Published in final edited form as:

Subst Use Misuse. 2017 January 28; 52(2): 182–193. doi:10.1080/10826084.2016.1223136.

Drinking, Cigarette Smoking, and Employment among American College Freshmen at a Four-Year University

Rose S. Bono, BS¹, Andrew J. Barnes, Ph.D.¹, Danielle M. Dick, Ph.D.², and Kenneth S. Kendler, M.D.³

¹Department of Health Behavior and Policy, School of Medicine, Virginia Commonwealth University

²Department of Psychology, Virginia Commonwealth University

³Virginia Institute for Psychiatric and Behavioral Genetics, Virginia Commonwealth University

Abstract

Background—For American college students, alcohol and cigarette use are important health concerns, and employment concurrent with school attendance is on the rise. Given the lifelong importance of employment and substance use trajectories begun in college, parsing out the relationship between the two is meaningful.

Objectives—This study's purpose is to determine whether employment during college is associated with substance use.

Methods—Cross-sectional associations between employment (work hours, earnings) and substance use (drinking frequency, drinking quantity, smoking frequency) were estimated using partial proportional odds models in a sample of N=1457 freshmen attending a large, public 4-year university in 2011, after accounting for demographics, personality, social environment, and parental influences.

Results—Working 10 more hours and earning \$50 more per week as a freshman had modest positive associations with higher smoking frequency and with moderate drinking frequency and quantity prior to adjustment. After adjustment, work hours remained modestly associated with moderate drinking frequency and quantity. No adjusted associations were found among employment measures and smoking or between weekly earnings and drinking frequency. Different relationships emerged for moderate versus heavy alcohol use frequency and quantity.

Conclusions—Both employment and substance use are commonplace among college freshmen. After extensive controls for potential confounders, the relationship between the two appears modest. Employment may yet play a role in college student substance use, but work hours and earnings are likely only small parts of a larger web of influences on drinking and smoking.

Corresponding author: Rose Bono, P.O. Box 980430, Richmond, VA 23298-0430, rose.bono@vcuhealth.org, Phone: (804)-628-3443, Fax: (804)-628-1233.

Financial disclosures: There are no financial disclosures from any authors. The authors report no conflicts of interest.

Keywords

alcohol; tobacco; employment; college students

United States college students are known for their high levels of substance use, which is concerning because excessive alcohol or cigarette consumption has been linked to numerous negative health outcomes (e.g. heart disease, sexually transmitted infections, cancer, emphysema, etc.) (U.S. Department of Health and Human Services, 2010a, 2010b). College is a particularly vulnerable time for substance use problems to develop due to factors such as decreased parental monitoring, increased peer interaction, and increased access to substances (Christie et al., 1988; Schulenberg & Maggs, 2002; White et al., 2006). According to a 2013 national survey, 40% of college students endorsed having been drunk and 14% smoked cigarettes in the past month (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014). Higher levels of substance use during college have been found to be inversely related to academic performance (Ruthig, Marrone, Hladkyj, & Robinson-Epp, 2011) and post-college employment status (Arria et al., 2013).

Employment while attending university is commonplace in America, particularly as college enrollment and tuition rates climb (Riggert, Boyle, Petrosko, Ash, & Rude-Parkins, 2006). The general college student employment rate rose from 45% in 1959 to 56% in 1986 (Stern & Nakata, 1991) to 61% in public four-year institutions in 2011–12 (National Center for Education Statistics, 2014). Despite this increase, most literature focuses on full-time working adults (Loughlin & Barling, 2001; Park & Sprung, 2013) or high school students, not college students. Research into adolescent populations is equivocal. Generally, adolescent students who work are more likely to use tobacco or drink alcohol than those who do not work (Paschall, Ringwalt, & Flewelling, 2002; Wu, Schlenger, & Galvin, 2003) and much research reports positive gradient between work intensity (the number of hours worked per week) and alcohol or tobacco use (Kingston & Rose, 2015; Mortimer, Finch, Shanahan, & Ryu, 1992; Mortimer, Finch, Ryu, Shanahan, & Call, 1996; Weller, Kelder, Cooper, Basen-Engquist, & Tortolero, 2003). Other studies, however, note that working a limited number of hours is linked with equal or lower rates of cigarette or alcohol use than the non-working population (Bachman & Schulenberg, 1993; Steinberg & Dornbusch, 1991; Valois, Dunham, Jackson, & Waller, 1999; Weller et al., 2003).

While multiple inquiries address the relationship of employment and substance use in high school students, few studies explore this association among college students (Butler, Dodge, & Faurote, 2010; Leppel, 2006). One found that female college students who worked fewer than 40 hours per week were less likely to binge drink than unemployed female students, and male college students who worked 1–19 or more than 40 hours per week were less likely to binge drink than their unemployed male peers (Leppel, 2006). This was taken from a 1995 national college student sample which represented a mix of 2- and 4-year institutions and had employment rates of almost 70% among men and women (Leppel, 2006). A second investigation, a daily study of alcohol use and work stress, found that work hours per day were positively related to the number of drinks consumed that day, but that employment status and daily earnings were negatively related to alcohol consumption (Butler et al.,

2010). This latter study's small convenience sample (n=106), in which all participants were employed and drank alcohol and the majority were white and female, limits its generalizability (Butler et al., 2010). Thus college students' work hours and earnings play a potentially important, yet poorly understood, role in their substance use patterns.

Why is there so much disagreement in the literature on the association of student employment and substance use? Perhaps this stems from incomplete controls for the confounding influences of variables not included in prior estimation approaches. Characteristics like risk-taking propensity have been implicated in the working-drinking relationship (Paschall et al., 2002), and personal traits appear to play a role in adult employment (Kanfer, Wanberg, & Kantrowitz, 2001; Schermer, Carswell, & Jackson, 2012) and in alcohol use in adolescence (Labouvie & McGee, 1986), so personality traits are potentially important. Additionally, important social differences separate high school and college. First, college students often live on or near campus, whereas high school students usually live at home with their parents (White et al., 2006). Decreased parental supervision and increased peer interactions can impact college student substance use (Borsari & Carey, 2001) and differential parental financial support may affect college student employment (Steelman & Powell, 1989). Dynamic peer-based social networks include romantic relationships, which can affect student alcohol use (Bogg, 2011); compared to high school relationships, romantic involvement in college is often more serious (Arnett, 2000). Further, college students have easier access to alcohol—largely through older students who can legally purchase it (Wechsler, Lee, Nelson, & Kuo, 2002)—and to cigarettes, either through peers (Kenford et al., 2005) or at retail stores, since most college freshmen can legally buy them. Because the social environment plays an important role in college students' lives, these factors are worth exploring.

With both employment and substance use common among college students, understanding how the two relate is important for students, parents, colleges, and employers. The present study uses data from a large, diverse college population to assess the relationship of college student employment and alcohol and tobacco use after accounting for the influences of students' social environment, personality, and family history.

Methods

Data and Participants

As part of a study of genetic and environmental influences on substance use and emotional health, email invitations were sent to all incoming first year students who were over 18 years of age during the first 10 weeks of the fall 2011 semester (wave 1) at a large, public mid-Atlantic 4-year university (n=3,623) (Dick et al., 2014). Participating students completed a 30-minute online baseline survey. The 2,054 freshmen who participated in fall 2011 represent a response rate of 57%. Of these, 1,559 who were still registered at the university also completed a second wave of the online survey, administered in the spring of 2012 (wave 2), for a retention rate of 76% (Dick et al., 2014). In each wave, participants were assured of confidentiality before and after taking the survey and were compensated \$10. Both surveys were approved by the university's institutional review board.

