HHS Public Access

Author manuscript

J Ethn Subst Abuse. Author manuscript; available in PMC 2017 January 01.

Published in final edited form as:

J Ethn Subst Abuse. 2016 ; 15(1): 73–91. doi:10.1080/15332640.2014.1002879.

Racial/ethnic Differences in Associations between Neighborhood Socioeconomic Status, Distress and Smoking among U.S. Adults

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Abstract

Introduction—There are strong associations between neighborhood disadvantage and increased tobacco use. Theories suggest neighborhood disadvantage may increase smoking by increasing distress. By extension, neighborhood affluence may reduce smoking by increasing positive affect. We examined whether relationships between neighborhood socioeconomic status and daily smoking operated through distress and positive affect.

Methods—Simultaneous multivariate path models used pooled cross-sectional data from the 2000 and 2005 National Alcohol Surveys (15,963 respondents; weighted *N*=10,753) and the 2000 Decennial Census. Multiple groups analysis assessed differences by gender and race/ethnicity. Covariates included neighborhood immigrant concentration and individual-level demographics.

Results—In the full sample, neighborhood disadvantage had a significant direct path that increased smoking and neighborhood affluence had a significant direct path that decreased smoking. There were no indirect paths to smoking through either distress or positive affect, but distress was significantly associated with increased smoking. Positive affect was not associated with smoking. Sub-group analyses revealed a protective effect of neighborhood affluence unique to Hispanics: Affluence resulted in decreased smoking indirectly through reduced distress. Relationships between affect and smoking also varied by race/ethnicity, with distress being positively associated with smoking for all groups but Whites, and positive affect being negatively associated with smoking for Whites only. There were no significant differences by gender.

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Contributors

Dr. Karriker-Jaffe designed the study, guided the statistical analysis and wrote the manuscript.
Mr. Liu conducted the statistical analysis.
Dr. Johnson contributed to the writing of the manuscript.

Conflict of Interest

The authors declare they have no conflicts of interest to report.

The content is solely the responsibility of the author and does not necessarily represent the official views of the NIAAA, NIDA, or the National Institutes of Health.

Conclusions—Existing theories of neighborhood effects appear insufficient to explain geographic variation in smoking. Further research to develop and test new models in diverse groups is needed. Interventions targeting neighborhood socioeconomic status and distress may help reduce smoking, particularly for racial/ethnic minorities.

Keywords

Neighborhood disadvantage; socioeconomic status; distress; smoking

Although there are well-known medical problems associated with smoking cigarettes, 21.3% of Americans aged 12 and older reported past-month use of cigarettes in 2013, and 60% of those indicated that they smoke daily (Substance Abuse and Mental Health Services Administration, 2013). Identifying macro-level and structural factors that influence cigarette use is central to developing policies, initiatives, and programs aimed at preventing smoking and helping smokers quit. Therefore, we examine the nature of the association between neighborhood-level socioeconomic status (SES) and smoking.

At the two ends of the neighborhood-level SES spectrum are socioeconomic disadvantage and affluence. Neighborhood disadvantage is characterized by high unemployment, low educational attainment (such as dropping out of high school), and high rates of poverty. By contrast, indicators of neighborhood affluence include high levels of educational attainment (college graduation, in particular), low rates of poverty and unemployment, and high annual incomes and housing values. Characterization of neighborhood SES using these two dimensions 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 affluent areas that are not present in other non-poor, middle-class neighborhoods (Browning & Cagney, 2003).

There is strong evidence to suggest that neighborhood disadvantage is associated with health risk behaviors, including alcohol and drug use (reviewed in Karriker-Jaffe, 2011), as well as tobacco use (Datta et al., 2006; Diez Roux, Stein Merkin, Hannan, Jacobs, & Kiefe, 2003; Karriker-Jaffe, 2013; Matheson et al., 2011; Shohaimi et al., 2003). For example, Datta et al. found that women in neighborhoods where 20% or more of the residents were below the poverty level were 1.6 times more likely to smoke cigarettes than women in less disadvantaged neighborhoods. By contrast, neighborhood affluence has been shown to be negatively associated with regular tobacco use (Karriker-Jaffe, 2013), although more research is needed to confirm this finding.

Emotional states – which are impacted by neighborhood-level SES and which also influence smoking – may be key to understanding the association between neighborhood-level SES and smoking. Unfortunately, emotional states have not been fully explored as mediating factors in the relationship between neighborhood SES and smoking. Therefore, the purpose of this article is to examine associations between neighborhood disadvantage and affluence with daily smoking, and, because of the strong relationship between emotional well-being and smoking, to consider emotional distress and its counterpart, positive affect, as potential mediators.

