HHS Public Access

Author manuscript

Psychol Addict Behav. Author manuscript; available in PMC 2022 June 01.

Published in final edited form as:

Psychol Addict Behav. 2021 June ; 35(4): 415–423. doi:10.1037/adb0000686.

Behavioral Economic Indicators of Risky Drinking Among Community-Dwelling Emerging Adults

Jalie A. Tucker[1], **Katie Lindstrom**, **Susan D. Chandler**, **Joseph P. Bacon**, **JeeWon Cheong**

University of Florida and Center for Behavioral Economic Health Research Gainesville, FL

Abstract

Objective.—Behavioral economic (BE) approaches to understanding and reducing risky drinking among college students are well established, but little is known about the generalizability of prior findings to peers who currently are not traditional college students and are more difficult to reach for assessment and intervention. This cross-sectional survey investigated whether drinking practices and negative consequences were associated with greater alcohol demand, alcohol reward value, and delay discounting in this target population.

Method.—Community-dwelling emerging adult drinkers ages 21 to 29 (N = 357) were recruited using Respondent Driven Sampling adapted to a digital platform (M age = 23.6 years, 64% women). Peers recruited peers in an iterative fashion. Participants completed a web-based survey of drinking practices, negative alcohol-related consequences, and BE measures of alcohol demand, alcohol reward value, and delay discounting.

Results.—Regression analyses supported the study hypotheses. Higher alcohol demand (intensity and elasticity) predicted higher drinks per drinking day, more past month drinking days, and more negative consequences. Higher alcohol reward value (discretionary alcohol spending and alcohol-involved activities) and stronger preference for sooner smaller versus later larger rewards predicted select drinking risk variables in the hypothesized direction (ps < .05).

Conclusions.—BE risk characteristics generalized to community-dwelling emerging adult risky drinkers, with the most consistent associations found between alcohol demand and drinking risk measures. The findings lay a foundation for extending successful BE interventions with college drinkers to this underserved population.

Keywords

emerging adults; risky drinking; behavioral economics; web-based survey; respondent driven sampling

Risky drinking during emerging adulthood, which spans adolescence to young adulthood (Arnett, 2005), is a significant public health concern, with over a third of young adults ages 18–25 reporting past month binge drinking (> 5 drinks on one occasion for men; > 4 drinks for women; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2019a; Substance Abuse and Mental Health Services Administration, 2019). Moreover, the twenties

[1]Correspondence concerning this article should be addressed to Jalie A. Tucker, Department of Health Education and Behavior, University of Florida, P.O. Box 118210, Gainesville, FL 32611-8210. jaliet@ufl.edu.

are generally when risky drinking either resolves or develops into a chronic disorder (Grucza et al., 2018), making this a priority age group for prevention-oriented research and intervention.

Much progress has been made in developing brief motivational interventions (BMIs) to reduce risky drinking among fulltime college students who typically live on campus (NIAAA, 2019b), but the needs of young adult drinkers who reside in the community and do not attend college or work while doing so have been neglected. These emerging adults (EAs) tend to come from less advantaged backgrounds and to have distinct and heightened risk profiles that are not well understood and need to be considered when developing interventions and approaches to reach them (Barnett, Monti, Spirito, et al., 2015; Slutzke, 2005; White, Labouvie, & Papadaratsakis, 2005). Compared to relatively captive traditional college students who live on campus, residing in the community creates additional barriers to reaching young adults to offer accessible, appealing, and evidence-based alcohol services. This compounds the dissemination challenges common among EA risky drinkers, who as a group typically have limited motivation to change their drinking (Epler, Sher, & Piasecki, 2009) and rarely seek specialized alcohol services (Buscemi et al., 2010).

Behavioral economics (BE) offers a useful framework to understand and address the needs of EA risky drinkers and has been widely and successfully applied with persons who have substance-related problems, including college student risky drinkers. Substance misuse is conceptualized as a “reinforcement pathology” or pattern of intertemporal choice that involves persistent preference for short-term rewards that lead to longer term costs and a devaluation of larger, delayed rewards that support adaptive functioning (Bickel et al., 2014). Persons who engage in harmful substance use tend to discount delayed rewards more than controls who do not (Madden & Bickel, 2010), and younger age and lower income and education (e.g., Green, Myerson, Lichtman, Rosen, & Fry, 1996) are normatively associated with such foreshortened time horizons for behavioral allocation. In addition, harmful substance use is more likely in environments with limited or no substance-free reinforcers, and harmful use decreases if access to valued alternative reinforcers is increased (Acuff et al., 2019). Many BE interventions thus seek to reduce harmful substance use by enriching the environment with valuable substance-free activities and highlighting delayed benefits of sobriety over continued harmful use (e.g., Delmée, Roozen, & Steenhuis, 2018; Murphy, Dennhardt, Skidmore, et al., 2012; Murphy, Dennhardt, Martens, Borsari, Witkiewitz, & Meshesha, 2019). For example, Murphy and colleagues (2012, 2019) developed and evaluated the efficacious Substance-Free Activity Session (SFAS) that is delivered with a BMI and focuses on reducing drinking and related harms by enhancing future orientation and engagement in substance-free activities.

Despite the success of BE approaches to understanding and intervening to reduce risky drinking among traditional college students, comparable work with their community-dwelling peers is lacking, and little is known about the generalizability of relationships between BE variables and risky drinking in this neglected at-risk population. As a starting point in extending a BE analysis to community-dwelling EAs, the present cross-sectional survey investigated associations among their drinking practices and problems and BE variables with established utility in conceptualizing, predicting, and intervening to reduce

harmful substance use. Because community-dwelling EAs are more difficult to reach for assessment and intervention than traditional college students living on campus, we implemented digital Respondent Driven Sampling (d-RDS), a web-based RDS method (e.g., Bauermeister et al., 2012; Zhang et al., 2017) found to be successful in recruiting at-risk populations through peer-driven chain referral. Peer relationships in both in-person and online social networks influence substance use among EAs (e.g., Cook, Bauermeister, Gordon-Messer, & Zimmerman, 2013; Tucker et al., 2015), and using peer social networks to reach community-dwelling EAs facilitates access to this difficult-to-reach target population. Eligible EA risky drinkers (N = 357) completed an online web survey that assessed their recent drinking practices and problems and BE measures of multiple dimensions of the reinforcement value of alcohol, including alcohol demand, delay discounting, and the value of alcohol relative to other activities and commodities. If associations between drinking and BE variables observed with traditional college student risky drinkers generalize to peers currently living in the community, our primary hypotheses were that riskier drinking practices and greater alcohol-related problems should be associated with lower sensitivity to alcohol price changes, greater alcohol-involvement and alcohol expenditures, and stronger preferences for sooner smaller versus delayed larger rewards on a delay discounting questionnaire.

