Understanding Associations between Neighborhood Socioeconomic Status and Negative Consequences of Drinking: A Moderated Mediation Analysis

Katherine J. Karriker-Jaffe, PhD[a], **HuiGuo Liu, MA**[a,b], and **Lauren M. Kaplan, PhD**[a,c]

[a]Alcohol Research Group, Public Health Institute, Emeryville, CA

[b]Indiana University, Bloomington, IN

[c]School of Public Health, University of California, Berkeley, CA

Abstract

Aims—We explored how neighborhood socioeconomic status (SES) is related to negative consequences of drinking to explain why racial/ethnic minority group members are more at risk than Whites for adverse alcohol outcomes. We tested direct and indirect effects of neighborhood SES on alcohol problems and examined differences by gender and race.

Methods—We used data from the 2000 and 2005 National Alcohol Surveys (*N*=7,912 drinkers aged 18 and older; 49% female) linked with data from the 2000 Decennial Census in multivariate path models adjusting for individual demographics.

Results—In the full sample, neighborhood disadvantage had a significant direct path to increased negative consequences, with no indirect paths through depression, positive affect or pro-drinking attitudes. Neighborhood affluence had significant indirect paths to increased negative consequences through greater pro-drinking attitudes and increased heavy drinking. Sub-group analyses showed the indirect path from affluence to consequences held for White men, with no effects of neighborhood disadvantage. For racial/ethnic minority men, significant indirect paths emerged from both neighborhood disadvantage and affluence to increased consequences through greater pro-drinking attitudes and more heavy drinking. For minority women, there was an indirect effect of neighborhood affluence through reduced depression to fewer drinking consequences. There were limited neighborhood effects on alcohol outcomes for White women.

Conclusions—Interventions targeting pro-drinking attitudes in both affluent and disadvantaged areas may help reduce alcohol-related problems among men. Initiatives to improve neighborhood conditions could enhance mental health of minority women and reduce alcohol-related health disparities.

Keywords

neighborhood socioeconomic status; depression; alcohol; racial/ethnic disparities

---

Racial/ethnic minorities are at an increased risk of negative consequences of alcohol consumption relative to Whites (Grant, et al., 2011; Mulia, Ye, Greenfield & Zemore, 2009; Witbrodt, Mulia, Zemore & Kerr, 2014), but processes underlying this disparity remain unclear. In the U.S., national studies have noted differentially-negative impacts of neighborhood disadvantage on alcohol problems experienced by racial/ethnic minority group members compared to Whites (Jones-Webb, Snowden, Herd, Short, & Hannan, 1997; Karriker-Jaffe et al., 2012). Relatively few studies have detailed the pathways through which neighborhoods can impact alcohol use among adults, and little research has focused on identifying unique pathways for different racial/ethnic groups. Building on previous work, we explore how neighborhood socioeconomic status (SES) is related to heavy drinking and alcohol problems to help explain why racial/ethnic minority group members are more at risk than Whites for these adverse outcomes. We examined direct and indirect associations between neighborhood disadvantage and affluence with alcohol outcomes, focusing on depression, positive affect, and pro-drinking attitudes as possible mediators of neighborhood effects. We included differences by gender and race/ethnicity to highlight possible causes of racial/ethnic disparities in alcohol outcomes.

Although findings for alcohol outcomes are somewhat mixed (Karriker-Jaffe, 2011), evidence generally suggests neighborhood disadvantage increases heavy episodic drinking (Cerdá, Diez-Roux, Tchetgen, Godron-Larsen, & Kiefe, 2010). Effects of neighborhood SES on substance use outcomes are likely to be indirect (Karriker-Jaffe, 2011), and theory suggests several ways neighborhood SES (disadvantage, in particular) may impact substance use, including pathways through stress, social control and social modeling.

Turner (2013) detailed a stress process model for understanding racial/ethnic health disparities. In this model, one pathway toward health disparities involves the link between neighborhood disadvantage and increased stress, which results in poor mental health outcomes, including substance use. By extension, neighborhood affluence may be associated with positive affect that subsequently could contribute to less substance use. Prior research has demonstrated neighborhood disadvantage is associated with elevated levels depression (Bassett & Moore, 2013; Mair, Diez Roux, & Galea, 2008). The next step in the pathway linking depression and distress to heavy drinking also has empirical support (Graham, Massak, Demers, & Rehm, 2007).

Despite suggestive evidence, few studies have tested a mediating role of depression as a pathway from neighborhood disadvantage to alcohol problems. Several studies, however, have focused on depression and distress as mediators of other neighborhood risk factors on drinking. In a cross-sectional study using a relatively small sample of African Americans

seeking smoking cessation treatment, Kendzor et al. (2009) found associations between low individual SES, neighborhood risk factors (such as low levels of social cohesion and problems like litter and vandalism) and at-risk drinking were at least partially indirect, working through depression, negative affect, and perceived stress. Findings were similar to those of Hill and Angel (2005), who found neighborhood disorder was associated with increased distress, which led to heavy drinking in a sample of low-income, African American and Latina women. Given the restriction of these studies to racial/ethnic minority respondents, replication in a nationally-representative sample is warranted, which is one emphasis of the current study.

Other empirical examples suggest a mediating role of social control or social norms in the relationship between neighborhood SES and alcohol outcomes. Elliott et al. (1996) found informal social control mediated the associations between neighborhood disadvantage and rates of problem behavior by adolescents. Another study used data from a national sample of early adolescents to examine indirect effects of neighborhood SES on alcohol use (Chuang, et al., 2005). In that sample, effects of neighborhood disadvantage on increased alcohol use by the youth were mediated through increased peer alcohol use. Interestingly, additional effects of neighborhood affluence on increased youth alcohol use were mediated through increased parental alcohol use. Few published studies have focused on these mediating pathways for adults, however. One exception is a study of retired older adults (Akers & LaGreca, 1991), which found community SES had little direct effect on drinking, but there was a significant mediated pathway to increased alcohol use through increased social ties with drinkers and more pro-drinking attitudes in higher SES areas. Social norms could be particularly relevant for men, as some men may consider heavy drinking to be one way to establish or assert masculinity, particularly in the context of economic marginalization (Connell & Messerschmidt, 2005).

