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Daily Reports of Positive and Negative Affect and Alcohol and Marijuana Use Among College Student and Non-Student Young Adults

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Abstract

Background—Daily affect and substance use covary among college students, but little is known about these associations among young adults not in college.

Objectives—The current pilot study examines associations between positive and negative affect and alcohol and marijuana use, with a focus on differences between college student and non-student young adults.

Methods—High school seniors completed a baseline survey during the spring of 2012 and were then randomly selected to participate in an intensive measurement follow-up. Participants in the follow-up (*N*=72, 40.3% men, 77.8% White, 66.7% full-time college students) completed up to 14 consecutive web-based daily surveys during the fall after high school completion. Multilevel models in which days (Level 1) were nested in persons (Level 2) were estimated.

Results—Weekend days were associated with increased alcohol use among all young adults, increased marijuana use among college students, and decreased marijuana use among non-students. For young adults not in college, greater daily positive affect was associated with increased likelihood of binge drinking, consuming a greater number of drinks, and lower odds of marijuana use; greater daily negative affect was associated with lower odds of alcohol use and lower odds of binge drinking for non-students. For college students, greater daily negative affect was associated with lower odds of marijuana use.

Conclusions/Importance—Daily affect and alcohol and marijuana use covary among young adults, though these associations differ between students and non-students. Results highlight the need to examine predictors of alcohol and marijuana use among young adults who do not attend college.

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Keywords

alcohol; marijuana; positive and negative affect; college; young adult

1. Background

Substance use, including alcohol and marijuana use, is known to increase during young adulthood, the period of life between adolescence and the adoption of adult roles and responsibilities such as marriage, parenthood, and full-time employment (Arnett, 1992; Park, Mulye, Adams, Brindis, & Irwin, 2006). Rates of alcohol and marijuana use are higher during the early years of young adulthood than at any other point during the life course (Bachman, Johnston, O'Malley, & Schulenberg, 1996; Park et al., 2006; SAMHSA, 2013). Among 19- to 20-year-old American high school graduates, rates of past-month alcohol and marijuana use are 52.1% and 21.6%, respectively, and having been drunk in the past month is reported by 34.3% (Johnston, O'Malley, Bachman, & Schulenberg, 2013). These rates of substance use raise questions such as who is most at risk for high levels of alcohol use and marijuana use, and what explains the patterns of when substance use is most likely to occur.

Various pathways to adulthood can be characterized by particular patterns of substance use behavior (Schulenberg, O'Malley, Bachman, & Johnston, 2005). College attendance or non-attendance provides an important variable for discerning populations most at risk for high levels of substance use as well as characteristics and general life circumstances that may predict certain patterns of use. College students, compared to their same-aged peers not in college, are known to have higher rates of alcohol use in their late teens and early twenties; non-students show higher rates of marijuana use during the early adult years (Johnston et al., 2013; O'Malley & Johnston, 2002). In the longer term, young adults who do not go to college tend to have higher rates of alcohol and other substance use disorders across adulthood, compared to those who attend college (Lanza & Collins, 2006; White, Labouvie, & Papadaratsakis, 2005). That is, college students are more likely to drink during college but are at lower risk for long-term alcohol disorders. Although these findings show that, between persons, college students and non-students have different patterns of substance use over time, very little is known about how substance use behaviors vary within person on a day-to-day basis for these two groups. In other words, we do not yet know whether the situational predictors of substance use are similar across young adult college students and non-students. The current study utilizes daily reports to examine alcohol use and marijuana use among young adults, with a focus on differences between college students and non-students.