Method

Sample Recruitment and Characteristics

"Seed" participants to start RDS were recruited in person at high traffic venues (e.g., outdoor markets, sporting events, art and music festivals) in North Central Florida communities with relatively high percentages of young adults based on 2010 U.S. Census tract data. Seeds were recruited by trained research staff similar in age to the target sample, and the in-person recruitment served to verify that RDS was initiated by EAs with the desired target group characteristics. Eligibility criteria for seeds and subsequent peer recruits were: (1) Men and women ages 21–29 living in Florida at enrollment; (2) at least one past month drinking episode above NIAAA (2019a) gender-adjusted thresholds for heavy drinking (4+/5+ drinks for women/men) and at least one alcohol-related negative consequences in the past 90 days; and (3) web access via smartphone or computer. After screening and informed consent, eligible seeds (n = 176) used a study computer tablet or their personal smart device to answer additional questions about their demographic characteristics, drinking patterns, and young adults ages 21–29 in their social networks. The number of young adults with whom they had interacted online during the past 3 months was used for RDS sample weighting (Gile, Johnston, & Salganik, 2015). Then they viewed video instructions how to recruit peers "like you" (drinkers of similar age who were not relatives) and received information about compensation. Specific drinking risk eligibility criteria were not disclosed to avoid creating demand characteristics or potential deceptive responding. The research received university Institutional Review Board approval and adhered to Journal Article Reporting Standards for cross-sectional studies (American Psychological Association, 2020).

Thereafter, using standard RDS procedures (Heckathorn, 1997, 2002,; Gile et al., 2015) adapted to a digital platform (e.g., Bauermeister et al., 2012; Zhang et al., 2017), all peer

recruitment and data collection were conducted online using a secure research website accessible by smartphone or computer maintained by the University of Florida Clinical and Translational Science Institute, which was programmed using Research Electronic Data Capture (REDCap) software. To maintain confidentiality, survey responses were collected using a numerical identifier and stored separately from participant information necessary for research compensation. Seeds and peer recruits each received three unique numerical enrollment codes to text or email to their peers. Enrollment was limited to a maximum of three peers from a given seed or recruiter to ensure network branching and prevent over-recruitment from any one network subgroup, and recruitment chains were allowed to develop naturally to facilitate independence between characteristics of seeds and the final sample (Gile et al., 2015). The unique enrollment codes allowed tracking of referral chains using the RDS Coupon Manager and Analysis Tools (http://www.respondentdrivensampling.org) developed by Heckathorn and colleagues (e.g., 1997, 2002). Seeds and recruits received $30 for their initial assessment and $15 for each eligible enrolled peer they recruited up to a maximum of 3 (up to $75 total). Compensation was delivered using electronically reloadable Visa™ gift cards.

The final sample included 176 seeds and 357 peer recruits. Seeds directly recruited 95 peers, who in turn recruited 262 peers. Among recruitment chains with at least one recruit, the mean chain length was 2.33 (*SD* = 2.31, range = 1 to 12). Table 1 presents the characteristics of peer recruits and shows that, as desired, d-RDS successfully recruited a sample of EA risky drinkers. The sample as a whole was in their lower mid-twenties, the great majority were educated to some extent beyond high school, most were employed full or part-time, but over half had annual personal incomes < $20K. Less than 10% were married or were parents. As in our past in-person RDS research (e.g., Tucker et al., 2016a), more women enrolled than men.

Survey Measures

The primary drinking-related and BE measures are described next. As noted, internal consistency checks using the present sample showed that Cronbach's alpha for all questionnaire scales exceeded the generally accepted .70 benchmark (range = .72 to .95). Additional measures to be reported elsewhere included the Protective Behavioral Strategies Scale-20 (Treloar et al., 2015), Brief Situational Confidence Questionnaire (Breslin et al., 2000), a modified Norbeck Social Support Questionnaire (Norbeck et al., 1981; Tucker et al., 2015), and participant preferences for help with drinking following from Tucker et al. (2009). Web-based survey data collection took an average of 30.69 minutes (*SD* = 18.71).

Primary Drinking Risk Measures—After answering brief background questions about their substance use histories (e.g., age of first intoxication; substance-related help-seeking), the primary measures of recent drinking practices (past month) and alcohol-related consequences (past 3 months) were collected. An abbreviated Daily Drinking Questionnaire-Revised (Collins, Parks, & Marlatt, 1985; cf. Leeman et al., 2016) assessed the number of drinking days and typical number of standard drinks consumed per drinking day during the past 30 days (range = 0 to 30), which were used for analysis. Widely used with young adults, the DDQ-R yields reliable reports that are highly correlated with self-monitoring reports of

alcohol consumption (Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990). Participants completed the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005) that asks about 24 negative events over the past 3 months (e.g., neglected obligations, driving after drinking). The number reported was summed for analysis (range = 0 to 24). The BYAACQ is reliable yet sensitive to changes in alcohol use, has high internal consistency (Cronbach's α = .90), and includes common but less severe consequences (Kahler et al., 2005, 2008).

Primary Behavioral Economic Measures

Alcohol Purchase Task (APT; Murphy & MacKillop, 2006).: Using APT trait vignette instructions (Kaplan et al., 2018), participants reported how many drinks in standard sizes (12 oz. beer, 5 oz. wine, 1.5 oz. liquor) they would consume across 20 prices ($0 to $20) in a typical drinking setting. They were told to assume they did not drink before these decisions, would drink every drink requested, and could not stockpile or take drinks home. The APT yields internally consistent (Cronbach's α = .72), reliable, and valid indices of the relative reinforcing value of alcohol, including four observed and one derived alcohol demand metrics that reflect sensitivity to price changes that correspond with actual alcohol use (MacKillop et al., 2009; Murphy et al., 2009). Intensity (consumption when drinks are free) and elasticity of demand were used for analysis because they are conceptually distinct. Intensity reflects unconstrained demand when drinks are free, whereas elasticity, the classic demand metric in economics, is based on the entire demand curve across the range of drink prices and thus subsumes other APT metrics that are based on delimited features of the demand curve (e.g., O_{max}, P_{max}, breakpoint). Both variables have been found to predict drinking and drug-related outcomes in clinical and experimental research (e.g., Acuff, Amlung, Dennhardt, MacKillop, & Murphy, 2020; Kiselica, Webber, & Bornovalova, 2016; Murphy et al., 2009; Strickland, Alcorn, & Stoops, 2019). Prior to analysis, the beezdemand R package version 0.1.0 (Kaplan et al., 2019) was used to examine the consistency of demand data using the Stein et al. (2015) algorithm for identifying unsystematic responses. Elasticity was computed using Koffarnus, Franck, Stein, and Bickel's (2015) exponentiated version of Hursh and Silberberg's (2008) exponential equation.