There also may be key differences in the role of social norms by race/ethnicity. Given the relatively strong abstinence culture among African Americans (Herd, 1994; Herd & Grube, 1996), drinking norms for this group may not depend on neighborhood SES as much as for other racial/ethnic groups. Furthermore, in the U.S., Hispanics are more likely to live in disadvantaged neighborhoods occupied by a high proportion of Hispanics. Despite the low SES, these ethnic enclaves may be protective, as there may be social norms discouraging health risk behaviors such as heavy alcohol use, particularly by women. Molina et al. (2012) noted Hispanic residents of Hispanic-dense neighborhoods had decreased risk of alcohol use disorders, but they did not assess whether this was due to differences in drinking norms in those areas. Thus, we include neighborhood immigrant concentration in our models due to its association with both neighborhood disadvantage and alcohol problems (Jones-Webb & Karriker-Jaffe, 2013).

Few studies have examined associations of neighborhood affluence with substance use outcomes. We distinguish between non-disadvantaged, middle-class areas and those that were more affluent, because of potential benefits afforded by residence in the most well-off areas (Browning & Cagney, 2003; Robert, 1999). While living in disadvantaged neighborhoods can increase psychological distress, living in affluent areas may be associated with reduced psychological distress through pathways including lower exposure to daily

stressors, more resources to handle stressors that do occur, and promotion of supportive social relationships to buffer negative impacts of stress (Cutrona, et al., 2006).

Neighborhood affluence also may promote positive affect, but less is known about how positive affect may impact alcohol outcomes. In contrast to negative emotions, which prompt a relatively narrow set of responses to stress (Fredrickson, 1998, 2001), positive affect can widen the coping strategies individuals consider while under stress (Tugade, Fredrickson, & Barrett, 2004). Thus, living in an affluent area could increase feelings of positive affect, which in turn could reduce the use of alcohol to cope with stress. An innovation in our study is inclusion of positive affect as a possible mediator between neighborhood SES and alcohol outcomes.

Neighborhood affluence also may impact alcohol outcomes via attitudes and social norms. Higher SES individuals may embrace health-related lifestyles (Cockerham, Rütten, & Abel, 1997; Ross, 2000), which may be incompatible with risky or heavy drinking. Although people of higher SES and residents in affluent areas are more likely to drink alcohol than their lower SES counterparts (Chuang, et al., 2005; Galea, Ahern, Tracy, & Vlahov, 2007; Karriker-Jaffe, et al., 2012), moderate alcohol use may be seen as part of a healthy lifestyle due to potential health benefits of light drinking (Corrao, Bagnardi, Zambon, & LaVecchia, 2004). Thus, residents in more affluent areas may drink moderately and subsequently experience fewer negative consequences of drinking. Prior analyses using data from the current sample suggested some weak protective effects of neighborhood affluence on tobacco use, drinking to drunkenness, and other drug use, with associations that varied in intensity by outcome and by respondent gender (Karriker-Jaffe, 2013). A mediating role for drinking attitudes in relation to neighborhood affluence has not been examined in these data.

We hypothesized that neighborhood disadvantage would be positively associated with depression (and negatively with positive affect) and pro-drinking attitudes, which then would increase heavy drinking and alcohol problems. In contrast, we expected neighborhood affluence to be positively associated with positive affect (and negatively with depression) and less strongly associated with pro-drinking attitudes, resulting in reduced heavy drinking and fewer alcohol problems. We investigated whether pathways varied according to race/ ethnicity and gender (Bassett & Moore, 2013; R. Jones-Webb, et al., 1997; Karriker-Jaffe, et al., 2012). Given associations of neighborhood disadvantage with both abstinence from drinking and alcohol-related problems among those who do drink (Karriker-Jaffe, et al., 2012), we limited our analyses to past-year drinkers.

Methods

Dataset

Data came from the 2000 and 2005 National Alcohol Surveys (NAS), with neighborhood data drawn from the 2000 Decennial Census (U.S. Census Bureau, 2002). The 2000 and 2005 surveys involved computer-assisted telephone interviews with a randomly-selected sample of U.S. adults, with targeted oversamples of Black and Hispanic respondents and residents from sparsely-populated U.S. states. For more details on the NAS series, see Kerr et al. (2013). The 2000 NAS included 7,613 adult respondents (over age 18), and the 2005

NAS included 6,919 adult respondents. Response rates were 58% and 56%, respectively. Although response rates are lower than those often seen in face-to-face surveys, they are typical for random-digit dial (RDD) telephone surveys in the U.S., and do not necessarily produce biased population estimates because many refusals (hang-ups) often occur before the study topic has been mentioned (Groves, 2006; Keeter, Kennedy, Dimock, Best, & Craighill, 2006). Given similarity in methods and virtually identical interview protocols, these datasets were merged to increase power for subgroup analyses. The sample for the current study includes 9,971 current drinkers who reported consuming at least one alcoholic beverage in the 12 months prior to the interview.

Measures

Alcohol measures—Heavy drinking volume was included as a predictor of alcohol-related consequences. The volume from heavy drinking was calculated from drinking occasions where drinking 5–7, 8–11 or 12+ drinks was reported, using a graduated quantity-frequency approach, which is very effective for measuring consumption among individuals who occasionally drink heavily (Greenfield, 2000). Due to skewness, volume was log-transformed.

The primary outcome was negative drinking consequences experienced in the past year. We used a dichotomous variable indicating whether the respondent had experienced two or more of 15 negative alcohol-related consequences, including social (e.g., getting into a fight while drinking), legal (e.g., being questioned or warned by a police officer because of drinking), workplace (e.g., drinking hurting chances for promotion, raises or better jobs) and health consequences (e.g., drinking becoming a serious threat to physical health). In this sample, the reliability was acceptably high (internal consistency: KR-20=.73).

Neighborhood context—We used Census tract-level indicators of neighborhood characteristics. U.S. Census tracts are effective for delineating contextual determinants of health and substance use (Karriker-Jaffe, 2011; Krieger et al., 2002). Neighborhood indicators included socioeconomic disadvantage, affluence and immigrant concentration. There was substantial variability across neighborhoods, with most unstandardized indicators ranging from 0–100%.

Neighborhood disadvantage was a standardized factor score based on proportions of people with incomes below the federal poverty level (M=12%, SD=9.8), families with incomes below 50% of the U.S. median household income (M=21%, SD=13.7), households receiving public assistance (M=3%, SD=3.7), female-headed households (M=27%, SD=10.6), males who were unemployed or not in labor force (M=33%, SD=11.7), and people who are African American/Black (M=11%, SD=21.2). Reliability was high (Cronbach's alpha=0.90).

Neighborhood affluence was a standardized factor score based on proportions of people with a college degree (M=24%, SD=16.3), people with working class jobs (negative factor loading; including service occupations, healthcare support, protective services, construction and maintenance occupations, among others; M=64%, SD=12.9) and homes worth more than $300,000 (M=8%, SD=18.2). Reliability was high (Cronbach's alpha=0.88).

