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Neighborhood Socioeconomic Status and Substance Use by U.S. Adults

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Abstract

Background—This study examined relationships of extremes in neighborhood socioeconomic status with use of tobacco, alcohol, marijuana and other drugs. Hypotheses were (1) residence in disadvantaged neighborhoods would be positively associated with stress-related and higher-risk substance use patterns (e.g., drug use), and (2) residence in affluent neighborhoods would be positively associated with "healthy" substance use (e.g., drinking within recommended guidelines) and negatively associated with substance use patterns incompatible with a culture of health. Age was examined as a potential moderator.

Methods—Data were from nationally-representative samples of U.S. adults (N=14,531) from the 2000 and 2005 National Alcohol Surveys linked with indicators of neighborhood SES from the 2000 U.S. Decennial Census. Analyses included gender-stratified multivariate logistic regression using weights to adjust for sampling and non-response.

Results—As hypothesized, compared to middle-class neighborhoods, residence in disadvantaged neighborhoods was associated with higher odds of both men's and women's tobacco use and with women's other drug use. Residence in affluent neighborhoods was associated with lower odds of men's tobacco use and women's marijuana use. The association of neighborhood SES with men's tobacco use was modified by age, with the highest odds of daily tobacco use evident for all men in disadvantaged neighborhoods, as well as for younger men in middle-class neighborhoods. There were no significant associations of either alcohol outcome with neighborhood SES.

Conclusions—Increased risk of substance use for younger residents in both disadvantaged and middle-class neighborhoods and for older residents in disadvantaged neighborhoods suggest a need for targeted prevention interventions.

Keywords

neighborhood; tobacco; alcohol; substance use

Contributors
Dr. Karriker-Jaffe designed the study, undertook the statistical analysis and wrote the manuscript.

Conflict of Interest
Dr. Karriker-Jaffe declares she has no conflicts of interest.

1. INTRODUCTION

The importance of the neighborhood context for successful child and adolescent development has long been acknowledged (Bronfenbrenner, 1979), and studies of neighborhood effects on youth have proliferated over the past two decades (Leventhal and Brooks-Gunn, 2000). Neighborhood effects persist into adulthood, as the place one lives provides a context for both work and leisure, and many people develop important social relationships with neighbors. In the best cases, neighborhoods provide infrastructure and social structures that are positive resources for residents both young and old (Browning and Cagney, 2003; Robert, 1999; Wen et al., 2003); however, neighborhoods also can cause stress and tension (Cohen et al., 2003; Ewart and Suchday, 2002; Fitzpatrick and LaGory, 2000) or provide contextual cues and social norms promoting health risk behaviors such as alcohol or drug use (Ahern et al., 2008). For some, the combination of neighborhood stress and permissive social norms may result in tobacco, alcohol or other drug use to cope with increased anxiety and tension (Greeley and Oei, 1999; Moos et al., 1989). Neighborhood effects vary quite widely according to individual attributes, including the amount of time spent near home (Inagami et al., 2007). The current study examines effects of neighborhood socioeconomic status (SES) on substance use in a national sample of U.S. adults and examines variation by gender and age.

Studies of neighborhood effects on adult health outcomes suggest neighborhood SES is an important marker of a variety of contextual factors that impact health and behavior. Disadvantaged neighborhoods often suffer from illicit drug sales and proliferation of alcohol outlets including bars and liquor stores (Bluthenthal et al., 2008), as well as erosion of social controls of behaviors considered to be risky, antisocial or unconventional (Sampson and Groves, 1989; Wilson, 1987). Visible drug sales (Bradizza and Stasiewicz, 2003; Kadushin et al., 1998; Lambert et al., 2004), high alcohol outlet density (Bryden et al., 2012; Livingston et al., 2007; Theall et al., 2009) and social disorganization (Duncan et al., 2000; Esbensen and Huizinga, 1990; Hill and Angel, 2005; Lambert et al., 2004; Wilson et al., 2005) each contribute to substance use and associated problems. At the other end of the socioeconomic spectrum are more affluent areas. Residents of these areas often embrace health-related lifestyles (Cockerham et al., 1997; Ross, 2000). In contrast with neighborhood disadvantage, neighborhood affluence may be associated with certain types of light, recreational substance use patterns that are compatible with a sub-culture of health, such as moderate alcohol use.

Some studies show strong associations between neighborhood disadvantage and increased use of tobacco, alcohol or drugs (Boardman et al., 2001; Datta et al., 2006; Diez Roux et al., 2003; Giggs et al., 1989; Stimpson et al., 2007; Waitzman and Smith, 1998; Williams and Latkin, 2007). A recent review found that neighborhood SES was associated with both adult and adolescent substance use outcomes, with effects of neighborhood disadvantage noted more consistently in samples of adults (Karriker-Jaffe, 2011). There have only been a few studies conducted in the U.S. with national samples, as in the current study. Those suggest that neighborhood disadvantage is associated with recreational and illicit drug use (Ford and Beveridge, 2006; Hoffmann, 2002), heavy drinking (Karriker-Jaffe et al., 2012; Stimpson et al., 2007), and alcohol-related problems (Jones-Webb et al., 1997; Karriker-Jaffe et al., 2012). However, these national studies of neighborhood effects on drug outcomes often find differing results depending on the specific neighborhood measure employed. This was the case in the study by Hoffmann (2002), which documented a positive association between male joblessness in the neighborhood and adolescent drug use, as well as a negative association of the same outcome with neighborhood poverty. Findings also tend to vary by the particular outcome considered, such as in the study by Ford and Beverage (2006), which showed neighborhood disadvantage was associated with increased use of barbiturates and

amphetamines, but not greater use of marijuana, cocaine, LSD or tranquilizers. The current study contributes to the extant literature by considering separate substance use outcomes in addition to alcohol, while using a Census-based composite measure of neighborhood socioeconomic status (SES) that allows differentiation of effects of affluent and disadvantaged (compared to middle-class) neighborhoods in a national sample of U.S. adults.

Characterization of neighborhoods in this manner is important, as there may be unique characteristics associated with conditions of advantage that are not captured by a mere absence of disadvantage (Robert, 1999). That is, there may be distinct benefits to residence in the most affluent areas that are not present in other non-poor, middle-class neighborhoods (Browning and Cagney, 2003). Thus, the two extremes in neighborhood socioeconomic conditions (i.e., disadvantage and affluence) may differ in their relationships with substance use outcomes. For example, there is evidence for adults that neighborhood affluence is associated with being an alcohol drinker (Galea et al., 2007a, 2007b) and regularly using alcohol (Chuang et al., 2005; Pollack et al., 2005), while neighborhood disadvantage is associated with abstinence from alcohol (Karriker-Jaffe et al., 2012). It remains unclear whether neighborhood affluence is associated (either positively or negatively) with problem drinking, although analyses using a subset of the data included in the present investigation suggest there may not be a strong association (Mulia and Karriker-Jaffe, 2012). Two analyses of data from New York City suggest higher neighborhood incomes (Galea et al., 2007b) and higher neighborhood education (Galea et al., 2007a) are associated with increased marijuana use, but effects on other drugs were not reported. It is unknown whether findings from prior research will replicate when national data on other drug use by adults is considered.

Thus, this study examines relationships of neighborhood SES with five substance use outcomes using data from two national samples of U.S. adults (analyzed together). The hypotheses are as follows: (1) compared to middle-class neighborhoods, residence in disadvantaged neighborhoods will be positively associated with stress-related and risky substance use patterns (daily tobacco use, monthly drunkenness, monthly use of marijuana and monthly use of other drugs), and (2) compared to middle-class neighborhoods, residence in affluent neighborhoods will be positively associated with “healthy” substance use (drinking within recommended guidelines), but negatively associated with substance use patterns incompatible with a culture of health (particularly daily tobacco use and monthly use of drugs other than marijuana).