1.1 Affect and Substance Use

Individual differences in positive and negative affect are important predictors of substance use and related problems (Simons, 2003; Simons & Carey, 2002). Substance use that co-occurs with positive affect (e.g., during celebrations, socializing) may be very different from substance use that co-occurs with negative affect (e.g., when coping with a difficult day). These differences are explored in previous research examining associations between daily affect, or day-to-day fluctuations in reports of positive and negative emotions, and alcohol use among college students. Based on within-person studies of college students, positive

affect is found to be positively associated with the number of drinks consumed and the number of binge drinking episodes in a seven-day period (Rankin & Maggs, 2006), the number of drinks consumed on one day (Park, Armeli, & Tennen, 2004), and intoxication on a given day (defined as a combination of perceived intoxication and estimated blood alcohol concentration; Simons, Dvorak, Batien, & Wray, 2010). Within-person results for negative affect, however, are mixed. Some studies of daily reports among college students find positive associations between negative affect and alcohol use (Park et al., 2004) and alcohol problems (Simons, Gaher, Correia, Hansen, & Christopher, 2005), whereas others find that greater negative affect is associated with a lower frequency of alcohol use (Rankin & Maggs, 2006) and less alcohol intoxication (Simons et al., 2010). With respect to college students, then, these conflicting findings point to the need for additional research to delineate within-person associations of affect and alcohol use. With respect to non-student young adults, there are no studies as yet to provide information about daily associations between affect and alcohol use.

Compared to research of alcohol use, much less research has examined daily reports of marijuana use, in general, and marijuana use in relation to affect, in particular. Preliminary within-person findings suggest that marijuana use is associated with lower daily positive affect and higher daily negative affect in a sample of depressed youth (ages 15–22; Bhushan, Blood, & Shrier, 2012), and with higher negative affect (but not with positive affect) in a sample of medical outpatient marijuana users (ages 15–24; Shrier, Ross, & Blood, 2014). Among college students as well as non-student young adults, the associations between affect and marijuana use are yet to be documented.

2. Objectives

The current pilot study extends the growing literature on positive and negative affect and alcohol use and is among the first to examine positive and negative affect and marijuana use among young adults. In addition, the majority of research examining the fluctuations in young adult substance use has focused exclusively on college student populations. It is unclear whether the same mechanisms (including daily positive and negative affect) are associated with substance use among non-student young adults. This is the first study to examine the extent to which associations between affect and substance use may differ based on college status. Research questions for the current study are: (1) What are the daily associations of positive and negative affect with alcohol use and marijuana use? (2) To what extent are these associations different for full-time college students and non-student young adults?

3. Methods

3.1. Participants

High school seniors from three schools in the Midwest were recruited during the spring to participate in this study's baseline survey. The schools were purposively selected to maximize diversity and included one rural, one suburban, and one urban high school. A total of 440 individuals were in the selected schools and classes; 318 (72.3%) completed the baseline survey, of whom 300 (94.3%) provided their contact information on a separate

form, which allowed us to make contact for the follow-up. After completion of the baseline survey in spring 2012, about two-thirds of the 300 students (*N*=202) were randomized into an intensive measurement follow-up group. Of the 202 young adults randomized into the intensive measurement group, 193 (95.5%) were eligible (ineligible young adults included 9 participants who were under age 18) to participate in a 30-minute web-based survey followed by 14 daily surveys. Ultimately, the response rate for the follow-up survey was 45.1% (*N*=87 out of *N*=193); 72 (37.3%) completed at least one of the 14 daily reports.

For the present analysis, we used data from participants who completed at least one day of the 14-day diary. Of the 72 participants, 75.0% completed at least half of the diary days and 66.7% completed more than two thirds of the diary days (i.e., at least 10 days). The mean number of diaries completed was 10.01 (*SD* = 4.21). The mean age of participants at the time of the daily reports was 18.7 years (*SD*=0.42). The analytic sample was 40.3% men and 59.7% women; 77.8% identified as White (Caucasian), 9.7% as Black or African American, 9.7% as Hispanic American (including the response options Mexican American or Chicano, Cuban American, Puerto Rican, and Other Hispanic or Latino), and 2.8% as more than one race/ethnicity category or as one of the other options (including Asian American, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander). Two thirds (66.7%) were full-time college students. Having a parent with at least some college education (as a marker of higher socioeconomic status) was reported by 73.6% of participants.