Measures

Alcohol—In each wave, participants were asked to report past-month alcohol use. The first wave used free-response measures for past-month frequency and quantity of alcohol use (Dick et al., 2014). The second wave asked participants to answer similar questions with categorical responses. Two three-level alcohol use measures were then empirically defined for drinking frequency (*never, less than weekly, weekly or more*) and typical drinking quantity (*none, 1–4 drinks per drinking day, 5 or more drinks per drinking day*). The outcome of interest in all analyses was wave 2 substance use; wave 1 substance use was included in adjusted analyses as a control variable.

Tobacco—Past-month tobacco use was assessed in both waves. Wave 2 smoking frequency, the primary outcome of interest, was categorized to match drinking frequency, with categories of *never, less than weekly, and weekly or more*. Wave 1 responses were similarly collapsed and included as dummy control variables in adjusted regressions.

Employment—In the second wave only, students were first asked whether they were employed. Employed participants were then asked about their total work hours per week; categorical responses ranged from 0 to more than 60 in 10-hour increments. Total weekly earnings (including tips) were also assessed, with possible answer choices anchored at \$0 and \$500 or more, with \$50 increments in between. Students who were currently unemployed at the time of the survey were recoded as working 0 hours and earning \$0 per week. Work hours and weekly earnings were analyzed as a linear measure with each unit increase approximating a 10 hour (\$50) increase in work hours (earnings).

Demographics—Demographic factors like gender and race affect the relationship between student employment and alcohol/tobacco use (Bachman & Schulenberg, 1993; Mortimer et al., 1992; Valois et al., 1999; Wu et al., 2003). To control for demographic characteristics, sex, weight, height and race/ethnicity were included in our regression models. Sex (female referent) and race/ethnicity (White referent) were coded as dummy variables. Weight (pounds) and height (inches) were measured on a continuous scale, as body mass can influence alcohol metabolism (Watson, Watson, & Batt, 1981). Because age showed very little variation in this population of college freshmen, it was excluded; the average age of participants was 18.5 years (standard deviation=0.45).

Personality—The Big Five Personality Inventory (John & Srivastava, 1999) was adapted to include 44 items measuring the personality constructs Openness (Cronbach's $\alpha=0.74$), Conscientiousness ($\alpha=0.78$), Extraversion ($\alpha=0.83$), Agreeableness ($\alpha=0.76$) and Neuroticism ($\alpha=0.80$). Items were summed according to personality construct, with higher scores representing those who “agree strongly” that those personality traits reflect them; these five summary measures were included as linear variables.

A second personality scale measuring impulsivity, fielded in wave 2, was taken from Cyders et al.'s UPPS-P metric (Cyders et al., 2007). The UPPS-P includes five factors, here assessed by three items each: (lack of) premeditation (Cronbach's $\alpha=0.79$), (lack of) perseverance ($\alpha=0.71$), sensation seeking ($\alpha=0.63$), negative urgency ($\alpha=0.68$) and positive urgency

($\alpha=0.73$). Positive and negative urgency each measure impulsivity under a different mood valence.

Social Environment—Several variables were included as influences of the social environment. A dichotomous variable indicated if the student had been in trouble with the police since beginning college, since that may represent an adverse life event affecting both alcohol use (Clark, Lesnick, & Hegedus, 1997) and employment status (Arria et al., 2013; Bushway, 1998). Variables indicating housing status were included, because whether a student lives on campus (referent), off campus, or with his or her parents may have significant influence on the students' alcohol and tobacco use patterns (Arnett, 2005). Students' relationship status was included with three variables indicating whether the student was single (referent), in a committed relationship, or dating several people at the time of the second survey, since romantic partners (or the lack thereof) can have significant impacts on the substance use of the individual (Salvatore, Kendler, & Dick, 2014). Also included was a variable assessing change in relationship status from wave 1 to 2, to control for influences that recent changes in relationship status may have on working and substance use.

Peer deviance was measured by six items, adapted from Kendler et al. (2008), which asked how many of the participant's friends would have smoked cigarettes or marijuana, used any alcohol, gotten drunk or had problems with alcohol or the law. Response options ranged from *none* to *all*, and the items were summed such that higher scores represented a greater proportion of friends engaging in these deviant behaviors. Five questions measured the amount of time (*never* to *often*) participants spent in various prosocial activities outside of class. Because athletic involvement and Greek life involvement are each associated with higher rates of alcohol use among college students (Borsari, Murphy, & Barnett, 2007; Lisha & Sussman, 2010), and because activities like religious or school involvement and volunteering are associated with less risky or deviant behaviors (Eccles & Barber, 1999), the questions assessing these activities were grouped respectively.

Parental Influences—To control for parental-level confounders on students' employment decisions and substance use behaviors, we include measures of educational attainment for the mother and father separately as a series of dummy variables. To control for parental drinking problems, dichotomous variables were included from a survey item asking if the student thought each biological parent ever had a drinking problem. Including student assessments of the parents' problem helps control for participant perspectives on their home environment (Nardi, 1981; O'Malley, Carey, & Maisto, 1986) and specifically asking about the biological parent taps into any genetic predispositions the student might have toward alcohol misuse (Goodwin, 1981). Finally, an item asked students if they thought their family had just enough, more than enough or less than enough money to meet their needs; this was included to help control for financial assistance the student might be receiving from his or her parents.

Statistical Analysis

In a cross-sectional design, unadjusted and adjusted associations between substance use behaviors and work hours or earnings were estimated using partial proportional odds models and results are reported in odds ratios (OR). Partial proportional odds models are a hybrid of an ordinal and generalized ordinal logistic regression where the proportional odds assumption is tested on each coefficient and allows coefficients to vary across outcome levels if the proportionality assumption is violated (Peterson & Harrell, 1990). The ORs represent the likelihood of being in higher frequency or quantity categories compared to no drinking or smoking, for each 10-hour or \$50 increase in weekly work hours or earnings. In our adjusted analyses, we controlled for demographic, personality, social, and parental influences plus wave 1 substance use.

To account for missing data across our large set of variables, we performed multiple imputation by chained equations (Allison, 2001), using all variables included in the regression analysis except our outcome. This created ten datasets that were analyzed together, accounting for the increased uncertainty. Our final sample size was N=1457.

To compare model fit between unadjusted and adjusted models, differences in McFadden's adjusted pseudo- R^2 (Long & Freese, 2006) between the unadjusted and adjusted models were qualitatively examined. Within each model, for each of the ten imputations, the pseudo- R^2 was estimated separately; the median is presented here. Wald tests of the joint significance of control variables added in the adjusted model are also discussed (Cameron & Trivedi, 2005).

To test the sensitivity of our main model specifications, we compared the differences in probability of drinking and smoking between those who remained in both waves of the survey and those who were lost to follow-up using Chi-squared tests, and we qualitatively compared analyses done with complete cases versus analyses with multiple imputation data. All analyses were conducted in Stata 12 (StataCorp, 2011) and used an alpha of $p < 0.05$.

Results

Sample Characteristics

Of the 1559 participants who completed both Fall 2011 and Spring 2012 waves, approximately 37% were male and 63% were female (see Table 1).

Most freshman participants were White (50.1%), with 20.3% indicating they were African American, 15.9% Asian, 5.7% Hispanic/Latino, and 6.1% other race. The demographic characteristics of our sample closely resemble those of the university in 2011 in which 43% of students were male, 57% female, and 48% were White, 19% African American, 14% Asian, 8% Hispanic/Latino, and approximately 9% other race (Dick et al., 2014).