Positive affect is relatively understudied in the stress literature (Folkman, 2008; Folkman & Moskowitz, 2000). In contrast to negative emotions, which tend to initiate a narrow set of responses to stress, including such typical reactions as fleeing a situation or fighting a challenger (Fredrickson, 1998, 2001), positive affect can widen the coping strategies that an individual considers while under stress (Tugade, Fredrickson, & Barrett, 2004). Thus, individuals with more positive affect may be less likely to adopt negative coping behaviors such as smoking.

Neighborhood-Level Disadvantage and Smoking

There are two theories that serve to explain the association between neighborhood-level socioeconomic disadvantage and smoking. First, disadvantaged neighborhoods often provide contextual cues to smoke, such as a higher density of tobacco retailers (Schneider, Reid, Peterson, Lowe, & Hughey, 2005) and a greater number of point-of-sale and outdoor tobacco advertisements (Widome, Brock, Noble, & Forster, 2013), both of which contribute to social norms promoting tobacco use. Second, residing in neighborhoods with high levels of disadvantage increases feelings of powerlessness, helplessness, tension and distress (Cohen, Farley, & Mason, 2003; Cutrona, Wallace, & Wesner, 2006; Ewart & Suchday, 2002; Fitzpatrick & LaGory, 2000; Mair, Diez Roux, & Galea, 2008). These factors may lead to people using cigarettes as a coping mechanism, and may also make quitting smoking more difficult.

Because neighborhood disadvantage is associated with emotional distress (Cohen, et al., 2003; Ewart & Suchday, 2002; Fitzpatrick & LaGory, 2000), and distress is related to current smoking (Hrywna, Bover Manderski, & Delnevo, 2014; Sung, Prochaska, Ong, Shi, & Max, 2011) and heavy smoking (20 or more cigarettes per day, Sung, et al., 2011), it is plausible that emotional distress is an important mediator of the neighborhood disadvantage–smoking association. Surprisingly, very few studies have explored this issue. One study of Black smokers showed that perceived stress was a mediator of effects of neighborhood disadvantage on alcohol use (Kendzor et al., 2009). However, because the sample was restricted to smokers, those authors could not examine neighborhood effects on smoking. Empirical research is needed to fully understand the mediating role of emotional distress in the neighborhood disadvantage-smoking association.

Neighborhood-Level Affluence and Smoking

With a few 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 affluence. In one study of a large, nationally-representative sample of US adults, researchers showed that there was a strong gradient effect of neighborhood SES on tobacco outcomes (Karriker-Jaffe, 2013). Specifically, residence in affluent neighborhoods was associated with lower levels of daily tobacco use than what was observed in middle-class or disadvantaged neighborhoods. Similar results were reported in a study of young adults in four U.S. cities (Diez Roux, et al., 2003). Thus, neighborhood affluence may operate as a protective factor for smoking.

One explanation for the inverse association between neighborhood affluence and smoking relates to the high value placed on healthy behaviors by high-SES individuals. Residents of affluent neighborhoods tend to embrace health-related lifestyles (Cockerham, Rütten, & Abel, 1997; Ross, 2000), which discourages smoking. Additionally, the theory described above could be reversed. That is, it is plausible that residence in an affluent neighborhood may decrease emotional distress, increase positive affect, or both, because there may be lower exposure to daily stressors, more resources to handle stressors, and greater levels of emotional and instrumental social support for residents of affluent areas (Cutrona, et al., 2006). As with neighborhood disadvantage, empirical research is needed to fully understand the mediating role of positive affect in the neighborhood affluence-smoking association. Accordingly, a key innovation in this project is to illuminate relationships of neighborhood SES with residents' positive affect and smoking behavior.

The Current Study

In response to the knowledge gaps identified above, the present study examines how neighborhood disadvantage and neighborhood affluence are associated with smoking, and also examines distress and positive affect as potential mediators of those associations. We hypothesized that neighborhood disadvantage would be associated with increased distress, which would be associated with a greater risk for daily smoking, and also that neighborhood affluence would be associated with increased positive affect, which would be associated with a lower risk for daily smoking. Data are from a national sample of U.S. adults, and we use Census-based composite measures of neighborhood SES that allow for differentiation of effects of both high SES (neighborhood affluence) and low SES (neighborhood disadvantage).

