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Personal Income and Substance Use among Emerging Adults in the United States

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Abstract

Background: Taxation and other policy measures have been implemented across the United States to curb the accessibility of substance use, especially among youth. While the inverse relationship between price and youth consumption is well known, available research on youth earned income and substance use is sparser, particularly among emerging adults.

Objectives: We examined the association between emerging adult past-year personal income and 30-day substance use.

Methods: We analyzed data from Wave 5 ($n = 2,202$) of the NEXT Generation Health Study, an annual survey study administered to a nationally representative sample of emerging adults in the U.S. Wave 5 (mean age=20.28 years, SE=0.02 years) was administered during the 2013–2014 academic year. After grouping participants into five levels of self-reported, pre-tax personal income, we used binomial logistic regression to examine the association between personal income and cigarette smoking, marijuana use, alcohol use, and heavy episodic drinking (HED).

Results: In unadjusted models, those at certain levels of higher past-year income were more likely to smoke cigarettes, consume alcohol, or engage in HED at least once in the past 30 days. Several associations remained significant after controlling for covariates. Most associations were no longer significant after including perceived peer norms as additional covariates. Personal income was not associated with 30-day marijuana use in unadjusted or adjusted models.

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Statement on human subject informed consent

Among participants who were less than 18 years old, parents gave informed consent and the participants provided assent. Participants provided consent during the first data collection period after they turned 18 years old. The study was approved by the Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Conflict of interest statement

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Conclusions/Importance: Higher earned income may provide emerging adults greater economic access to cigarettes and alcohol, but the association might be partly attenuated by social factors, particularly perceived peer norms.

Keywords

Alcohol use; cigarette smoking; emerging adults; heavy episodic drinking; marijuana use; personal income

Introduction

Among the emerging adult population – those between the ages of 18 and 25 (Arnett, 2000, 2007) – cigarette smoking has been declining in the United States (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2016). However, the prevalence of marijuana use among them has been rising since the early 1990s, and alcohol consumption remains prevalent (Johnston et al., 2016). The prevalence of marijuana use generally follows an upward trajectory from adolescence to the earlier part of emerging adulthood – ages eighteen to twenty-one (Chen & Jacobsen, 2012; Evans-Polce, Vasilenko, & Lanza, 2015; Fleming, White, Haggerty, Abbott, & Catalano, 2012). Alcohol use and binge drinking also generally follow an upward trajectory over the same age range (Chen & Jacobsen, 2012; Evans-Polce et al., 2015; Fleming et al., 2012; Timberlake et al., 2007). This increase can partially be attributed to attending post-secondary school (Fleming et al., 2012; Johnston et al., 2016; Simons-Morton et al., 2016; Stone et al., 2012), living in college housing (Eisenberg, Golberstein, & Whitlock, 2014; Simons-Morton et al., 2016), and peer norms (Andrews, Tildesley, Hops, & Li, 2002; Etcheverry & Agnew, 2008; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Simons-Morton et al., 2016), all of which have a strong environmental/social influence.

Another factor that could be important but is perhaps less emphasized among this age group is economic accessibility. In theory, economic accessibility has two components: one's income (money and time) and the costs (monetary, time-related, health-related, and social) of consuming substances (Correia, Murphy, Irons, & Vasi, 2010; Murphy, Correia, & Barnett, 2007). There are studies on the cost component among emerging adults. For example, a purchase task study that asked emerging adult smokers how much they would smoke at different cigarette prices exhibited a negative relationship between monetary price and desired consumption (MacKillop et al., 2008). Similar studies on emerging adult marijuana users found an inverse relationship between the hypothetical price of marijuana and the number of joints participants would smoke (Collins, Vincent, Yu, Liu, & Epstein, 2014; Vincent, Collins, Liu, Yu, & De Leo, 2017). Other similar studies with college students found a negative relationship between the hypothetical monetary price of alcohol and the number of drinks participants would consume (Murphy & MacKillop, 2006; Murphy, MacKillop, Skidmore, & Pederson, 2009). Public policies have utilized the negative association between monetary price and substance use by raising taxes on substance-related items that can be purchased legally (Bader, Boisclair, & Ferrence, 2011; Gruber, 2002; Laixuthai & Chaloupka, 1993; Phillips, 2015).

Some studies have examined the income component of economic accessibility by analyzing family socioeconomic status (SES). Research suggests that among emerging adults, higher SES is positively associated with marijuana and alcohol use and negatively associated with cigarette use (Finch, Ramo, Delucchi, Liu, & Prochaska, 2013; McMorris & Uggen, 2000; Patrick, Wightman, Schoeni, & Schulenberg, 2012). However, there is debate about the mechanisms through which SES affects emerging adult substance use (Patrick et al., 2012; Stone et al., 2012). There is also little empirical research on the topic (Patrick et al., 2012). Not many studies have examined accessibility from the perspective of an emerging adult's individually earned income, which differs from family SES (Finch et al., 2013; Patrick et al., 2012). Personal income – also referred to as earned income or personal earnings – is directly accessible by an individual and can be readily used by the individual to purchase goods, unlike components of family SES such as wealth/assets and family/household income (i.e. the collective income earned by a household).

Possible reasons that personal income has not been widely studied among emerging adults include continued financial dependence on parents/guardians and limited time for full-time college students to work and earn substantial money. Yet, among recent high school graduates attending post-secondary school, around 40% of two-year college students and over 25% of four-year college students are employed in the U.S. (BLS, 2015; Bureau of Labor Statistics, 2016). Among recent high school dropouts 20–24 years old not enrolled in school, over 70% are employed (BLS, 2016; BLS, 2015). In addition, before adjusting for inflation, the annual median personal income of those between 15 and 24 years old was around \$10,420 in 2014; \$10,975 in 2015; and \$11,541 in 2016 (U.S. Census Bureau, 2017). Among that age group, annual mean income was about \$15,734 in 2014; \$16,106 in 2015; and \$17,659 in 2016, before adjusting for inflation (U.S. Census Bureau, 2017). Therefore, a sizable proportion of the U.S. emerging adult population has some of its own financial resources, so this could present a mostly unexamined factor of substance use.