In the first wave, 41% of incoming freshmen reported that they had used any alcohol in the past month, and by the next semester, 66% endorsed this behavior. About 13% of students endorsed drinking five or more drinks in a typical day and 10% endorsed weekly or more frequent tobacco use in wave 1; these figures increased to 23% and 12%, respectively, in the

month prior to the wave 2 survey. In wave 2, almost a third of students reported being employed, most of whom worked between 10 and 19 hours per week and earned \$50 to \$99 per week.

Associations between Work Hours and Substance Use Behaviors

Drinking frequency—Both before and after adjustment for demographics, prior substance use, personality, social environment, and parental influences, we found hours worked had a significant positive association with the odds of freshman college students drinking less than once a week, but not once a week or more, in the past 30 days (Table 2).

Specifically, in our adjusted model, working 10 more hours per week was associated with having 16% higher odds of consuming alcohol less often than once a week in the past month compared to no drinking (95% CI 1.01, 1.34). As a set, controls for prior wave drinking status, demographics, personality, social environment, and parental influences were jointly significantly different from zero, $F(48, 3312.7)=7.21, p<0.01$. Controlling only for work hours resulted in a poorly fitting model (median McFadden's adjusted pseudo- $R^2 = 0.00$), while including controls for prior wave drinking status, demographics, personality, social environment, parental influences improved the pseudo- R^2 to 0.31.

Drinking quantity—Before adjustment, only the 1–4 drinks category showed a significant association with weekly work hours, such that working an additional 10 hours per week predicted higher odds of drinking 1–4 drinks compared to 0 drinks (OR 1.18; 95% CI 1.06, 1.32). This remained after adjustment (OR 1.16; 95% CI 1.02, 1.33). However, no significant associations were found between freshmen's work hours and drinking 5 or more drinks per day. Controls were jointly significant at $F(48, 10757.8)=9.01, p<0.01$. With the rich set of controls, the pseudo- R^2 was 0.28, showing improved model fit over the unadjusted pseudo- $R^2=0.00$.

Smoking frequency—In our unadjusted model, working an additional 10 hours per week was associated with having 15% higher odds of smoking (see Table 2). However, after adjustment, the work hours coefficients for each level were non-significant, OR 1.07 (95% CI 0.93, 1.22). When added to the adjusted model, controls for prior wave drinking status, demographics, personality, social environment, and parental influences were significant, $F(42, 6021.7)=7.75, p<0.01$. As with drinking, work hours alone were a poor predictor of smoking status (pseudo- $R^2=0.00$), while including all model covariates resulted in an improved model with a pseudo- $R^2=0.35$.

Associations between Earnings and Substance Use Behaviors

Drinking frequency—The amount of earnings college freshmen earned from employment each week had a significant positive association with the odds of consuming alcohol less than once a week before, but not after, adjustment (see Table 3). As in the work hours model above, the controls as a set were jointly significantly different from zero, $F(49, 2720.0)=6.61, p<0.01$. The pseudo- R^2 for the saturated drinking frequency and earnings model was 0.30, representing an improvement in model fit from the unadjusted model's pseudo- $R^2=0.00$.

Drinking quantity—Similar to the work hours and drinking quantity models above, significant associations were found only between weekly earnings and drinking 1–4 drinks, before and after adjustment. With the array of control variables, there was a 12% increase in odds of drinking 1–4 drinks per day compared to 0 drinks per day with each \$50 increase in weekly earnings, OR 1.12, 95% CI 1.01, 1.24. This association did not hold for the relationship of weekly earnings to drinking 5 or more drinks in one day. Together, the controls were jointly significant, $F(48, 9212.0)=8.83$, $p<0.01$. Adding in the control variables improved model fit: the unadjusted pseudo- R^2 was 0.00, compared to the adjusted pseudo- R^2 of 0.28.

Smoking frequency—In our unadjusted model only, college freshmen's earnings had a significant positive association with their odds of smoking cigarettes in the past month but provided poor model fit (pseudo- $R^2=0.01$). However, when including controls for demographics, prior wave smoking status, personality, and social and parental influences, the association of earnings and smoking frequency was not significant, OR 1.07 (95% CI 0.98, 1.18). As in the adjusted models described above, the rich set of controls were, as a set, significantly different from zero, $F(42, 5900.1)=7.72$, $p<0.01$, and improved the model's fit, adjusted pseudo- $R^2=0.35$.

Sensitivity analyses—The sensitivity of our findings to attrition bias and missing data was analyzed. After testing for differences in the probability of substance use between those who participated in both waves and those who only responded to wave 1, we found that freshmen participating in only wave 1 were more likely to smoke than those responding to both waves ($p=0.045$). However, we found no statistically significant differences between respondents to both waves and wave 1 only in the probability of belonging to one of the alcohol frequency or quantity categories.

We compared the results using multiple imputation (presented here) and the results using complete cases only (i.e., those with data for all variables). In the complete case analysis approach, analytic samples ranged from 56% ($n=876$) to 66% ($n=1036$) of the $N=1559$ freshman responding to both waves of the survey, due to differences in missing data across the large number of covariates. With the multiple imputation sample, the relationship of work hours to drinking once a week or more was not significant, while this relationship was significant with the complete case analysis approach. Unlike the complete cases analysis results with earnings as a predictor, drinking frequency did not achieve statistical significance after adjustment at either frequency level in the multiple imputation sample. In our model comparing weekly earnings to drinking quantity, the multiple imputation sample found statistical significance for the 1–4 drinks per day category but not the 5 or more drinks per day category, unlike the sample of complete cases, which found similar non-significant effects of weekly earnings for both categories of drinking quantity. Otherwise, the odds ratios and p-values were broadly consistent across both samples.

Discussion

Substance use and employment among U.S. college students are commonplace, but the link between them has remained unclear. Using data from a large and diverse sample of freshmen

from a 4-year university, we assessed the relationship of college student employment and alcohol and tobacco use after accounting for the influences of students' social environment, personality, and family history on this relationship. We found that weekly earnings did not predict drinking frequency. Work hours did predict greater odds of drinking less than once a week, but were not associated with drinking once a week or more. Each 10-hour increase in weekly work hours and \$50 increase in weekly earnings predicted modestly greater odds of drinking 1–4 drinks per day, but not drinking 5 or more drinks per day. Employment variables were not related to smoking frequency after adjustment.

Previous literature supports the notion that working more hours is, overall, positively related to alcohol consumption (Butler et al., 2010; Mortimer et al., 1992; Mortimer et al., 1996; Paschall et al., 2002; Wu et al., 2003). The tension-reduction hypothesis posits that people drink to relieve stress (Cooper, Russell, Skinner, Frone, & Mudar, 1992), such that as a person works more hours, he or she is likely to drink more. This may help explain why both adolescents and college students are more likely to drink with increasing hours; this corroborates previous findings that college students drink more on days when they work more (Butler et al., 2010). Because questions about drinking motivations were only asked of those who had initiated drinking and uninitiated drinkers were included in our models, we were unable to include motivations to drink in our models, which would have helped to clarify whether students were drinking for tension-reduction purposes. After adding in our control variables, the present study did not find the positive association between hours worked and tobacco use found among high school students (Wu et al., 2003), suggesting that our previously untested control variables may explain the relationship.