Both gender and race have been shown to have an impact on associations among neighborhood characteristics, emotional distress, and smoking. In terms of gender, some US national survey studies suggest distress is more strongly associated with smoking for women compared to men (Hrywna, et al., 2014), and other studies show stronger neighborhood effects on smoking for women than men (Cohen, Sonderman, Mumma, Signorello, & Blot, 2011). Concerning race, theories of accumulated disadvantage (Hatch, 2005; Pearlin, Schieman, Fazio, & Meersman, 2005) suggest that effects of neighborhood disadvantage on distress and daily smoking are stronger for racial/ethnic minority groups – including Blacks/African Americans and Hispanics/Latinos – than for Whites. However, several studies have found that neighborhood effects on smoking are stronger for Whites versus Blacks (Diez Roux, et al., 2003; Nowlin & Colder, 2007; Tseng, Yeatts, Millikan, & Newman, 2001), whereas others show stronger relationships for Blacks than Whites (Cohen, et al., 2011). As many studies addressing race or ethnicity were restricted to women or adolescents, additional research with representative samples is needed. We address this issue in the present study by examining differences in the neighborhood SES-smoking association by both race/ethnicity and gender.

Methods

Dataset

Data for the current study come from the 2000 and 2005 administrations of the National Alcohol Survey (NAS). Both surveys involved computer-assisted telephone interviews with a randomly-selected sample of U.S. adults, and they oversampled Blacks, Hispanics and residents from sparsely-populated U.S. states. For more details on NAS methodology, see Kerr and colleagues (Kerr, Greenfield, Ye, Bond, & Rehm, 2013). Given similarity in methods and virtually identical interview protocols, these datasets were merged to increase power for subgroup analyses.

The 2000 NAS included 7,613 adult respondents (over age 18), and the 2005 NAS included 6,919 adult respondents. Response rates for each NAS 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 telephone surveys in the U.S., and do not necessarily produce biased population estimates (Groves, 2006; Keeter, Kennedy, Dimock, Best, & Craighill, 2006).

For this study, NAS data were linked with Census tract-level indicators of neighborhood SES from the 2000 Census (U.S. Census Bureau, 2002). U.S. Census tracts are effective for delineating contextual determinants of health and substance use (Karriker-Jaffe, 2011; Krieger et al., 2002). Preliminary analyses suggested associations of neighborhood variables with the outcome did not vary significantly by survey year (i.e., NAS 2000 vs. NAS 2005) for any group except for Whites, for whom effects generally were stronger in 2000 (data available upon request). Most survey participants (60%) had geocodes assigned based on street address; the remainder had a geocode assigned based on the ZIP code centroid because a street address was not available (many respondents reported PO Box addresses). Preliminary analyses were conducted to test for interactions of geocode precision and neighborhood variables when predicting smoking; there were no statistically significant interactions overall or for any racial/ethnic group (all $p>.05$).

Measures

Neighborhood context—Neighborhood indicators included socioeconomic disadvantage, affluence and immigrant concentration. There was substantial variability across neighborhoods in the sample, with ranges from 0–100% for most unstandardized indicators (means and standard deviations below). **Neighborhood disadvantage** was a standardized factor score based on proportions of: people with incomes below the Federal poverty level (which was approximately $17,000 for a family of four in 1999; M=12%, SD=9.8); families with incomes below 50% of the U.S. median household income (median household income was approximately $42,000 in 1999; 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 Black (M=11%, SD=21.2). The Cronbach's alpha was 0.90 (M=0.14, SD=1.07) for the standardized factor score. **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), with a Cronbach's alpha of 0.88 (M= −0.05, SD=0.98) for the standardized factor score. **Neighborhood immigrant concentration** was a standardized factor score based on: linguistic isolation (i.e., proportion of households in which no resident age 14 or older speaks English "very well"; M=4%, SD=6.4), crowded housing (i.e., 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 (M=10%, SD=18.0), with a Cronbach's alpha of 0.92 (M=0.11, SD=1.08) for the standardized factor score. Neighborhood immigrant concentration was included as a control variable due to its association with both neighborhood disadvantage and tobacco availability (Schneider, et al., 2005).

Proposed mediators: Distress and positive affect—Two possible mediating variables were included: distress and positive affect. Both were based on items from the Center for Epidemiologic Studies' Depression Scale (CES-D; Radloff, 1977; Roberts, 1980). **Distress** was a 5-item factor score (Cronbach's alpha = 0.75, M=0.11, SD=0.76 for standardized factor score in the full sample, with alphas of .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 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. **Positive affect** was a 3-item factor score (Cronbach's alpha = 0.69, M= −0.13, SD=0.72 for standardized factor score in the full sample, with alphas of .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 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. Although it is possible to calculate an overall depression score using all eight items, confirmatory factor analysis suggested these items were appropriately treated as two separate factors in this sample.