Monetary Choice Questionnaire (MCQ; Kirby, Petry, & Bickel, 1999).: This 17-item delay discounting questionnaire assesses preferences for smaller, immediate over larger, delayed hypothetical monetary amounts (Cronbach's α = .88). Length of delay and money amount vary across items (e.g., $110 today or $300 in 7 days; $690 today or $850 in 91 days), and choices establish the rate at which monetary rewards are discounted as a function of time to availability, which is related to substance use risk status and outcomes (Madden & Bickel, 2010). The proportion of choices of the hypothetical larger, delayed monetary amounts relative to smaller, immediate amounts was computed for analysis (MCQ proportion large; Myerson et al., 2014) (range = 0 to 1.0). Although MCQ proportion large makes no assumption about the underlying discounting function, MCQ proportion large and discounting rates (*k*-parameter) are highly correlated (Myerson et al., 2014), and hypothetical and real money choices generate equivalent measures of discounting (e.g., Johnson & Bickel, 2002).

Relative Discretionary Expenditures on Alcohol (RDEA; Murphy et al., 2015).: RDEA reflects strength of preference for alcohol in relation to other discretionary commodities in the personal economies of EAs and is a simplification of the Alcohol-Savings Discretionary Expenditure (ASDE) index that predicts recovery outcomes in problem drinkers (e.g., Tucker et al., 2016b, 2016c). Participants report past-month spending in dollars on alcoholic beverages (independent of consumption), money available for spending on discretionary items (e.g., clothing, music, recreation), and money saved. The reliability and validity of reports of spending on alcohol and other commodities have been established through comparisons with financial records (e.g., Tucker et al., 2006). RDEA was computed as the proportion of alcohol spending relative to all discretionary money available (range = 0 to 1.0). Lower RDEA values predict positive drinking outcomes (e.g., Murphy et al., 2015).

Adolescent Reinforcement Survey Schedule - Substance Use Version (ARSS-SUV; Murphy et al., 2005).: Participants reported past month frequency of 32 activities that are substance-free vs. substance involved (0 = “0 times” to 4 = “more than once a day”). Enjoyment ratings were not collected because it would have doubled the time required to complete the ARSS-SUV. Cronbach’s alpha for activity reports was .95. The proportion of all past month activities involving drinking was computed for analysis [(alcohol-related total / (alcohol-free total + alcohol-related total activities)] (range = 0 to 1.0). Lower proportions of alcohol-related activities are associated with positive drinking outcomes (Acuff et al., 2019). The alcohol reinforcement ratio derived from the ARSS-SUV has good test-retest reliability and is positively correlated with drinking practices and negative consequences (Hallgren, Greenfield, & Ladd, 2016).

Data Analyses

Per standard RDS analysis procedures, the analysis sample excluded seeds who were purposively selected to start RDS and did not complete the survey. The resulting sample of peer recruits was examined for recruitment bias and analytic assumptions (Heckathorn, 1997, 2002; Gile et al., 2015; Tucker et al., in press). Age, sex, race/ethnicity, and baseline drinking were checked for potential non-random recruitment (homophily) and independence from the nonrandomly selected seeds (equilibrium) over recruitment waves. These sample checks indicated a slight bias in favor of same race groups recruiting among themselves. To account for potential bias in network size, the RDSII estimator was used to create weights via RDS Analyst (Handcock, Fellows, & Gile, 2013). Skewed BE predictors (intensity, elasticity, RDEA) were log transformed prior to analysis. Weighted ordinary least square (OLS) regression analyses were conducted using SAS EG v8.1 to predict past month drinking days and consequences with BE measures (APT intensity and elasticity, MCQ proportion of larger choices, RDEA, and ARSS-SUV drinking proportion of activities). Drinks/drinking day were skewed and analyzed using a generalized linear model with a negative binomial distribution. Correlations among the five BE measures ranged from − 0.58 (APT intensity and elasticity) to 0.04 (elasticity and MCQ proportion large), and variance inflation factors ranged between 1.1 and 2.1, suggesting no evidence of multicollinearity among predictors. Correlations among the three drinking risk variables were moderate, ranging from 0.35 to 0.52. As shown in Table 2, the pattern of correlations among drinking risk variables and five variables that can be derived from the APT supported the inclusion of

intensity and elasticity in the regression models along with MCQ proportion of larger choices, RDEA, and ARSS-SUV drinking proportion of activities. Significant correlations were found between intensity and elasticity and all three drinking risk variables, whereas the correlations for other APT metrics were either non-significant or less consistently significant and/or were generally of lower magnitude than the correlations for intensity and elasticity.

Each drinking outcome was examined separately in 3 models that each had an analysis sample of 334 or 335 participants due to cases with missing values on select predictors, which were minimal (6.4% overall). Eight were lost due to nonsystematic APT data (four failed for poor trend, one for bounce, two for reversals from zero, and one for all three), and the remainder had missing or invalid values on various predictors that were not systematically item specific. Furthermore, Satterthwaite *t*-tests showed no significant differences in drinking risk indicators between the analysis sample and the excluded participants with missing data on predictors (*ps* > .20). Initial regression models controlled for demographic variables variously associated in our prior RDS studies with health risk behaviors or BE variables (gender, race, income, marital status, parental status, and education level); the final models excluded non-significant covariates. The effect sizes of BE indicators in regression models ranged from very small (unique R-square = .001) to medium (unique R-square = .09). The analysis sample sizes were powered (> .80) to detect a small-to-medium effect (i.e., unique R-square of .047), taking into account that RDS sample size requirements are about twice as large as those needed for random sampling to achieve independence from seed characteristics.