Socialization and selection effects may alternatively explain the relationships found here. The work experience may provide expanded networks for underage freshmen to gain access to alcohol, so work-based socialization effects may be at play. Conversely, students who drink more may self-select into employment in order to gain the discretionary income needed to afford alcohol. Future research could explore reasons for employment and alcohol access networks.

Earning more money per week was positively associated with the likelihood of drinking 1–4 drinks per day, but not with the likelihood of drinking 5 or more drinks per day or with frequency of drinking or smoking. This finding, although modest, disputes evidence from one study which asserted that daily earnings were negatively associated with daily alcohol use in college students (Butler et al., 2010). Perhaps this difference stems from the time frame in which alcohol use was measured (daily versus past month), the data collection methods (daily diaries versus once-per-semester online surveys), or the sample (mostly white, female, convenience sample in which all participants were employed and used alcohol versus a diverse sample of younger freshmen with variation in alcohol use and employment) that distinguish the present study from the earlier investigation (2010). However, it is important to note that Butler et al.'s within-person design, by nature, controls for the between-person covariates we included in our regression models. Most previous research has not examined the relationship of earnings and students' substance use, so our assessments represent new contributions to the field.

Despite statistical significance, the effect sizes from the adjusted models were fairly modest and the pseudo- R^2 values suggest the added explanatory value of employment in substance use is negligible among the freshmen in our sample conditional on demographics, personality, social environment and parental influences. Indeed, the most important predictor of current substance use appeared to be prior (i.e. wave 1) substance use (see Tables 2 and 3). Interestingly, we found different relationships at different levels of drinking frequency and quantity: the relationship of employment variables to alcohol outcomes was only significant for those with moderate drinking frequency (i.e., less than once a week) and quantity (i.e., no more than four drinks per day). The association of working variables and alcohol use was not different for those drinking weekly or more often compared to those who never drink, nor for those drinking 5 or more drinks per day compared to those drinking zero drinks per day. This suggests that employment variables may be more important for those who are inclined to drink moderately, while for those who drink heavily, the influence of employment is minimal. However, taken together with our small effect sizes, work hours and weekly earnings appear to exert relatively little influence over drinking patterns.

Limitations

Despite the strengths of our study, several limitations should be considered. First are the well-known problems with cross-sectional analyses and self-report data, which are prone to biases including recall and social desirability. Second, our data consist of two waves of survey responses. If respondents to the first wave were systematically different in their employment and substance use behaviors than non-respondents, or if those who were retained in the subsequent wave were likewise different from those who attrited, our estimates of the association between work hours or earnings and substance use may not be representative of the cohort of incoming freshmen. Similarly, as employment variables were not assessed in wave 1 of the survey, longitudinal analysis was not possible and we are unable to determine if students who dropped out of the study differed on employment status from those who remained in the study. However, follow-up tests suggest that there were not significant differences in alcohol use between those who remained in the study and those who did not, and there appeared to be no meaningful effect of missing data on our results.

In terms of generalization to other students, as noted earlier, our sample closely approximates the demographics for the whole university. Additionally, when the prevalence of substance use in our sample was compared to two large surveys of participants of similar age—the College Alcohol Study (Knight et al., 2002) and Monitoring the Future (Johnston, O'Malley, Bachman, & Schulenberg, 2009)—rates of substance use were similar across studies (Dick et al., 2014). One of our proxies for socioeconomic status, parental education, also appears consistent with the 2011 national undergraduate student sample summarized by the National Center for Education Statistics (NCES) (National Center for Education Statistics, 2014). To the extent that our regression models adjusted for possible important differences between other universities and ours, our results should be broadly generalizable to college students. However, our results may not generalize to young adults who do not attend college (Cleveland, Mallett, White, Turrisi, & Favero, 2013). Additionally, given that our sample was only freshmen, who are all under the legal drinking age in the U.S., the rates of alcohol use presented here will likely not represent the drinking patterns of older students,

in particular those who can legally purchase and consume alcohol. Future analyses should follow these freshmen as they continue through college to examine how age and alcohol availability affect this relationship.

Related to this, the rate of employment in our study was much smaller than the general rate of employment by full- and part-time students at a 4-year public university in 2011–12 provided by the NCES (32% versus 61%) (National Center for Education Statistics, 2014). We suspect that, because our sample is exclusively freshmen, many students may not have begun employment, thus accounting for the difference in these estimates. This is supported by NCES data showing that among students 18 years and younger, the total part- and full-time employment rate is 44.6% (National Center for Education Statistics, 2014), which is closer to our sample's employment rate.

We were not able to examine parental smoking habits, which may influence students' smoking; academic performance or perceived stress levels, which may influence both working and substance use; workplace factors like work-school conflict, which can impact college student health (Park & Sprung, 2013); or personal and career goals, which may affect college seniors' drinking (Radomski, Read, & Bowker, 2015). We could also not address variability in types of, or reasons for, employment. On-campus or career-related jobs may have different sequelae compared to service jobs in restaurants or retail (Staff & Uggen, 2003) and working out of financial necessity may differ from working for disposable income or job experience; this is worth exploring in future research.

Conclusions

In summary, our results suggest that employment during the freshman year at college has a modest positive association with moderate alcohol drinking quantity but not necessarily with alcohol or tobacco use frequency. However, neither work hours nor earnings tell the whole story for college freshmen, whose drinking habits appear more influenced by other personal, social and familial characteristics. These findings, which represent new contributions to the literature, suggest that interventions to reduce freshman drinking and smoking may not be particularly effective when targeting employment characteristics. Nonetheless, college behavioral health counselors may still wish to include employment characteristics in discussions about substance use, since employment may become a greater demand as students continue through school and may have a larger effect on moderate drinkers compared to heavy drinkers. While the findings presented here are largely null, the relationship of university students' health behaviors and work experiences requires further study to determine the extent to which employment factors affect the health, academic achievement, and career trajectories of this increasingly employed student population.

Acknowledgments

Spit for Science: The VCU Student Survey has been supported by Virginia Commonwealth University, P20 AA107828, R37AA011408, K02AA018755, and P50 AA022537 from the National Institute on Alcohol Abuse and Alcoholism, and UL1RR031990 from the National Center for Research Resources and National Institutes of Health Roadmap for Medical Research.