Outcome: Daily smoking—Daily smoking was a dichotomous variable indicating smoking or using other kinds of tobacco "daily or almost daily" over the past 12 months. Approximately one-quarter (29%) of the sample reported any tobacco use in the past year, with 25% of the sample (84% of past-year users) reporting daily tobacco use. Of the daily users, 90% reported using cigarettes (86% used only cigarettes, and 4% used cigarettes and some other type of tobacco).

Demographic control variables—Models were adjusted for **gender**, **age** (continuous), **race/ethnicity** (mutually-exclusive dummy variables for Black, Hispanic, and other races/ethnicities, with White as reference group), **marital status** (currently living with spouse/partner vs. not), **educational attainment** (dummy variables for less than high school, high school graduate, and some college, with college degree as reference group), **employment status** (dummy variables for unemployed and not in labor force, 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). Models also included an indicator of **geocoding precision** (ZIP code match vs. street address match).

Analysis Strategy—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. For this study, all three neighborhood characteristics (i.e., neighborhood disadvantage, neighborhood affluence, and neighborhood immigrant concentration) were specified as correlated with each other, and the two hypothesized mediators 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 race/ethnicity given documented disparities in tobacco use for residents of disadvantaged neighborhoods and by some minority groups. We used multiple groups analysis and difference tests to evaluate whether allowing paths to vary by race/ethnicity significantly improved the fit over models where paths were constrained to be equal across groups.

Because samples were selected by random-digit dialing methods, only 23% of neighborhoods contained more than two respondents, and just 3% contained 5 or more (maximum was 9). Therefore, multilevel analytic strategies were not required due to the low degree of geographic clustering in the data (Snijders & Bosker, 1999).

All analyses used weighted data to adjust for sampling design and non-response. Survey year was used as the weighting stratum in order 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.

Results

Descriptive Analyses

The weighted sample was 48% male, and the mean age was 45 years (Table 1). The majority of respondents were White (71.8%); 11.4% were Hispanic, 11.4% were Black, and 5.4% were of another race or ethnic group. Sixty-three percent were living with a partner, either married or not. Two-thirds (66.8%) were employed, 59.9% had annual incomes of <= $60,000, and 57.6% had attended or graduated from college.

Among Whites (n=10,434), rates of tobacco use were 30.3% for any use and 25.9% for daily use. Comparable rates were 23.6% for any use and 17.6% for daily use for Hispanics (n=1,661); 25.4% for any use and 21.8% for daily use for Blacks (n=1,657); and 32.8% for any use and 27.5% for daily use for respondents of another race or ethnic group (n=779).

Compared to participants who did not report daily smoking, daily smokers were significantly younger and had lower levels of educational attainment. They were also more likely to be male, single, White, and have annual incomes of less than $40,000. Daily smokers also had significantly lower scores on neighborhood SES and positive affect, and higher scores on distress, than other respondents (Table 1).

Bivariate Correlations

Neighborhood affluence was negatively correlated with both daily smoking ($r = -0.12$, $p<.01$) and distress ($r = -0.05$, $p<.01$), and it was positively correlated with positive affect ($r = 0.05$, $p<.01$). The opposite pattern emerged for neighborhood disadvantage, with a positive correlation with both daily smoking ($r = 0.06$, $p<.01$) and distress ($r = 0.08$, $p<.01$), and a negative correlation with positive affect ($r = -0.08$, $p<.01$). Neighborhood immigrant concentration showed significant negative correlations with both daily smoking ($r = -0.03$, $p<.01$) and positive affect ($r = -0.07$, $p<.01$), and it was positively correlated with distress ($r = 0.04$, $p<.01$). As expected, distress was positively associated with daily smoking ($r = 0.09$, $p<.01$), and positive affect was negatively associated with smoking ($r = -0.09$, $p<.01$).

Path Analyses

Overall model—Figure 1 shows all statistically significant paths in the overall final model. All paths, including additional coefficients for control variables, are presented in Table 2. Although the overall path model achieved excellent fit (see fit statistics included with Figure 1), it only explained 16% of total variance in daily smoking.

Neighborhood affluence and neighborhood immigrant concentration both had statistically significant direct paths to reduced daily smoking. Neighborhood disadvantage, in contrast, was significantly related to increased daily smoking. Distress also was significantly related to increased smoking, whereas positive affect was not. Neither distress nor positive affect mediated relationships between any neighborhood characteristics and daily smoking, with all neighborhood effects on hypothesized mediators and all specific indirect effects on smoking found to be non-significant (all $p>.10$).