Results

Table 3 presents the regression models for each drinking risk variable. The analyses showed that BE variables had utility in predicting one or more drinking risk variables in the hypothesized direction. Higher alcohol demand (higher APT intensity and lower elasticity) was associated with all three drinking risk variables in the predicted direction. Although the associations were relatively more robust for intensity than elasticity, higher demand on both variables predicted higher drinks per drinking day, more past month drinking days, and more negative consequences. Higher alcohol reward value assessed by the RDEA index was associated with more past month drinking days and more negative consequences, although the former association was only marginally significant. Stronger preference for smaller sooner rewards on the MCQ was associated with more drinks per drinking day and more negative consequences, and higher proportion of past month activities involving drinking was associated with more drinks per drinking day.

Regarding covariates, non-white race was associated with higher drinks per drinking day and more negative consequences. Being male was associated with more past month drinking days and fewer negative consequences. Being married was associated with more past month drinking days, and higher education (college degree vs. no degree) showed a significant association with higher negative consequences.

Discussion

Significant associations among BE and drinking risk variables established in traditional college students were replicated with EA risky drinkers currently living in the community who were recruited using d-RDS. Consistent with prior research, significant associations in the predicted direction were found between one or more BE variables and alcohol-related risks. The results lay an empirical foundation for extending successful BE interventions with college drinkers (e.g., Murphy et al., 2012, 2019) to this underserved population. The study also showed that d-RDS is an efficient, effective method to recruit community-dwelling risky drinkers who are more difficult to reach than groups accessible by location (e.g., campuses, clinics).

Alcohol demand assessed by APT intensity when drinks are free and elasticity reflecting sensitivity to drink price changes were associated with all three drinking risk variables in the predicted direction. These consistent associations across multiple drinking risk variables further demonstrated the utility of the APT in BE alcohol research (Kaplan et al., 2018; Murphy et al., 2009; Kiselica et al., 2016). Although more limited in scope, significant associations in the predicted direction were found between the other three BE indicators and select drinking risk measures. Higher discretionary spending on alcohol had near significant or significant associations with higher drinking frequency and negative consequences, respectively, which adds to evidence that monetary spending on substances is a viable measure of substance reward value and problem severity (e.g., Tucker et al., 2016b; Worley, Shoptow, Bickel, & Ling, 2015). Steeper delay discounting showed significant associations with more drinks per drinking day and more negative consequences. The proportion of alcohol-involved activities was associated with a single drinking risk dimension (drinks/drinking day). In addition, the overall pattern of positive associations tended to be most consistent for negative alcohol-related consequences. This is generally in line with research suggesting that EAs typically have limited motivation to change their drinking practices (Epler et al., 2009) and that interventions aimed at reducing negative consequences are likely a more fruitful approach to risk reduction in EAs (Leeman et al., 2016).

The variable associations observed among specific BE and drinking risk variables add to growing research that used multiple measures of both domains and found a similar mix of significant and non-significant associations (e.g., Acuff et al., 2017; MacKillop et al., 2010; Strickland et al., 2019; Tucker et al., 2016b, 2016c). Although findings are not wholly consistent and preclude firm generalizations, indicators of alcohol demand, particularly intensity, tend to show reliable significant associations with consumption levels and quantities consumed. In contrast, indicators of the value of alcohol relative to other activities and commodities tend to show significant associations with the frequency and patterning of drinking over longer intervals. Associations with discounting measures were less consistent.

This pattern of differential associations appears to reflect the extent to which different BE measures assess own-price versus cross-price relationships with drinking (Green & Kagel, 1996; Hursch, 1991). Own-price relationships reflect changes in demand for a given commodity as a function of changes in its prices or other direct constraints on its availability. Cross-price relationships reflect how demand for one commodity varies with changes in the

price or constraints on other commodities in the context of choice. The APT is a laboratory analogue of own-price relationships with drinking and reliably predicts consumption quantities and, in some studies, symptoms or negative consequence resulting from higher consumption. The RDEA and similar ASDE index assess cross-price relationships in which behavioral allocation to alcohol is part of a molar pattern of allocation among multiple available activities and commodities. These indices are associated with drinking frequency and patterning over time, which are also molar behavior patterns formed from repetitive daily choices to drink or abstain over longer intervals. Future research that investigates these functional distinctions among the multiple BE indicators may inform refinements in BE theory as applied to substance misuse.

The present measure of relative alcohol value assessed by the proportion of alcohol-free activities among all activities assessed by ARSS-SUV (Murphy et al., 2005) cannot be clearly placed within this framework. In service of balancing survey completion time and inclusion of multiple BE and drinking measures in this initial web-based study of the target population, we did not collect activity enjoyment ratings that support computation of the proportion of reinforcement received from alcohol-related activities, computed as the cross-product of frequency and enjoyment ratings. This change limited the measure's representation of cross-price relationships between drinking and other rewards, which merits future investigation using the full ARSS-SUV.

Another unexpected finding was the extent of educational attainment and student status in the RDS community sample. Post hoc analyses showed that non-students were more likely than students to have personal incomes greater than $20K and to have more money available for discretionary expenditures ($ps < .05$). However, when the personal and household incomes were discrepant, the frequencies among students and non-students were similar, indicating that any economic disadvantage associated with student status was not offset by greater household (e.g., parental or partner) income. Moreover, although there were college students in the sample, for the most part they were not currently enrolled full-time at a four-year institution, did not live on campus, and were working at least part-time. Thus, the sample as a whole was distinct from traditional college students and relatively disadvantaged.

Other study qualifications include the cross-sectional design, which precludes causal inferences, and the necessity of using participant self-reports for this web-based survey that could not be verified independently (e.g., using collateral informants). Nevertheless, the in-person recruitment of seeds assured that the sample was generated by members of the target population of interest, and regular checks on chain development ensured that peer recruits retained for analysis also met the eligibility criteria. More generally, the study measures selected for conceptual relevance, predictive utility, measurement quality, brevity, and ease of online administration yielded results in line with BE theory and previous research.

Another qualification common in survey research (Korkeila, Suominen, & Ahvenainen, 2001) and prior RDS studies with EAs (e.g., Tucker et al., 2016a) is that more women enrolled than men. This is discrepant with the greater proportion of male than female risky drinkers and persons with AUD in the population and qualifies the present findings. This

qualification notwithstanding, because women appear to be the more accessible social network entry channel, this feature can be used to advantage in designing peer-driven community-based studies to increase intervention dissemination and uptake.

