self-enhancement motives, depression, ACEs, along with other factors, impact the amount of alcohol and/or marijuana use and problem alcohol and/or marijuana use. Additionally, the co-use of these substances are related to the amount of alcohol and marijuana consumed which can be harmful to US college students. It is important to consider these findings in future studies or interventions among college students. These findings can be incorporated into campus-wide education and programming to address these psychosocial factors and motives for use in order to reduce the effects of frequent and problem alcohol and marijuana use among US college students.

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Table 1. Participant Characteristics and Bivariate Analyses Comparing Alcohol-Only Users vs. Alcohol-Marijuana Co-Users, Past 4 Months (W5)

	All Alcohol Users N=1,870 M (SD) or N (%)	Alcohol-Only Users N=1,525 M (SD) or N (%)	Alcohol-Marijuana Co-Users N=345 M (SD) or N (%)	
Sociodemographics				**p**
Age, M (SD)	20.70 (1.90)	20.75 (1.88)	20.47 (1.94)	.013
Gender, N (%)				.496
Male	680 (36.4)	549 (36.0)	131 (38.0)	
Female	1190 (63.6)	976 (64.0)	214 (62.0)	
Sexual Orientation, N (%)				.004
Heterosexual	1701 (91.7)	1,403 (92.6)	298 (87.6)	
Other	154 (8.3)	112 (7.4)	42 (12.4)	
Race, N (%)				.001
White	1277 (69.1)	1,066 (70.6)	211 (62.4)	
Black	343 (18.6)	255 (16.9)	88 (26.0)	
Asian	121 (6.5)	99 (6.6)	22 (6.5)	
Other	107 (5.8)	90 (6.0)	17 (5.0)	
Ethnicity, N (%)				.913
Non-Hispanic	1711 (92.0)	1,395 (92.0)	316 (91.9)	
Hispanic	149 (8.0)	121 (8.0)	28 (8.1)	
Parental Education, N (%)				.672
< Bachelors	795 (42.9)	652 (43.2)	143 (41.8)	
≥ Bachelors	1058 (57.1)	859 (56.8)	199 (58.2)	
School Type, N (%)				.001
Private	899 (48.1)	729 (47.8)	170 (49.3)	
Public	525 (28.1)	430 (28.2)	95 (27.5)	
Technical college	269 (14.4)	237 (15.5)	32 (9.3)	
HBCU	177 (9.5)	129 (8.5)	48 (13.9)	
Rural/urban, N (%)				.438
Rural	922 (49.3)	780 (51.1)	168 (48.7)	
Urban	948 (50.7)	745 (48.9)	177 (51.3)	
Psychosocial Factors, M (SD)				
ACEs	1.24 (1.69)	1.18 (1.67)	1.49 (1.74)	.004
ADHD symptoms	9.70 (4.17)	9.57 (4.09)	10.27 (4.45)	.005
Depressive symptoms	5.45 (5.56)	5.31 (5.49)	6.07 (5.82)	.023
Parental alcohol use, N (%)				.714
No	721 (38.6)	585 (38.4)	136 (39.4)	
Yes	1149 (61.4)	940 (61.6)	209 (60.6)	
Parental marijuana use, N (%)				.001

No	1755 (93.9)	1,445 (94.8)	310 (89.9)	
Yes	115 (6.1)	80 (5.2)	35 (10.1)	
Substance Use, Past 4 Months (W5)				
# days used alcohol, M (SD)	15.33 (18.68)	13.71 (17.21)	22.50 (22.81)	<.001
# days used marijuana	5.50 (20.36)	N/A	29.83 (39.05)	N/A
Problem Substance Use (W6)				
Problem Drinking, M (SD)	1.11 (1.22)	1.01 (1.12)	1.60 (1.51)	<.001
Problem Marijuana Use (CUDIT)	4.20 (4.56)	2.08 (2.88)	5.49 (4.91)	<.001
Motives for Alcohol Use, M (SD)				**p**[a]
Social	14.26 (5.59)	13.66 (5.50)	16.94 (5.18)	<.001
Coping	9.17 (4.71)	8.84 (4.59)	10.65 (4.91)	<.001
Self-enhancement	12.09 (5.29)	11.48 (5.14)	14.77 (5.11)	<.001
Conformity	7.18 (3.48)	7.07 (3.42)	7.68 (3.69)	.003
Expansion	7.27 (3.71)	7.03 (3.59)	8.30 (4.07)	<.001
Motives for Marijuana Use, M (SD)				**p**[b]
Social	--	--	12.49 (6.15)	<.001
Coping	--	--	11.31 (6.12)	.122
Self-enhancement	--	--	17.17 (5.91)	<.001
Conformity	--	--	7.30 (4.15)	.204
Expansion	--	--	11.55 (6.57)	<.001