Immigrant concentration was a standardized factor score based on linguistic isolation (proportion of households in which no resident age 14 or older speaks English "very well"; M=4%, SD=6.4), crowded housing (housing units with more than one person per room (Krieger, Waterman, Chen, Soobader, & Subramanian, 2003); M=5%, SD=7.9), and proportion of people who are Hispanic/Latino (M=10%, SD=18.0). Reliability was high (Cronbach's alpha=0.92).

Proposed mediators—Depression and positive affect were based on items from the Center for Epidemiologic Studies' Depression Scale (CES-D; Roberts, 1980). Factor analysis suggested the 8 items (scored on a 4-point scale ranging from "*rarely or none of the time*" to "*most or all of the time*" during the last week) were best treated as two separate factors in this sample. Thus, depression was a 5-item factor score (Cronbach's alpha=0.75 in full sample, .75 for Whites, .75 for Blacks, .77 for Hispanics and .76 for respondents of other race/ethnicity). The items (bothered by things that don't usually bother me, felt depressed, sleep was restless, felt lonely, felt sad) were coded so high scores indicated higher levels of depression. Positive affect was a 3-item factor score (Cronbach's alpha=0.69 in full sample, .74 for Whites, .61 for Blacks, .62 for Hispanics and .66 for respondents of other race/ethnicity). The items (felt hopeful about future, was happy, enjoyed life) were coded so high scores indicated greater positive affect.

Pro-drinking attitudes were measured with a 6-item factor score (Cronbach's alpha=0.68 in full sample, .70 for Whites, .66 for Blacks, .65 for Hispanics and .73 for respondents of other race/ethnicity). Four survey items assessed how much drinking is acceptable (*no drinking*, *1 or 2 drinks*, "*enough to feel the effects but not get drunk*," or "*getting drunk is sometimes all right*") in different social situations, including at a party at someone else's home, out at a bar with friends, for a couple of co-workers out for lunch, and when going to drive a car (Greenfield & Room, 1997). Two additional dichotomous items assessed pro-drunkenness attitudes ("getting drunk is just an innocent way of having fun" and "it does some people good to get drunk once in a while"), which were given one point if affirmed by the respondent (versus zero if not affirmed).

Demographic control variables—Models were adjusted for age (continuous), gender, marital status (currently living with spouse/partner vs. not), race/ethnicity (mutually-exclusive dummy variables for Black, Hispanic, and other race/ethnicity, with White as reference group), educational attainment (dummy variables for less than high school diploma, high school graduate, and some college, with college degree as reference group), employment status (dummy variables for unemployed and not in workforce, with employed as reference group) and household income in past year (dummy variables for $20,000 or less; $20,001–40,000; $40,001–60,000; $60,001–80,000; and missing income; with $80,001 or more as reference group).

Most participants (60%) had geocodes assigned based on street address; the remainder had a geocode assigned based on the ZIP code centroid (such as for PO Boxes). Models also included an indicator of geocoding precision (ZIP code match vs. street address match).

Analysis Strategy

Samples were selected by RDD methods that resulted in a low degree of geographic clustering in the data. Thus, multilevel analytic strategies were not required and the primary analysis technique was simultaneous, multivariate path modeling conducted with Mplus (Muthén & Muthén, 2008). In the context of multiple correlated mediators, this technique provides greater power for testing mediation than would separate tests of each hypothesized mediator (Hays, Stacy, Widaman, DiMatteo, & Downey, 1986), and it tests the influence of each mediator while adjusting for relationships among all variables in the model. The three neighborhood characteristics (neighborhood disadvantage, neighborhood affluence, and immigrant concentration) were specified as correlated with each other, and the mediators depression and positive affect also were specified as correlated. Analysis followed recommendations of MacKinnon (2008), with mediated effects estimated using the MODEL INDIRECT sub-command to estimate indirect effects and their standard errors.

We used the robust weighted least squares estimator (WLSMV), because the model contains both continuous and categorical variables (MacKinnon, 2008). The final path model was chosen based on comparisons of nested models using the DIFFTEST procedure (Muthén & Muthén, 2011), because standard chi-square difference testing is not valid for models using WLSMV estimation. For each path in the overall model, control variables that were not statistically significant were trimmed to preserve degrees of freedom. Effects of changes on model fit were assessed using difference testing and fit indices, including the comparative fit index (CFI), Tucker-Lewis fit index (TFI) and the root mean square error of approximation (RMSEA). After the full path model was specified, we examined subgroup differences by conducting simultaneous multivariate path models with multiple groups analysis.

All analyses used weighted data to adjust for sampling design and non-response. Survey year was used as the weighting stratum to approximate the age, gender 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, and respondents were weighted to represent the average person during the respective year of data collection. Preliminary analyses suggested associations of neighborhood variables with the primary outcome did not vary significantly by survey year for any racial/ethnic or gender subgroup (all $p > .05$; data available upon request).

Results

The weighted sample was half male (51%), with an average age of 43 years. The majority of respondents (76%) were White/Caucasian, with 10% Hispanic/Latino, 9% Black/African American, and 5% reporting another race/ethnicity. Two-thirds (65%) were married or living with a partner. Most (73%) were employed, slightly more than half (56%) had incomes of $60,000/year or less, and 64% had attended at least some college. Overall, 5% of respondents reported two or more negative consequences of drinking in the past year. Those reporting two or more negative consequences had significantly lower scores on neighborhood affluence and positive affect, and significantly higher scores on neighborhood disadvantage, neighborhood immigrant concentration, distress, pro-drinking attitudes and heavy drinking volume than respondents without negative consequences of drinking in the

past year (data available on request). Correlations between the neighborhood variables, proposed mediators and drinking variables are presented in Table 1.

Path Analyses

Overall model—Figure 1 shows all statistically significant coefficients in the overall path model. All paths, including coefficients for control variables, are presented in Table 2. The overall model achieved excellent fit and explained 50% of total variance in alcohol-related problems. Neighborhood disadvantage had a statistically significant direct path to increased alcohol problems. Immigrant composition was significantly related to decreased alcohol problems. Depression also was significantly related to increased alcohol problems. There was a significant indirect path from neighborhood affluence to increased alcohol problems via more pro-drinking attitudes and increased heavy drinking (indirect effect: β=0.01, SE=0.02, p<.001). None of the proposed mediators were on indirect pathways between neighborhood disadvantage or immigrant composition to either heavy drinking or alcohol problems.