References

- Allison, PD. Missing data. Thousand Oaks, California: Sage; 2001. Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-136
- Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*. 2000; 55(5):469–480. [PubMed: 10842426]
- Arnett JJ. The developmental context of substance abuse in emerging adulthood. *Journal of Drug Issues*. 2005; 35(2):235–253. Retrieved from <http://jod.sagepub.com/content/35/2/235.short>.
- Arria AM, Garnier-Dykstra LM, Cook ET, Caldeira KM, Vincent KB, Baron RA, O'Grady KE. Drug use patterns in young adulthood and post-college employment. *Drug and Alcohol Dependence*. 2013; 127:23–30. DOI: 10.1016/j.drugalcdep.2012.06.001 [PubMed: 22743161]
- Bachman JG, Schulenberg J. How part-time work intensity relates to drug use, problem behavior, time use, and satisfaction among high school seniors: Are these consequences or merely correlates? *Developmental Psychology*. 1993; 29(2):220–235.
- Bogg T. Investigating drinking via the social investment hypothesis: Committed relationship status moderates the association between educational investment and excessive alcohol consumption among college students. *Personality and Individual Differences*. 2011; 50:1104–1109. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0191886911000560>. [PubMed: 21607195]
- Borsari B, Carey KB. Peer influence on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13(4):391–424. [PubMed: 11775073]
- Borsari B, Murphy JG, Barnett NP. Predictors of alcohol use during the first year of college: Implications for prevention. *Addictive Behaviors*. 2007; 32(10):2062–2086. DOI: 10.1016/j.addbeh.2007.01.017 [PubMed: 17321059]
- Bushway SD. The impact of an arrest on the job stability of young white american men. *Journal of Research in Crime and Delinquency*. 1998; 35(4):454–479.
- Butler AB, Dodge KD, Faurote EJ. College student employment and drinking: A daily study of work stressors, alcohol expectancies, and alcohol consumption. *Journal of Occupational Health Psychology*. 2010; 15(3):291–303. DOI: 10.1037/a0019822 [PubMed: 20604635]
- Cameron, AC., Trivedi, PK. *Microeconometrics: Methods and applications*. New York, NY: Cambridge University Press; 2005.
- Christie KA, Burke JD, Regier DA, Rae DS, Boyd JH, Locke BZ. Epidemiologic evidence for early onset of mental disorders and higher risk of drug abuse in young adults. *American Journal of Psychiatry*. 1988; 145(8):971–975. Retrieved from <http://ajp.psychiatryonline.org/data/Journals/AJP/3494/971.pdf>. [PubMed: 3394882]
- Clark DB, Lesnick L, Hegedus AM. Traumas and other adverse life events in adolescents with alcohol abuse and dependence. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997; 36(12):1744–1751. [PubMed: 9401336]
- Cleveland MJ, Mallett KA, White HR, Turrissi R, Favero S. Patterns of alcohol use and related consequences in non-college-attending emerging adults. *Journal of Studies on Alcohol and Drugs*. 2013; 74(1):84–93. [PubMed: 23200153]
- Cooper M, Russell M, Skinner JB, Frone MR, Mudar P. Stress and alcohol use: Moderating effects of gender, coping, and alcohol expectancies. *Journal of Abnormal Psychology*. 1992; 101(1):139–152. [PubMed: 1537960]
- Cyders MA, Smith GT, Spillane NS, Fischer S, Annus AM, Peterson C. Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment*. 2007; 19(1):107–118. DOI: 10.1037/1040-3590.19.1.107 [PubMed: 17371126]
- Dick DM, Nasim A, Edwards AC, Salvatore JE, Cho SB, Adkins A, ... Kendler KS. Spit for science: Launching a longitudinal study of genetic and environmental influences on substance use and emotional health at a large US university. *Frontiers in Genetics*. 2014; 5:47.doi: 10.3389/fgene.2014.00047 [PubMed: 24639683]
- Eccles JS, Barber BL. Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? *Journal of Adolescent Research*. 1999; 14(1):10–43. DOI: 10.1177/0743558499141003

T=P&P=AN&K=5390824&S=R&D=s3h&EbscoContent=dGJyMMTo50Sep644y9f3OLCmr0uep7JSs6m4TLeWxWXS&ContentCustomer=dGJyMPGuslGvrbVKuePfgeyx44Dt6fIA. [PubMed: 7311485]

National Center for Education Statistics. Profile of undergraduate students: 2011–12. Washington, DC: U.S. Department of Education; 2014. No. NCES 2015-167

O'Malley SS, Carey KB, Maisto SA. Validity of young adults' reports of parental drinking practices. *Journal of Studies on Alcohol*. 1986; 47(5):433–435. Retrieved from http://www.jsad.com/jsad/downloadarticle/Validity_of_Young_Adultsreports_of_Parental_Drinking_Practices/3871.pdf. [PubMed: 3762165]

Park Y, Sprung J. Work–school conflict and health outcomes: Beneficial resources for working college students. *Journal of Occupational Health Psychology*. 2013; 18(4):384–394. DOI: 10.1037/a0033614 [PubMed: 24099158]

Paschall MJ, Ringwalt CL, Flewelling RL. Explaining higher levels of alcohol use among working adolescents: An analysis of potential explanatory variables. *Journal of Studies on Alcohol*. 2002; 63(2):169–178. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12033693>. [PubMed: 12033693]

Peterson B, Harrell FE Jr. Partial proportional odds models for ordinal response variables. *Journal of the Royal Statistical Society Series C (Applied Statistics)*. 1990; 39(2):205–217.

Radomski SA, Read JP, Bowker JC. The role of goals and alcohol behavior during the transition out of college. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*. 2015 2015-03939-001 [pii].

Riggert SC, Boyle M, Petrosko JM, Ash D, Rude-Parkins C. Student employment and higher education: Empiricism and contradiction. *Review of Educational Research*. 2006; 76(1):63–92. Retrieved from <http://rer.sagepub.com/content/76/1/63.full.pdf>.

Ruthig JC, Marrone S, Hladkyj S, Robinson-Epp N. Changes in college student health: Implications for academic performance. *Journal of College Student Development*. 2011; 52(3):307–320. DOI: 10.1353/csd.2011.0038

Salvatore JE, Kendler KS, Dick DM. Romantic relationship status and alcohol use and problems across the first year of college. *Journal of Studies on Alcohol and Drugs*. 2014; 75(4):580–589. [PubMed: 24988257]

Schermer JA, Carswell J, Jackson S. Correlations between a general factor of personality and employment measures. *Personality and Individual Differences*. 2012; 53:557–561.

Schulenberg JE, Maggs JL. A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol*. 2002; 14:54–70.

Staff J, Uggen C. The fruits of good work: Early work experiences and adolescent deviance. *Journal of Research in Crime and Delinquency*. 2003; 40(3):263–290. Retrieved from <http://jrc.sagepub.com/content/40/3/263.short>.

StataCorp. Stata statistical software: Release 12. College Station, TX: StataCorp LP; 2011.

Steelman LC, Powell B. Acquiring capital for college: The constraints of family configuration. *American Sociological Review*. 1989; 54(5):844–855.

Steinberg L, Dornbusch SM. Negative correlates of part-time employment during adolescence: Replication and elaboration. *Developmental Psychology*. 1991; 27(2):304–313. Retrieved from <http://psycnet.apa.org/index.cfm?fa=fulltext.journal&jcode=dev&vol=27&issue=2&page=304&format=PDF>.

Stern D, Nakata Y. Paid employment among U.S. college students: Trends, effects, and possible causes. *The Journal of Higher Education*. 1991; 62(1):25–43. Retrieved from <http://www.jstor.org/stable/1982099>.

U.S. Department of Health and Human Services. Healthy people 2020: Substance abuse: Overview. Washington, D.C: Office of Disease Prevention and Health Promotion; 2010a. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=40>

U.S. Department of Health and Human Services. Healthy people 2020: Tobacco use: Overview. Washington, D.C: Office of Disease Prevention and Health Promotion; 2010b. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=41>

- Valois RF, Dunham AC, Jackson KL, Waller J. Association between employment and substance abuse behaviors among public high school adolescents. *Journal of Adolescent Health*. 1999; 25(4):256–263. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1054139X99000397>. [PubMed: 10505843]
- Watson PE, Watson ID, Batt RD. Prediction of blood alcohol concentrations in human subjects: Updating the Widmark equation. *Journal of Studies on Alcohol*. 1981; 42(7):47–556.
- Weller NF, Kelder SH, Cooper SP, Basen-Engquist K, Tortolero SR. School-year employment among high school students: Effects on academic, social, and physical functioning. *Adolescence*. 2003; 38(151):442–458. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/14768991>.
- Wechsler H, Lee JE, Nelson TF, Kuo M. Underage college students' drinking behavior, access to alcohol, and the influence of deterrence policies: Findings from the harvard school of public health college alcohol study. *Journal of American College Health*. 2002; 50(5):223–236. [PubMed: 11990980]
- White HR, McMorris BJ, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol*. 2006; 67(6):810–822. Retrieved from <http://www.jsad.com.proxy.library.vcu.edu/>. [PubMed: 17060997]
- Wu LT, Schlenger WE, Galvin DM. The relationship between employment and substance use among students aged 12 to 17. *Journal of Adolescent Health*. 2003; 32(1):5–15. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1054139X02004470>. [PubMed: 12507796]

Table 1

Sample characteristics (N=1559).