Finally, the community sample was recruited in a particular region of a Southern state and had characteristics reflecting varying degrees of disadvantage. Also, the race/ethnicity composition of the sample was diverse but included unexpectedly a larger proportion of Asians and a lower proportion of Blacks compared to the North and Central Florida population. Detailed comparisons across race/ethnic groups were not carried out because that was not part of our research questions and the numbers of participants in groups other than Whites were insufficient for meaningful comparisons. Whether results would generalize to other populations of EAs requires further study, but the commonalities in findings among this community sample and fulltime college students suggest that BE-drinking risk associations in EAs are robust. The generality of associations could be further confirmed in future research that directly compares community-dwelling and traditional college student samples. Furthermore, it should be noted that the present sample consisted of young adults who currently resided in and were recruited from the community, and we did not assess whether they had attended college fulltime and lived on campus in the past or whether such variations in educational history may qualify the present findings.

In conclusion, the study replicated BE-drinking risk associations observed in other populations to community-dwelling EA risky drinkers and supports extension of successful BE interventions to this underserved risk group. The d-RDS recruitment method provided an efficient means to shift the focus of much brief intervention research from relatively advantaged fulltime college students to community-dwelling EAs who often face different challenges as they transition into adulthood. Accessing hard-to-reach community risk groups using RDS may promote intervention diffusion through their social networks and enhance overall intervention effectiveness.

Acknowledgments

Portions of the research were presented at the 2019 annual Collaborative Perspectives on Addiction conference, Society of Addiction Psychology (Division 50), American Psychological Association, Providence, RI. The authors thank Diana Arrocha, Natalya Beltran, Lauren Bugner, Jack Lin, Lauren Kousek, and Tiffany Williams for assistance with seed recruitment and Akshay A. Sawant for assistance with data management and analysis. The research was supported in part by research start-up funds provided to Jalie Tucker by the University of Florida College of Health and Human Performance and by the University of Florida Clinical and Translational Science Institute, which is supported in part by the NIH National Center for Advancing Translational Sciences under award number UL1TR001427. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

Acuff SF, Amlung M, Dennhardt AA, MacKillop J, & Murphy JG (2020). Experimental manipulations of behavioral economic demand for addictive commodities: a meta-analysis. Addiction, 115, 817–831. doi:10.1111/add.14865 [PubMed: 31656048]

Acuff SF, Dennhardt AA, Correia C, & Murphy JG (2019). Measurement of substance-free reinforcement in addiction: A systematic review. Clinical Psychology Review, 70, 79–90. 10.1016/j.cpr.2019.04.003 [PubMed: 30991244]

Acuff SG, Soltis KE, Dennhardt AA, Berlin KS & Murphy JG (2018). Evaluating behavioral economic models of heavy drinking among college students. Alcoholism: Clinical and Experimental Research, 42(7), 1304–1314. doi:10.1111/acer.13774

American Psychological Association (2020). Publication Manual of the American Psychological Association (7th ed.).

Arnett JJ (2005). The developmental context of substance use in emerging adulthood. Journal of Drug Issues, 35(2), 235–254. 10.1177/002204260503500202

Barnett NP, Monti PM, Spirito A, Colby SM, Rohsenow DJ, Ruffolo L, & Woolard R (2015). Alcohol use and related harm among older adolescents treated in an emergency department: The importance of alcohol status and college status. Journal of Studies on Alcohol, 64(3),342–349. 10.15288/jsa.2003.64.342

Bauermeister JA, Zimmerman MA, Johns MM, Glowacki P, Stoddard S, & Volz E (2012). Innovative recruitment using online networks: Lessons learned from an online study of alcohol and other drug use utilizing a web-based, Respondent Driven Sampling (webRDS) strategy. Journal of Studies on Alcohol and Drugs, 73(5), 834–838. 10.15288/jsad.2012.73.834 [PubMed: 22846248]

Bickel WK, Johnson MW, Koffarnus MN, MacKillop J, & Murphy JG (2014). The behavioral economics of substance use disorders: Reinforcement pathologies and their repair. Annual Review of Clinical Psychology, 10, 641–677. 10.1146/annurev-clinpsy-032813-153724

Breslin FC, Sobell LC, Sobell MB, & Agrawal S (2000). A comparison of a brief and long version of the Situational Confidence Questionnaire. Behaviour Research and Therapy, 38(12), 1211–1220. 10.1016/s0005-7967(99)00152-7 [PubMed: 11104185]

Buscemi J, Murphy JG, Martens MP, McDevitt-Murphy ME, Dennhardt AA, & Skidmore JR (2010). Help-seeking for alcohol-related problems in college students: correlates and preferred resources. Psychology of Addictive Behaviors, 24(4), 571–580. doi:10.1037/a0021122 [PubMed: 21198220]

Collins RL, Parks GA, & Marlatt GA (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. Journal of Consulting and Clinical Psychology, 53(2), 189–200. 10.1037/0022-006X.53.2.189 [PubMed: 3998247]

Cook SH, Bauermeister JA, Gordon-Messer D, & Zimmerman MA (2013). Online network influences on emerging adults' alcohol and drug use. Journal of Youth and Adolescence, 42(11), 1674–1686. 10.1007/s10964-012-9869-1 [PubMed: 23212348]

Delmée L, Roozen HG, & Steenhuis I (2018). The engagement of non-substance-related pleasant activities is associated with decreased levels of alcohol consumption in university students. International Journal of Mental Health and Addiction, 16(5), 1261–1269.

Epler AJ, Sher KJ, & Piasecki TM (2009). Reasons for abstaining or limiting drinking: A developmental perspective. Psychology of Addictive Behaviors, 23(3), 428–442. 10.1037/a0015879 [PubMed: 19769427]

Gile KJ, Johnston LG, & Salganik MJ (2015). Diagnostics for Respondent-driven Sampling. Journal of the Royal Statistical Society. Series A, (Statistics in Society), 178(1), 241–269. doi:10.1111/rssa.12059

Green L, Myerson J, Lichtman D, Rosen S, & Fry AF (1996). Temporal discounting in choice between delayed rewards: The role of age and income. Psychology and Aging, 11(1), 79–84. 10.1037/0882-7974.11.1.79 [PubMed: 8726373]

Grucza RA, Sher KJ, Kerr WC, Krauss MJ, Lui CK, McDowell YE, Hartz S, Virdi G, & Bierut LJ (2018). Trends in adult alcohol use and binge drinking in the early 21st-century United States: A meta-analysis of 6 national survey series. Alcoholism: Clinical and Experimental Research, 42(10), 1939–1950. 10.1111/acer.13859

Hallgren KA, Greenfield BL, & Ladd BO (2016). Psychometric properties of the Adolescent Reinforcement Survey Schedule-Alcohol Use Version with college student drinkers. Substance Use & Misuse, 51(7), 812–822. 10.3109/10826084.2016.1155609 [PubMed: 27096713]

Handcock MS, Fellows IE, & Gile KJ (2014). RDS analyst: Analysis of respondent-driven sampling data. Version 0.42. URL: http://wiki.stat.ucla.edu/hpmrg/index.php/RDS_Analyst_Install.