Subgroup differences—Among minority men, neighborhood disadvantage had significant direct paths to more heavy drinking and alcohol problems, and immigrant composition had a direct path to significantly less alcohol problems (Table 3). Neighborhood disadvantage (indirect effect: β=0.02, SE=0.01, p=.004), neighborhood affluence (indirect effect: β=0.02, SE=0.01, p<.001), and immigrant composition (indirect effect: β= −0.01, SE=0.003, p=.005) each had significant indirect paths through pro-drinking attitudes to heavy drinking and alcohol problems. Both neighborhood disadvantage and affluence significantly increased pro-drinking attitudes among minority men, whereas immigrant composition significantly decreased pro-drinking attitudes. Positive affect had a significant indirect effect to reduced negative consequences through less heavy drinking (indirect effect: β= −0.03, SE=0.03, p=.05), and depression was directly associated with increased negative consequences from drinking among minority men.

Among minority women, neighborhood disadvantage and immigrant composition did not have significant direct or indirect paths to heavy drinking or alcohol problems, but neighborhood affluence was significantly associated with increased positive affect and less depression (Table 3). Depression was a marginally significant mediator of the relationship between neighborhood affluence and alcohol problems among minority women (indirect effect: β= −0.03, SE=0.02, p=.09). Pro-drinking attitudes were significantly associated with more heavy drinking and alcohol problems among minority women (indirect effect: β=0.10, SE=0.02, p<.001).

For White women, none of the neighborhood variables were significantly associated with any of the proposed mediators or alcohol problems (Table 3), although immigrant composition was marginally associated with less heavy drinking by White women. Depression (indirect effect: β=0.03, SE=0.02, p=.002), positive affect (indirect effect: β=0.03, SE=0.02, p=.006) and pro-drinking attitudes (indirect effect: β=0.10, SE=0.02, p<.001) each had significant indirect paths through increased heavy drinking to increased alcohol problems among White women.

For White men, neighborhood affluence had a significant indirect effect to greater alcohol problems through increased pro-drinking attitudes and increased heavy drinking (indirect effect: β=0.02, SE=0.01, p=.005). Immigrant composition and neighborhood disadvantage were not significantly associated with pro-drinking attitudes or the other hypothesized mediators (Table 3). Depression significantly increased heavy drinking and subsequent alcohol problems among White men (indirect effect: β=0.03, SE=0.03, p=.05).

Post-hoc Analyses

To further investigate the unexpected association between neighborhood affluence and pro-drinking attitudes, we conducted bivariate post-hoc analyses using data on drinking motives which were available for a subset of the sample (approximate n=5,600). Neighborhood affluence scores were significantly positively associated with social motives for drinking, such as drinking to be sociable and drinking to celebrate, while neighborhood disadvantage and minority concentration were negatively associated with these drinking motives. Neighborhood affluence was positively correlated with drinking when feeling nervous and tense, but neighborhood disadvantage was positively correlated with drinking to forget worries and problems, although these relationships were much weaker (correlations, r, from .03 to .05) than the associations with social motives for drinking (r from .12 to .17). We also assessed the relationship between the neighborhood variables and whether a doctor had ever suggested the respondent cut down on drinking. Those who reported having such a conversation with their physician in the past year lived in neighborhoods with significantly greater disadvantage (M=0.41 vs. −0.01, F(1,8785)=15.79, p<.001) and immigrant concentration (M=0.35 vs. −0.01, F(1,8785)=7.89, p=.005) than those who did not report such interactions.

Discussion

Our primary aim was to examine how neighborhood SES is related to negative drinking consequences to explain racial/ethnic disparities in alcohol outcomes. In the full sample, neighborhood disadvantage had a significant direct path to increased negative consequences, with no indirect paths through depression, positive affect or pro-drinking attitudes. Sub-group analyses, however, showed there was a significant indirect path from neighborhood disadvantage to increased consequences through greater pro-drinking attitudes and increased heavy drinking that was unique to racial/ethnic minority men. There were no effects of neighborhood disadvantage on alcohol outcomes (neither consumption nor negative consequences of drinking) for White men, White women or minority women.

There are several reasons neighborhood disadvantage would be more strongly related to pro-drinking attitudes and increased heavy drinking for minority men than for other groups. Drinking norms and motives may differ across racial/ethnic groups due to cultural variation, exposure to stress, and differing coping strategies in response to stress. Some prior research using earlier National Alcohol Survey data suggests that pro-drinking norms may be more harmful for racial/ethnic minority men than for White men (Jones-Webb, Hsiao, Hannan, & Caetano, 1997), and others have shown stronger relationships between certain drinking motives in adolescence and later heavy drinking for Blacks than for other racial/ethnic

groups (Cooper et al., 2008). These racial/ethnic differences may be more pronounced in disadvantaged neighborhoods, where stress levels may be high and coping resources are limited. Furthermore, neighborhood disadvantage may intersect with both race/ethnicity and gender to contribute to heavy drinking among minority men in part as a response to threats to masculinity posed by both racial/ethnic and socioeconomic marginalization (Connell & Messerschmidt, 2005). This is in contrast to prior findings of a strong abstinence culture among African Americans (Herd, 1994; Herd & Grube, 1996), which may be more persistent for African American women in disadvantaged neighborhoods. Thus, additional research is needed to more fully examine how pro-drinking attitudes are linked to alcohol outcomes, with attention to both racial/ethnic and gender differences. Pro-drinking attitudes may be important modifiable factors in the prevention of alcohol problems for minority men in disadvantaged neighborhoods.

Counter expectations, neighborhood affluence had significant indirect paths to increased negative consequences through greater pro-drinking attitudes and increased heavy drinking in the full sample, as well as in the subsamples of White and minority men. For minority women only, there was an indirect effect of neighborhood affluence to fewer drinking consequences through reduced depression. Our results for men are consistent with prior research finding that people of higher SES and residents in affluent areas are more likely to drink alcohol (Chuang, et al., 2005; Galea, et al., 2007; Karriker-Jaffe, et al., 2012). Alcohol use may be a marker for social distinction and prestige, and it can be a component of social identity and sense of belonging among men (de Visser & Smith, 2007), which might explain why neighborhood affluence increased pro-drinking attitudes among men but not among women. Social contexts—including affluent neighborhoods—characterized by more acceptance of heavy drinking can influence drinking behavior. Our post-hoc analyses suggested physicians may be more likely to discuss drinking with respondents in disadvantaged areas, which could contribute to pro-drinking attitudes and heavy drinking in more affluent areas. This may be an opportunity for intervention to reduce heavy drinking by higher SES men, in particular. For women, living in an affluent neighborhood may increase feelings of self-efficacy and access to resources, thereby reducing depression and alcohol problems, especially for minority women. Mechanisms linking social-contextual factors to depression and positive affect, and in turn to health outcomes including alcohol problems, are complex and merit further study in diverse representative samples.