Subgroup differences—We examined gender differences, but found no paths varied significantly between men and women (results available upon request). However, subgroup analyses revealed some differences by race/ethnicity. Figure 2 shows all paths that varied significantly by race/ethnicity (highlighted by bold arrows), with significant mediation pathways highlighted by dashed arrows.

Among Hispanics, neighborhood affluence was significantly related to increased positive affect and decreased distress, and the association between distress and daily smoking was statistically significant and positive. There was a marginally significant indirect effect from affluence to decreased smoking through reduced distress (standardized $\beta = -0.01$, $p<.10$). As the direct effect of affluence on smoking was not statistically significant (standardized $\beta = -0.06$, $p>0.10$), the effect of neighborhood affluence on daily smoking for Hispanics appeared to be fully mediated by reduced distress.

Among Whites, Blacks, and those of other races/ethnicities, none of the neighborhood factors were significantly associated with the hypothesized mediators. The relationships between distress and positive affect with daily smoking differed by race/ethnicity. The association between distress and daily smoking was significant and positive for Blacks and those of other races/ethnicities. The association between positive affect and smoking was not statistically significant for Blacks or those of other races/ethnicities, however. Among Whites, distress was not significantly associated with smoking (standardized $\beta = 0.03$, $p>0.10$), but there was a significant negative association between positive affect and smoking.

Discussion

In the present study, we used data from a nationally-representative sample of US adults to examine whether positive affect and emotional distress functioned as mediators of associations between neighborhood-level SES and daily smoking. We expected to find that neighborhood disadvantage would be associated with increased distress and with increased smoking, and also that neighborhood affluence would be associated with increased positive affect and decreased smoking. In the overall path model, neighborhood affluence, neighborhood disadvantage, and distress were significantly associated with daily smoking in the expected directions, but there was no evidence that distress or positive affect served as mediators. In race-specific path analyses, however, we found evidence of indirect effects of neighborhood SES on smoking via distress for Hispanics, but not for Blacks, Whites, or those of other races/ethnicities. Thus, our subgroup analyses suggested a protective effect of neighborhood affluence unique to Hispanics.

Counter to dominant theories of neighborhood effects, we did not find support for our hypothesis that negative effects of neighborhood disadvantage on smoking operate through increased stress. However, parts of the hypothesized causal pathway were upheld. Confirming results from prior studies of neighborhood effects on smoking (Datta, et al., 2006; Diez Roux, et al., 2003; Matheson, et al., 2011; Shohaimi, et al., 2003) and of distress on smoking (Hrywna, et al., 2014; Sung, et al., 2011), neighborhood disadvantage and distress both had significant direct paths that increased the prevalence of daily smoking in

our full sample. Similarly, neighborhood affluence had a significant direct path that decreased the prevalence of daily smoking. Positive affect was not associated with daily smoking in the full sample, although it was negatively associated with daily smoking for Whites.

Increased tobacco use in disadvantaged neighborhoods may be partially due to increased availability of tobacco in these areas (Henriksen et al., 2008). Low-income neighborhoods are more likely to have tobacco advertisements featured prominently throughout the community, which increases the urge to smoke and makes it more difficult to quit (Datta, et al., 2006; Gilpin, White, & Pierce, 2005; Kendzor et al., 2012; Miles, 2006). A prime example is point-of-sale tobacco advertisements, which are more common in neighborhoods with high proportions of Blacks and with high proportions of low-income residents (Henriksen, Schleicher, Dauphinee, & Fortmann, 2012; Widome, et al., 2013). Both aggressive marketing tactics and high tobacco outlet density are likely to contribute to social norms supporting tobacco use and to promote tobacco as a relatively low-cost stress-reduction strategy in disadvantaged neighborhoods. These alternative pathways from neighborhood disadvantage to increased smoking deserve additional investigation in large, national datasets so that differential effects for various demographic subgroups also can be examined.