[a] Comparing motives for alcohol use and other participant characteristics between alcohol-only vs. alcohol-marijuana users.
[b] Comparing motives for alcohol or marijuana use, respectively, among alcohol-marijuana users.

Table 2. Correlations Among Motives for Alcohol Versus Marijuana Use in All Alcohol Users, N=345

					Motives for Alcohol Use					
Note: Among All Alcohol Users	Social		Coping		Self-enhancement		Conformity		Expansion	
Motives for Alcohol Use	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Social	--	--	.52	<.001	.73	<.001	.42	<.001	.38	<.001
Coping	--	--	--	--	.57	<.001	.47	<.001	.56	<.001
Self-enhancement	--	--	--	--	--	--	.37	<.001	.46	<.001
Conformity	--	--	--	--	--	--	--	--	.57	<.001
Expansion	-	--	--	--	--	--	--	--	--	--
					Motives for Marijuana Use					
Note: Among All Co-Users	Social		Coping		Self-enhancement		Conformity		Expansion	
Motives for Marijuana Use	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Social	--	--	.59	<.001	.61	<.001	.36	<.001	.51	<.001
Coping	--	--	--	--	.50	<.001	.30	<.001	.55	<.001
Self-enhancement	--	--	--	--	--	--	.07	.154	.51	<.001
Conformity	--	--	--	--	--	--	--	--	.25	<.001
Expansion	-	--	--	--	--	--	--	--	--	--
					Motives for Marijuana Use					
Note: Among All Co-Users	Social		Coping		Self-enhancement		Conformity		Expansion	
Motives for Alcohol Use	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Social	.50	<.001	.28	<.001	.52	<.001	.17	.001	.30	<.001
Coping	.31	<.001	.57	<.001	.25	<.001	.32	<.001	.30	<.001
Self-enhancement	.41	<.001	.23	<.001	.50	<.001	.18	.001	.25	<.001
Conformity	.26	<.001	.19	<.001	.11	.040	.65	<.001	.23	<.001
Expansion	.34	<.001	.35	<.001	.23	<.001	.37	<.001	.57	<.001

Table 3. Motives for Alcohol or Marijuana Use in Relation to Alcohol and Marijuana Use Outcomes

	Alcohol-Only Users, N=1,525				Alcohol-Marijuana Co-Users, N=345				Alcohol-Marijuana Co-Users, N=345			
	W5 Alcohol Use		W6 Problem Alcohol Use		W5 Alcohol Use		W6 Problem Alcohol Use		W5 Marijuana Use		W6 CUDIT Scores	
Motives for Alcohol Use									***Motives for Marijuana Use***			
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Social	.20	<.001	.16	<.001	.12	.022	.16	.008	.30	<.001	.27	<.001
Coping	.18	<.001	.29	<.001	.07	.169	.32	<.001	.34	<.001	.25	<.001
Self-enhancement	.26	<.001	.25	<.001	.17	.002	.16	.008	.28	<.001	.33	<.001
Conformity	.02	.535	.11	<.001	-.06	.299	.06	.359	.04	.496	.07	.348
Expansion	.10	<.001	.17	<.001	.04	.486	.13	.029	.34	<.001	.35	<.001

Table 4. Multivariable Regression Results Indicating Predictors of Alcohol Use Outcomes, N=1,870