Using data from the baseline questionnaire, we conducted an attrition analysis to determine whether young adults who did not complete the follow-up survey differed significantly from those who did. Participants who remained in the sample at follow-up did not significantly differ from those who did not based on gender, which high school they attended, alcohol use (lifetime, past 12 months, and past 30 days), binge drinking (past two weeks), or marijuana use (lifetime, past 12 months, past 30 days). Participants who completed the follow-up survey were more likely than study attriters to be White (compared to those in other racial/ethnic groups) and to have parents who attended some college (vs. no college).

3.2 Measures

Alcohol use and marijuana use were assessed each day. Participants were asked whether they used alcohol and, if so, the number of drinks they consumed on a scale from 1 to 25 or more. Non-drinking days were coded as 0 drinks. Binge drinking was defined as five or more drinks for men and four or more drinks for women in one day (coded as 1; Wechsler, Dowdall, Davenport, & Rimm, 1995), compared to non-drinking or non-binge drinking days (0). A drink was defined as a half-ounce of absolute alcohol and the following examples were provided: a 12-ounce can (or bottle) of beer, a 5-ounce glass of wine, or a drink containing 1 shot of liquor or spirits. Participants were asked whether they used marijuana or hashish each day (1) or did not (0).

Positive and negative affect were calculated from the daily questionnaires based on the positive and negative affect schedule (Watson, Clark, & Tellegen, 1988). Positive affect was calculated using the average of 10 items (α=.83–.94 across days; i.e., excited, interested, proud, strong, inspired, enthusiastic, alert, determined, attentive, active), each rated on a scale ranging from 0 = *very slightly or not at all* to 4 = *extremely*. Similarly, negative affect

was the average of 10 items (α=.79–.94 across days; i.e., upset, scared, ashamed, distressed, hostile, irritable, guilty, nervous, jittery, afraid).

College status was created using information from the follow-up questionnaire. Participants were classified as full-time college students (1) if they indicated that they were attending college (including two-year and four-year schools) as a full-time student; all other participants were coded as non-students (0). Of full-time college students, 60.4% were attending a four-year college, 37.5% were attending a two-year college, and 2.1% indicated attending some other type of college.

Weekend days were defined as Thursday, Friday, or Saturday (1), based on previous research regarding substance use patterns among young adults (Del Boca, Darkes, Greenbaum, & Goldman, 2004; Hartzler & Fromme, 2003; O'Connor & Colder, 2005; Maggs, Williams, & Lee, 2011). Weekdays were coded as 0.

3.3 Procedures

Students participated in the baseline survey in school during normal school hours in 12th grade in spring 2012. Four months later (during fall 2012), young adults in the intensive measurement follow-up group received a 30-minute web survey followed by a request to complete 14 consecutive days of a web-based daily diary. Each day, participants were sent a link to a survey about the previous day (e.g., "This survey is about Wednesday from the time you woke up until you went to sleep.").

3.4 Plan of Analysis

Multilevel modeling (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999) was used to examine alcohol use (any alcohol, binge drinking, and number of drinks) and marijuana use (any). The outcome variables any drinking, binge drinking, and any marijuana use were dichotomous and modeled with a Bernoulli distribution. For the outcome measuring number of drinks, a Poisson distribution allowing for overdispersion was utilized. All four outcome variables were measured at the daily level using up to 14 days of data for each person. *Days* (Level 1; N=720 for alcohol, N=721 for marijuana) were nested within *persons* (Level 2; N=72) permitting the partitioning of within-person and between-person variance. Between-person (Level 2) effects were gender, race, parental education, college status, and person-mean levels of positive and negative affect (i.e., average scores across all days, grand-mean centered). Within-person (Level 1) effects were weekend and person-mean centered daily positive and negative affect (i.e., the effect of having a higher or lower positive or negative affect score than usual). To determine whether effects varied by college status, cross-level interactions between college status and weekend, daily positive affect, and daily negative affect were also examined. To probe the significant interaction effects, we computed the simple slopes of each of the associations for college students and non-students (Bauer & Curran, 2005; Preacher, Bauer, & Curran, 2006). All models were estimated using HLM 6.03 (Raudenbush, Bryk, & Congdon, 2006).