Neighborhood effects may be more pronounced for younger adults, as they are more likely to engage in substance use than their older counterparts and they may be more involved in neighborhood-based social networks formed through school activities; however it also is possible that older adults may be more place-bound after retirement from formal employment and thus may be more strongly influenced by their residential environment (Bernard et al., 2007). As such, interactions with age also are assessed. As gender differences in relationships of substance use patterns with neighborhood SES have been suggested by other studies (Karriker-Jaffe et al., 2012; Karvonen and Rimpelä, 1996; Karvonen and Rimpelä, 1997; Matheson et al., 2011), we present gender-stratified models to highlight any differences in associations of these outcomes with neighborhood disadvantage and affluence. Finally, because some studies show neighborhood disadvantage is associated with both increased abstinence and increased heavy drinking and alcohol-related problems among some drinkers (Karriker-Jaffe et al., 2012), we conduct analyses of the alcohol outcomes in the full sample and in a restricted sample of past-year drinkers.

2. METHODS

2.1. Study design

2.1.1. Dataset—Survey data come from the 2000 and 2005 National Alcohol Surveys (NAS). Both cross-sectional surveys utilized computer-assisted telephone interviews with randomly-selected adults ages 18 and older. Each survey included oversamples of African-Americans, Hispanics, and residents from low-population states. For more details on methodology, please see Kerr et al. (2004) and Midanik and Greenfield (2003). The 2000 NAS included 7,613 respondents (58% response rate); the 2005 NAS included 6,919 respondents (56% response rate). Although lower than those of many face-to-face surveys, these response rates are typical of telephone surveys in a time of increasing barriers to random-digit dial studies in the U.S. (Midanik and Greenfield, 2002). Evidence suggests low response rates for telephone surveys may not bias estimates as much as low response rates for in-person studies, because most telephone sample losses are due to immediate hang-ups that occur prior to description of the study (Groves, 2006).

Survey data were matched with indicators of neighborhood SES from the 2000 Census (U.S. Census Bureau, 2002). Respondent addresses were matched with census geocodes by a commercial geocoding firm, and were found to be highly accurate when compared to the gold standard recommended by Krieger and colleagues (2001). Survey data then were linked via these geocodes to indicators of neighborhood SES at the census tract level. Census tracts effectively delineate social and structural determinants of health behaviors, including substance use (Cook et al., 1997; Karriker-Jaffe, 2011; Krieger et al., 2002). Approximately two-thirds (60%) of the sample had geocodes assigned based on the street address; the remainder had a geocode assigned based on the ZIP Code centroid. Preliminary analyses determined that the relationship between neighborhood SES and the outcomes did not vary significantly according to geocode precision (data available upon request). Regardless, all analyses adjusted for the precision of the geocode match.

2.1.2. Sample—The sample was 52.0% female, and the average age was 44.8 years (41.0% were under age 40). The majority (63.5%) were married or living with a partner. Most respondents (71.8%) were Caucasian, but 11.4% were African American, and 11.4% were Hispanic/Latino. Over half (57.6%) of the respondents had attended at least some college or technical school, and 66.8% were employed either full- or part-time. See Table 1 for detailed respondent characteristics by gender.

2.2. Measures

2.2.1. Neighborhood SES—Neighborhood SES was based on composite indicators of socioeconomic disadvantage and affluence defined across three dimensions (income, educational capital and employment opportunities) using easily-interpretable, socially-relevant markers of extremes in SES (Krieger et al., 2002; Wagle, 2002; Wilson, 1987). Neighborhood disadvantage was defined using U.S. Census data on the proportions of adults without a high school diploma, males who were unemployed or not in the labor force, people with incomes below poverty, families with incomes below 50% of the U.S. median, and households without access to a car. Neighborhood affluence was defined using U.S. Census data on the proportions of families with incomes above 150% the U.S. median, households with income from secondary sources such as rent or dividends, adults over age 25 with a 4-year college degree, and adults over age 15 in management and professional occupations. The composite measures were validated in a prior study utilizing data from a subset of cases from the current sample using factor analysis and reliability assessment (Karriker-Jaffe and Kaskutas, 2009). In the current sample, each measure had high reliability (Cronbach's alphas=.89 for disadvantage and .91 for affluence), and disadvantage was

highly correlated with percent receiving public assistance (r=.73, $p<.01$) and proportion working class (r=.60, $p<.01$), while affluence was negatively correlated with these measures (r= −.53, $p<.01$, and r= −.89, $p<.01$, respectively).

Disadvantaged neighborhoods were those in the top quartile on the disadvantage composite; affluent neighborhoods were those in the top quartile on the affluence composite. Thus, 24.6% of respondents lived in disadvantaged neighborhoods and another 24.6% lived in affluent neighborhoods. Other than a small group of neighborhoods high on both disadvantage and affluence (0.8%, which were excluded), all other neighborhoods were classified as middle-class (reference group). Median household income averaged $27,868 in the sample's disadvantaged neighborhoods and $68,630 in the affluent neighborhoods, both of which were significantly different than the median income in middle-class neighborhoods ($42,746). The national median income was $41,994 in 1999 (U.S. Census Bureau, 2002). Median housing value averaged $89,048 in disadvantaged neighborhoods and $229,883 in affluent neighborhoods, both of which were significantly different than middle-class neighborhoods ($110,497). The national median housing value was $119,600 in 1999 (U.S. Census Bureau, 2002).

2.2.2. Outcomes—Substance use outcomes were based on the past 12 months. *Daily tobacco use* included smoking or using other tobacco "daily or nearly daily." *Drinking within guidelines* was a dichotomous variable indicating whether respondents had remained within the U.S. National Institute on Alcohol Abuse and Alcoholism's (National Institute on Alcohol Abuse and Alcoholism, 2005) gender-specific, low-risk guidelines for daily and weekly drinking. Recommended limits for men are no more than 4 drinks per day and 14 drinks per week; limits for women are no more than 3 drinks per day and 7 drinks per week. *Monthly drunkenness* was a dichotomous measure indicating whether respondents drank enough to feel drunk at least once a month. Frequency of drunkenness is a strong predictor of alcohol-related problems (Midanik, 1999). In this sample, monthly drunkenness was more strongly correlated with past-year alcohol problems (r=.53 with dependence symptoms and r=.48 with negative consequences of drinking, both $p<.01$) than was a measure of less frequent drunkenness (i.e., got drunk more than once in past year, with r=.49 with dependence symptoms and r=.40 with negative consequences of drinking, both $p<.01$). *Monthly marijuana use* was a dichotomous measure indicating using marijuana at least "once every month or two." *Monthly illicit drug use* was a dichotomous indicator of using cocaine, amphetamines or methamphetamines, heroin, tranquilizers, painkillers, hallucinogens, or prescription drugs "not as prescribed by a doctor" at least "once every month or two." In the current sample, monthly drug use measures each were more strongly associated with past-year drug problems (r=.31 for marijuana and r=.22 for other drugs, both $p<.01$) than an indicator of use at least once in the past year (r=.27 for marijuana and r=.05 for other drugs, both $p<.01$). Both monthly drug use measures included a majority of respondents who reported using the substance on a weekly basis or more (61.1% of monthly marijuana users and 55.1% of monthly users of other drugs).