Interestingly, most studies on personal income/available spending money and substance use among youth have been conducted with adolescents between the ages of thirteen and seventeen. This research indicated that with more earnings or more available spending money, adolescents may be more likely to consume tobacco, marijuana, or alcohol as well as binge drink or experience drunkenness (Bellis et al., 2007; Godley, Passetti, & White, 2006; Greenberger & Steinberg, 1981; Kaestner, Sasso, Callison, & Yarnoff, 2013; McCrystal, Percy, & Higgins, 2007; Paschall, Flewelling, & Russell, 2004). In particular, Paschall et al. (2004) and Kaestner et al. (2013) analyzed national samples. Using data from the National Longitudinal Study of Adolescent to Adult Health (Add Health), Paschall et al. (2004) suggested the income obtained from work could mediate the association between longer working hours and heavy drinking. They also indicated personal income was independently associated with frequent engagement in heavy drinking until they included peer descriptive norms of alcohol use as a covariate, at which point participants' earned income was no longer associated (Paschall et al., 2004).

Examining data from the National Longitudinal Survey of Youth (NLSY97), Kaestner et al. (2013) indicated that the hourly wage rate was positively, but weakly, associated with cigarette use, marijuana use, and alcohol use. The same study utilized Monitoring the Future

(MTF) data to suggest that weekly earnings were associated with the same three substances, though it was undetermined how independent the association was from work hours (Kaestner et al., 2013). One of the few studies on adults 18–25 years old found a positive association between personal income and tobacco use (Finch et al., 2013). A study on college students found an association between more available spending money and a greater likelihood of being drunk (Martin et al., 2009).

Supporting the significance of studying youth personal income is a qualitative study of teenagers in an outpatient substance abuse treatment program (Godley et al., 2006). In that study, participants who had a job indicated they used their income from work to directly purchase alcohol and drugs prior to treatment (Godley et al., 2006). A different study in Britain found that, compared to teens who had never purchased their own alcohol, those who had were almost six times more likely to binge drink, drink frequently, or drink in a public place and 3.5 times more likely to engage in all three behaviors (Bellis et al., 2007). These studies imply that the availability of their own income may offer adolescents a degree of access to substances and, by extension, the opportunity to consume them in a risky manner. Considering that emerging adults tend to be more independent than adolescents but without the responsibilities of full adults (Arnett, 2000, 2007), emerging adult personal income may warrant further investigation.

Our study sought to expand on the sparse literature by analyzing self-reported income earned over the previous year in relation to cigarette use, marijuana use, alcohol use, and heavy episodic drinking (HED) over the past 30 days among a diverse sample of emerging adults. Among the covariates we controlled for were environmental/social factors that are known to be strongly associated with substance use in this age group. The goals of the study were to examine the unadjusted association between personal income and substance use and to analyze the adjusted association, before and after controlling for perceived peer norms.

Methods

Data source and sampling

We analyzed data from Wave 5 ($n = 2,202$) of the NEXT Generation Health Study, which employs an annual, self-report survey of a nationally representative cohort across the nine U.S. Census Divisions. The study employed a three-stage sampling design to recruit participants who were in 10th grade during the 2009–2010 academic year. School districts in each county were grouped into primary sampling units (PSUs); smaller school districts were grouped together while larger school districts were considered one PSU. PSUs were randomly sampled within each Census Division. Within the PSUs, individual schools with 10th grade classrooms were randomly sampled, and within those schools, one or two 10th grade classrooms were randomly sampled. All students in the participating classrooms were eligible for the study except those who did not provide parental consent and participant assent (or participant consent if participant was at least 18 years old); those with developmental limitations affecting their ability to understand questions or provide age-appropriate responses to questions were also not eligible. The sampling strategy is described in detail elsewhere (Hingson, Zha, Simons-Morton, & White, 2016; Li, Iannotti, Haynie, Perlus, & Simons-Morton, 2014).

In Wave 5 (mean age = 20.28 years, SE = 0.02 years), surveys were self-administered by participants online during the 2013–2014 academic year. The median age of the analytic sample was 20.20 years. The age range was 18.00 to 24.17 years, but approximately 90% of participants were between 19.58 (5th percentile) and 21.07 (95th percentile) years old. We chose to analyze Wave 5 data because that was the first wave in which participants were asked about their personal income.

Among participants who were less than 18 years old, parents gave informed consent and the participants provided assent. Participants provided consent during the first data collection period after they turned 18 years old. The study was approved by the Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Measures

Personal income—The independent variable of interest was self-reported personal income. Participants were asked the following question: *What is your best guess of your personal earnings before taxes, for the past year?* There were eleven response options: *I had no personal earnings last year, less than \$2,500, \$2,500–\$4,999, \$5,000–\$9,999, \$10,000–\$14,999, \$15,000–\$19,999, \$20,000–\$24,999, \$25,000–\$29,999, \$30,000–\$39,999, \$40,000–\$49,999, \$50,000–\$74,999, and \$75,000–\$99,999* (Add Health, n.d.). Relatively few participants endorsed earning \$15,000–\$19,999 or more. Thus, we categorized this variable based on approximate \$5,000 increments until the \$15,000–\$19,999 level, leading to the following categorization: No self-reported personal income; Up to \$5,000; \$5,000–\$9,999; \$10,000–\$14,999; and \$15,000+.