4. Results

4.1 Descriptive Results

As shown in Table 1, we first examined descriptive information about the Level 2 (between-person) and Level 1 (within-person) variables in the model. Based on chi-square tests, college students and non-student young adults did not differ on gender or parental education; differences were found with respect to race/ethnicity, with a greater percentage of White young adults ($p<.05$) and a lower percentage of African American young adults ($p<.001$) reporting college attendance. Twenty participants (27.8%) reported having at least one drink during the 14-day diary period, 12 participants (16.7%) reported binge drinking, and 11 participants (15.3%) reported using marijuana at least once during the 14-day diary period. As shown in Table 1, at the within-person level, drinking was reported on 5.0% of total days, binge drinking was reported on 2.6% of days, and marijuana use was reported on 4.6% of days. Intraclass correlations were 32% for any drinking, 31% for binge drinking, 88% for number of drinks, and 55% for marijuana use.

4.2 Multilevel Models

4.2.1 Demographic Differences—As shown in Table 2, between-person (Level 2) effects indicated that, compared to women, men had lower odds of consuming any alcohol, binge drinking, and smoking marijuana; there was no gender difference in number of drinks. Whites had higher levels of substance use on all outcomes than those reporting other races/ethnicities. Having a parent with at least some college education was positively associated with all three alcohol indicators, but was not associated with marijuana use. Full-time college students did not differ from non-students on the three alcohol indicators, but college students had lower odds of using marijuana than did non-students.

4.2.2 Weekends—Within-person effects (Level 1) indicated that weekend days were associated with increased odds for all three alcohol indicators. For marijuana use, there was a significant interaction between weekend day and college status such that weekends were associated with increased odds of marijuana use for college students ($OR=2.59$, $p<.001$) but decreased odds of marijuana use for non-students ($OR=0.81$, $p<.05$).

4.2.3 Positive Affect—Level 2 (between-person) effects indicated that a higher person-mean of positive affect (i.e., having more positive affect than other young adults) was associated with greater odds of consuming any alcohol and lower odds of marijuana use, but was not associated with binge drinking or number of drinks.

Level 1 (within-person) effects indicated significant interactions between daily positive affect (i.e., having a higher score than usual on a given day) and college status for binge drinking, number of drinks, and marijuana use. The associations between positive affect and substance use were not significant for college students (i.e., simple slopes for binge drinking: $OR=1.28$, $p=.31$, number of drinks: $OR=1.07$, $p=.91$, and marijuana use: $OR=1.40$, $p=.11$). For non-students, there was a positive association between positive affect and binge drinking ($OR=4.21$, $p<.001$) and number of drinks ($OR=3.95$, $p<.001$), and a negative association between positive affect and marijuana use ($OR=0.71$, $p<.05$).

4.2.4 Negative Affect—Level 2 (between-person) effects indicated that a higher person-mean of negative affect (i.e., having more negative affect than other young adults) was associated with lower odds of consuming any alcohol and using marijuana, but was not associated with binge drinking or number of drinks.

Level 1 (within-person) effects indicated that there were significant interactions between daily negative affect and college status for any alcohol use, binge drinking, and marijuana use. The associations between negative affect and alcohol use were not significant for college students (i.e., simple slopes for any alcohol use: OR=1.48, p=.35, and binge drinking: OR=1.42, p=.41), but they were negative for non-students (i.e., any alcohol use: OR=0.32, p<.001, and binge drinking: OR=0.19, p<.001). Lastly, marijuana use was negatively associated with negative affect among college students (OR=0.14, p<.001), but not associated among non-students (OR=1.20, p=.40).

5. Conclusions

Overall, this study provided preliminary evidence that the associations between affect and substance use differed in meaningful ways for college student and non-student young adults and extended the existing literature in at least two ways. First, we examined how daily affect was associated with daily marijuana use, to this day the focus of very little empirical research. Second, we examined how associations between daily affect and daily substance use might be moderated by college student status. That is, we provided a direct test of the extent to which daily-level associations between positive and negative affect and substance use were the same or different for college student and non-student young adults.