2.2.3. Control variables—Basic multivariate analyses adjusted for *age* (18–29 years, 30–39 years, 40–49 years, and 50–59 years, with 60 years and over as reference), *race/ethnicity* (African American, Hispanic/Latino, and other race/ethnicity, with Caucasian as reference), *marital status* (married or partnered, with single/divorced/widowed as reference), *education* (less than high school, high school graduate, and some college, with college graduate as reference), *employment status* (unemployed and not in workforce, with employed as reference), *total household income before taxes* (five variables starting with "less than $10,000," with "more than $80,000/year" as reference, with an additional indicator of missing income). In models containing neighborhood SES, it is important to control for individual SES as it is a likely confounder of any observed associations between

neighborhood SES and behavior (Karriker-Jaffe et al., 2012); neighborhood and individual SES also have independent effects on health (Robert, 1999). Multivariate models also included indicators of *urbanicity* (more than 90% of tract residents living in an urban area or urbanized cluster), *geocoding precision* (whether geocode was based on ZIP code match or street address) and *survey year*.

In addition to these demographic controls, additional variables that might confound or mediate relationships between neighborhood SES and outcomes were included in final multivariate models. These included *sense of coherence*, measured with a 4-item scale indicating a positive outlook and orientation to the world as a manageable and meaningful place (Eriksson and Lindström, 2005), and which has protective effects on mortality (Wainwright et al., 2008) and substance use and related problems (Midanik and Zabkiewicz, 2009; Wainwright et al., 2008); current levels of *distress*, measured with an 8-item scale based on the Center for Epidemiologic Studies' Depression Scale (Radloff, 1977; Roberts, 1980), and which is associated with past-year substance use (Boardman et al., 2001; Graham et al., 2007; McGue et al., 1997; Mulia et al., 2008; Palfai et al., 2007; Stasiewicz and Maisto, 1993); *family history of alcohol problems* and *heavy drinking in teens*, to represent biological and behavioral propensity for substance use (Dawson et al., 2008, 1992; Prescott and Kendler, 1999); and *region of residence*, to indicate cultural norms around drinking as defined by Kerr (2010).

2.3. Data analysis

Associations between neighborhood SES (both disadvantage and affluence) and substance use were examined using gender-stratified unadjusted and adjusted logistic regression models. Adjusted models progressed from basic demographic controls to the larger set of possible confounding and mediating variables. Overall contribution of neighborhood SES to each model was assessed using an omnibus F-test (design-adjusted Wald test). Multivariate models for alcohol outcomes were repeated for past-year drinkers (n=9,971). Fully-adjusted moderation models assessed interactions between neighborhood SES (both disadvantage and affluence) with age using a dichotomous indicator (under age 40 vs. age 40 and over). Analyses were conducted using Stata (Stata Corp., 2009) to accommodate weights adjusting for sampling and non-response. Survey year was used as the weighting stratum in order to approximate the age, sex and race/ethnicity distributions of the U.S. population at the time each survey was conducted. Weights were normalized to each survey's sample size; respondents thus were weighted to represent the average person during the respective year of data collection. Preliminary analyses suggested associations between neighborhood SES and outcomes did not vary by survey year (data available upon request).

2.4. Human subjects protection

The current secondary data analysis was reviewed by the Institutional Review Boards of the Public Health Institute, Oakland, CA, and the University of California, Berkeley, and found to be exempt because no personally-identifying data were used.

3. RESULTS

3.1. Descriptive statistics

Respondents living in the sample's three types of neighborhoods showed important demographic differences. Compared to residents of the middle-class neighborhoods, respondents in disadvantaged neighborhoods were significantly more likely to be under 40 years of age (46.2% disadvantaged vs. 39.5% middle-class vs. 38.6% affluent neighborhoods, $F(1.98, 28573)=18.20$, $p<0.01$), less likely to be living with a partner or spouse (53.8% disadvantaged vs. 66.8% middle-class vs. 67.0% affluent neighborhoods,

$F(1.99, 28699)=71.43$, $p<0.01$), less likely to be white (48.4% disadvantaged vs. 79.1% middle-class vs. 80.7% affluent neighborhoods, $F(5.44, 78315)=193.11$, $p<0.01$), more likely to have dropped out of high school (23.1% disadvantaged vs. 10.9% middle-class vs. 5.2% affluent neighborhoods, $F(5.95, 85233)=159.28$, $p<0.01$), and less likely to be employed (61.2% disadvantaged vs. 67.9% middle-class vs. 70.2% affluent neighborhoods, $F(3.90, 55937)=17.49$, $p<0.01$).

Differences between men and women in prevalence of daily tobacco use, drinking within guidelines, monthly drunkenness and regular marijuana use were statistically significant (Table 1). Men reported higher rates of most outcomes, with the exception of drinking within recommended guidelines, which was more prevalent among women.

3.2. Bivariate models

Bivariate models showed neighborhood SES was significantly associated with daily tobacco use ($F(2, 14429)=26.36$, $p<0.01$), drinking within guidelines ($F(2, 14447)=8.85$, $p<0.01$), and regular marijuana use ($F(2, 14434)=3.36$, $p<0.05$) for men, and with daily tobacco use ($F(2, 14415)=17.12$, $p<0.01$), drinking within guidelines ($F(2, 14387)=15.77$, $p<0.01$), regular marijuana use ($F(2, 14436)=3.77$, $p<0.05$) and regular other drug use ($F(2, 14461)=8.79$, $p<0.01$) for women. Residence in disadvantaged (vs. middle-class) neighborhoods was associated with significantly higher odds of daily tobacco use, drinking within guidelines and regular marijuana use for men (Table 2), as well as with marginally higher odds of daily tobacco use and significantly higher odds of drinking within guidelines and regular other drug use for women (Table 3). Residence in affluent (vs. middle-class) neighborhoods was associated with significantly lower odds of daily tobacco use, drinking within guidelines and regular other drug use (marginally significant) for men, as well as with lower odds of daily tobacco use, drinking within guidelines, regular marijuana use and regular other drug use (marginally significant) for women.

3.3. Multivariate models

Some associations were attenuated upon adjustment for individual-level control variables (Tables 2 and 3). In multivariate models, neighborhood SES remained significantly associated with daily tobacco use ($F(2, 14306)=7.90$, $p<0.01$) and drinking within guidelines ($F(2, 14324)=4.15$, $p<0.05$) for men, and with daily tobacco use ($F(2, 14183)=6.25$, $p<0.01$), regular marijuana use ($F(2, 14203)=2.92$, $p=0.05$) and regular other drug use ($F(2, 14228)=5.64$, $p<0.01$) for women. For men, residence in disadvantaged (vs. middle-class) neighborhoods was associated with higher odds of tobacco use and drinking within recommended guidelines (marginally significant). For women, neighborhood disadvantage was associated with higher odds of both tobacco and other drug use. Residence in affluent (vs. middle-class) neighborhoods was associated with significantly lower odds of tobacco use and drinking within recommended guidelines (marginally significant) for men and with lower odds of both tobacco and marijuana use for women.

When the male sample was limited to past-year drinkers (full models not shown), there were no significant associations between neighborhood SES with either drinking within recommended guidelines ($F(2, 14396)=0.56$, $p>0.10$) or monthly drunkenness ($F(2, 14385)=0.86$, $p>0.10$). For past-year female drinkers, there also were no significant associations of neighborhood SES with either drinking within recommended guidelines ($F(2, 14325)=0.44$, $p>0.10$) or monthly drunkenness ($F(2, 14332)=0.39$, $p>0.10$).

Further adjustment for additional confounders or possible mediators of effects of neighborhood SES on outcomes did not substantively change the pattern of findings (Tables 4 and 5). Significant associations remained for neighborhood SES with men's tobacco use

($F(2, 14009)=8.11$, $p<0.01$) and with women's tobacco use ($F(2, 13845)=5.35$, $p<0.01$), marijuana use ($F(2, 13863)=3.41$, $p<0.05$) and other drug use ($F(2, 13811)=3.61$, $p<0.05$). Neighborhood disadvantage increased odds of men's tobacco use, women's tobacco use, and women's other drug use (marginally so). Neighborhood affluence decreased odds of men's tobacco use and women's marijuana use. The protective effect of neighborhood affluence on women's tobacco use was reduced to non-significance in the further-adjusted models, although the odds ratios for the multivariate models were similar in magnitude.