Substance use—There were several outcomes of interest: smoking cigarettes, using marijuana, drinking alcohol, and HED. In separate items, participants were asked on how many occasions they smoked cigarettes, smoked/used marijuana, or drank alcohol in the last 30 days. For each of these, response options included *never, once or twice, 3–5 times, 6–9 times, 10–19 times, 20–39 times, and 40 times or more*. In another item, HED was measured by asking how many times in the last 30 days they consumed at least five (for males)/four (for females) standard drinks in a row on one occasion. Response choices for HED were *none, one, two, 3–5, 6–9, and 10 or more times*. Each substance use outcome was dichotomized into no use versus any use.

Demographics—Gender was categorized as male or female. Race/ethnicity was divided into four categories: White, African-American, Hispanic, and other. From the participant report, family SES was estimated by using the Family Affluence Scale (Currie et al., 2008); items included the number of cars owned, the number of computers owned, whether the participant had their own bedroom, and the number of family vacations in the last 12 months. We then categorized participants as low, moderate, or high affluence.

Current post-secondary school attendance—Participants were asked if they were currently attending technical/vocational school, community college, or a four-year college/university. Participants who reported attending a technical/vocational school were grouped

with participants who reported attending a community college. The categories for current post-secondary school attendance were as follows: not attending post-secondary school, attending technical/vocational school or community college, and attending four-year college/university.

Current residence—Participants were asked where they were currently living. There were thirteen response choices, which were reduced to four categories: parent's or relative's home, college campus (residence hall/dormitory or fraternity/sorority house), own place/rented room or apartment, and other (friend's house, boyfriend's/girlfriend's house, military barracks, or no permanent residence).

Perceived peer injunctive norms—In a single item, participants were asked how important it was to their close friends that they not smoke cigarettes. In two other separate items, the same question was asked with respect to not smoking/using marijuana and not using alcohol. Each item had a 7-point Likert scale: 1 = *not at all*, 4 = *somewhat*, and 7 = *extremely*. We reverse-coded the responses so that higher scores reflected norms more supportive of use. The reverse-coded variables were categorized as such: 1–2 = lower approval; 3–5 = moderate approval; and 6–7 = higher approval.

Perceived peer descriptive norms—In a single item, participants were asked to think of their five closest friends and rate how often these friends smoked cigarettes. In two other separate items, the same question was asked with respect to smoking/using marijuana and drinking alcohol. Each item had a 5-point Likert scale: 1 = *never*, 2 = *almost never*, 3 = *sometimes*, 4 = *often*, and 5 = *almost always*. Categories were reduced to 1 = never, 2–3 = almost never/sometimes, and 4–5 = often/almost always (Simons-Morton et al., 2016).

Statistical analysis—We first conducted Wald chi-square tests of independence between self-reported personal income and the following covariates: gender, race/ethnicity, current post-secondary school attendance, current residence, and family affluence.

Then, each substance (cigarettes, marijuana, alcohol use, HED) was examined in separate, unadjusted, binomial logistic regression models with self-reported personal income as the only independent variable. Then, the following covariates were added to each model: gender, race/ethnicity, current post-secondary school attendance, current residence, and family affluence. Finally, perceived peer injunctive norms and perceived peer descriptive norms were included as additional covariates.

All analyses were conducted in SAS 9.4. We used the PROC SURVEYLOGISTIC command to run logistic regression models and the PROC SURVEYFREQ command for Wald chi-square tests of independence. All descriptive statistics, Wald chi-square tests, and regression models accounted for the complex survey design (stratification by census division, clustering by primary sampling unit, and Wave 5 cross-sectional weight).

Results

The frequencies and weighted percentages of participant characteristics, five-category personal income, and binary substance use are shown in Table 1. Past-year personal income was distributed as such: 16.4% for no earnings over the previous year; 43.1% for up to \$5,000; 17.2% for \$5,000–\$9,999; 10.6% for 10,000–\$14,999; and 12.8% for \$15,000+. About 23.5% of the sample reported smoking cigarettes, 21.7% reported using marijuana, 55.6% reported consuming alcohol, and 40.8% of the sample reported HED at least once in the past 30 days. Also shown in Table 1 is the prevalence of perceived peer injunctive norms. Higher peer approval for each substance was as such: 41.2% for cigarette use, 47.2% for marijuana use, and 56.9% for alcohol use. The prevalence of perceived peer descriptive norms is also presented in Table 1. About 6.7% of the sample reported their five closest friends often/almost always smoked cigarettes, 8.4% reported their five closest friends often/almost always used marijuana, and 14.9% reported their five closest friends often/almost always drank alcohol.

Table 2 presents Wald chi-square tests of independence between participant characteristics and personal income. Gender, race/ethnicity, current residence, and current post-secondary school attendance were significantly associated ($p < 0.05$) with personal income. Family affluence was not significantly associated with earned income.

Table 3 exhibits the unadjusted odds and adjusted odds of smoking cigarettes (any use versus no use) over the past 30 days by level of self-reported personal income. Compared to those with no personal earnings, those who earned \$5,000–\$9,999; \$10,000–\$14,999; or \$15,000+ in the past year had significantly higher odds of smoking cigarettes at least once in the past 30 days. After controlling for gender, race/ethnicity, current post-secondary school attendance, current residence, and family affluence, those who earned up to \$5,000 in the past year had significantly higher odds of smoking cigarettes. After including perceived peer injunctive norms and perceived peer descriptive norms of cigarette smoking as additional covariates, none of the personal income categories were associated with cigarette use. Table 3 also presents unadjusted and adjusted odds of marijuana use. Across all models, compared to those who reported earning no income over the past year, those who earned more were not at significantly higher odds of using any marijuana in the past 30 days.