Heckathorn DD (1997). Respondent-driven sampling: A new approach to the study of hidden populations. Social Problems, 44(2),174–199. 10.1525/sp.1997.44.2.03×0221m

Heckathorn DD (2002). Respondent-driven sampling II: Deriving valid population estimates from chain-referral samples of hidden populations. Social Problems, 49(1),11–34. 10.1525/sp.2002.49.1.11

Hursch S (1991). Behavioral economics of drug self-administration and drug abuse policy. Journal of the Experimental Analysis of Behavior, 56, 377–393. [PubMed: 1955823]

Hursh SR, & Silberberg A (2008). Economic demand and essential value. Psychological Review, 115(1), 186–198. 10.1037/0033-295X.115.1.186 [PubMed: 18211190]

Johnson MW & Bickel WK (2002). Within-subject comparison of real and hypothetical money rewards in delay discounting. Journal of the Experimental Analysis of Behavior, 77(4), 129–146. [PubMed: 11936247]

Green L, & Kagel JH (Eds.) (1996). Advances in Behavioral Economics: Substance Use and Abuse. Norwood, NJ: Ablex Publishing.

Kahler CW, Hustad J, Barnett NP, Strong DR, & Borsari B (2008). Validation of the 30-Day version of the Brief Young Adult Alcohol Consequences Questionnaire for use in longitudinal studies. Journal of Studies on Alcohol and Drugs, 69(4), 611–615. doi: 10.15288/jsad.2008.69.611 [PubMed: 18612578]

Kahler CW, Strong DR, & Read JP (2005). Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: The Brief Young Adult Alcohol Consequences Questionnaire. Alcoholism: Clinical and Experimental Research, 29(7), 1180–1189. 10.1097/01.ALC.0000171940.95813.A5

Kaplan BA, Foster RNS, Reed DD, Amlung M, Murphy JG, & MacKillop J (2018). Understanding alcohol motivation using the alcohol purchase task: A methodological systematic review. Drug and Alcohol Dependence, 191, 117–140. 10.1016/j.drugalcdep.2018.06.029 [PubMed: 30099174]

Kaplan BA, Gilroy SP, Reed DD, Koffarnus MN, & Hursch SR (2019). The R package beezdemand: Behavioral Economic Easy Demand. Perspectives on Behavior Science, 42, 163–180. 10.1007/s40614-018-00187-7 [PubMed: 31976427]

Kirby KN, Petry NM, & Bickel WK (1999). Heroin addicts have higher discount rates for delayed rewards than non-drug-using controls. Journal of Experimental Psychology. General, 128(1), 78–87. [PubMed: 10100392]

Kiselica AM, Webber TA, & Bornovalova MA (2016). Validity of the Alcohol Purchase Task: A meta-analysis. Addiction, 111(5), 806–816. 10.1111/add.13254 [PubMed: 26616514]

Kivlahan DR, Marlatt GA, Fromme K, Coppel DB, & Williams E (1990). Secondary prevention with college drinkers: Evaluation of an alcohol skills training program. Journal of Consulting and Clinical Psychology, 58(6), 805–810. 10.1037/0022-006X.58.6.805 [PubMed: 2292630]

Koffarnus MN, Franck CT, Stein JS, & Bickel WK (2015). A modified exponential behavioral economic demand model to better describe consumption data. Experimental and Clinical Psychopharmacology, 23(6), 504–512. [PubMed: 26280591]

Korkeila K, Suominen S, Ahvenainen J, Ojanlatva A, Rautava P, Helenius H, Koskenvuo H, & Koskenvuo M (2001). Non-response and related factors in a nation-wide health survey. European Journal of Epidemiology, 17(11), 991–999. 10.1023/A:1020016922473 [PubMed: 12380710]

Leeman RF, Demartini KS, Nogueira C, Corbin WR, Neighbors C, & Malley SSO (2016). Randomized controlled trial of a very brief, multicomponent web-based alcohol intervention for undergraduates with a focus on protective behavioral strategies. Journal of Consulting and Clinical Psychology, 84(8), 1008–1015. 10.1037/ccp0000132 [PubMed: 27599223]

MacKillop J, Miranda R, Monti PM, Ray L, Murphy JG, Rohsenow DJ, McGeary JE, Swift RM, Tidey JW, & Gwaltney CJ (2010). Alcohol demand, delayed reward discounting, and craving in relation to drinking and Alcohol Use Disorders. Journal of Abnormal Psychology, 119(1), 106–114. doi:10.1037/10017513 [PubMed: 20141247]

MacKillop J, Murphy JG, Tidey JW, Kahler CW, Ray LA, & Bickel WK (2009). Latent structure of facets of alcohol reinforcement from a behavioral economic demand curve. Psychopharmacology (Berl), 203(1):33–40. 10.1007/s00213-008-1367-5 [PubMed: 18925387]

Madden GJ, & Bickel WK (Eds.). (2010). Impulsivity: The behavioral and neurological science of discounting. American Psychological Association.

Murphy JG, Correia CJ, Colby SM, & Vuchinich RE (2005). Using behavioral theories of choice to predict drinking outcomes following a brief intervention. Experimental and Clinical Psychopharmacology, 13(2), 93–101. 10.1037/1064-1297.13.2.93 [PubMed: 15943542]

Murphy J, Dennhardt A, Martens M, Borsari B, Witkiewitz K &, Meshesha L (2019). A randomized clinical trial evaluating the efficacy of a brief alcohol intervention supplemented with a substance-free activity session or relaxation training. Journal of Consulting and Clinical Psychology, 87(7), 657–669. 10.1037/ccp0000412 [PubMed: 31070386]

Murphy JG, Dennhardt AA, Skidmore JR, Borsari B, Barnett NP, Colby SM, & Martens MP (2012). A randomized controlled trial of a behavioral economic supplement to brief motivational interventions for college drinking. Journal of Consulting and Clinical Psychology, 80(5), 876–886. 10.1037/a0028763 [PubMed: 22663899]