3.4. Modification by age

Omnibus F-tests from a second set of fully-adjusted models (not shown) identified a significant interaction of neighborhood SES with age for men's tobacco use ($F(2, 14371)=5.79$, $p<0.01$). There was an elevated risk of tobacco use for younger men (under age 40) in both disadvantaged and middle-class neighborhoods and for older men (ages 40 and older) only in disadvantaged neighborhoods (Figure 1).

In the full sample, there also was a significant interaction of neighborhood SES with age for women's drinking within recommended guidelines ($F(2, 13973)=3.23$, $p<0.05$), which reflected reduced probability of drinking within guidelines for older women in affluent neighborhoods, as well as slightly increased probability of drinking within guidelines for younger women in affluent neighborhoods. The interaction was not significant when limited to past-year female drinkers ($F(2, 14156)=1.15$, $p>0.10$).

4. DISCUSSION

The hypotheses were partially supported, with more evidence compatible with the disadvantage hypothesis than the affluence hypothesis. Specifically, compared to middle-class neighborhoods, residence in disadvantaged neighborhoods was positively associated with one of the stress-related behaviors (daily tobacco use by both men and women) and with one of the more risky substance use outcomes (regular use of other drugs by women). There were no significant associations of neighborhood disadvantage with either monthly drunkenness or regular marijuana use for men or women, however. As hypothesized, residence in affluent neighborhoods was negatively associated with substance use patterns incompatible with more conventional norms and a health culture (particularly less daily tobacco use, but also less regular marijuana use by women). However, the hypothesized associations of neighborhood affluence with the alcohol outcomes were not significant for either the full sample or the sub-sample of past-year drinkers. Additionally, other than robust results for tobacco, findings varied by gender, with associations between disadvantage and higher odds of other drug use and between affluence and reduced odds of regular marijuana use emerging only for women. The association between neighborhood SES and tobacco use for men was further modified by age, with protective effects of residence in middle-class neighborhoods only evident for older adults.

With some exceptions (see, for example, Diez Roux et al., 2003), most studies of neighborhood SES and tobacco use have focused on disadvantage, without considering effects of concentrated affluence. The gradient effect of neighborhood SES on tobacco outcomes observed in the current data thus extends findings from other studies using localized samples of adults in the U.S. (Ross, 2000; Tseng et al., 2001) and other countries (Duncan et al., 1999; Shohaimi et al., 2003), which have documented an association between neighborhood disadvantage and increased smoking. Increased tobacco use in disadvantaged neighborhoods may be partially due to the density of tobacco outlets (Henriksen et al., 2008), which may contribute to social norms supporting tobacco use and promote tobacco as a relatively low-cost stress-reduction strategy. As in a study of young adults in four U.S. cities (Diez Roux et al., 2003), in these national data, residence in

affluent neighborhoods was associated with a further reduction in daily tobacco use above that observed in middle-class (vs. disadvantaged) neighborhoods. Examination of mediators of effects of both neighborhood affluence and disadvantage on tobacco use would help confirm hypothesized differences in norms supporting healthy lifestyles. The moderation effect for men uncovered differential relationships between neighborhood SES and tobacco use by age, and other studies suggest neighborhood effects on smoking vary by race/ethnicity (Diez Roux et al., 2003; Kandula et al., 2009; Nowlin and Colder, 2007; Tseng et al., 2001). Future studies should examine which groups are at increased risk in disadvantaged and middle-class neighborhoods and identify protective factors that could be targets of intervention.

In this national sample there was a protective effect of neighborhood affluence on reduced marijuana use by women, but there was no association between neighborhood disadvantage and marijuana use for either men or women in adjusted models. This is counter to findings from a New York City sample (Galea et al., 2007a, 2007b), and it suggests that their reported positive associations between neighborhood affluence and recent marijuana use could be unique to large urban areas. Along those lines, the current multivariate models showed neighborhood urbanicity was significantly associated with increased marijuana use by men, but not by women. Although only statistically significant for women in multivariate models, the direction of associations of neighborhood SES with regular marijuana use differed for men and women. Additional investigations could provide valuable insight into social norms and attitudes toward marijuana use that may differ by gender and neighborhood SES, and also by urbanicity. These norms also may vary by region, as marijuana use was reported significantly more often by men in New England and the Pacific (compared to the Dry South; data available on request).

These data also produced somewhat unexpected results for regular use of drugs other than marijuana. There was a significant association between neighborhood disadvantage and other drug use for women. In contrast to findings from prior studies using local U.S. samples (Boardman et al., 2001; Williams and Latkin, 2007), in this national dataset, there was no significant relationship between neighborhood SES and regular non-marijuana drug use for men. There may be a “downward drift” of heavy substance users into disadvantaged neighborhoods over time (Buu et al., 2007) that could contribute to these findings, but it is not clear why this effect would be more pronounced for women than men. As documented in the fully-adjusted models, the increased odds of other drug use by women in disadvantaged neighborhoods was only slightly reduced after controlling for indicators of early substance use and genetic vulnerability to substance use, each of which may contribute to neighborhood selection as an adult. Replication of these results in other datasets would be informative.

Overall, there were no notable effects of neighborhood SES on the drinking outcomes. For both men and women, the strongest correlates of monthly drunkenness were age (inverse association) and heavy drinking as a teenager. One hypothesis was that stress-related behaviors, including frequent drunkenness, would be associated with neighborhood disadvantage. Alcohol may only be used to reduce stress by those individuals who drink to improve their emotional states or who expect alcohol to relieve stress or other negative emotions (Greeley and Oei, 1999). Thus, it would be informative to investigate individual differences in vulnerabilities to neighborhood stress that might contribute to increased alcohol (or other drug) use in disadvantaged neighborhoods. The second hypothesis was that neighborhood affluence would be positively associated with drinking within recommended guidelines (a relatively healthy alcohol use pattern) and negatively associated with frequent drunkenness (posited to be incompatible with a healthy or conventional lifestyle), but the data did not support this. A study from New York City suggests neighborhood-level norms

about drunkenness are related to drinking patterns (Ahern et al., 2008). Future studies examining whether norms vary by neighborhood SES would be able to provide an alternative test of this hypothesis.

Limitations of this study should be noted. First, analyses cannot account for length of neighborhood residence, and the data are cross-sectional. A recent longitudinal study demonstrated that men diagnosed as alcohol dependent were significantly more likely to move to disadvantaged neighborhoods over time (Buu et al., 2007), and this neighborhood selection pattern presumably would be similar, or perhaps even more acute, for heavy drug users. A recent critical literature review documented that relationships between neighborhood socioeconomic status and substance use outcomes do not differ markedly for cross-sectional and longitudinal studies (Karriker-Jaffe, 2011), but longitudinal studies of neighborhood effects on adults could provide more nuanced understanding of the interplay between individuals and their neighborhood environments over time. Another limitation pertains to the relatively low response rate of this and other recent U.S. telephone surveys (Midanik and Greenfield, 2002). Alternative methods for recruiting and engaging nationally-representative samples for both cross-sectional and longitudinal studies of health behaviors are needed. Despite these limitations, the very large, nationally-representative sample of U.S. adults derived from the two National Alcohol Surveys is unique and provided statistical power necessary to examine effects of neighborhood SES on relatively rare substance use outcomes. The current examination of effects of neighborhood affluence, as well as disadvantage, also fills a critical gap in the extant literature.