Table 4 presents the unadjusted and adjusted odds of drinking alcohol. Compared to participants with no personal income, those who earned up to \$5,000; \$5,000–\$9,999; \$10,000–\$14,999; or \$15,000+ in the past year had significantly higher odds of consuming alcohol at least once in the past 30 days. After controlling for gender, race/ethnicity, current post-secondary school attendance, current residence, and family affluence, those who earned up to \$5,000; \$5,000–\$9,999; or \$10,000–\$15,999 over the past year had significantly higher odds of consuming any alcohol. The estimate for the \$15,000+ group approached statistical significance with a lower bound of 1.00 in the 95% confidence interval. After including perceived peer injunctive norms and perceived peer descriptive norms of alcohol use as additional covariates, the \$10,000–\$14,999 group had significantly higher odds of any alcohol use.

Table 4 also exhibits the unadjusted and adjusted odds of HED. Compared to those with no reported personal earnings, those who earned up to \$5,000; \$10,000–\$14,999; or \$15,000+ in the past year had significantly higher odds of HED at least once in the past 30 days. After controlling for gender, race/ethnicity, current post-secondary school attendance, current residence, and family affluence, the \$10,000–\$14,999 group and \$15,000+ group had significantly higher odds of HED. After adding perceived peer injunctive norms and perceived peer descriptive norms of alcohol use as additional covariates, the \$15,000+ group was at significantly higher odds of HED.

Discussion

In this study, we examined cross-sectional associations between self-reported, past-year personal income and 30-day substance use among a nationally representative sample of emerging adults in the United States. In the unadjusted models, those at certain levels of higher personal income had a greater likelihood of smoking cigarettes, drinking alcohol, or engaging in HED. Some emerging adults may need their own income to acquire cigarettes or alcohol from sources that require monetary compensation, and this may be implicated by our unadjusted findings. After adjusting for covariates excluding perceived peer norms, some of the personal income groups were still at significantly higher odds of alcohol use or HED, indicating alcohol may be more accessible to emerging adults at certain levels of higher personal earnings.

However, after adding injunctive peer norms and descriptive peer norms as covariates, most earned income categories were no longer significant with the cigarette or alcohol outcomes. Interestingly, a study on a national sample of adolescents presented similar findings in regards to heavy drinking (Paschall et al., 2004). Analyzing data from an Add Health survey, Paschall et al. (2004) found that personal income was significantly associated with frequent engagement in heavy drinking in adjusted models that did not include peer norms. But when they included perceived peer descriptive norms of alcohol use as a covariate, participants' personal income was no longer associated while peer descriptive norms remained significant.

In our study, descriptive peer norms, as well as injunctive peer norms, were robustly associated in the fully adjusted models, which is not surprising considering previous research on norms (Andrews et al., 2002; Etcheverry & Agnew, 2008; Neighbors et al., 2007; Simons-Morton et al., 2016). Also, one or two categories of current residence remained significant. This included college residence, which has also been found associated with emerging adult substance use in past research (Eisenberg et al., 2014; O'Brien et al., 2017; Simons-Morton et al., 2016). The results from our study suggest the association of personal earnings may be partly attenuated by social factors, particularly by perceived peer norms.

In theory, income (money and time) and costs (monetary, time-related, health-related, and social) are opposing factors when emerging adults choose to engage in substance use (Correia et al., 2010; Murphy et al., 2007). Higher income is believed to make consumption more likely, and higher costs are believed to make consumption less likely (MacKillop et al.,

2008; Murphy et al., 2007, 2009; Murphy & MacKillop, 2006). It follows that lower income makes substance use less likely and lower costs make it more likely. In research (MacKillop et al., 2008; Murphy et al., 2009; Murphy & MacKillop, 2006) and in practice (Bader et al., 2011; Gruber, 2002; Laixuthai & Chaloupka, 1993), the negative associations between monetary cost and smoking (or intended smoking) as well as drinking (or intended drinking) have been consistent with the cost side of the theory. Furthermore, in past experimental research, potential costs in the form of missing a next-day academic commitment (a class to attend or an exam to take) lowered alcohol demand among college students (Berman & Martinetti, 2017; Skidmore & Murphy, 2011). In contrast, our findings lend some support, albeit modest, to the income side of the theory where higher monetary income facilitates smoking and drinking.

Yet, our findings may provide some support to the cost side of the theory with respect to social costs, at least for cigarette smoking and drinking. Through social reinforcement, an environment supportive of use could possibly decrease social costs (Murphy et al., 2007; Murphy & Dennhardt, 2016) by lowering social barriers to either behavior, thereby making either behavior more likely. In this respect, our study suggests the living environment and peer norms might be important aspects of social cost as it relates to cigarette use and alcohol use among emerging adults.

Those at most of the higher personal income groups had a greater likelihood of smoking cigarettes in the unadjusted analysis. This is consistent with the sparse literature on teenagers and emerging adults and is consistent with the income side of the theory. In the fully adjusted model that included perceived peer norms, personal income was no longer associated with smoking cigarettes whereas residing in their own place/rented room or apartment, higher peer approval of smoking, and peer engagement in smoking were significant risk factors. Compared to a parent's/relative's home, there may be less supervision from authority figures when emerging adults live in their own place/rented room or apartment. This could be thought of as lowering the social cost of smoking. Furthermore, if peers are believed to implicitly endorse smoking, this could also be thought of as lowering the social cost of smoking. Lower social cost and higher monetary income both theoretically make smoking more likely, and the point estimates for earned income, own place/rented room or apartment, and peer norms were all greater than one in the fully adjusted model. However, the latter two remained significant while monetary income did not. This indicates emerging adults may be more sensitive to the social environment than to monetary income as it pertains to smoking, a concept that would need further investigation.