Murphy JG, Dennhardt AA, Yurasek AM, Skidmore JR, Martens MP, MacKillop J, & McDevitt-Murphy ME (2015). Behavioral economic predictors of brief alcohol intervention outcomes. Journal of Consulting and Clinical Psychology, 83(6, :1033–1043. 10.1037/ccp0000032 [PubMed: 26167945]

Murphy JG, & MacKillop J (2006). Relative reinforcing efficacy of alcohol among college student drinkers. Experimental and Clinical Psychopharmacology, 14(2), 219–227. 10.1037/1064-1297.14.2.219 [PubMed: 16756426]

Murphy JG, MacKillop J, Skidmore JR, & Pederson AA (2009). Reliability and validity of a demand curve measure of alcohol reinforcement. Experimental and Clinical Psychopharmacology, 17(6), 396–404. 10.1037/a0017684 [PubMed: 19968404]

Myerson J, Baumann AA, & Green L (2014). Discounting of delayed rewards: (A)theoretical interpretation of the Kirby questionnaire. Behavioural Processes, 107, 99–105. [PubMed: 25139835]

National Institute on Alcohol Abuse and Alcoholism. (2019a). Drinking levels defined. https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-binge-drinkingbinge-drinking.

National Institute on Alcohol Abuse and Alcoholism. (2019b). Planning alcohol interventions using NIAAA's College Alcohol Intervention Matrix. https://www.collegedrinkingprevention.gov/CollegeAIM/Resources/NIAAA_College_Matrix_Booklet.pdf

Norbeck JA, Lindsey AM, & Carrieri VL (1981). The development of an instrument to measure social support. Nursing Research, 30(5), 264–269. [PubMed: 7027185]

Rachlin H (1995). Self-control: Beyond commitment. Behavioral and Brain Sciences, 18, 109–121. 10.1017/S0140525X00037602

Slutske WS (2005). Alcohol use disorders among US college students and their non-college attending peers. Archives of General Psychiatry, 62(3), 321–327. 10.1001/archpsyc.62.3.321 [PubMed: 15753245]

Stein JS, Koffarnus MN, Snider SE, Quisenberry AJ, & Bickel WK (2015). Identification and management of nonsystematic purchase task data: Toward best practice. Experimental & Clinical Psychopharmacology, 23(5), 377–386. 10.1037/pha0000020 [PubMed: 26147181]

Strickland JC, Alcorn JL, & Stoops WW (2019). Using behavioral economic variables to predict future alcohol use in a crowdsourced sample. Journal of Psychopharmacology, 33(7), 779–790. doi:10.1177/0269881119827800 [PubMed: 30789298]

Substance Abuse and Mental Health Services Administration. (2019). Key substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. SMA 18-5068, NSDUH Series H-53). Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration.

Treloar H, Martens MP, & McCarthy DM (2015). The Protective Behavioral Strategies Scale-20: Improved content validity of the Serious Harm Reduction Subscale. Psychology Assessment, 27(1), 340–346. 10.1037/pas0000071

Tucker JA, Bacon JP, Chandler SD, Lindstrom K, & Cheong J (in press). Utility of digital Respondent Driven Sampling to recruit community-dwelling emerging adults for assessment of drinking and related risks. Addictive Behaviors. doi: 10.1016/j.addbeh.2020.106536

Tucker JA, Cheong J, Chandler SD, Crawford MS, & Simpson CA (2015). Social networks and substance use among at-risk emerging adults living in disadvantaged urban areas in the southern United States: A cross-sectional naturalistic study. Addiction, 110(9), 1524–1532. 10.1111/add.13010 [PubMed: 26054041]

Tucker JA, Foushee HR, & Simpson CA (2009). Increasing the appeal and utilization of substance abuse services: What consumers and their social networks prefer. International Journal of Drug Policy, 20(1), 76–84. 10.1016/j.drugpo.2007.11.004 [PubMed: 18162389]

Tucker JA, Simpson CA, Chandler SD, Borch CA, Davies SL, Kerbawy SJS, Lewis TL, Crawford MS, Cheong J, & Michael M (2016a). Utility of Respondent Driven Sampling to reach disadvantaged emerging adults for assessment of substance use, weight, and sexual behaviors. Journal of Health Care for the Poor and Underserved, 27(1), 194–208. 10.1353/hpu.2016.0006

Tucker JA, Cheong J, Chandler SD, Lambert BH, Kwok H, & Pietrzak B (2016b). Behavioral economic indicators of drinking problem severity and initial outcomes among problem drinkers attempting natural recovery: A cross-sectional naturalistic study. Addiction, 111, 1956–1965. DOI: 10.1111/add.13492 [PubMed: 27318078]

Tucker JA, Cheong J, Chandler SD, Lambert BH, Pietrzak B, Kwok H, & Davies SL (2016c). Prospective analysis of behavioral economic predictors of stable moderation drinking among problem drinkers attempting natural recovery. Alcoholism: Clinical and Experimental Research, 40(12), 2676–2684. 10.1111/acer.13245

Tucker JA, Vuchinich RE, Black BC, & Rippens PD (2006). Significance of a behavioral economic index of reward value in predicting problem drinking resolutions. Journal of Consulting and Clinical Psychology, 74(2), 317–326. [PubMed: 16649876]

Vuchinich RE (1995). Alcohol abuse as molar choice: An update of a 1982 proposal. Psychology of Addictive Behaviors, 9(4), 223–235. 10.1037/0893-164X.9.4.223

White H, Labouvie E, & Papadaratsakis V (2005). Changes in substance use during the transition to adulthood: A comparison of college students and their noncollege age peers. Journal of Drug Issues, 35(2), 281–306. 10.1177/002204260503500204

Worley MJ, Shoptaw SJ, Bickel WK, & Ling W, (2015). Using behavioral economics to predict opioid use during prescription opioid dependence treatment. Drug and Alcohol Dependence, 148, 62–68. 10.1016/j.drugalcdep.2014.12.018 [PubMed: 25622776]

Zhang MW, Tran BX, Nguyen HLT, Le HT, Long NH, Hinh ND, Tho TD, Le BN, Thuc VTM, Ngo C, Tu NH, Latkin CA, & Ho RC (2017). Using online respondent driven sampling for Vietnamese youths' alcohol use and associated risk factors. Healthcare Informatics Research, 23(2), 109–118. 10.4258/hir.2017.23.2.109 [PubMed: 28523209]

Public Health Statement:

This cross-sectional survey found that established associations of behavioral economic variables with risky drinking among traditional college students are generalizable to young adults who currently reside in the community. It lays a foundation for extending behavioral economic interventions with college drinkers to the underserved population of community-dwelling young adult risky drinkers. The study also showed that online peer-driven sample recruitment using Respondent Driven Sampling is an efficient, effective method to recruit community-dwelling risky drinkers who are harder to reach than groups accessible by location.