In examining the hypothesized causal pathway from neighborhood SES to smoking, we are faced with the question of why were there no neighborhood effects on distress or positive affect for people who are not Hispanic. Many studies have found robust effects of neighborhood disadvantage on distress (Cohen, et al., 2003; Cutrona, et al., 2006; Ewart & Suchday, 2002; Fitzpatrick & LaGory, 2000), although a few have failed to do so (such as Glymour, Mujahid, Wu, White, & Tchetgen Tchetgen, 2010). One possible explanation may be related to measurement of the proposed mediators. In our study, we used items from the CES-D to assess distress and positive affect. Despite the short time-frame referenced (items refer to the past week), these abbreviated measures have acceptable reliability (i.e., Cronbach's alpha greater than 0.70) and have been used in studies linking distress to past-year health risk behaviors, particularly heavy alcohol use (Karriker-Jaffe, 2013), drug use (Karriker-Jaffe, 2013), and alcohol problems (Mulia, Ye, Zemore, & Greenfield, 2008). In the present analysis, distress was positively associated with daily smoking, but distress was not related to neighborhood socioeconomic status. Given our innovative approach using items from the CES-D to represent both distress and positive affect, we note that correlations of the neighborhood SES factor scores with these mediators were similar to correlations of neighborhood SES with an overall CES-D8 score, and all were quite small (ranging from r=. 11 to r=.05). Other studies using the CES-D (either full or modified versions) have documented associations of neighborhood disadvantage and disorder on depression, although findings are somewhat mixed (see review by Mair, et al., 2008). Although additional studies of neighborhood effects on distress are needed to replicate the findings of the present analysis, it appears that current theories emphasizing the role of stress and distress in explaining effects of neighborhood disadvantage on health risk behaviors could be insufficient to explain geographic variation in smoking. It is possible that rather than mediating the relationship between neighborhood context and smoking, both distress and positive affect may be moderators of this association. For example, residents of

disadvantaged neighborhoods who report greater levels of distress may be at increased risk of smoking, while their counterparts who report greater positive affect may be at reduced risk of smoking.

Another question remaining is why we observed a different pattern of neighborhood effects for Hispanics. There are well-documented protective effects of living in ethnic enclaves for Hispanics in the U.S. (see, for example, Molina, Alegría, & Chen, 2012), and in our sample we saw a negative association of neighborhood immigrant concentration with smoking for all racial/ethnic groups. This relationship was not mediated by either reduced distress or increased positive affect, however. Neighborhood affluence, by contrast, was associated with decreased smoking indirectly through reduced distress, but only among Hispanics. This relationship was observed after accounting for individual level SES, as well as neighborhood immigrant concentration. It is unclear why Hispanics would differentially benefit from residence in affluent neighborhoods. Hispanics living in affluent areas might experience reduced exposure to daily stressors (Cutrona, et al., 2006), which could reduce distress and negative coping behaviors such as smoking. These beneficial effects should extend to other racial/ethnic minority group members, however, so the present analysis merits replication in other diverse samples. It would be particularly informative to examine whether differences in social support or other buffers of stress appear for diverse racial/ethnic groups in affluent neighborhoods. It also could be that norms supporting health-related lifestyles in affluent neighborhoods (Cockerham, et al., 1997; Ross, 2000) are stronger among Hispanics compared to Whites and other racial/ethnic group members, although it was not possible to test this in the current dataset.

There are a few limitations of this study to note. First, analyses cannot account for length of neighborhood residence, and the data are cross-sectional. Although some evidence suggests downward social mobility of heavy drinkers (Buu et al., 2007), neighborhood selection is likely to be less acute for heavy tobacco 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 would provide more nuanced understanding of the interplay between individuals and their neighborhood environments over time. Second, our analyses found stronger associations of neighborhood SES with smoking by Whites for the earlier survey in our pooled dataset. This is likely due to changes in neighborhoods between 2000 and 2005 which were not captured in the available Census measures. Alternate national data sources that provide more frequently updated population demographics for small areas such as neighborhoods and Census tracts, as well as studies that incorporate longitudinal neighborhood exposure data to capture changes in neighborhoods over time, are greatly needed. Another limitation pertains to the relatively low response rate of this and other recent U.S. telephone surveys (Midanik & Greenfield, 2003). Although bias due to topic reactivity would likely be low in this study (the main purpose of the survey was to assess alcohol use and its consequences), alternative methods for recruiting and engaging nationally-representative samples for both cross-sectional and longitudinal studies of health behaviors are needed. Finally, measures of nicotine dependence were not available, and it would be informative to replicate these analyses with other tobacco outcomes such as cessation attempts and intermittent smoking,

particularly in light of racial/ethnic differences in smoking patterns (Watson et al., 2003). Despite these limitations, the very large, nationally-representative sample of U.S. adults derived from the two National Alcohol Surveys provided statistical power necessary to examine subgroup effects of neighborhood SES on regular tobacco use. Our focus on effects of neighborhood affluence, as well as disadvantage, also fills a critical gap in the extant literature.

