Published in final edited form as:
J Drug Issues. 2013 January ; 43(1): 69–84. doi:10.1177/0022042612462218.

Racial/Ethnic Differences in the Relationship Between Neighborhood Disadvantage and Adolescent Substance Use

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Abstract

Although social disorganization theory hypothesizes that neighborhood characteristics influence youth delinquency, the impact of neighborhood disadvantage on adolescent substance use and racial/ethnic differences in this relationship have not been widely investigated. The present study examines these issues using longitudinal data from 1,856 African American, Hispanic, and Caucasian adolescents participating in the Project on Human Development in Chicago Neighborhoods (PHDCN). The results indicated that neighborhood disadvantage did not significantly increase the likelihood of substance use for the full sample. When relationships were analyzed by race/ethnicity, one significant ($p \leq .10$) effect was found; disadvantage increased alcohol use among African Americans only. The size of this effect differed significantly between African American and Hispanic youth. In no other cases did race/ethnicity moderate the impact of disadvantage on substance use. These results suggest that disadvantage is not a strong predictor of adolescent substance use, although other features of the neighborhood may affect such behaviors.

Keywords

substance use; neighborhood disadvantage; race/ethnicity

Introduction

The importance of the neighborhood context in influencing adolescent problem behavior is widely acknowledged (Sampson, Raudenbush, & Earls, 1997; Shaw & McKay, 1942; Wilson, 1987). Social disorganization theories emphasize that youth delinquency is not equally distributed across communities but rather is clustered in more disadvantaged areas (Anderson, 1999; Haynie, Silver, & Teasdale, 2006; Shaw & McKay, 1942; Stewart, Simons, & Conger, 2002; Zimmerman & Messner, 2010). This work posits that

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Declaration of Conflicting Interests The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

neighborhoods characterized by structural deficits (i.e., poverty) increase the likelihood of adolescent delinquency directly and indirectly, by compromising the social processes (e.g., cohesion between neighborhood residents or the ability of residents to informally control crime) that would otherwise protect against youth involvement in crime (Kornhauser, 1978; Sampson & Groves, 1989; Sampson & Wilson, 1995).

Despite the strong theoretical tradition emphasizing the role of the neighborhood context in influencing youth development, most empirical tests of this perspective have focused on violent and antisocial behaviors (Molnar, Cerda, Roberts, & Buka, 2008; Zimmerman & Messner, 2010). There has been much less research examining the effects of neighborhood characteristics, including structural factors such as poverty, on adolescent substance use (Lambert, Brown, Phillips, & Ialongo, 2004; Leventhal & Brooks-Gunn, 2000). Moreover, although it is widely acknowledged that youth from minority racial/ethnic groups are most likely to live in disadvantaged neighborhoods, very few studies have examined whether the effect of neighborhood affluence/poverty on delinquency and drug use varies across racial/ethnic groups (Brenner, Bauermeister, & Zimmerman, 2011; Kulis, Marsiglia, Sicotte, & Nieri, 2007; Lambert et al., 2004). This study seeks to improve our understanding of these issues by examining the impact of neighborhood economic disadvantage on adolescent tobacco, alcohol, and marijuana use, and investigating the degree to which these relationships differ for African American, Hispanic, and Caucasian youth.

The Effects of Neighborhood Disadvantage on Substance Use

Although social disorganization theories (Kornhauser, 1978; Sampson & Groves, 1989; Sampson & Wilson, 1995; Shaw & McKay, 1942) suggest that structural and social characteristics of neighborhoods affect youth delinquency, the present article focuses on the effects of neighborhood disadvantage on substance use because few empirical studies have previously examined or established a direct effect of this particular neighborhood feature on adolescent drug use. In addition, although social disorganization theory hypothesizes that structural disadvantage will increase youth involvement in crime, whether this relationship extends to substance use is uncertain. Compared with more affluent areas, neighborhoods with high rates of poverty are likely to have higher rates of violence, more unemployed residents, more visible displays of crime (e.g., public intoxication or drug use), cultural norms more favorable to deviance and lawbreaking, more commercial access to alcohol and tobacco, and lower quality schools (Anderson, 1999; Kornhauser, 1978; Novak, Reardon, Raudenbush, & Buka, 2006; Shaw & McKay, 1942; Tobler, Livingston, & Komro, 2011). These risk factors may increase the likelihood of youth substance use, albeit in various ways. For example, children may use illegal substances as a means of coping with the stressors of living in such areas, because they have less academic success and lower attachment to school or because they are exposed to more drugusing adults and a culture that endorses illegal behavior (Galea, Rudenstine, & Vlahov, 2005; Gardner, Barajas, & Brooks-Gunn, 2010; Kulis et al., 2007; Lambert et al., 2004; Wilson, Syme, Boyce, Battistich, & Selvin, 2005). Greater numbers of commercial outlets may directly influence drug use by providing more opportunities for youth to purchase or otherwise procure illegal substances (Novak et al., 2006).