After adjusting for both neighborhood disadvantage and affluence, neighborhood immigrant density was related to marginally less heavy drinking by White men and White women, and it was related to significantly weaker pro-drinking attitudes by minority men, with no effects for minority women. There are well-documented protective effects of living in ethnic enclaves for Hispanics in the U.S. (Molina, Alegría, & Chen, 2012). Given we limited our sample to current drinkers, absence of a protective effect of immigrant concentration on drinking attitudes and alcohol outcomes of minority women may reflect a relative absence of minority women who are drinkers in these high-density immigrant areas.

Study Limitations and Strengths

The data are cross-sectional and analyses could not account for length of neighborhood residence. There may be significant downward social mobility of heavy drinkers over time (Buu et al., 2007), but evidence suggests similar relationships between neighborhood SES and substance use outcomes for cross-sectional and longitudinal studies (Karriker-Jaffe, 2011). Another limitation is the relatively low response rate of this and other recent U.S. telephone surveys. Fortunately, nonresponse may not necessarily lead to biased samples (Groves & Peytcheva, 2008; Keeter, et al., 2006). Alternative methods for recruiting and engaging nationally-representative samples for health studies are needed. Finally, another pathway through which neighborhood SES may impact alcohol outcomes involves alcohol availability (Bluthenthal et al., 2008). We were unable to assess the indirect impact of neighborhood disadvantage on alcohol problems through increased availability of alcohol, which should be examined in future studies.

Despite these limitations, the large, nationally-representative sample of U.S. adults from the two National Alcohol Surveys provided statistical power necessary to examine subgroup differences in associations between neighborhood SES and alcohol problems. A previous study with the same dataset showed a positive association between neighborhood disadvantage with past-year abstinence from drinking for all groups except Black and Latino men (Karriker-Jaffe, et al., 2012). By limiting our sample to past-year drinkers, we were well-positioned to examine how neighborhood disadvantage may impact alcohol problems experienced by minority men in particular. Our inclusion of neighborhood affluence also fills a gap in the extant literature.

Conclusions

To understand processes linking contextual factors with health outcomes, research should examine how and why pathways vary by gender and race/ethnicity. Overall, research generally suggests poverty is associated with increased levels of stress that can negatively impact health outcomes (Turner, 2013), but additional research on racial/ethnic- and gender-specific pathways from individual and neighborhood level SES to stress and negative health outcomes is needed.

In our post-hoc analyses, neighborhood affluence was positively associated with drinking when feeling nervous and tense, and neighborhood disadvantage was associated with drinking to forget worries and problems. Residents of both affluent and disadvantaged neighborhoods may be drinking to cope with stress. Components of distress may be better understood when depression and anxiety are disaggregated, as members of affluent neighborhoods were more likely to drink due to more anxiety-related motives and those in disadvantaged areas were more likely to drink due to depression-related motives. Further research is needed to determine whether different drinking motives are significant mediators of the relationships between neighborhood SES and alcohol outcomes.

We found pro-drinking attitudes increased heavy drinking among all subgroups. Targeting pro-drinking attitudes could have a widespread impact on alcohol problems in the general population, and particularly among men. Mental health interventions may be more important

for women, with potential benefits of mental health services for women residing in disadvantaged neighborhoods. Alcohol policies, such as raising alcohol taxes, may not be effective for reducing consumption and alcohol problems for residents of affluent neighborhoods due to their greater purchasing power. Thus, a combined approach involving policy, community, and individual-level interventions may best attenuate negative impacts of socioeconomic disadvantage on alcohol outcomes by targeting intermediate environmental, psychosocial, and behavioral pathways.

Acknowledgments

References

Akers, RL.; LaGreca, AJ. Alcohol use among the elderly: social learning, community context, and life events. In: Pittman, DJ.; White, HR., editors. Society, Culture, and Drinking Patterns Reexamined. New Brunswick, NJ: Rutgers Center on Alcohol Studies; 1991. p. 242-262.

Bassett E, Moore S. Gender differences in the social pathways linking neighborhood disadvantage to depressive symptoms in adults. PLoS One. 2013; 8(10):e76554. [PubMed: 24146888]

Bluthenthal RN, Cohen DA, Farley TA, Scribner R, Beighley C, Schonlau M, Robinson PL. Alcohol availability and neighborhood characteristics in Los Angeles, California and Southern Louisiana. Journal of Urban Health. 2008; 85(2):191–205. [PubMed: 18228148]

Browning CR, Cagney KA. Moving beyond poverty: neighborhood structure, social processes, and health. Journal of Health and Social Behavior. 2003; 44(4):552–571. [PubMed: 15038149]

Buu A, Mansour M, Wang J, Refior SK, Fitzgerald HE, Zucker RA. Alcoholism effects on social migration and neighborhood effects on alcoholism over the course of 12 years. Alcoholism: Clinical and Experimental Research. 2007; 31(9):1545–1551.

Cerdá M, Diez-Roux AV, Tchetgen E, Godron-Larsen P, Kiefe C. The relationship between neighborhood poverty and alcohol use: estimation by marginal structural models. Epidemiology. 2010; 21(4):482–489. [PubMed: 20498603]

Chuang Y-C, Ennett ST, Bauman KE, Foshee VA. Neighborhood influences on adolescent cigarette and alcohol use: mediating effects through parent and peer behaviors. Journal of Health and Social Behavior. 2005; 46(2):187–204. [PubMed: 16028457]

Cockerham WC, Rütten A, Abel T. Conceptualizing contemporary health lifestyles: Moving beyond Weber. The Sociological Quarterly. 1997; 38(2):321–342.

Connell RW, Messerschmidt JW. Hegemonic masculinity: Rethinking the concept. Gender & Society. 2005; 19(6):829–859.