Daily covariation among affect and substance use for college students and for non-student young adults diverged in a number of important ways. Substance use patterns among non-student young adults were associated with within-person variations in affect; that is, binge drinking and the consumption of greater quantities of alcohol were most likely on days with higher positive affect and lower negative affect, and marijuana use was most likely on days with lower positive affect. These findings were similar to previous results showing that college students exhibited greater alcohol use on days with positive affect (Park et al., 2004; Rankin & Maggs, 2006; Simons et al., 2010) and that youth in treatment used marijuana on days with higher negative affect (Shrier et al., 2014). Therefore, intervention programs for substance use among non-student young adults should be sensitive to situational and affect-related predictors of substance use, and how motivations for use could differ on days with positive (e.g., to have fun) or negative (e.g., to cope with stress) experiences.

In contrast, alcohol use among college students in this sample did not vary with affect, which contradicts previous research. Marijuana use among college students was less likely on days with greater negative affect. Previous research among students in four-year colleges showed associations between affect and alcohol use (e.g., Park et al., 2004; Rankin & Maggs, 2006) that were not replicated here. In addition, the weekly pattern of marijuana use among college students and non-student young adults differed, with college student marijuana use increasing on weekends and non-student use decreasing on weekends. These differences suggest different contexts and motivations for use (e.g., Armeli, Conner, Cullum,

& Tennen, 2010). Previous studies on marijuana use among college students were not available. The findings of the current study regarding college students may have diverged from existing research largely because our college sample is more heterogeneous than typical college samples. In the current study, full-time attenders of any two-year or four-year institution were included, because students were sampled in high school and followed to multiple institutions. In previous studies, students typically have been recruited from four-year universities after they enrolled. Future studies should examine how students at two-year and four-year colleges differ, along with potential differences in substance use patterns based on part-time and full-time status.

To the extent that positive and negative affect were differentially associated with substance use, particular interventions might better suit certain contexts. For example, negative affect substance use might be a coping mechanism; thus, teaching alternative coping strategies might be especially important. Positive affect substance use that leads to negative consequences might require interventions that teach young adults harm-reduction strategies (e.g., having fun while staying safe through protective behavioral strategies). In this study, patterns of marijuana use among non-student young adults suggested a coping-type of use (i.e., on weekdays or on days with low positive affect), whereas marijuana use among college students appeared to be more celebratory or social (i.e., on weekends or on days with lower negative affect). For example, college student marijuana use could be associated with parties and weekend socializing, whereas non-student use could be associated with relaxing after work. Future research should examine how specific motivations and contexts for substance use differ for college students and non-student young adults.

It is difficult to directly compare substance use rates in the current study to other studies, given that many studies of daily associations either had study selection criteria that included alcohol use or chose to include only substance use days (e.g., “among people who reported alcohol use on at least one day”) in the analysis. We can compare our sample to the national Monitoring the Future sample in terms of baseline use in 12^{th} grade. In the current study, 69.1% reported alcohol use in the past 12 months and 32.9% reported marijuana use in the past 12 months in the 12^{th} grade. These percentages are similar to national rates in 2012, which were 63.5% for alcohol use and 36.4% for marijuana use (Johnston et al., 2013). Therefore, our sample has comparable rates of substance use to a nationally representative sample of same-aged peers.

Limitations of this pilot study include the relatively small sample size, attrition, the relatively low within-person variation in use of daily alcohol and marijuana, the lack of temporal ordering indicating whether affect preceded or followed substance use on a given day, and 14-day bursts of daily surveys that might not be representative of typical patterns. Future research should build on these preliminary results by attempting to replicate these findings in larger samples, considering changes in affect throughout the day, differentiating among non-students (e.g., by employment status), and studying additional social roles (e.g., marriage, parenthood) that could also have different daily patterns of affect and substance use. Differences in the daily predictors of substance use among college student and non-student young adults highlight the need for future research to address predictors of alcohol and marijuana use specific to young adults not enrolled in post-secondary education.