Variables		N (%)	Mean (SD)
Substance use outcome (Wave 2)	Drinking frequency: never	470 (30.2%)	
	Drinking frequency: less than weekly	810 (52.0%)	
	Drinking frequency: weekly or more	225 (14.4%)	
	Drinking quantity: 0 drinks per day	470 (30.2%)	
	Drinking quantity: 1–4 drinks per day	670 (43.0%)	
	Drinking quantity: 5+ drinks per day	356 (22.8%)	
	Smoking frequency: never	1140 (73.1%)	
	Smoking frequency: less than weekly	174 (11.2%)	
	Smoking frequency: weekly or more	194 (12.4%)	
Employment	Hours per week (Wave 2)		
	0	1064 (68.3%)	
	1–9	135 (8.7%)	
	10–19	187 (12.0%)	
	20–29	87 (5.6%)	
	30–39	33 (2.1%)	
	40–49	10 (0.6%)	
	50–59	4 (0.3%)	
	Weekly earnings (Wave 2)		
	\$0	1069 (68.6%)	
	\$1–49	71 (4.6%)	
	\$50–99	143 (9.2%)	
	\$100–149	122 (7.8%)	
	\$150–199	43 (2.8%)	
	\$200–249	22 (1.4%)	
	\$250–299	12 (0.8%)	
	\$300–349	13 (0.8%)	
	\$350–399	6 (0.4%)	
	\$400–449	3 (0.2%)	
	\$450–499	1 (0.1%)	
Substance use predictor (Wave 1)	Drinking frequency: never	687 (44.1%)	
	Drinking frequency: less than weekly	407 (26.1%)	
	Drinking frequency: weekly or more	237 (15.2%)	
	Drinking quantity: 0 drinks per day	687 (44.1%)	
	Drinking quantity: 1–4 drinks per day	393 (25.2%)	
	Drinking quantity: 5+ drinks per day	195 (12.5%)	
	Smoking frequency: never	1251 (80.2%)	

Variables		N (%)	Mean (SD)
	Smoking frequency: less than weekly	127 (8.2%)	
	Smoking frequency: weekly or more	151 (9.7%)	
Demographics	Male sex	571 (36.6%)	
	Height (inches)		66.77 (3.99)
	Weight (pounds)		149.16 (36.68)
	Race/ethnicity: White	781 (50.1%)	
	Race/ethnicity: Asian	248 (15.9%)	
	Race/ethnicity: Black	317 (20.3%)	
	Race/ethnicity: Hispanic/Latino	89 (5.7%)	
	Race/ethnicity: Other	95 (6.1%)	
Personality	Openness		38.00 (5.78)
	Conscientiousness		31.74 (5.68)
	Extraversion		27.05 (6.12)
	Agreeableness		35.02 (5.64)
	Neuroticism		23.03 (6.16)
	Negative urgency		2.09 (0.74)
	Positive urgency		1.92 (0.73)
	Lack of premeditation		1.74 (0.64)
	Lack of perseverance		1.71 (0.62)
	Sensation seeking		2.76 (0.71)
Social environment	Trouble with police	169 (10.8%)	
	Residence hall	1359 (87.2%)	
	Off-campus housing	86 (5.5%)	
	Parents' house	95 (6.1%)	
	Change in relationship status	417 (26.8%)	
	Single (no relationship)	887 (56.9%)	
	In a committed relationship	559 (35.9%)	
	Dating several people	73 (4.7%)	
	Peer behavior		14.88 (5.07)
	Participates in sports or Greek life	698 (44.8%)	
	Participates in SGA/volunteer/church	890 (57.1%)	
Parental factors	Education: high school or less (mother)	334 (21.4%)	
	Education: some college (mother)	316 (20.3%)	
	Education: college graduate (mother)	554 (35.5%)	
	Education: past college (mother)	291 (18.7%)	
	Education: high school or less (father)	351 (22.5%)	
	Education: some college (father)	274 (17.6%)	
	Education: college graduate (father)	473 (30.3%)	
	Education: past college (father)	344 (22.1%)	
	Mother had problems with alcohol	128 (8.2%)	

Variables	N (%)	Mean (SD)
Father had problems with alcohol	333 (21.4%)	
Family finances: not enough to meet needs	263 (16.9%)	
Family finances: just enough to meet needs	922 (59.1%)	
Family finances: more than enough to meet needs	282 (18.1%)	

Table 2

Partial proportional odds model results of the associations of work hours and substance use.

Substance use outcome	Drinking Frequency		Drinking Quantity		Smoking Frequency	
	Odds Ratio [†] (Standard Error)		Odds Ratio [‡] (Standard Error)		Odds Ratio [‡] (Standard Error)	
Level	<Weekly	Weekly	1–4 drinks/day	5+ drinks/day	<Weekly	Weekly
<u>Unadjusted model</u>						
10-hour increase in weekly work hours	1.18* (0.05)	0.99 (0.07)	1.18* (0.05)	0.98 (0.06)	1.15* (0.04)	1.15* (0.04)
<u>Adjusted model</u>						
10-hour increase in weekly work hours	1.16* (0.06)	0.95 (0.08)	1.16* (0.06)	0.92 (0.07)	1.07 (0.06)	1.07 (0.06)
<u>Covariates^a</u>						
<u>Wave 1 substance use</u>						
Less than once a week/1–4 drinks	9.67* (0.02)	2.58* (0.10)	11.85* (0.02)	3.03* (0.06)	5.82* (0.04)	5.82* (0.04)
Weekly or more/5+ drinks	9.44* (0.03)	8.68* (0.03)	7.03* (0.03)	7.03* (0.03)	28.88* (0.01)	28.88* (0.01)
<u>Demographics</u>						
Male sex	0.69 (0.31)	2.06* (0.12)	0.77 (0.27)	1.73* (0.12)	1.20 (0.20)	1.20 (0.20)
Height (inches)	0.99 (0.03)	0.99 (0.03)	0.97 (0.02)	0.97 (0.02)	1.02 (0.03)	1.02 (0.03)
Weight (pounds)	1.00 (0.00)	0.99* (0.00)	1.00* (0.00)	1.00* (0.00)	1.00 (0.00)	1.00 (0.00)
Race/ethnicity: Asian	0.53* (0.37)	0.53* (0.37)	0.61* (0.33)	0.64* (0.35)	0.86 (0.30)	0.86 (0.30)
Race/ethnicity: Black	0.98 (0.18)	0.98 (0.18)	1.11 (0.15)	1.11 (0.15)	0.48* (0.53)	0.57 (0.68)
Race/ethnicity: Hispanic/Latino	0.62 (0.46)	0.62 (0.46)	0.59 (0.48)	0.59 (0.48)	0.68 (0.53)	0.68 (0.53)
Race/ethnicity: Mixed race/other	0.55* (0.50)	0.55* (0.50)	0.56* (0.46)	0.56* (0.46)	0.75 (0.45)	0.75 (0.45)
<u>Personality</u>						
Openness	1.02 (0.01)	0.99 (0.02)	1.02 (0.01)	0.98 (0.01)	1.02 (0.01)	1.02 (0.01)
Conscientiousness	0.99 (0.01)	0.99 (0.01)	0.99 (0.02)	1.03 (0.02)	0.98 (0.02)	0.98 (0.02)
Extraversion	1.01 (0.01)	1.01 (0.01)	1.00 (0.01)	1.00 (0.01)	1.02 (0.01)	1.02 (0.01)
Agreeableness	1.01 (0.01)	1.01 (0.01)	1.01 (0.02)	0.97* (0.01)	0.99 (0.02)	0.99 (0.02)