Findings from this study have important implications for tobacco control efforts. In addition to being more likely to smoke regularly, residents of disadvantaged neighborhoods are less likely to attempt to quit smoking (Turrell, Hewitt, & Miller, 2012). A longitudinal study of middle-aged adults in Brisbane, Australia, found the probability of quitting smoking among residents of disadvantaged neighborhoods to be approximately 10% over two years, but the probability of quitting among residents of affluent neighborhoods was double that (approximately 20%) (Turrell, et al., 2012). Given aggressive targeting of minority and disadvantaged communities by the tobacco industry (Yerger, Przewoznik, & Malone, 2007), systematic interventions are necessary to reduce the widening sociodemographic disparities in smoking (Murray & McNeill, 2012). Interventions ranging from targeted provision of cessation services in disadvantaged areas to universal delivery of brief interventions by medical providers to reduce smoking, as well as further restricting sales of tobacco, may be warranted.

Acknowledgments

The authors thank Dr. Sarah Zemore for her helpful feedback on this study. National Institute on Alcohol Abuse and Alcoholism (NIAAA) provided funding for the National Alcohol Surveys (P50AA05595, T. Greenfield, PI) and the research grant that supported this study (R21AA019175, K.J. Karriker-Jaffe, PI). Dr. Johnson's work on this study was supported by a career development award from the National Institute on Drug Abuse (K01DA031738).

Role of Funding Source

National Institute on Alcohol Abuse and Alcoholism (NIAAA) and National Institute on Drug Abuse (NIDA) provided funding that supported this study. The NIAAA and NIDA had no further role in study design; in the collection, analysis or interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

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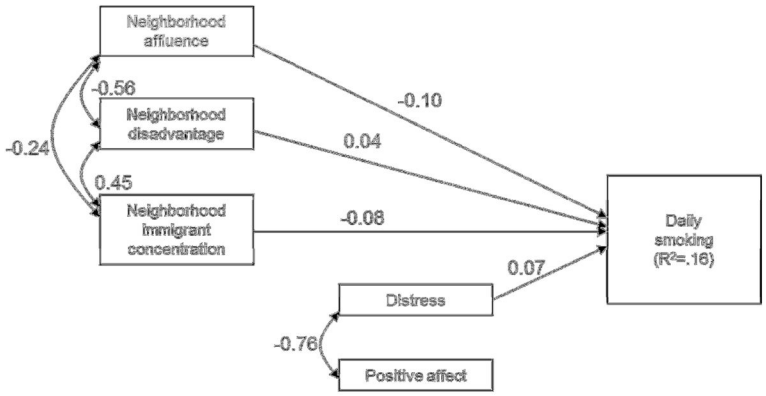

Figure 1.

Standardized coefficients for significant paths in overall model

Note. Estimated degrees of freedom = 8; Fit statistics: CFI=0.998, TLI=0.978, RMSEA=0.014. Significant paths from demographic control variables given in Table 2.

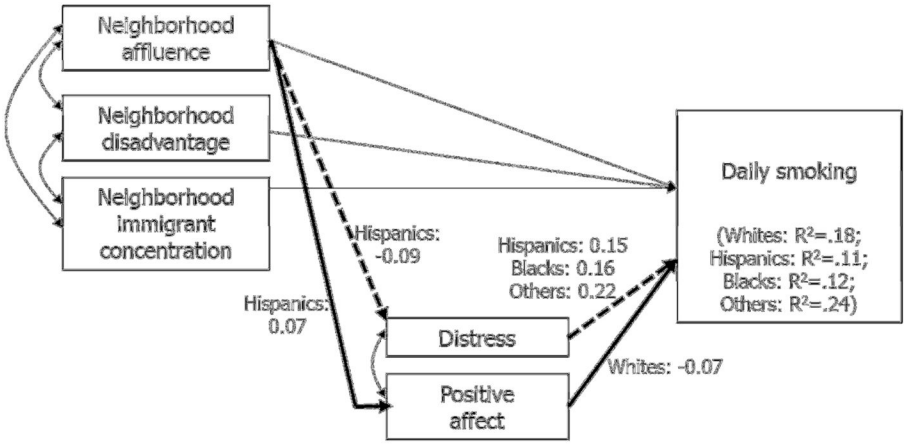

Figure 2.

Standardized coefficients for paths that varied significantly by race/ethnicity.

Note. Paths that varied significantly by race/ethnicity shown with bold lines; significant mediation pathway for Hispanics shown with dashed lines. Coefficients by racial/ethnic group given only for significant paths that varied by group.