The unadjusted findings for alcohol use were consistent with the income side of the theory where having more income puts emerging adults at risk of drinking. After adjusting for covariates aside from peer norms, three of the four earned income categories were still significant and the other category approached statistical significance with a lower bound of 1.00 in the 95% confidence interval. This provides some additional support to the income side of the theory. Since the majority of our sample (92.8%) was under the legal drinking age at Wave 5, it is possible they acquired alcohol from older peers or used fake identification (ID) to purchase alcohol from retail outlets. The positive association is consistent with studies on teenagers (Godley et al., 2006; Kaestner et al., 2013) and a study

on emerging adults (Martin et al., 2009), but it is inconsistent with Finch et al. (2013) who found no association. Finch et al. (2013) may have observed no association because their sample was limited to emerging adults who reported smoking at least one cigarette in the past month, which might have already meant they were more likely than non-smokers to drink alcohol (Bobo & Husten, 2000; Drobles, 2002; Yurasek, Murphy, Clawson, Dennhardt, & MacKillop, 2013).

In the fully adjusted alcohol use model with peer norms, only the \$10,000–\$14,999 group was significant. This suggests living in the drinking-friendly confines of a college campus and perceiving peer norms supportive of drinking may lower the social cost of drinking. On the other hand, a college campus and pro-alcohol norms might have provided access to group environments where participants could obtain alcohol with relatively little financial commitment, thereby possibly attenuating the association of personal income via an alternative mechanism.

The unadjusted findings for HED were relatively consistent with the income side of the theory, with most of the higher earned income groups more likely to engage in HED. The adjusted model without peer norms provided some modest support to the theory, given the two highest income categories remained significant. The positive associations were consistent with studies among teenagers (Bellis et al., 2007; Paschall et al., 2004) and a study on emerging adults that found a positive association between available spending money and being drunk (Martin et al., 2009). It is unclear how personal income could have specifically facilitated heavy drinking since most participants were too young to drink at a bar, restaurant, or club, though it may have facilitated acquiring larger quantities of alcohol through other means.

However, in the adjusted analysis that included peer norms, only the highest category of personal earnings was associated with HED while the more socially relevant variables were associated with HED. The loss of association between earned income and HED was similar to a finding in Paschall et al. (2004). Like simple alcohol use, it is possible that the social environment made HED accessible with relatively little financial commitment. On the other hand, living in a college residence hall, fraternity/sorority house, or an individual's own place/apartment might have presented lower barriers to underage heavy drinking compared to a bar, restaurant, or club. Peer norms supportive of drinking may have also lowered the social cost of HED. The theoretical effects of lower cost and higher income act in the same direction. However, the residential and normative factors remained significant while monetary income did not. This indicates emerging adults might be more sensitive to the social environment than to monetary income as it pertains to drinking, another concept that would need further investigation.

Curiously, higher personal earnings were not associated with marijuana use. The non-significant findings were consistent with those of Finch et al. (2013). By 2014 (when Wave 5 of the NEXT Study was administered), only two states (Colorado and Washington) had legalized recreational marijuana. Still, it was only legal there for adults aged 21 or older. Just 14 participants in our sample at Wave 5 reported living in either of those states, and only one of them was 21 or older. Thus, it is possible that the black market was a source of marijuana

for the majority of participants, implying the economic dynamics of illicit drugs might have been in play. Specifically, empirical research has indicated that illicit drug prices can be highly variable due to different factors including price discrimination and the varying purity of drugs (Caulkins & Baker, 2010; Caulkins & Reuter, 1998). Therefore, access to any marijuana might not have been differentiated by the level of earned income but by other economic factors unique to illicit drugs.

Limitations

Our study is not without limitations. This is a cross-sectional survey study, which precludes causal inferences. However, we examined an association that is understudied among the emerging adult population. The self-reported nature of this study introduces the possibility that some participants may not have accurately recalled how much income they earned over the previous year, perhaps because they earned income at irregular intervals or only for a portion of the year. The response choices contained ranges of income though, which likely decreased the need for a participant to recall or estimate a specific number.

Second, we did not have a measure or a viable proxy that captured the amount of financial support that parents/guardians might have provided to participants. Financial support could have supplemented participants' personal income and thus made substances more economically accessible. Inclusion of financial support in the models would have given us a more complete assessment of participants' monetary situation.

Next, by analyzing binary substance use outcomes, we did not take into account potential differences between lower frequency use (e.g. once or twice) and higher frequency use (e.g. 40 times or more) in relation to earned income. Given our sample size, it would not have been feasible to examine the association between five-category personal income and multi-category substance use outcomes. Future studies may seek to examine the association between personal earnings and the frequency of substance use among emerging adults who are substance users.

Lastly, unlike Godley et al. (2006), we did not definitively know if participants used a portion of their earned income to buy substances. Nonetheless, we felt an association between individually earned income and substance use would suggest some sort of monetary transaction between two parties, at least in some instances. Cigarettes could have been purchased from commercial vendors, marijuana acquired from the black market with cash, and alcohol bought from retail outlets with a fake ID. Even if a participant acquired a substance from a peer, the peer could have asked for money in return. Therefore, it is likely there were instances when participants exchanged some of their earned income for substances.

Conclusion

Higher personal income may give emerging adults economic access to cigarettes and alcohol. However, the access provided by earned income might be partly attenuated by peer norms supportive of use and by a place of residence where emerging adults come in contact with similarly aged peers with little supervision from authority figures. Examples of this

kind of residence are a college residence hall, a fraternity/sorority house, and an individual's own space/rented room or apartment. In the context of behavioral economic theory, this poses the question of whether a reduction in social costs may be more influential than an increase in monetary income on emerging adult decision-making as it relates to cigarette and alcohol use.