Findings have implications for prevention of substance use. Environmental and community systems prevention focuses on individuals and their environments by altering social, cultural, economic and physical contexts to shift conditions away from those that promote substance use to those that support health (Holder, 1998). In addition to affecting targeted individuals at a given time, these approaches also potentially benefit individuals who later enter the improved environment (Rose, 1985; Thomas, 2007). This study provides some evidence that environmental interventions targeting both disadvantaged and middle-class neighborhoods may help prevent substance use. In particular, in middle-class neighborhoods (the majority of U.S. neighborhoods), there are unmet needs in terms of anti-smoking messages directed to younger men. Further, older women in affluent neighborhoods also may need to be reached with information about recommended drinking guidelines, particularly because recent efforts to implement screening and brief intervention for alcohol problems in primary care settings suggest this intervention may be less effective for women than men (Kaner et al., 2009). Thus, it may be beneficial to develop targeted interventions to serve these higher-risk populations in neighborhoods where they live.

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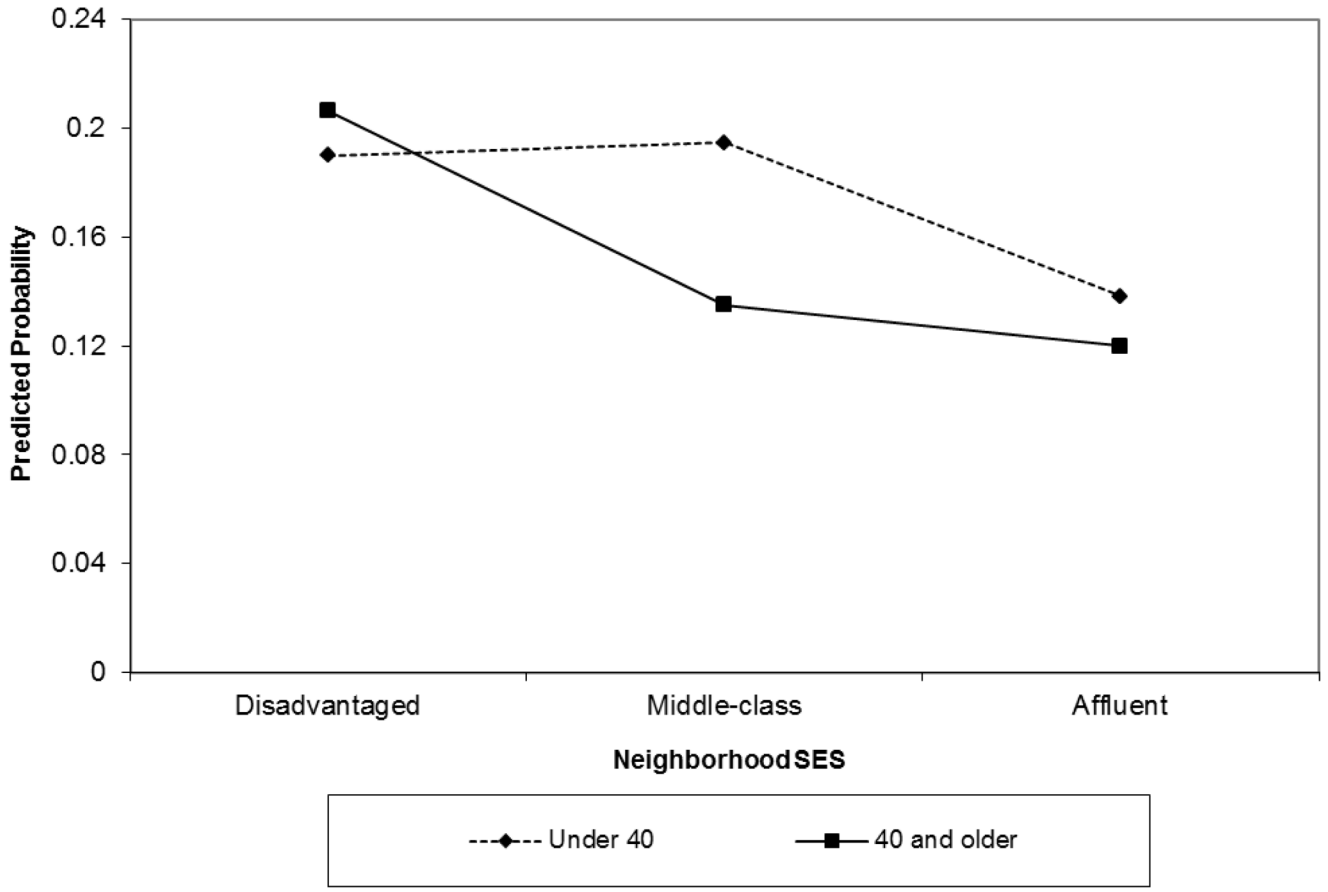

Figure 1.
Interaction of Neighborhood SES and Age for Men's Daily Tobacco Use

Table 1

Respondent characteristics[a,b]

	Men (N=6,709)	Women (N=7,822)
Married/partnered **	69.5	57.9
Age **		
18–29 years	22.0	20.5
30–39 years	21.5	19.4
40–49 years	21.1	20.5
50–59 years	17.6	17.6
60 years and older	17.8	22.0
Race/ethnicity **		
Caucasian	71.3	72.2
African American	10.6	12.2
Hispanic/Latino	12.1	10.8
Other race/ethnicity	6.0	4.8
Education **		
Less than high school	12.7	12.3
High school graduate	29.1	30.6
Some college	24.8	28.5
College graduate	33.4	28.6
Employment status **		
Employed	75.1	59.0
Unemployed	4.0	4.0
Not in workforce	20.9	37.0
Income **		
< $10,000	7.2	11.6
$10,001–20,000	10.7	12.9
$20,001–40,000	23.0	22.9
$40,001–60,000	16.4	14.9
$60,001–80,000	12.8	9.6
> $80,000	19.6	12.6
Missing income	10.3	15.5
Urban neighborhood	60.2	59.5
Neighborhood SES		
Disadvantaged	23.8	25.3
Middle-class	50.6	51.0
Affluent	25.6	23.7
Daily tobacco use **	28.3	21.1
Drinking within guidelines **	67.4	77.8
Monthly drunkenness **	11.1	3.6

	Men (N=6,709)	Women (N=7,822)
Monthly marijuana use **	5.7	2.6
Monthly other drug use	3.3	3.6

[a] Weighted percentages.

[b] Significant gender differences assessed using bivariate *F*-tests.

* $p<.05$.

** $p<.01$.

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Table 2

Relationship between neighborhood socioeconomic status and substance use outcomes among U.S. men