Table 1

Characteristics of the combined 2000 & 2005 National Alcohol Survey samples, overall and by smoking status

	Total Sample (Weighted N=14,302)	Not Daily Smoker (Weighted N=10,753)	Daily Smoker (Weighted N=3,549)	*P*-value
Mean Age (SD)	44.8 (16.7)	45.9 (17.3)	41.3 (14.3)	<.001
Sex				
Male	48.0%	45.7%	55.3%	<.001
Female	52.0%	54.4%	44.7%	
Marital Status				
Single	36.6%	35.1%	40.4%	<.001
Cohabiting	63.4%	64.9%	59.6%	
Race				
White	71.8%	70.7%	75.8%	<.001
Black	11.4%	11.7%	10.0%	
Hispanic	11.4%	12.5%	8.2%	
Other race	5.4%	5.1%	6.0%	
Education				
Less than high school	12.5%	11.2%	16.1%	<.001
High school graduate	29.9%	27.7%	36.6%	
Some college	26.7%	25.7%	30.2%	
College degree or more	30.9%	35.4%	17.1%	
Employment Status				
Employed full- or part-time	66.8%	65.7%	70.2%	<.001
Unemployed	4.0%	3.6%	5.4%	
Not in workforce	29.2%	30.7%	24.4%	
Income				
<$20000	21.4%	20.0%	25.5%	<.001
$20001–$40000	22.9%	21.1%	28.5%	
$40001–$60000	15.6%	15.6%	15.6%	
$60001–$80000	11.1%	11.9%	9.1%	
>$80000	15.9%	17.5%	11.2%	
Missing income	13.0%	13.9%	10.1%	
Neighborhood (NBH) Factors				
Mean NBH Affluence (SD)	0.003 (.98)	0.07 (1.02)	−0.20 (.83)	<.001
Mean NBH Disadvantage (SD)	−0.002 (.98)	−0.04 (.99)	0.10 (.95)	<.001
Mean NBH Immigrant concentration (SD)	0.0002 (.96)	0.02 (1.01)	−0.06 (.80)	<.001
Mediating Factors				
Mean Distress (SD)	0.113 (.76)	0.07 (.73)	.23 (.82)	<.001
Mean Positive affect (SD)	−0.132 (.72)	−0.10 (.70)	−.24 (.77)	<.001

SD, standard deviation.

Note. *P*-values based on adjusted Wald tests (continuous variables) and design-based F-tests for differences in proportions (categorical variables).

Table 2

Standardized coefficients from overall path model

	Neighborhood affluence	Neighborhood disadvantage	Neighborhood immigrant concentration	Distress	Positive affect	Daily smoking
Age		−0.028**	−0.043**			−0.148**
Male		0.028	0.034+	−0.118**	−0.034	0.240**
Cohabit	−0.137**			−0.301**	0.268**	−0.046
Race (White as reference)						
Black	−0.340**	0.938**	0.265**	−0.019	0.044	−0.337**
Hispanic	−0.161**	0.532**	1.438**	0.019	−0.101**	−0.434**
Other race	0.102*	0.124**	0.373**	0.151**	−0.187**	−0.018
Education (College degree as reference)						
Less than high school	−0.687**	0.342**	0.194**	0.179**	−0.203**	0.569**
High school graduate	−0.572**	0.129**	−0.055+	0.092**	−0.105**	0.439**
Some college	−0.380**	0.081**	0.025	0.036	0.005	0.404**
Employment Status						
Unemployed	0.026	0.087*		0.342**	−0.358**	0.036
Not in workforce	0.053*	0.064**		0.094**	−0.072**	−0.092**
Income (< $20,000 as reference)						
$20,001–$40,000	0.038	−0.197**	−0.064**	−0.192**	0.183**	0.085*
$40,001–$60,000	0.143**	−0.382**	−0.094**	−0.223**	0.253**	−0.028
$60,001–$80,000	0.229**	−0.476**	−0.136**	−0.257**	0.213**	−0.124*
> $80,000	0.652**	−0.658**	−0.136**	−0.229**	0.224**	−0.109+
Missing	0.279**	−0.338**	−0.057*	−0.195**	0.147**	−0.162**
Zip-level Geocode			−0.051**	−0.069**	0.079**	−0.047
Neighborhood (NBH) Factors						
NBH Affluence				−0.001	< 0.001	−0.103**
NBH Disadvantage				0.015	−0.004	0.040*
NBH Immigrant concentration				−0.010	−0.005	−0.084**

	Neighborhood affluence	Neighborhood disadvantage	Neighborhood immigrant concentration	Distress	Positive affect	Daily smoking
Mediating Factors						
Distress						0.072**
Positive affect						−0.031
R-squared	0.175	0.221	0.246	0.070	0.061	0.159

** $p < .01$;

* $p < .05$;

+ $p < .10$.