Cooper ML, Krull JL, Agocha VB, Flanagan ME, Orcutt HK, Grabe S, Dermen KH, Jackson M. Motivational pathways to alcohol use and abuse among black and white adolescents. Journal of Abnormal Psychology. 2008; 117(3):485–501. [PubMed: 18729604]

Corrao G, Bagnardi V, Zambon A, LaVecchia C. A meta-analysis of alcohol consumption and the risk of 15 diseases. Preventive Medicine. 2004; 38(5):613–619. [PubMed: 15066364]

Cutrona CE, Wallace G, Wesner KA. Neighborhood characteristics and depression: An examination of stress processes. Current Directions in Psychological Science. 2006; 15(4):188–192. [PubMed: 18185846]

de Visser R, Smith JA. Alcohol consumption and masculine identity among young men. Psychology & Health. 2007; 22(5):595–614.

Elliott DS, Wilson WJ, Huizinga D, Sampson RJ, Elliott A, Rankin B. The effects of neighborhood disadvantage on adolescent development. Journal of Research in Crime and Delinquency. 1996; 33(4):389–426.

Fredrickson BL. What Good Are Positive Emotions? Rev Gen Psychol. 1998; 2(3):300–319. [PubMed: 21850154]

Fredrickson BL. The role of positive emotions in positive psychology. The broaden-and-build theory of positive emotions. Am Psychol. 2001; 56(3):218–226. [PubMed: 11315248]

Galea S, Ahern J, Tracy M, Vlahov D. Neighborhood income and income distribution and the use of cigarettes, alcohol and marijuana. American Journal of Preventive Medicine. 2007; 32(6, Suppl.):S195–S202. [PubMed: 17543711]

Graham K, Massak A, Demers A, Rehm J. Does the association between alcohol consumption and depression depend on how they are measured? Alcoholism: Clinical and Experimental Research. 2007; 31(1):78–88.

Grant JD, Vergés A, Jackson KM, Trull TJ, Sher KJ, Bucholz KK. Age and ethnic differences in the onset, persistence and recurrence of alcohol use disorder. Addiction. 2011; 107:756–756. [PubMed: 22085024]

Greenfield TK. Ways of measuring drinking patterns and the difference they make: experience with graduated frequencies. Journal of Substance Abuse. 2000; 12(1):33–49. [PubMed: 11288473]

Greenfield TK, Room R. Situational norms for drinking and drunkenness: trends in the U.S. adult population, 1979–1990. Addiction. 1997; 92(1):33–47. [PubMed: 9060196]

Groves RM. Nonresponse rates and nonresponse bias in household surveys. Public Opinion Quarterly. 2006; 70(5):646–675.

Groves RM, Peytcheva E. The impact of nonresponse rates on nonresponse bias: a meta-analysis. Public Opinion Quarterly. 2008; 72(2):167–189.

Hays RD, Stacy AW, Widaman KF, DiMatteo MR, Downey R. Multistage path models of adolescent alcohol and drug use: a reanalysis. Journal of Drug Issues. 1986; 16(3):357–369.

Herd D. The effects of parental influences and respondents' norms and attitudes on black and white adult drinking patterns. Journal of Substance Abuse. 1994; 6(2):137–154. [PubMed: 7804014]

Herd D, Grube JW. Black identity and drinking in the US: A national study. Addiction. 1996; 91(6): 845–857. [PubMed: 8696247]

Hill TD, Angel RJ. Neighborhood disorder, psychological distress, and heavy drinking. Social Science and Medicine. 2005; 61(5):965–975. [PubMed: 15955398]

Jones-Webb R, Snowden LR, Herd D, Short B, Hannan P. Alcohol-related problems among black, Hispanic, and white men: the contribution of neighborhood poverty. Journal of Studies on Alcohol. 1997; 58(5):539–545. [PubMed: 9273921]

Jones-Webb RJ, Hsiao C-Y, Hannan P, Caetano R. Predictors of increases in alcohol-related problems among black and white adults: results from the 1984 and 1992 National Alcohol Surveys. American Journal of Alcohol and Drug Abuse. 1997; 23(2):281–299.

Jones-Webb RJ, Karriker-Jaffe KJ. Neighborhood disadvantage, high alcohol content beverage consumption, drinking norms, and consequences: a mediation analysis. Journal of Urban Health. 2013; 90(4):667–684. [PubMed: 23423945]

Karriker-Jaffe KJ. Areas of disadvantage: a systematic review of effects of area-level socioeconomic status on substance use. Drug and Alcohol Review. 2011; 30(1):84–95. [PubMed: 21219502]

Karriker-Jaffe KJ. Neighborhood socioeconomic status and substance use by U.S. adults. Drug and Alcohol Dependence. 2013; 133(1):212–221. [PubMed: 23726978]

Karriker-Jaffe KJ, Zemore SE, Mulia N, Jones-Webb RJ, Bond J, Greenfield TK. Neighborhood disadvantage and adult alcohol outcomes: differential risk by race and gender. Journal of Studies on Alcohol and Drugs. 2012; 73(6):865–873. [PubMed: 23036203]

Keeter S, Kennedy C, Dimock M, Best J, Craighill P. Gauging the impact of growing nonresponse on estimates from a national RDD telephone survey. Public Opinion Quarterly. 2006; 70(5):759–779.

Kendzor DE, Businelle MS, Mazas CA, Cofta-Woerpel LM, Reitzel LR, Vidrine JI, Li Y, Costello TJ, Cinciripini PM, Ahluwalia JS, Wetter DW. Pathways between socioeconomic status and modifiable risk factors among African American smokers. Journal of Behavioral Medicine. 2009; 32:545–557. [PubMed: 19757014]

Kerr WC, Greenfield TK, Ye Y, Bond J, Rehm J. Are the 1976–1985 birth cohorts heavier drinkers? Age-period-cohort analyses of the National Alcohol Surveys 1979–2010. Addiction. 2013; 108(6): 1038–1048. [PubMed: 22897662]

Krieger N, Chen JT, Waterman PD, Soobader M-J, Subramanian SV, Carson R. Geocoding and monitoring of US socioeconomic inequalities in mortality and cancer incidence: does the choice of area-based measure and geographic level matter? American Journal of Epidemiology. 2002; 156(5):471–482. [PubMed: 12196317]

Krieger N, Waterman PD, Chen JT, Soobader MJ, Subramanian SV. Monitoring socioeconomic inequalities in sexually transmitted infections, tuberculosis, and violence: geocoding and choice of area-based socioeconomic measures--the public health disparities geocoding project (US). Public Health Rep. 2003; 118(3):240–260. [PubMed: 12766219]

MacKinnon, DP. Introduction to statistical mediation analysis. New York: Laurence Erlbaum Associates; 2008.