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Bivariate models	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***
Neighborhood SES [a]					
Disadvantaged	1.19 (1.02, 1.38)*	1.20(1.04, 1.39)*	0.89 (0.71, 1.11)	1.49 (1.10, 2.02)**	0.98 (0.67, 1.43)
Affluent	0.60 (0.50, 0.71)**	0.83 (0.72, 0.97)*	1.06 (0.84, 1.33)	1.12 (0.80, 1.57)	0.67 (0.44, 1.04)†
Multivariate models [b]	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***
Married/partnered	0.95 (0.81, 1.11)	1.37 (1.18, 1.59)**	0.54 (0.44, 0.68)**	0.75 (0.55, 1.01) †	0.75 (0.52, 1.08)
Age [c]					
18–29 years	3.23 (2.45, 4.27)**	0.11 (0.08, 0.15)**	22.39 (12.29, 40.79)**	24.56 (10.35, 58.28)**	1.93 (1.02, 3.67)*
30–39 years	3.26 (2.46, 4.30)**	0.16 (0.12, 0.22)**	10.11 (5.47, 18.66)**	17.34 (7.12, 42.24)**	1.08 (0.52, 2.23)
40–49 years	3.31 (2.52, 4.34)**	0.29 (0.21, 0.39)**	7.29 (3.93, 13.51)**	11.28 (4.66, 27.29)**	1.62 (0.83, 3.16)
50–59 years	2.54 (1.93, 3.35)**	0.46 (0.34, 0.63)**	3.67 (1.91, 7.04)**	7.09 (2.83, 17.72)**	1.66 (0.88, 3.13)
Race/ethnicity [d]					
African American	0.56 (0.45, 0.69)**	2.52 (1.99, 3.19)**	0.61 (0.43, 0.85)**	1.15 (0.77, 1.73)	1.42 (0.85, 2.37)
Hispanic/Latino	0.42 (0.34, 0.53)**	1.13 (0.93, 1.37)	0.73 (0.55, 0.97)*	0.63 (0.40, 1.00) †	0.71 (0.43, 1.18)
Other race/ethnicity	1.08 (0.80, 1.46)	1.97 (1.40, 2.76)**	0.70 (0.43, 1.14)	1.51 (0.91, 2.52)	1.43 (0.77, 2.67)
Education [e]					
Less than high school	3.01 (2.36, 3.85)**	1.12 (0.87, 1.43)	0.98 (0.68, 1.41)	2.16 (1.32, 3.52)**	2.18 (1.22, 3.90)**
High school graduate	3.44 (2.01, 2.96)**	0.94 (0.78, 1.13)	0.85 (0.64, 1.12)	1.73 (1.14, 2.62)**	2.01 (1.21, 3.33)**
Some college	2.21 (1.81, 2.68)**	0.77 (0.64, 0.92)**	1.19 (0.92, 1.56)	1.65 (1.12, 2.44)**	1.58 (0.94, 2.64) †
Employment status [f]					
Unemployed	1.15 (0.84, 1.57)	0.98 (0.70, 1.39)	1.00 (0.63, 1.60)	2.33 (1.50, 3.64)**	1.51 (0.76, 3.00)
Not in workforce	1.23 (1.00, 1.52) †	1.27 (1.00, 1.60)*	0.88 (0.63, 1.23)	2.00 (1.37, 2.93)**	1.91 (1.18, 3.08)**
Income [g]					

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
< $10,000	1.30 (0.94, 1.79)	1.42 (1.03, 1.95)*	1.05 (0.68, 1.63)	1.33 (0.76, 2.33)	1.68 (0.85, 3.33)
$10,001–20,000	1.37 (1.03, 1.83)*	1.81 (1.36, 2.40)**	1.08 (0.71, 1.64)	1.61 (0.92, 2.81) †	1.55 (0.81, 2.99)
$20,001–40,000	1.48 (1.17, 1.89)**	1.31 (1.05, 1.63)*	1.01 (0.72, 1.41)	1.03 (0.63, 1.68)	1.30 (0.71, 2.38)
$40,001–60,000	1.31 (1.02, 1.68)*	1.08 (0.86, 1.36)	1.11 (0.78, 1.57)	1.14 (0.69, 1.88)	0.93 (0.49, 1.78)
$60,001–80,000	1.14 (0.87, 1.49)	1.14 (0.90, 1.44)	0.95 (0.65, 1.38)	0.91 (0.52, 1.60)	1.33 (0.65, 2.70)
Missing income	1.10 (0.82, 1.48)	1.63 (1.21, 2.18)**	0.55 (0.35, 0.88)*	1.28 (0.72, 2.26)	0.92 (0.41, 2.05)
Urban neighborhood	0.94 (0.81, 1.09)	0.96 (0.83, 1.12)	1.09 (0.87, 1.37)	1.37 (1.00, 1.89)*	1.04 (0.72, 1.51)
Neighborhood SES [a]					
Disadvantaged	1.26 (1.06, 1.49)**	1.16 (0.98, 1.38) †	0.81 (0.64, 1.04)	1.10 (0.78, 1.54)	0.75 (0.49, 1.15)
Affluent	0.81 (0.67, 0.98)*	0.86 (0.72, 1.02) †	1.06 (0.81, 1.37)	1.25 (0.88, 1.78)	0.81 (0.51, 1.27)
Obs (Wtd. N)	*6,487 (6,773)*	*6,505 (6,788)*	*6,427 (6,756)*	*6,492 (6,770)*	*6,526 (6,805)*

OR, odds ratio. CI, confidence interval. Obs, number of observations. Wtd. N, weighted sample size.

[a] Middle-class neighborhood is reference.

[b] Models also controlled for survey year and precision of geocode.

[c] 60 and older is reference.

[d] White is reference.

[e] College graduate is reference.

[f] Employed is reference.

[g] Over $80,000 is reference.

† $p < .10$

* $p<.05$.

** $p<.01$

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Table 3

Relationship between neighborhood socioeconomic status and substance use outcomes among U.S. women

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Bivariate models	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***
Neighborhood SES [a]					
Disadvantaged	1.16 (0.99, 1.35)†	1.34 (1.12, 1.59)**	0.88 (0.61, 1.27)	0.91 (0.60, 1.38)	1.61 (1.14, 2.26)**
Affluent	0.63 (0.51, 0.76)**	0.76 (0.64, 0.90)**	0.89 (0.59, 1.34)	0.40 (0.21, 0.78)**	0.68 (0.43, 1.06)†
Multivariate models [b]	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***	***OR (95% CI)***
Married/partnered	0.74 (0.63, 0.88)**	1.33 (1.13, 1.58)**	0.42 (0.29, 0.60)**	0.71 (0.45, 1.12)	0.70 (0.49, 1.01) †
Age [c]					
18–29 years	2.60 (2.00, 3.40)**	0.15 (0.11, 0.20)**	64.74 (24.52, 170.93)**	184.06 (24.15, 1403.06)**	2.15 (1.26, 3.66)**
30–39 years	3.42 (2.60, 4.51)**	0.25 (0.19, 0.34)**	17.74 (6.36, 49.48)**	73.71 (9.44, 575.79)**	1.47 (0.78, 2.77)
40–49 years	2.90 (2.23, 3.78)**	0.40 (0.30, 0.54)**	22.70 (8.44, 61.02)**	64.80 (8.23, 509.99)**	1.54 (0.84, 2.83)
50–59 years	2.69 (2.07, 3.50)**	0.69 (0.51, 0.97)*	7.29 (2.52, 21.08)**	34.81 (4.26, 284.33)**	2.33 (1.36, 3.98)**
Race/ethnicity [d]					
African American	0.49 (0.40, 0.61)**	3.17 (2.50, 4.02)**	0.56 (0.35, 0.90)*	0.57 (0.34, 0.93)*	0.95 (0.61, 1.49)
Hispanic/Latino	0.29 (0.21, 0.39)**	1.78 (1.39, 2.29)**	0.34 (0.20, 0.58)**	0.37 (0.21, 0.67)**	0.62 (0.30, 1.29)
Other race/ethnicity	0.72 (0.50, 1.05) †	2.05 (1.27, 3.31)**	0.47 (0.21, 1.03) †	1.36 (0.57, 3.23)	1.07 (0.54, 2.10)
Education [e]					
Less than high school	3.51 (2.65, 4.63)**	1.92 (1.40, 2.64)**	1.54 (0.88, 2.70)	2.34 (1.18, 4.64)*	1.64 (0.93, 2.87) †
High school graduate	2.66 (2.12, 3.33)**	1.34 (1.09, 1.66)**	0.77 (0.48, 1.22)	0.86 (0.45, 1.64)	1.03 (0.64, 1.67)
Some college	2.37 (1.91, 2.95)**	0.93 (0.76, 1.13)	1.22 (0.74, 1.72)	1.72 (0.93, 3.17) †	1.75 (1.09, 2.79)*
Employment status [f]					
Unemployed	1.36 (0.97, 1.90) †	1.28 (0.81, 2.01)	1.05 (0.51, 2.16)	1.39 (0.69, 2.81)	0.41 (0.18, 0.94)*
Not in workforce	0.96 (0.81, 1.15)	1.49 (1.23, 1.81)**	0.78 (0.49, 1.24)	0.85 (0.51, 1.42)	1.45 (0.99, 2.11) †
Income [g]					