Table 1.

Sample Characteristics of Peer Recruits

Variable	Frequency (%) / Mean (*SD*)
Demographic characteristics	
Age in years	23.6 (2.6)
Gender (% women)	228 (64.0)
Race/ethnicity	
Asian	68 (19.2)
Black	23 (6.5)
White	228 (64.4)
Other[a]	35 (9.9)
Hispanic	61 (17.2)
Education > high school	307 (86.7)
Student (full or part-time)	229 (64.1)
Employed (full or part-time)	275 (77.5)
Personal annual income < $20k	183 (55.4)
Married	26 (7.3)
Have children	22 (6.2)
Drinking risk variables	
Number of past month drinking days	9.99 (5.86)
Drinks consumed per drinking day (past month)	4.71 (4.76)
Drinks consumed on high risk drinking days[b]	7.03 (6.14)
Drinks consumed on very high risk drinking days[c]	17.00 (10.96)
Alcohol-related negative consequences (BYAACQ)	8.51 (5.37)
Hangovers	229 (83.8)
Very sick stomach/vomiting	233 (65.3)
Drank despite plans not to	213 (59.7)
Engaged in regrettable impulsive behavior while drinking	174 (48.7)
Blackouts/brownouts	127 (35.6)
Tolerance	125 (35.0)
Social network characteristics	
Size of young adult online network (# members)	27.3 (51.8)
Productive peer recruiters (≥ 1 recruit)	153 (42.9)
Behavioral economic variables	
Relative discretionary expenditures on alcohol (past month)	0.49 (2.16)
Proportion of past month activities involving drinking (ARSS-SUV)	0.26 (0.15)
Proportion of larger delayed monetary choices (MCQ)	0.59 (0.22)
Intensity (APT)	8.32 (22.58)
Elasticity coefficient (APT)	0.008 (0.007)

Ns = 346 – 357, median age = 23 years.

[a]Includes American Indian/Alaska Native (.6%), Native Hawaiian/Other Pacific Islander (1.1%), and more than one race (5.4%); 3 additional participants indicated "I choose not to answer."

[b]Days involving 4+/5+ drinks for women/men for 141 participants (39.61%) who any reported high risk drinking;

[c]Days involving 8+/10+ drinks for women/men for 27 participants (7.581%) who reported any very high risk drinking.

APT = Alcohol Purchase Task. ARSS-SUV = Adolescent Reinforcement Survey Schedule - Substance Use Version. BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire (past 3 months). MCQ = Monetary Choice Questionnaire.

Table 2.

Correlations among Alcohol Purchase Task (APT) and drinking risk variables

APT Variable	Drinking Risk Variables		
	Drinks per drinking day	# Drinking days (past month)	Negative consequences (BYAACQ)
Intensity[1]	0.346***	0.355***	0.231***
Elasticity[1]	−0.153**	−0.265***	−0.204***
O_{max}	0.130*	0.152**	0.159**
P_{max}	−0.009	0.001	0.123*
Breakpoint	−0.041	0.085	0.232***

*$p < .05$;

**$p < .01$;

***$p < .001$.

Ns = 335 – 336.

[1]Log transformed.

BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire (past 3 months).

Table 3.

Behavioral economic and demographic predictors of drinking practices and consequences among community-dwelling emerging adult risky drinkers

Predictors	Drinking Risk Variables					
	Drinks per drinking day		# Drinking days (past month)		Negative consequences (BYAACQ)	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
Relative discretionary expenditures on alcohol (past month)(RDEA)[1]	−0.01 (0.04)	−0.09, 0.06	0.66 (0.36)$^{+}$	−0.05, 1.36	0.74 (0.33)*	0.08, 1.40
Proportion of past month activities involving drinking (ARSS-SUV)	0.82 (0.21)***	0.40, 1.24	−1.40 (1.90)	−5.15, 2.34	−1.02 (1.78)	−4.53, 2.49
Proportion of larger delayed monetary choices (MCQ)	−0.49 (0.14)***	−.76, −0.22	−1.10 (1.29)	−3.64, 1.44	−3.98 (1.21)**	−6.35, −1.60
Elasticity (APT)[1]	−0.14 (0.05)**	−.0.24, −0.04	−1.01 (0.48)*	−1.94, −0.07	−0.84 (0.45)$^{+}$	−1.72, 0.04
Intensity (APT)[1]	0.34 (0.08)***	0.19, 0.49	3.36 (0.74)***	1.90, 4.82	2.49 (0.70)***	1.12, 3.86
Gender	0.01 (0.06)	−0.11, 0.14	2.36 (0.62)***	1.14, 3.58	−1.69 (0.58)**	−2.83, −0.55
Race	−0.19 (0.07)**	−0.32, −0.06	−0.64 (0.63)	−1.88, 0.60	−2.75 (0.59)***	−3.91, −1.59
Education	−0.09 (0.06)	−0.21, 0.04	0.75 (0.60)	−0.44, 1.93	1.61 (0.57)**	0.50, 2.73
Married	−0.34 (0.13)	−0.60, −0.09	2.69 (1.28)*	0.18, 5.21	−1.20 (1.20)	−3.55, 1.16

$^{+}p < .07$;

$^{*}p < .05$;

$^{**}p < .02$;

$^{***}p < .001$.

Ns = 333 – 336.

[1]Log transformed.

Drinks/drinking day analyzed using a generalized linear model with a negative binomial distribution; past month drinking days and negative consequences analyzed using weighted ordinary least square (OLS) regression analyses. B and SE are estimates of unstandardized regression coefficients and standard error of estimates, respectively. 95% CI = 95% confidence intervals for regression coefficients. APT = Alcohol Purchase Task. ARSS-SUV = Adolescent Reinforcement Survey Schedule. BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire. MCQ = Monetary Choice Questionnaire. Gender (men/women); race (white/non-white); married (yes/no). Dichotomous variable reference groups: gender (male =1, female = 0), race (white = 1, other = 0), marital status (married = 1, other = 0), education (college degree = 1, no degree = 0).