Mair C, Diez Roux AV, Galea S. Are neighbourhood characteristics associated with depressive symptoms? A review of evidence. J Epidemiol Community Health. 2008; 62(11):940–946. 948 p following 946. [PubMed: 18775943]

Molina KM, Alegría M, Chen C-N. Neighborhood context and substance use disorders: a comparative analysis of racial and ethnic groups in the United States. Drug and Alcohol Dependence. 2012; 125(Suppl. 1):S35–S43. [PubMed: 22699095]

Mulia N, Ye Y, Greenfield TK, Zemore SE. Disparities in alcohol-related problems among white, black, and Hispanic Americans. Alcoholism: Clinical and Experimental Research. 2009; 33(4): 654–662.

Muthén, LK.; Muthén, B. Mplus version 5.1. Los Angeles, CA: Muthén & Muthén; 2008.

Muthén, LK.; Muthén, B. Mplus User's Guide, Version 6. Los Angeles: Muthén & Muthén; 2011.

Robert SA. Socioeconomic position and health: the independent contribution of community socioeconomic context. Annual Review of Sociology. 1999; 25:489–516.

Roberts RE. Reliability of the CES-D scale in different ethnic settings. Psychiatry Research. 1980; 2(2):125–134. [PubMed: 6932058]

Ross CE. Walking, exercising, and smoking: Does neighborhood matter? Social Science & Medicine. 2000; 51:265–274. [PubMed: 10832573]

Tugade MM, Fredrickson BL, Barrett LF. Psychological resilience and positive emotional granularity: examining the benefits of positive emotions on coping and health. J Pers. 2004; 72(6):1161–1190. [PubMed: 15509280]

Turner RJ. Understanding health disparities: The relevance of the stress process model. Society & Mental Health. 2013; 3(3):170–186.

U.S. Census Bureau. Census 2000 Summary File 3—United States. Washington, DC: Public Information Office, U.S. Census Bureau; 2002.

Witbrodt J, Mulia N, Zemore SE, Kerr WC. Racial/ethnic disparities in alcohol-related problems: differences by gender and level of heavy drinking. Alcoholism: Clinical and Experimental Research. 2014; 38(6):1662–1670.
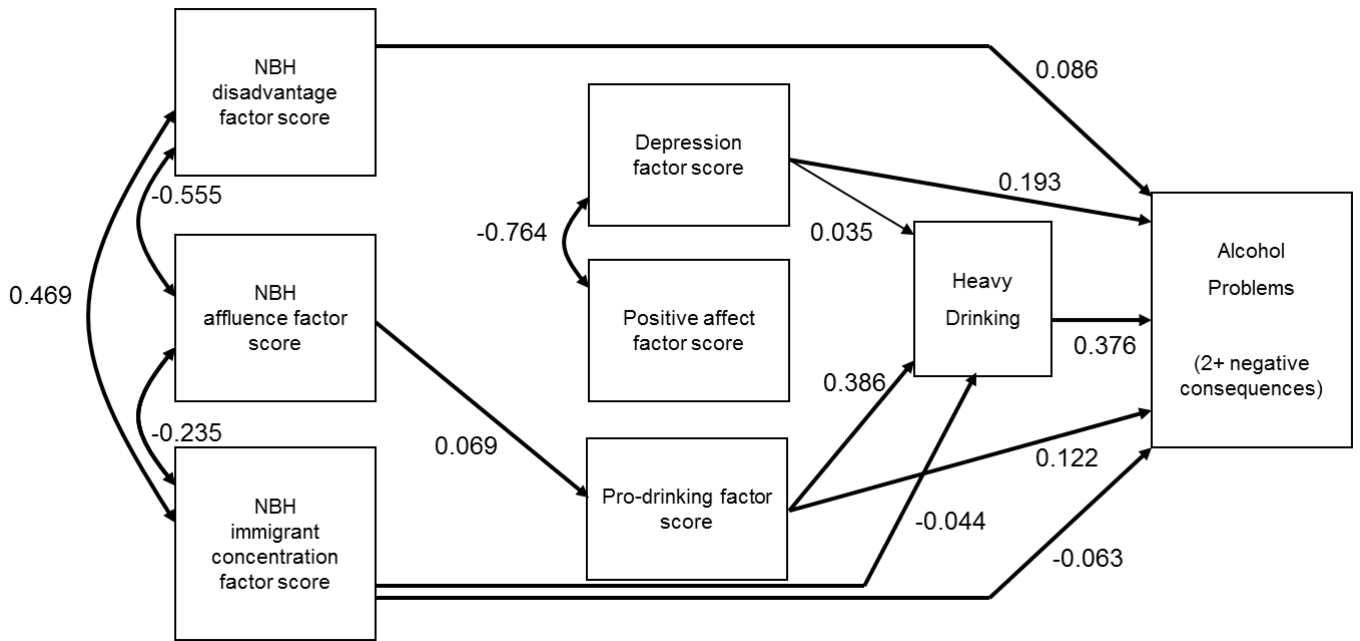
Figure 1. Standardized coefficients from reduced path model
Notes. Model controls for age, race, gender, income, education, employment, marital status, family history of alcohol problems, and geocode precision. Non-significant paths from the control variables were trimmed to preserve degrees of freedom. Non-significant paths from neighborhood variables to mediators and alcohol outcomes not shown in this diagram. (See Table 3 for all coefficients.)

Table 1

Correlations of alcohol outcomes with neighborhood variables and hypothesized mediators

White respondents (weighted N=3,528 men; 3,571 women)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) NBH affluence	---	-0.59**	-0.16**	0.07**	-0.03	0.02	-0.04†	-0.04†
(2) NBH disadvantage	-0.58**	---	0.43**	-0.02	0.04	-0.01	0.01	0.04†
(3) NBH immigrant concentration	-0.19**	0.44**	---	0.02	0.02	-0.01	-0.02	0.01
(4) Pro-drinking attitudes	0.05*	-0.02	0.03	---	0.11**	-0.11**	0.55**	0.26**
(5) Depression	-0.03	0.06**	0.03	0.10**	---	-0.75**	0.11**	0.16**
(6) Positive affect	0.01	-0.05*	-0.02	-0.08**	-0.81**	---	-0.09**	-0.12**
(7) Heavy drinking volume	-0.05*	0.05*	0.01	0.44**	0.05*	-0.02	---	0.40**
(8) 2+ Negative consequences	-0.07**	0.09**	0.02	0.19**	0.09**	-0.07**	0.36**	---

Minority respondents (weighted N=1,233 men; 967 women)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) NBH affluence	---	-0.66**	-0.39**	0.11**	-0.06*	0.09**	-0.06*	-0.09**
(2) NBH disadvantage	-0.61**	---	0.49**	-0.03	0.08*	-0.08*	0.12**	0.12**
(3) NBH immigrant concentration	-0.34**	0.46**	---	-0.07†	0.01	-0.07*	0.06*	0.01
(4) Pro-drinking attitudes	0.05	0.04	-0.01	---	0.13**	-0.05	0.36**	0.20**
(5) Depression	-0.12**	0.08*	0.04	0.12**	---	-0.70**	0.08**	0.26**
(6) Positive affect	0.11*	-0.07*	-0.04	-0.10**	-0.80**	---	-0.11**	-0.19**
(7) Heavy drinking volume	-0.06*	0.05	0.00	0.33**	0.08*	-0.08†	---	0.38**
(8) 2+ Negative consequences	-0.02	0.02	-0.03	0.10**	0.18**	-0.17*	0.29**	---

**
Note. p<.01,

*
p<.05,

[†] p<.10. Correlations for men above diagonal; for women below.