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
< $10,000	1.39 (0.97, 2.00) †	1.45 (1.01, 2.08) *	0.99 (0.47, 2.06)	5.47 (1.38, 21.76) *	0.90 (0.37, 2.22)
$10,001–20,000	1.44 (1.01, 2.05) *	1.53 (1.10, 2.13) *	1.14 (0.58, 2.24)	5.12 (1.30, 20.06) *	0.90 (0.38, 2.13)
$20,001–40,000	1.57 (1.14, 2.17) **	1.57 (1.19, 2.08) **	0.60 (0.32, 1.13)	3.56 (0.96, 13.16) †	0.78 (0.34, 1.76)
$40,001–60,000	1.14 (0.81, 1.59)	1.50 (1.12, 2.00) **	0.90 (0.49, 1.67)	2.96 (0.74, 11.88)	1.24 (0.55, 2.81)
$60,001–80,000	0.82 (0.56, 1.20)	1.29 (0.95, 1.75)	0.84 (0.40, 1.78)	4.12 (1.06, 16.07) *	0.71 (0.29, 1.75)
Missing income	0.88 (0.62, 1.26)	2.02 (1.44, 2.81) **	0.61 (0.28, 1.77)	1.66 (0.40, 6.87)	0.53 (0.23, 1.26)
Urban neighborhood	0.93 (0.79, 1.09)	0.86 (0.73, 1.03) †	0.98 (0.68, 1.40)	1.03 (0.63, 1.69)	0.96 (0.66, 1.39)
Neighborhood SES [a]					
Disadvantaged	1.24 (1.03, 1.47) *	1.07 (0.89, 1.31)	0.77 (0.51, 1.19)	0.74 (0.48, 1.15)	1.54 (1.05, 2.26) *
Affluent	0.81 (0.65, 1.00) *	0.89 (0.73, 1.09)	0.80 (0.51, 1.27)	0.43 (0.21, 0.89) *	0.66 (0.38, 1.14)
Obs (Wtd. N)	*7,477 (7,258)*	*7,451 (7,242)*	*7,406 (7,190)*	*7,497 (7,263)*	*7,522 (7,301)*

OR, odds ratio. CI, confidence interval. Obs, number of observations. Wtd. N, weighted sample size.

[a] Middle-class neighborhood is reference.

[b] Models also controlled for survey year and precision of geocode.

[c] 60 and older is reference.

[d] White is reference.

[e] College graduate is reference.

[f] Employed is reference.

[g] Over $80,000 is reference.

† $p < .10$

* $p < .05$.

** $p < .01$

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Table 4

Relationship between neighborhood socioeconomic status and substance use outcomes among U.S. men further adjusted for additional confounders and possible mediators[a]

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Married/partnered	0.96 (0.82, 1.14)	1.33 (1.13, 1.57) **	0.54 (0.43, 0.69) **	0.76 (0.56, 1.03) †	0.88 (0.60, 1.28)
Age [b]					
18–29 years	2.87 (2.14, 3.86) **	0.11 (0.08, 0.15) **	17.25 (9.40, 31.67) **	19.63 (7.93, 48.60) **	1.32 (0.66, 2.65)
30–39 years	2.87 (2.14, 3.86) **	0.18 (0.13, 0.24) **	7.04 (3.78, 13.12) **	13.34 (5.20, 34.18) **	0.74 (0.34, 1.60)
40–49 years	3.00 (2.25, 4.00) **	0.33 (0.24, 0.46) **	5.04 (2.71, 9.35) **	7.83 (3.08, 19.92) **	1.06 (0.53, 2.10)
50–59 years	2.31 (1.73, 3.10) **	0.53 (0.38, 0.74) **	2.80 (1.43, 5.48) **	5.92 (2.23, 15.76) **	1.22 (0.61, 2.44)
Race/ethnicity [c]					
African American	0.59 (0.48, 0.74) **	2.12 (1.65, 2.73) **	0.83 (0.58, 1.18)	1.53 (1.00, 2.35) †	1.65 (0.97, 2.81) †
Hispanic/Latino	0.43 (0.34, 0.55) **	1.05 (0.85, 1.29)	0.77 (0.56, 1.05) †	0.60 (0.37, 0.99) *	0.67 (0.40, 1.14)
Other race/ethnicity	1.11 (0.81, 1.52)	1.93 (1.34, 2.76) **	0.72 (0.46, 1.14)	1.36 (0.81, 2.29)	1.30 (0.67, 2.53)
Education [d]					
Less than high school	2.77 (2.15, 3.58) **	1.44 (1.11, 1.87) *	0.76 (0.51, 1.14)	1.69 (1.02, 2.81) *	2.06 (1.13, 3.76) *
High school graduate	2.31 (1.88, 2.82) **	1.09 (0.89, 1.33)	0.67 (0.50, 0.91) *	1.52 (0.98, 2.37) †	1.93 (1.12, 3.33) *
Some college	2.07 (1.69, 2.53) **	0.89 (0.73, 1.08)	0.99 (0.74, 1.30)	1.41 (0.94, 2.12)	1.63 (0.95, 2.79) †
Employment status [e]					
Unemployed	1.07 (0.77, 1.50)	1.05 (0.74, 1.49)	0.81 (0.48, 1.37)	2.15 (1.37, 3.38) **	1.08 (0.54, 2.16)
Not in workforce	1.23 (0.99, 1.53) †	1.37 (1.08, 1.73) *	0.82 (0.59, 1.15)	2.00 (1.35, 2.97) **	1.72 (1.03, 2.87) *
Income [f]					
< $10,000	1.39 (1.00, 1.94) †	1.24 (0.89, 1.74)	1.18 (0.74, 1.88)	1.34 (0.75, 2.42)	1.29 (0.62, 2.68)
$10,001–20,000	1.38 (1.03, 1.86) *	1.80 (1.33, 2.43) **	1.05 (0.68, 1.63)	1.50 (0.85, 2.63)	1.19 (0.60, 2.38)
$20,001–40,000	1.55 (1.21, 1.99) **	1.24 (0.98, 1.57) †	1.07 (0.75, 1.53)	1.04 (0.62, 1.72)	1.13 (0.60, 2.13)
$40,001–60,000	1.39 (1.08, 1.80) **	1.10 (0.86, 1.40)	1.14 (0.78, 1.66)	1.01 (0.59, 1.73)	0.80 (0.41, 1.57)
$60,001–80,000	1.17 (0.89, 1.55)	1.11 (0.86, 1.43)	0.98 (0.65, 1.46)	0.95 (0.53, 1.72)	1.22 (0.58, 2.56)
Missing income	1.23 (0.91, 1.68)	1.37 (1.00, 1.88) †	0.65 (0.40, 1.07) †	1.56 (0.86, 2.83)	0.89 (0.38, 2.05)

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Sense of coherence	1.00 (0.90, 1.11)	0.95 (0.85, 1.07)	0.85 (0.72, 1.00)*	0.93 (0.76, 1.14)	0.83 (0.65, 1.06)
Depression	1.10 (1.00, 1.21) †	0.91 (0.83, 1.00)*	1.16 (1.01, 1.33)*	1.29 (1.05, 1.58)*	1.79 (1.39, 2.31)**
Family history of alcohol problems	1.24 (1.08, 1.43)**	0.78 (0.68, 0.90)**	1.19 (0.96, 1.47)	1.72 (1.28, 2.31)**	1.89 (1.30, 2.75)**
Heavy drinking in teens	1.88 (1.63, 2.17)**	0.28 (0.24, 0.33)**	4.15 (3.32, 5.19)**	3.38 (2.53, 4.51)**	2.12 (1.47, 3.07)**
Urban neighborhood	0.98 (0.83, 1.14)	1.00 (0.85, 1.17)	1.02 (0.80, 1.30)	1.43 (1.02, 1.99)*	1.12 (0.75, 1.69)
Neighborhood SES [g]					
Disadvantaged	1.27 (1.06, 1.51)**	1.16 (0.97, 1.39)	0.84 (0.65, 1.09)	1.05 (0.74, 1.50)	0.68 (0.44, 1.04) †
Affluent	0.79 (0.65, 0.97)*	0.91 (0.75, 1.09)	1.09 (0.83, 1.44)	1.25 (0.87, 1.79)	0.88 (0.55, 1.40)
Obs (Wtd. N)	*6,190 (6,464)*	*6,198 (6,470)*	*6,189 (6,462)*	*6,194 (6,462)*	*6,526 (6,805)*

OR, odds ratio. CI, confidence interval. Obs, number of observations. Wtd. N, weighted sample size.