	W5 Number of Days Used, Past 4 Months			W6 Problem Drinking Index		
	B	**CI**	**p-value**	**B**	**CI**	**p-value**
Sociodemographics						
Age	1.50	1.05, 1.95	<.001	-0.01	-0.05, 0.02	.500
Gender						
Male	Ref	--	--	Ref	--	--
Female	-3.44	-5.26, -1.63	<.001	-0.17	-0.30, -0.03	.014
Sexual Orientation						
Heterosexual	Ref	--	--	Ref	--	--
Other	2.85	-0.19, 5.88	0.066	-0.02	-0.24, 0.21	.890
Race						
White	Ref	--	--	Ref	--	--
Black	-3.29	-6.29, -0.30	.031	0.03	-0.19, 0.26	.771
Asian	-6.93	-10.44, -3.42	<.001	-0.19	-0.46, 0.07	.148
Other	-3.85	-7.69, -0.01	.049	0.18	-0.10, 0.45	.216
Ethnicity						
Non-Hispanic	Ref	--	--	Ref	--	--
Hispanic	-2.36	-5.62, 0.90	.155	0.05	-0.19, 0.29	.662
Parental Education						
< Bachelors	Ref	--	--	Ref	--	--
≥ Bachelors	3.21	1.38, 5.05	.001	0.12	-0.01, 0.26	.073
School Type						
Private	Ref	--	--	Ref	--	--
Public	-3.82	-5.92, -1.73	<.001	-0.14	-0.29, 0.01	.073
Technical college	-4.79	-7.62, -1.95	.001	-0.22	-0.43, -0.01	.045
HBCU	-2.01	-6.17, 2.15	.343	0.05	-0.26, 0.37	.736
Rural/urban						
Rural	Ref	--	--	Ref	--	--
Urban	-3.21	-5.12, -1.30	.001	-0.19	-0.33, -0.05	.009
Psychosocial Factors						
ACEs	0.05	-0.48, 0.57	.861	0.08	0.04, 0.12	<.001
Depressive symptoms	-0.07	-0.24, 0.10	.420	0.01	-0.01, 0.02	.429
ADHD symptoms	0.12	-0.09, 0.33	.246	0.01	0.00, 0.03	.068
Parental Use						
Parental alcohol use	2.06	0.32, 3.79	.020	-0.01	-0.14, 0.12	.830
Parental marijuana use	1.02	-2.50, 4.54	.570	0.24	-0.01, 0.50	.063
Days Used Marijuana, Past 4 Months	0.08	0.04, 0.13	<.001	0.00	0.00, 0.01	.053
Motives for Alcohol Use						

Social	0.05	-0.18, 0.27	.672	-0.01	-0.02, 0.01	.493
Coping	0.54	0.29, 0.80	<.001	0.07	0.06, 0.09	<.001
Self-enhancement	0.75	0.51, 1.00	<.001	0.03	0.01, 0.05	.002
Conformity	-0.87	-1.18, -0.57	<.001	-0.02	-0.04, 0.00	.055
Expansion	0.02	-0.28, 0.32	.890	-0.01	-0.03, 0.02	.585
Adjusted R-Squared		.176			.141	

Note: Given the collinearity among the motives subscales, we also modeled each motive separately, controlling for all other factors. For wave 5 number of days of alcohol use, the findings were as follows: Social: B=0.53, CI: 0.36, 0.69, p<.001, Adjusted R-Squared=.129; Coping: B=0.75, CI: 0.53, 0.95, p<.001, Adjusted R-squared=.135; Self-enhancement: B=0.83, CI: 0.67, 1.00, p<.001, Adjusted R-squared=.156; Conformity: B=-0.14, CI: -0.39, 1.10, p=.271, Adjusted R-squared=.107; and Expansion: B=0.38, CI: 0.14, 0.62, p=.002, Adjusted R-squared=.112. For wave 6 problem drinking index scores, the findings were as follows: Social: B=0.03, CI: 0.02, 0.05, p<.001, Adjusted R-squared=.084; Coping: B=0.08, CI: 0.06, 0.09, p<.001, Adjusted R-squared=.113; Self-enhancement: B=0.05, CI: 0.04, 0.06, p<.001, Adjusted R-squared=.104; Conformity: B=0.02, CI: 0.00, 0.04, p=.021, Adjusted R-squared=.067; and Expansion: B=0.04, CI: 0.02, 0.06, p<.001, Adjusted R-squared=.077.