Substance use outcome	Drinking Frequency		Drinking Quantity		Smoking Frequency	
	Odds Ratio [†] (Standard Error)	Weekly	Odds Ratio [‡] (Standard Error)	5+ drinks/day	Odds Ratio [‡] (Standard Error)	Weekly
Level	<Weekly	Weekly	1-4 drinks/day	5+ drinks/day	<Weekly	Weekly
Neuroticism	1.00 (0.01)	1.00 (0.01)	1.01 (0.01)	0.97* (0.01)	0.99 (0.02)	0.99 (0.02)
Negative urgency	0.95 (0.11)	0.95 (0.11)	1.10 (0.09)	1.10 (0.09)	1.04 (0.13)	1.04 (0.13)
Positive urgency	1.19 (0.09)	1.19 (0.09)	1.02 (0.10)	1.02 (0.10)	1.21 (0.11)	1.21 (0.11)
Lack of premeditation	1.01 (0.14)	1.50* (0.13)	1.02 (0.13)	1.71* (0.08)	1.33* (0.11)	1.33* (0.11)
Lack of perseverance	0.92 (0.15)	0.97 (0.16)	0.93 (0.12)	0.93 (0.12)	0.93 (0.16)	0.93 (0.16)
Sensation seeking	1.31* (0.08)	1.31* (0.08)	1.42* (0.07)	1.42* (0.07)	1.24 (0.11)	1.24 (0.11)
Social environment						
Trouble with police	1.03 (0.19)	1.03 (0.19)	1.07 (0.18)	1.07 (0.18)	2.03* (0.10)	2.03* (0.10)
Off-campus housing	1.37 (0.19)	1.37 (0.19)	1.13 (0.22)	1.13 (0.22)	2.31* (0.13)	2.31* (0.13)
Lives with parents	0.77 (0.36)	0.77 (0.36)	0.81 (0.33)	0.81 (0.33)	1.14 (0.34)	1.14 (0.34)
Relationship change	0.87 (0.16)	0.87 (0.16)	0.94 (0.21)	1.14 (0.16)	1.25 (0.15)	1.25 (0.15)
In a relationship	1.08 (0.12)	1.08 (0.12)	1.25 (0.10)	1.25 (0.10)	0.85 (0.20)	0.85 (0.20)
Dating more than one person	0.99 (0.31)	0.99 (0.31)	0.78 (0.38)	0.78 (0.38)	0.77 (0.47)	0.77 (0.47)
Peer deviant behavior	1.18* (0.01)	1.18* (0.01)	1.17* (0.01)	1.17* (0.01)	1.15* (0.02)	1.15* (0.02)
Participates in sports/Greek life	1.37 (0.12)	1.44* (0.11)	1.48* (0.09)	1.48* (0.09)	0.78 (0.21)	0.78 (0.21)
Participates in SGA/volunteer/church	0.73 (0.24)	0.84 (0.23)	0.65* (0.27)	0.94 (0.18)	1.00 (0.17)	0.63* (0.35)
Parental influences						
Education: mother: some college	0.68* (0.27)	0.68* (0.27)	0.80 (0.22)	0.80 (0.22)	1.65* (0.15)	1.65* (0.15)
Education: mother: college	0.67* (0.27)	0.67* (0.27)	0.72 (0.24)	0.72 (0.24)	1.43 (0.17)	1.43 (0.17)
Education: mother: beyond college	0.68 (0.32)	0.68 (0.32)	0.79 (0.27)	0.79 (0.27)	1.09 (0.26)	1.09 (0.26)
Education: father: some college	0.79 (0.25)	0.79 (0.25)	0.73 (0.26)	0.73 (0.26)	1.07 (0.24)	1.07 (0.24)
Education: father: college	0.91 (0.21)	0.91 (0.21)	0.98 (0.18)	0.98 (0.18)	0.85 (0.29)	0.85 (0.29)
Education: father: beyond college	0.88 (0.24)	0.88 (0.24)	1.08 (0.19)	1.08 (0.19)	1.10 (0.25)	0.94 (0.37)
Mother had an alcohol problem	1.17 (0.19)	1.17 (0.19)	1.14 (0.18)	1.14 (0.18)	1.23 (0.22)	1.23 (0.22)
Father had an alcohol problem	0.98 (0.17)	0.98 (0.17)	0.89 (0.18)	0.89 (0.18)	1.29 (0.14)	1.40 (0.17)

Substance use outcome	Drinking Frequency Odds Ratio [‡] (Standard Error)		Drinking Quantity Odds Ratio [‡] (Standard Error)		Smoking Frequency Odds Ratio [‡] (Standard Error)	
	<Weekly	Weekly	1–4 drinks/day	5+ drinks/day	<Weekly	Weekly
Family finances: more than enough	0.71 (0.28)	1.32 (0.16)	0.88 (0.18)	0.88 (0.18)	0.84 (0.25)	0.84 (0.25)
Family finances: just enough	0.93 (0.18)	0.93 (0.18)	1.06 (0.15)	1.06 (0.15)	1.16 (0.18)	1.16 (0.18)

[‡] Odds ratio is compared to “never” frequency

[‡] Odds ratio is compared to “0 drinks” quantity

* p 0.05

^a White is the reference category for race/ethnicity. Living in a dormitory/residence hall is the reference group for residence. Being single is the reference group for relationship status. High school diploma or less is the reference group for parental education level. Not enough money to meet family’s needs is the reference group for family finances.

Table 3

Partial proportional odds model results of the associations of weekly wages and substance use.