[a] Models also controlled for survey year, precision of geocode and region of country.

[b] 60 and older is reference.

[c] White is reference.

[d] College graduate is reference.

[e] Employed is reference.

[f] Over $80,000 is reference.

[g] Middle-class neighborhood is reference.

† $p<.10$

* $p<.05$.

** $p<.01$

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Table 5

Relationship between neighborhood socioeconomic status and substance use outcomes among U.S. women further adjusted for additional confounders and possible mediators[a]

	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Married/partnered	0.78 (0.66, 0.92) **	1.36 (1.14, 1.63) **	0.40 (0.27, 0.59) **	0.74 (0.45, 1.22)	0.76 (0.53, 1.10)
Age [b]					
18–29 years	1.97 (1.49, 2.63) **	0.21 (0.15, 0.28) **	41.61 (14.85, 116.61) **	91.98 (11.91, 710.13) **	1.57 (0.91, 2.71)
30–39 years	2.55 (1.90, 3.43) **	0.40 (0.29, 0.55) **	10.55 (3.57, 31.14) **	33.74 (4.30, 264.93) **	1.15 (0.61, 2.18)
40–49 years	2.12 (1.60, 2.81) **	0.60 (0.44, 0.83) **	13.18 (4.61, 37.72) **	31.74 (3.87, 260.13) **	1.04 (0.54, 2.01)
50–59 years	2.37 (1.80, 3.12) **	0.91 (0.65, 1.26)	5.63 (1.81, 17.49) **	20.31 (2.42, 170.58) **	1.90 (1.09, 3.31) *
Race/ethnicity [c]					
African American	0.55 (0.44, 0.68) **	2.42 (1.89, 3.11) **	0.72 (0.43, 1.19)	0.79 (0.45, 1.37)	1.06 (0.67, 1.68)
Hispanic/Latino	0.35 (0.25, 0.48) **	1.53 (1.17, 2.01) **	0.51 (0.30, 0.88) *	0.47 (0.24, 0.90) *	0.62 (0.30, 1.27)
Other race/ethnicity	0.75 (0.51, 1.10)	1.86 (1.16, 3.00) **	0.48 (0.21, 1.11) †	1.28 (0.52, 3.12)	0.89 (0.43, 1.87)
Education [d]					
Less than high school	3.37 (2.52, 4.51) **	1.88 (1.36, 2.61) **	1.32 (0.71, 2.46)	2.05 (0.93, 4.48) †	1.47 (0.83, 2.63)
High school graduate	2.56 (2.02, 3.24) **	1.39 (1.11, 1.75) **	0.76 (0.48, 1.22)	0.73 (0.35, 1.50)	0.97 (0.60, 1.58)
Some college	2.30 (1.84, 2.88) **	0.94 (0.76, 1.16)	1.10 (0.70, 1.73)	1.54 (0.80, 3.00)	1.63 (1.00, 2.64) †
Employment status [e]					
Unemployed	1.25 (0.87, 1.79)	1.45 (0.90, 2.33)	0.74 (0.33, 1.66)	1.39 (0.64, 2.99)	0.39 (0.16, 0.92) *
Not in workforce	0.94 (0.78, 1.14)	1.58 (1.28, 1.94) **	0.75 (0.46, 1.21)	0.77 (0.44, 1.34)	1.32 (0.89, 1.96)
Income [f]					
< $10,000	1.22 (0.83, 1.80)	1.61 (1.11, 2.33) *	0.77 (0.36, 1.63)	3.68 (0.93, 14.64) †	0.71 (0.28, 1.79)
$10,001–20,000	1.33 (0.91, 1.94)	1.58 (1.12, 2.23) *	1.01 (0.49, 2.08)	3.60 (0.87, 14.89) †	0.75 (0.31, 1.82)
$20,001–40,000	1.53 (1.09, 2.15) *	1.65 (1.23, 2.22) **	0.55 (0.28, 1.06) †	2.92 (0.76, 11.15)	0.73 (0.32, 1.66)
$40,001–60,000	1.14 (0.80, 1.63)	1.56 (1.13, 2.14) *	0.84 (0.45, 1.59)	1.97 (0.40, 9.62)	1.28 (0.55, 2.94)
$60,001–80,000	0.76 (0.51, 1.15)	1.40 (1.00, 1.95) †	0.76 (0.34, 1.67)	2.76 (0.70, 10.94)	0.74 (0.30, 1.83)

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	Daily tobacco use	Drinking within guidelines	Monthly drunkenness	Monthly marijuana use	Monthly other drug use
Missing income	0.93 (0.64, 1.36)	1.88 (1.32, 2.67) **	0.55 (0.24, 1.28)	1.34 (0.32, 5.70)	0.50 (0.21, 1.21)
Sense of coherence	0.83 (0.74, 0.93) **	0.99 (0.87, 1.13)	0.82 (0.63, 1.06)	0.77 (0.56, 1.06) †	0.69 (0.54, 0.88) **
Depression	1.14 (1.02, 1.27) *	1.05 (0.95, 1.17)	1.06 (0.84, 1.33)	1.21 (0.89, 1.64)	1.24 (0.94, 1.63)
Family history of alcohol problems	1.63 (1.39, 1.91) **	0.77 (0.65, 0.91) **	1.27 (0.88, 1.82)	1.47 (0.83, 2.59)	1.13 (0.79, 1.60)
Heavy drinking in teens	2.20 (1.81, 2.66) **	0.23 (0.19, 0.28) **	3.57 (2.50, 5.11) **	3.67 (2.34, 5.77) **	1.33 (0.85, 2.09)
Urban neighborhood	0.95 (0.81, 1.13)	0.88 (0.73, 1.06)	1.05 (0.70, 1.56)	1.07 (0.64, 1.77)	1.01 (0.69, 1.48)
Neighborhood SES [g]					
Disadvantaged	1.26 (1.04, 1.52) *	1.01 (0.81, 1.25)	0.75 (0.47, 1.17)	0.69 (0.44, 1.08)	1.42 (0.95, 2.11) †
Affluent	0.83 (0.66, 1.05)	0.87 (0.70, 1.07)	0.87 (0.54, 1.41)	0.37 (0.16, 0.85) *	0.69 (0.39, 1.21)
Obs (Wtd. N)	*7,139 (6,900)*	*7,112 (6,883)*	*7,112 (6,878)*	*7,137 (6,904)*	*7,171 (6,927)*

OR, odds ratio. CI, confidence interval. Obs, number of observations. Wtd. N, weighted sample size.

[a] Models also controlled for survey year, precision of geocode and region of country.

[b] 60 and older is reference.

[c] White is reference.

[d] College graduate is reference.

[e] Employed is reference.

[f] Over $80,000 is reference.

[g] Middle-class neighborhood is reference.

† $p<.10$

* $p<.05$.

** $p<.01$