It is also possible, however, that neighborhood affluence will lead to greater adolescent drug use. At the individual level, higher income and socioeconomic status have been linked to increased alcohol use among adults and teenagers (Hawkins, Catalano, & Miller, 1992). Thus, youth from wealthier neighborhoods may have more contact with adults and parents who drink. Exposure to attitudes and behaviors favorable to drinking and increased access to alcohol may elevate the chances that youth will use alcohol (Chuang, Ennett, Bauman, & Foshee, 2005; Gardner et al., 2010; Song et al., 2009). Research also suggests that affluent parents are less likely to monitor their children's activities and may have more permissive attitudes regarding children's behavior, both of which can lead to increased opportunities for adolescent use of alcohol and other illicit drugs (Gardner et al., 2010; Hawkins et al., 1992; Trim & Chassin, 2008). Conversely, lower socioeconomic status has been associated with higher rates of smoking, at least among adults (Gardner et al., 2010). Although the extant empirical literature is limited, it appears that neighborhood disadvantage has the potential to increase or decrease the likelihood of adolescent use of tobacco, alcohol, and other drugs.

There is evidence linking neighborhood poverty to increased rates of smoking (Chilenski & Greenberg, 2009; Kulis et al., 2007) and alcohol use (Tobler et al., 2011). However, other investigations have found significant associations between neighborhood disadvantage and decreased drinking (Snedker, Herting, & Walton, 2009; Song et al., 2009) and marijuana use (Snedker et al., 2009). Trim and Chassin (2008) reported that the effect of neighborhood disadvantage was conditional on the drinking patterns of parents: Neighborhood disadvantage was significantly associated with increased alcohol use among teen-aged children of alcoholic parents, and it was negatively associated with drinking among children of nonalcoholic parents. Although these studies have indicated significant relationships between disadvantage and adolescent drug use, albeit with mixed results regarding the direction of these relationships, other research has failed to find a significant impact of neighborhood socioeconomic status on adolescent smoking, drinking, or other drug use (Brenner et al., 2011; Ennett, Flewelling, Lindrooth, & Norton, 1997; Gottfredson, McNeil, & Gottfredson, 1991; Novak et al., 2006; Xue, Zimmerman, & Caldwell, 2007; Zimmerman & Vasquez, 2011).

The limited number of studies and varied findings make it difficult to draw conclusions regarding the direct effects of neighborhood disadvantage on adolescent substance use. Typically, mixed findings can be attributed to differences in research methodology, but nearly all the studies reviewed here relied on cross-sectional, not longitudinal, data, and all utilized similar measures of neighborhood disadvantage and drug use. For instance, all relied on multiple items from the U.S. Census to assess disadvantage (e.g., the percentage of families in the neighborhood receiving public assistance, below poverty, with an adult who was unemployed, with a head of household having less than a high school degree, or with a female as the head of household), and all were based on self-reported information from youth regarding substance use in the past month or past year.

Some variation in methods was found, however. Some studies have assessed only one type of drug (e.g., smoking or drinking), and a few included a combined measure of multiple drugs. Although all the studies reviewed included control variables, the number varied substantially across investigations, and a few failed to include some of the more salient and

proximal risk factors for drug use, such as family and peer influences. Omission of important control variables may lead to misspecifying and perhaps overstating the impact of disadvantage on substance use. Finally, not all the studies utilized multilevel models to assess the impact of neighborhood disadvantage on adolescent substance use. Investigations that fail to use this method risk over- or underestimating the unique effects of neighborhood factors on substance use (Leventhal & Brooks-Gunn, 2000), and variation in statistical models across studies could also have contributed to the mixed findings.

Past empirical research has also largely failed to investigate the degree to which the effects of concentrated disadvantage differ according to race/ethnicity. Although the racial/ethnic makeup of the sample has varied across studies, most have included primarily Caucasian or primarily minority youth, thus precluding examination of racial/ethnic differences. Only two of the investigations reviewed here assessed racial/ethnic differences in the effects of neighborhood disadvantage on substance use (Kulis et al., 2007; Tobler et al., 2011), and each included youth from only two different groups. Kulis et al. (2007) reported that the relationships between disadvantage and alcohol and marijuana use were similar for Caucasian and Hispanic youth. In contrast, Tobler and colleagues (2011) found that community deprivation (i.e., poverty) had direct, positive effects on alcohol use among African American youth living in Chicago but had no significant effects on drinking among Hispanic youth.