Substance use outcome	Drinking Frequency		Drinking Quantity		Smoking Frequency	
	Odds Ratio ^a (Standard Error)	Weekly	Odds Ratio ^a (Standard Error)	5+ drinks/day	Odds Ratio ^a (Standard Error)	Weekly
Level	<Weekly	Weekly	1-4 drinks/day	5+ drinks/day	<Weekly	Weekly
<u>Unadjusted model</u>						
\$50 increase in weekly wages	1.12 [*] (0.04)	1.03 (0.05)	1.14 [*] (0.04)	1.01 (0.04)	1.11 [*] (0.03)	1.11 [*] (0.03)
<u>Adjusted model</u>						
\$50 increase in weekly wages	1.07 (0.05)	1.04 (0.06)	1.12 [*] (0.04)	0.96 (0.05)	1.07 (0.04)	1.07 (0.04)
<u>Covariates^a</u>						
<u>Wave 1 substance use</u>						
Less than once a week/1-4 drinks	9.69 [*] (0.02)	2.53 [*] (0.11)	11.88 [*] (0.02)	3.03 [*] (0.06)	5.87 [*] (0.04)	5.87 [*] (0.04)
Weekly or more/5+ drinks	9.90 [*] (0.03)	8.43 [*] (0.03)	7.04 [*] (0.03)	7.04 [*] (0.03)	29.24 [*] (0.01)	29.24 [*] (0.01)
<u>Demographics</u>						
Male sex	0.69 (0.30)	2.06 [*] (0.12)	0.76 (0.27)	1.73 [*] (0.12)	1.20 (0.20)	1.20 (0.20)
Height (inches)	0.99 (0.03)	0.99 (0.03)	0.97 (0.02)	0.97 (0.02)	1.02 (0.03)	1.02 (0.03)
Weight (pounds)	1.00 (0.00)	0.99 [*] (0.00)	1.00 [*] (0.00)	1.00 [*] (0.00)	1.00 (0.00)	1.00 (0.00)
Race/ethnicity: Asian	0.53 [*] (0.37)	0.53 [*] (0.37)	0.61 [*] (0.33)	0.64 [*] (0.35)	0.86 (0.29)	0.86 (0.29)
Race/ethnicity: Black	1.00 (0.17)	1.00 (0.17)	1.10 (0.15)	1.10 (0.15)	0.49 [*] (0.52)	0.57 (0.67)
Race/ethnicity: Hispanic	0.63 (0.45)	0.63 (0.45)	0.59 (0.48)	0.59 (0.48)	0.68 (0.53)	0.68 (0.53)
Race/ethnicity: Mixed race/other	0.55 [*] (0.51)	0.55 [*] (0.51)	0.55 [*] (0.47)	0.55 [*] (0.47)	0.75 (0.45)	0.75 (0.45)
<u>Personality</u>						
Openness	1.02 (0.01)	0.99 (0.02)	1.02 (0.01)	0.98 (0.01)	1.02 (0.01)	1.02 (0.01)
Conscientiousness	0.99 (0.01)	0.99 (0.01)	0.99 (0.02)	1.02 (0.02)	0.98 (0.02)	0.98 (0.02)
Extraversion	1.01 (0.01)	1.01 (0.01)	1.00 (0.01)	1.00 (0.01)	1.02 (0.01)	1.02 (0.01)
Agreeableness	1.01 (0.01)	1.01 (0.01)	1.01 (0.02)	0.97 [*] (0.01)	0.99 (0.02)	0.99 (0.02)

Substance use outcome	Drinking Frequency Odds Ratio [†] (Standard Error)		Drinking Quantity Odds Ratio [‡] (Standard Error)		Smoking Frequency Odds Ratio [‡] (Standard Error)	
	<Weekly	Weekly	1-4 drinks/day	5+ drinks/day	<Weekly	Weekly
Level						
Neuroticism	1.00 (0.01)	1.00 (0.01)	1.01 (0.01)	0.97* (0.01)	0.99 (0.02)	0.99 (0.02)
Negative urgency	0.95 (0.11)	0.95 (0.11)	1.11 (0.09)	1.11 (0.09)	1.04 (0.13)	1.04 (0.13)
Positive urgency	1.19 (0.09)	1.19 (0.09)	1.02 (0.10)	1.02 (0.10)	1.21 (0.11)	1.21 (0.11)
Lack of premeditation	1.02 (0.14)	1.50* (0.12)	1.03 (0.13)	1.70* (0.08)	1.33* (0.11)	1.33* (0.11)
Lack of perseverance	0.92 (0.15)	0.96 (0.17)	0.93 (0.12)	0.93 (0.12)	0.92 (0.16)	0.92 (0.16)
Sensation seeking	1.31* (0.08)	1.31* (0.08)	1.43* (0.07)	1.43* (0.07)	1.23 (0.11)	1.23 (0.11)
Social environment						
Trouble with police	1.04 (0.19)	1.04 (0.19)	1.07 (0.18)	1.07 (0.18)	2.03* (0.10)	2.03* (0.10)
Off-campus housing	1.36 (0.19)	1.36 (0.19)	1.13 (0.22)	1.13 (0.22)	2.31* (0.13)	2.31* (0.13)
Lives with parents	0.78 (0.34)	0.78 (0.34)	0.81 (0.32)	0.81 (0.32)	1.12 (0.34)	1.12 (0.34)
Relationship change	0.88 (0.16)	0.88 (0.16)	0.96 (0.20)	1.12 (0.16)	1.24 (0.15)	1.24 (0.15)
In a relationship	1.07 (0.12)	1.07 (0.12)	1.24 (0.10)	1.24 (0.10)	0.85 (0.20)	0.85 (0.20)
Dating more than one person	0.93 (0.40)	1.02 (0.33)	0.77 (0.38)	0.77 (0.38)	0.78 (0.46)	0.78 (0.46)
Peer deviant behavior	1.18* (0.01)	1.18* (0.01)	1.17* (0.01)	1.17* (0.01)	1.15* (0.02)	1.15* (0.02)
Participates in sports/Greek life	1.36 (0.13)	1.50* (0.12)	1.49* (0.09)	1.49* (0.09)	0.78 (0.21)	0.78 (0.21)
Participates in SGA/volunteer/church	0.76 (0.19)	0.80 (0.20)	0.65* (0.27)	0.94 (0.18)	0.99 (0.17)	0.63* (0.35)
Parental influences						
Education: mother: some college	0.68* (0.27)	0.68* (0.27)	0.80 (0.22)	0.80 (0.22)	1.64 (0.15)	1.64 (0.15)
Education: mother: college	0.66* (0.27)	0.66* (0.27)	0.71 (0.24)	0.71 (0.24)	1.43 (0.17)	1.43 (0.17)
Education: mother: beyond college	0.67 (0.32)	0.67 (0.32)	0.79 (0.27)	0.79 (0.27)	1.08 (0.26)	1.08 (0.26)
Education: father: some college	0.80 (0.24)	0.80 (0.24)	0.74 (0.26)	0.74 (0.26)	1.08 (0.24)	1.08 (0.24)
Education: father: college	0.91 (0.21)	0.91 (0.21)	0.98 (0.18)	0.98 (0.18)	0.85 (0.29)	0.85 (0.29)
Education: father: beyond college	0.88 (0.24)	0.88 (0.24)	1.08 (0.19)	1.08 (0.19)	1.10 (0.25)	0.94 (0.37)
Mother had an alcohol problem	1.16 (0.19)	1.16 (0.19)	1.15 (0.18)	1.15 (0.18)	1.23 (0.22)	1.23 (0.22)
Father had an alcohol problem	0.98 (0.17)	0.98 (0.17)	0.89 (0.18)	0.89 (0.18)	1.27 (0.15)	1.39 (0.17)

Substance use outcome	Drinking Frequency Odds Ratio [†] (Standard Error)		Drinking Quantity Odds Ratio [‡] (Standard Error)		Smoking Frequency Odds Ratio [†] (Standard Error)	
	<Weekly	Weekly	1–4 drinks/day	5+ drinks/day	<Weekly	Weekly
Level						
Family finances: more than enough	0.71 (0.28)	1.36 (0.16)	0.88 (0.18)	0.88 (0.18)	0.84 (0.24)	0.84 (0.24)
Family finances: just enough	0.94 (0.18)	0.94 (0.18)	1.07 (0.15)	1.07 (0.15)	1.15 (0.18)	1.15 (0.18)

[†] Odds ratio is compared to “never” frequency

[‡] Odds ratio is compared to “0 drinks” quantity

* p 0.05

^a White is the reference category for race/ethnicity. Living in a dormitory/residence hall is the reference group for residence. Being single is the reference group for relationship status. High school diploma or less is the reference group for parental education level. Not enough money to meet family’s needs is the reference group for family finances.