Table 5. Multivariable Regression Results Indicating Predictors of Marijuana Use Outcomes, N=345

	W5 Number of Days Used, Past 4 Months			W6 CUDIT Scores		
	B	**CI**	**p-value**	**B**	**CI**	**p-value**
Sociodemographics						
Age	1.07	-0.94, 3.08	.295	0.19	-0.15, 0.53	.279
Gender						
Male	Ref	--	--	Ref	--	--
Female	-8.27	-16.91, 0.36	.060	-1.85	-3.33, -0.37	.015
Sexual Orientation						
Heterosexual	Ref	--	--	Ref	--	--
Other	15.73	3.88, 27.57	.009	-0.84	-2.70, 1.02	.374
Race						
White	Ref	--	--	Ref	--	--
Black	-15.52	-28.54, -2.50	.020	-0.78	-2.71, 1.14	.423
Asian	-0.92	-17.31, 15.48	.913	1.96	-1.04, 4.95	.199
Other	2.41	-15.91, 20.73	.796	1.29	-1.59, 4.18	.378
Ethnicity						
Non-Hispanic	Ref	--	--	Ref	--	--
Hispanic	1.44	-14.24, 17.11	.857	-0.49	-2.95, 1.97	.697
Parental Education						
< Bachelors	Ref	--	--	Ref	--	--
≥ Bachelors	6.02	-2.56, 14.59	.168	0.55	-0.85, 1.95	.439
School Type						
Private	Ref	--	--	Ref	--	--
Public	-0.81	-10.75, 9.13	.873	-0.08	-1.69, 1.53	.920
Technical college	6.11	-8.74, 20.97	.419	-0.34	-2.89, 2.21	.794
HBCU	14.74	-2.81, 32.30	.099	2.88	0.04, 5.72	.047
Rural/urban						
Rural	Ref	--	--	Ref	--	--
Urban	-6.16	-15.03, 2.72	.173	0.84	-0.59, 2.27	.246
Psychosocial Factors						
ACEs	-1.31	-3.68, 1.07	.280	0.01	-0.36, 0.38	.959
Depressive symptoms	-0.83	-1.56, -0.10	.025	0.05	-0.06, 0.17	.370
ADHD symptoms	-0.74	-1.66, 0.18	.116	-0.08	-0.23, 0.07	.319
Parental alcohol use	-2.67	-10.69, 5.35	.513	-0.32	-1.72, 1.08	.651
Parental marijuana use	9.02	-4.04, 22.08	.175	1.52	-0.47, 3.5	.134
Days Used Alcohol, Past 4 Months	0.13	-0.04, 0.30	.129	0.01	-0.02, 0.03	.592
Motives for Marijuana Use						
Social	0.52	-0.40, 1.44	.268	0.00	-0.16, 0.15	.959
Coping	2.45	1.51, 3.39	<.001	0.03	-0.13, 0.18	.716

Self-enhancement	0.12	-0.81, 1.04	.807	0.15	-0.01, 0.32	.069
Conformity	-0.86	-1.87, 0.15	.094	0.03	-0.14, 0.19	.765
Expansion	0.90	0.15, 1.65	.018	0.17	0.05, 0.29	.005
Adjusted R-Squared		.250			.197	

Note: Given the collinearity among the motives subscales, we also modeled each motive separately, controlling for all other factors. For wave 5 number of days of marijuana use, the findings were as follows: Social: B=2.16, CI: 1.49, 2.82, p<.001, Adjusted R-Squared=.137; Coping: B=3.24, CI: 2.54, 3.95, p<.001, Adjusted R-squared=.230; Self-enhancement: B=2.20, CI: 1.50, 2.89, p<.001, Adjusted R-squared=.132; Conformity: B=0.58, CI: -.46, 1.61, p=.272, Adjusted R-squared=.028; and Expansion: B=2.18, CI: 1.55, 2.80, p<.001, Adjusted R-squared=.154. For wave 6 CUDIT scores, the findings were as follows: Social: B=0.20, CI: 0.10, 0.31, p<.001, Adjusted R-squared=.125; Coping: B=0.23, CI: 0.11, 0.34, p<.001, Adjusted R-squared=.126; Self-enhancement: B=0.27, CI: 0.16, 0.38, p<.001, Adjusted R-squared=.165; Conformity: B=0.10, CI: -0.07, 0.26, p=.253, Adjusted R-squared=.058; and Expansion: B=0.25, CI: 0.16, 0.35, p<.001, Adjusted R-squared=.184.