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Table 1. Participant characteristics, prevalence of substance use, and prevalence of perceived peer norms.

	<i>n</i>	Weighted percentage (%)	95% CI (%)
Gender			
Male	904	40.78	(36.94, 44.63)
Female	1298	59.22	(55.37, 63.06)
Race/ethnicity			
White	858	60.75	(49.63, 71.87)
African-American	572	13.61	(6.63, 20.59)
Hispanic	656	20.22	(12.15, 28.30)
Other	108	5.42	(3.26, 7.58)
Current post-secondary school attendance			
Not attending post-secondary school	720	37.47	(31.40, 43.53)
Technical/vocational school or community college	570	22.40	(16.17, 28.64)
4-year college/university	911	40.13	(34.26, 46.00)
Current residence			
Parent's or relative's home	1419	53.85	(46.75, 60.94)
College campus	266	13.10	(9.23, 16.98)
Own place/rented room or apartment	449	28.78	(21.74, 35.82)
Other	60	4.27	(1.00, 7.54)
Family affluence			
Low	711	22.97	(17.50, 28.44)
Moderate	1019	48.57	(45.63, 51.50)
High	470	28.47	(22.99, 33.95)
Personal income (over previous year)			
No personal income	502	16.39	(12.00, 20.77)
Up to \$5,000	940	43.09	(39.50, 46.69)
\$5,000–\$9,999	311	17.16	(14.01, 20.31)
\$10,000–\$14,999	206	10.57	(8.34, 12.80)
\$15,000+	227	12.79	(9.77, 15.80)
Substance use (over past 30 days)			

	<i>n</i>	Weighted percentage (%)	95% CI (%)
No cigarette smoking	1740	76.51	(70.72, 82.29)
Any cigarette smoking	404	23.49	(17.71, 29.28)
No marijuana use	1659	78.30	(73.54, 83.07)
Any marijuana use	484	21.70	(16.93, 26.46)
No alcohol use	1053	44.45	(38.81, 50.09)
Any alcohol use	1089	55.55	(49.91, 61.19)
No HED	1392	59.24	(53.14, 65.35)
Any HED	747	40.76	(34.65, 46.86)
Perceived peer injunctive norms			
Approval of cigarette smoking			
Lower	756	36.29	(32.45, 40.13)
Moderate	496	22.56	(19.01, 26.11)
Higher	896	41.15	(37.68, 44.62)
Approval of marijuana use			
Lower	635	34.41	(30.23, 38.58)
Moderate	498	18.39	(15.63, 21.16)
Higher	1016	47.20	(43.42, 50.98)
Approval of alcohol use			
Lower	387	17.28	(14.11, 20.46)
Moderate	604	25.86	(23.34, 28.37)
Higher	1158	56.86	(52.90, 60.83)
Perceived peer descriptive norms (perceived peer use)			
Cigarette smoking			
Never	1602	73.61	(68.95, 78.28)
Almost never/sometimes	353	19.72	(15.64, 23.81)
Often/always	122	6.67	(4.48, 8.85)
Marijuana use			
Never	1475	72.03	(66.94, 77.12)
Almost never/sometimes	417	19.59	(15.43, 23.74)
Often/always	188	8.39	(6.02, 10.76)
Alcohol use			

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	<i>n</i>	Weighted percentage (%)	95% CI (%)
Never	1022	44.03	(38.78, 49.29)
Almost never/sometimes	767	41.09	(36.94, 45.25)
Often/always	291	14.87	(11.21, 18.54)

Abbreviations: HED – heavy episodic drinking; CI – confidence interval.

Note: Descriptive statistics account for the complex survey design.

Table 2.

Percentage (weighted) of participant characteristics within each category of self-reported personal income.

Characteristics	Personal Income Level										p^A
	No personal income		Up to \$5,000		\$5,000–\$9,999		\$10,000–\$14,999		\$15,000+		
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	
Gender											
Male	35.70	(27.02, 44.38)	33.59	(29.16, 38.01)	49.62	(41.66, 57.58)	45.56	(31.05, 60.08)	54.63	(43.96, 65.30)	< 0.01
Female	64.30	(55.62, 72.98)	66.41	(61.99, 70.84)	50.38	(42.42, 58.34)	54.44	(39.92, 68.95)	45.37	(34.70, 56.04)	
Race/ethnicity											
White	39.55	(23.69, 55.42)	61.44	(49.18, 73.70)	70.08	(56.00, 84.16)	63.73	(48.75, 78.70)	71.79	(57.91, 85.67)	0.04
African-American	23.00	(11.56, 34.44)	15.81	(7.62, 24.00)	8.33	(2.57, 14.08)	8.38	(2.79, 13.97)	4.45	(0.00, 8.92)	
Hispanic	31.89	(17.38, 46.41)	17.59	(9.99, 25.18)	15.11	(6.09, 24.12)	22.14	(10.74, 33.55)	19.11	(8.62, 29.60)	
Other	5.55	(1.57, 9.53)	5.16	(2.15, 8.17)	6.49	(0.19, 12.78)	5.76	(0.00, 13.07)	4.64	(0.00, 10.77)	
Current post-secondary school attendance											
Not attending	37.26	(27.33, 47.19)	28.77	(22.28, 35.26)	30.22	(22.44, 38.00)	49.28	(32.37, 66.18)	67.91	(54.38, 81.44)	0.01
Technical/vocational school or community college	27.50	(21.76, 33.24)	17.96	(10.89, 25.03)	25.92	(16.56, 35.27)	26.54	(12.18, 40.91)	21.76	(8.81, 34.71)	
4-year college/university	35.24	(26.49, 43.99)	53.28	(44.79, 61.76)	43.87	(35.38, 52.35)	24.18	(14.90, 33.46)	10.33	(4.28, 16.37)	
Current residence											
Parent's or relative's home	61.62	(49.67, 73.56)	51.12	(43.60, 58.64)	50.91	(38.62, 63.20)	61.83	(50.55, 73.11)	49.70	(36.98, 62.42)	0.02
College campus	9.01	(4.74, 13.28)	20.11	(13.36, 26.87)	14.06	(6.10, 22.04)	2.94	(0.40, 5.47)	2.14	(0.00, 4.56)	
Own place/rented room or apartment	25.31	(13.49, 37.12)	26.26	(18.15, 34.38)	30.19	(18.90, 41.47)	35.16	(22.82, 47.51)	34.84	(25.02, 44.67)	
Other	4.06	(0.00, 8.60)	2.50	(0.42, 4.59)	4.84	(0.00, 10.22)	0.07	(0.00, 0.21)	13.31	(3.21, 23.41)	
Family affluence											
Low affluence	27.06	(16.79, 37.32)	22.16	(14.65, 29.67)	19.29	(12.15, 26.43)	22.75	(12.14, 33.36)	23.46	(13.59, 33.32)	0.42
Moderate affluence	45.82	(38.96, 52.69)	46.62	(40.77, 52.46)	51.64	(44.35, 58.92)	57.20	(44.39, 70.00)	48.96	(39.08, 58.84)	
High affluence	27.12	(16.93, 37.32)	31.22	(26.22, 36.22)	29.07	(17.55, 40.59)	20.05	(5.14, 34.97)	27.58	(18.03, 37.13)	