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TABLE 1

Descriptive statistics

	% or M	SD	Observed Range
Between-person constructs (Level 2)			
Male gender	40.28%		
White race	77.78%		
Parental education (some college or more)	73.61%		
College status (full-time)	66.67%		
Person-mean positive affect[a]	1.08	0.72	0.08–2.85
Person-mean negative affect[a]	0.39	0.41	0–1.91
Within-person daily constructs (Level 1)			
Alcohol use	5.00%		
Binge drinking	2.64%		
Number of drinks	0.26	1.37	0–12
Marijuana use	4.58%		
Weekend	42.96%		
Positive affect[a]	1.06	0.86	0–3.80
Negative affect[a]	0.39	0.53	0–3.00

Note. % = the percentage of people (for Level 2) or the percentage of total days (for Level 1). *M* = mean, *SD* = standard deviation. For between-person constructs (Level 2) *N*=72 persons. For within-person constructs (Level 1), *N*=710–721 total days.

[a]Positive and negative affect were based on the mean of items in each scale, with scores ranging from 0 = *very slightly or not at all* to 4 = *extremely*. These scores were person-mean centered for analysis.

TABLE 2

Associations between substance use (alcohol and marijuana), positive and negative affect, and college status

	Any Alcohol OR [95% CI]	**Binge Drinking OR [95% CI]**	**Number of Drinks RR [95% CI]**	**Any Marijuana OR [95% CI]**
Between-person effects, β_0 (Level 2; N = 72)				
Intercept, γ_{00}	0.006 [0.004,0.009] ***	0.001 [0.000,0.001] ***	0.011 [0.003, 0.038] ***	0.104 [0.081,0.133] ***
Male gender, γ_{01}	0.820 [0.696,0.966] *	0.550 [0.457,0.662] ***	0.739 [0.470, 1.161]	0.393 [0.328,0.472] ***
White race, γ_{02}	1.426 [1.148,1.772] **	3.902 [2.803,5.432] ***	2.734 [1.292, 5.789] **	1.964 [1.610,2.395] ***
Parental education (some college or more), γ_{03}	3.720 [2.854,4.847] ***	4.866 [3.508,6.750] ***	3.850 [1.720, 8.621] ***	0.933 [0.778,1.118]
College status (full-time), γ_{04}	0.950 [0.698,1.292]	1.333 [0.917,1.938]	1.346 [0.496, 3.654]	0.032 [0.023,0.044] ***
Person-mean positive affect, γ_{05}	1.344 [1.203,1.502] ***	0.983 [0.865,1.119]	1.285 [0.944, 1.750]	0.366 [0.312,0.429] ***
Person-mean negative affect, γ_{06}	0.652 [0.527,0.807] ***	0.991 [0.789,1.246]	0.769 [0.434, 1.362]	0.373 [0.275,0.505] ***
Within-person effects (Level 1[a])				
Weekend, β_1				
Intercept, γ_{10}	3.552 [2.636,4.786] ***	4.468 [3.119,6.400] ***	4.768 [1.861, 12.220] **	0.813 [0.682,0.968] *
x College status (full-time), γ_{11}	1.268 [0.882,1.823]	1.078 [0.711,1.634]	0.987 [0.328, 2.974]	3.182 [2.143,4.726] ***
Positive affect (person-mean centered), β_2				
Intercept, γ_{20}	1.190 [0.857,1.652]	4.205 [3.050,5.797] ***	3.951 [1.898, 8.225] ***	0.711 [0.575,0.879] **
x College status (full-time), γ_{21}	0.935 [0.651,1.342]	0.304 [0.214,0.432] ***	0.271 [0.118, 0.622] **	1.975 [1.375,2.836] ***
Negative affect (person-mean centered), β_3				
Intercept, γ_{30}	0.319 [0.183,0.558] ***	0.191 [0.108,0.335] ***	0.368 [0.089, 1.527]	1.203 [0.783,1.847]
x College status (full-time), γ_{31}	4.643 [2.532,8.516] ***	7.42 [4.055,13.578] ***	3.880 [0.831, 18.127]	0.120 [0.052,0.278] ***

* $p<.05$,

** $p<.01$,

*** $p<.001$

[a] Level 1 N=720 person days for alcohol and *N*=721 for marijuana.

Note: OR = odds ratio; RR = relative risk; CI = confidence interval; x denotes interaction with respective Level 1 effect.