Table 2

Standardized coefficients from reduced path model

	Neighborhood affluence	Neighborhood disadvantage	Neighborhood immigrant concentration	Pro-drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Age		-0.05**	-0.04**	-0.35**	-0.11**	-0.05†	-0.19**	-0.24**
Male		0.04	0.06*	0.43**		0.28**	0.39**	0.18**
Married/cohabiting	-0.13**			-0.21**	-0.32**		-0.12**	-0.05
Education[a]								
Less than HS	-0.73**	0.36**	0.26**	-0.20**	0.14**	-0.20**	0.24**	0.41**
HS graduate	-0.57**	0.13**	-0.05	-0.05	0.08*	-0.13**	0.15**	0.19*
Some college	-0.40**	0.09**	0.05	0.02	-0.004	0.02	0.15**	0.11
Race[b]								
Black	-0.31**	0.95**	0.33**	-0.37**	0.04	0.02	-0.20**	
Hispanic	-0.15**	0.58**	1.43**	-0.36**	-0.02	-0.05	0.06†	
Other race	0.10†	0.12*	0.39**	-0.22**	0.18**	-0.22**	-0.12*	
Employment Status[c]								
Unemployed	0.03	0.11*			0.39**	-0.37**		
Not in workforce	0.08*	0.07*			0.06	-0.05		
Income[d]								
Missing	0.31**	-0.42**	-0.09*		-0.22**	0.15**		
$20001-$40000	0.06	-0.21**	-0.05		-0.18**	0.15**		
$40001-$60000	0.13**	-0.40**	-0.11**		-0.20**	0.25**		
$60001-$80000	0.19**	-0.48**	-0.14**		-0.22**	0.19**		
>$80000	0.64**	-0.71**	-0.18**		-0.21**	0.21**		
Family alcoholism history	-0.06*	0.06*	0.04†	0.06†	0.22**	-0.15**	0.05†	0.25**
Zip-level geocode			-0.05†		-0.05*	0.06*		-0.09
Neighborhood Factors								

	Neighborhood affluence	Neighborhood disadvantage	Neighborhood immigrant concentration	Pro-drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Affluence				0.07**	0.00	−0.01	−0.02	−0.02
Disadvantage				0.02	0.02	−0.01	0.03	0.09**
Immigrant concentration				−0.01	0.00	−0.01	−0.04**	−0.06**
Mediating Factors								
Pro-drinking attitudes							0.39**	0.12**
Depression							0.04†	0.19**
Positive affect							−0.001	0.003
Heavy drinking volume								0.38**
R-square	.18	.22	.23	.20	.07	.06	.33	.50

**
p<.01,

*
p<.05,

†
p<.10. Fit statistics: Estimated degrees of freedom=24, CFI=.995, TLI=.981, RMSEA=.016.

*a*College degree as referent.

*b*White as referent.

*c*Employed as referent.

*d*Income less than or equal to $20,000 as referent.

Table 3

Standardized coefficients from reduced path model, presented by race/ethnicity and gender

White Men (N=3,012; weighted N=3,528)

	Pro-drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Neighborhood Factors					
Affluence	0.08**	0.01	-0.01	-0.05*	-0.01
Disadvantage	-0.02	0.01	0.01	-0.03	0.03
Immigrant concentration	0.02	0.02	-0.01	-0.04†	-0.01
Mediating Factors					
Pro-drinking attitudes				0.45**	0.08*
Depression				0.06†	0.14**
Positive affect				0.001	-0.02
Heavy drinking volume					0.47**
R-square	.20	.06	.05	.38	.56

White Women (N=3,021; weighted N=3,571)

	Pro-Drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Neighborhood Factors					
Affluence	0.03	0.01	-0.04	-0.01	-0.12
Disadvantage	-0.03	0.01	-0.03	0.06†	0.08
Immigrant concentration	0.03	0.01	0.01	-0.05†	-0.06
Mediating Factors					
Pro-drinking attitudes				0.36**	0.18**
Depression				0.12**	0.22**
Positive affect				0.11*	0.06
Heavy drinking volume					0.29**
R-square	.15	.06	.05	.25	.48

Minority Men (N=1,510; weighted N=1,233)

	Pro-drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Neighborhood Factors					
Affluence	0.18**	0.07	0.00	0.04	-0.05
Disadvantage	0.13**	0.05	0.04	0.12*	0.12*
Immigrant concentration	-0.09**	-0.03	-0.05	-0.02	-0.11*
Mediating Factors					
Pro-drinking attitudes				0.31**	0.11*
Depression				-0.05	0.28**
Positive affect				-0.09*	0.02
Heavy drinking volume					0.38**
R-square	.19	.11	.10	.21	.52

Minority Women (N=1,337; weighted N=967)

	Pro-Drinking attitudes	Depression	Positive affect	Heavy drinking volume	2+ Negative consequences
Neighborhood Factors					
Affluence	0.04	-0.12*	0.13*	0.01	0.03
Disadvantage	0.09	-0.04	0.06	0.05	0.01
Immigrant concentration	-0.05	-0.04	0.02	-0.03	-0.12
Mediating Factors					
Pro-drinking attitudes				0.32**	0.11
Depression				0.02	0.23†
Positive affect				-0.03	-0.10
Heavy drinking volume					0.30**
R-square	.06	.09	.09	.16	.36

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

[†] p<.10. Models control for age, income, education, employment, marital status, family history of alcohol problems, and geocode precision. Non-significant paths from the control variables were trimmed to preserve degrees of freedom. Coefficients in **bold text** varied significantly across the four groups.

[**] p<.01,

[*] p<.05,