^AWald chi-square test of independence, accounting for complex survey design.

Abbreviations: CI – confidence interval.

Table 3.

Association between self-reported personal income and odds of cigarette smoking or marijuana use in the past 30 days.

	Cigarette smoking in past 30 days (Ref = no smoking)			Marijuana use in past 30 days (Ref = no marijuana use)		
	Unadjusted model OR (95% CI)	Adjusted model with covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)	Unadjusted model OR (95% CI)	Adjusted model with covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)
Personal income						
No personal income (Ref)	—	—	—	—	—	—
Up to \$5,000	1.55 (0.96–2.50)	1.75 (1.01, 3.04)	1.21 (0.65–2.25)	1.55 (0.76–3.16)	1.73 (0.84, 3.55)	1.41 (0.61, 3.27)
\$5,000–\$9,999	1.85 (1.01–3.41)	1.85 (0.98, 3.46)	1.48 (0.73–3.02)	1.33 (0.75–2.38)	1.43 (0.79, 2.59)	1.22 (0.56–2.64)
\$10,000–\$14,999	2.22 (1.04–4.74)	1.75 (0.81, 3.80)	1.50 (0.57–3.94)	1.49 (0.64–3.50)	1.50 (0.65, 3.49)	1.25 (0.37–4.19)
\$15,000+	3.05 (1.41–6.57)	2.00 (0.94, 4.29)	1.51 (0.65–4.11)	1.12 (0.67–1.87)	1.10 (0.59, 2.06)	1.14 (0.37–3.49)
Gender						
Female (Ref)	—	—	—	—	—	—
Male	—	1.10 (0.73, 1.65)	0.99 (0.68–1.45)	—	1.92 (1.22, 3.03)	1.72 (0.94, 3.13)
Race/ethnicity						
White (Ref)	—	—	—	—	—	—
African-American	—	0.59 (0.33, 1.05)	0.48 (0.27–0.85)	—	1.58 (1.05, 2.40)	1.61 (0.98, 2.65)
Hispanic	—	0.56 (0.32, 0.99)	0.63 (0.36–1.08)	—	0.66 (0.41, 1.06)	0.95 (0.52, 1.74)
Other	—	0.95(0.37, 2.41)	0.73 (0.26–2.04)	—	0.45 (0.10, 1.98)	0.22 (0.09–0.56)
Current post-secondary school attendance						
Not attending (Ref)	—	—	—	—	—	—
Technical/vocational school or community college	—	0.75 (0.45, 1.24)	0.72 (0.41–1.26)	—	1.21 (0.64, 1.27)	0.86 (0.48, 1.54)
4-year College/university	—	0.27 (0.16, 0.46)	0.23 (0.11–0.46)	—	0.85 (0.50, 1.44)	0.67 (0.28, 1.60)
Current residence						
Parent's or relative's home (Ref)	—	—	—	—	—	—
College campus	—	1.04 (0.69, 1.56)	1.11 (0.69–1.80)	—	0.76 (0.45, 1.29)	0.47 (0.23–0.98)
Ownplace/rented room or apartment	—	1.33 (0.97, 1.82)	1.65 (1.07–2.52)	—	1.22 (0.87, 1.73)	1.28 (0.80–2.05)
Other	—	0.73 (0.41, 1.29)	0.75 (0.38–1.48)	—	0.40 (0.17, 0.96)	0.22 (0.09–0.53)
Family affluence						
Low affluence (Ref)	—	—	—	—	—	—
Moderate affluence	—	1.02 (0.65, 1.60)	1.35 (0.77–2.35)	—	0.47 (0.27, 0.84)	0.47 (0.22–1.01)

	Cigarette smoking in past 30 days (Ref = no smoking)			Marijuana use in past 30 days (Ref = no marijuana use)		
	Unadjusted model OR (95% CI)	Adjusted model with covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)	Unadjusted model OR (95% CI)	Adjusted model with covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)
High affluence	—	1.39(0.91, 2.12)	1.42 (0.82–2.46)	—	0.84 (0.50, 1.44)	0.63 (0.29–1.37)
Perceived peer injunctive norms						
Lower approval (Ref)	—	—	—	—	—	—
Moderate approval	—	—	2.56 (0.97–6.82)	—	—	1.60 (0.79–3.27)
Higher approval	—	—	3.49 (1.80–6.75)	—	—	5.43 (2.87–10.25)
Perceived peer descriptive norms						
Never (Ref)	—	—	—	—	—	—
Almost never/sometimes	—	—	11.10 (6.26–19.67)	—	—	13.32 (8.22–21.58)
Often/always	—	—	12.23 (6.77–22.08)	—	—	67.90 (29.42–156.71)

Abbreviations: OR – odds ratio; AOR – adjusted odds ratio; CI – confidence interval.

Note: Perceived peer norms of cigarette smoking were controlled for in the fully adjusted cigarette smoking model. Perceived peer norms of marijuana use were controlled for in the fully adjusted marijuana use model. All models accounted for complex survey design. Significant associations ($p < 0.05$) are in bold.

Table 4.

Associations between self-reported personal income and odds of alcohol use and HED in the past 30 days.

	Alcohol use in past 30 days (Ref = no alcohol use)			HED in past 30 days (Ref = no HED)		
	Unadjusted model OR (95% CI)	Model adjusted for covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)	Unadjusted model OR (95% CI)	Model adjusted for covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)
Personal income						
No personal income (Ref)	—	—	—	—	—	—
Up to \$5,000	2.40 (1.41–4.08)	2.10 (1.16, 3.77)	1.50 (0.79–2.86)	1.76 (1.04–2.99)	1.44(0.83, 2.47)	0.81(0.42, 1.57)
\$5,000–\$9,999	2.43(1.42–4.14)	2.10(1.19, 3.70)	1.48 (0.76–2.87)	1.82 (0.97–3.42)	1.34 (0.69, 2.60)	0.71 (0.31, 1.60)
\$10,000–\$14,999	3.39 (1.65–6.99)	3.56 (1.59, 8.01)	2.78 (1.15–6.72)	2.76 (1.40–5.44)	2.54 (1.27, 5.09)	1.66 (0.72, 3.81)
\$15,000+	2.21 (1.11–4.43)	2.18 (1.00, 4.79)	1.57 (0.64–3.88)	2.85 (1.51–5.39)	2.52 (1.29, 4.90)	1.93(1.02, 3.65)
Gender						
Female (Ref)	—	—	—	—	—	—
Male	—	0.88 (0.60, 1.29)	0.55 (0.34–0.90)	—	1.41 (1.03, 1.93)	1.08 (0.72, 1.61)
Race/ethnicity						
White (Ref)	—	—	—	—	—	—
African-American	—	0.67(0.48, 0.95)	0.67 (0.42–1.06)	—	0.50 (0.31, 0.81)	0.45 (0.30, 0.66)
Hispanic	—	0.67 (0.42, 1.07)	1.01 (0.66–1.54)	—	0.50 (0.31, 0.81)	0.75 (0.50, 1.13)
Other	—	0.43 (0.19, 0.96)	0.40 (0.17–0.97)	—	0.51 (0.20, 1.32)	0.48 (0.19, 1.21)
Current post-secondary school attendance						
Not attending (Ref)	—	—	—	—	—	—
Technical/vocational School or community college	—	1.47 (0.93, 2.30)	1.13 (0.64–2.01)	—	1.61 (1.16, 2.24)	1.37(0.90, 2.08)
4-year College/university	—	1.19 (0.80, 1.77)	0.63 (0.36–1.09)	—	1.35(0.90, 2.03)	0.65 (0.37, 1.15)
Current residence						
Parent's or relative's home (Ref)	—	—	—	—	—	—
College campus	—	1.97(1.31, 2.95)	2.40 (1.28–4.50)	—	1.71 (1.14, 2.57)	2.10(1.18, 3.72)
Own place/rented room or apartment	—	1.38 (0.95, 2.02)	1.36 (0.88–2.12)	—	1.75 (1.23, 2.49)	1.86 (1.17, 2.95)
Other	—	1.13 (0.51, 2.51)	1.08 (0.55–2.15)	—	1.10 (0.61, 1.98)	0.93 (0.48, 1.81)
Family affluence						
Low affluence (Ref)	—	—	—	—	—	—
Moderate affluence	—	1.26 (0.84, 1.90)	1.39 (0.92–2.08)	—	1.25 (0.83, 1.87)	1.42 (0.90, 2.25)

	Alcohol use in past 30 days (Ref = no alcohol use)			HED in past 30 days (Ref = no HED)		
	Unadjusted model OR (95% CI)	Model adjusted for covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)	Unadjusted model OR (95% CI)	Model adjusted for covariates AOR (95% CI)	Adjusted model including Perceived Peer Norms AOR (95% CI)
High affluence	—	1.91 (1.11, 3.28)	1.61 (0.89–2.93)	—	1.69 (1.02, 2.80)	1.39 (0.81, 2.39)
Perceived peer injunctive norms						
Lower approval (Ref)	—	—	—	—	—	—
Moderate approval	—	—	2.99 (1.81–4.93)	—	—	2.46 (1.41, 4.29)
Higher approval	—	—	3.87 (2.08–7.17)	—	—	3.72 (2.09, 6.60)
Perceived peer descriptive norms						
Never (Ref)	—	—	—	—	—	—
Almost never/sometimes	—	—	7.00 (4.63–10.57)	—	—	10.16 (6.73, 15.35)
Often/always	—	—	27.83 (15.50–49.99)	—	—	57.94 (29.07, 115.48)

Abbreviations: HED – heavy episodic drinking; OR – odds ratio; AOR – adjusted odds ratio; CI – confidence interval.

Note: Perceived peer norms of alcohol use were controlled for in the fully adjusted models. All models accounted for complex survey design. Significant associations ($p < 0.05$) are in bold.