There is much evidence that minority groups are more likely than Caucasians to reside in economically distressed neighborhoods (Anderson, 1999; Wilson, 1987). However, this disparity does not necessarily mean that the *influence* of neighborhood disadvantage will be stronger among minority youth. Some contend that residence in high-risk, high-poverty neighborhoods adds to the multitude of stressors (particularly racial discrimination) already facing minority youth and will thus more strongly contribute to substance use (Gibbons, Pomery, & Gerrard, 2010; Lambert et al., 2004). However, data from the Monitoring the Future study (Johnston, O'Malley, Bachman, & Schulenberg, 2008) and other empirical studies (Donovan, 2004; Gibbons et al., 2010; Tobler et al., 2011) contradict this hypothesis, and show that African American youth—those most likely to live in disadvantaged areas—have *lower* rates of cigarette and alcohol use compared with Caucasian youth, although rates of marijuana use are more similar. Hispanic and Caucasian teenagers, in contrast, report fairly similar rates of drug use (Johnston et al., 2008). In general, there has been somewhat limited analysis of racial/ethnic differences in the effects of known risk factors related to adolescent substance use (Unger, 2012). Although this literature has been increasing, very few studies have investigated how race/ethnicity may affect neighborhood influences on substance use, despite the recognition that residence in such areas varies across racial/ethnic groups.

To summarize, the strength and direction of the relationship between neighborhood disadvantage and adolescent substance use is uncertain. A limited number of studies that have investigated this issue have indicated positive, negative, and nonsignificant associations between these factors, and the direction and strength of the effect differs across different types of drugs. Although past research has typically relied on valid indicators of neighborhood disadvantage and adolescent substance use, relatively few investigations have

utilized multilevel modeling techniques, used longitudinal data to assess the impact of disadvantage on drug use over time, included a range of relevant control variables, or compared the impact of poverty on different types of drugs. Particularly relevant for the present investigation, few studies have assessed differences in the impact of disadvantage across racial/ethnic groups, despite the fact that residence in disadvantaged areas and involvement in substance use differ by race/ethnicity.

This study seeks to improve our understanding of the degree to which neighborhood disadvantage contributes to adolescent substance use and whether this relationship is moderated by race/ethnicity. We investigate these issues using data from the Project on Human Development in Chicago Neighborhoods (PHDCN), which includes an ethnically diverse sample of Caucasian, African American, and Hispanic youth. Analyses utilize longitudinal data to better establish the causal impact of disadvantage on substance use, include a range of psychosocial risk factors known to affect drug use as control variables, and analyze effects separately for tobacco use, alcohol use, binge drinking, and marijuana use.

Method

Participants

The PHDCN is a longitudinal, multiple component study designed to investigate contextual effects on youth development. The study design utilized 847 contiguous census tracks in Chicago, which were combined to create 343 neighborhood clusters (NCs), each of which contained about 8,000 residents. To collect longitudinal data for the Longitudinal Cohort Study (LCS) from children and caregivers in these areas, the 343 NCs were grouped by seven categories of racial and ethnic composition (e.g., 75% or more African American, Caucasian, and Hispanic residents) and three levels of socioeconomic status (SES; high, medium, low). From these 21 strata, 80 NCs were selected using stratified probability sampling,[1] and households within the 80 NCs were then randomly selected to participate in the LCS. Three waves of data were collected, with about 2.5 years between each wave. The original data were collected through Harvard Medical School in accordance with ethical standards and principles of human research (Earls, Brooks-Gunn, Raudenbush, & Sampson, 2002). Deidentified data for the present study were obtained through the Inter-University Consortium for Political and Social Research.

The LCS involved in-home and phone interviews with 6,228 youth from seven age cohorts (age 0, 3, 6, 9, 12, 15, and 18) and their primary caregivers (93% of whom were women). Given the focus of this article on adolescent drug use, analyses were restricted to respondents from the age 9, 12, and 15 cohorts. This sample included 2,344 youth at the first wave of data collection, conducted from 1994 to 1997; at Wave 2, when drug use was assessed, and after accounting for missing data on the primary variables, 1,856 respondents (79%) from 79 NCs remained. As shown in Table 1, the mean age of the respondents was 12

[1]Despite efforts to ensure that NCs varied in ethnicity and socioeconomic status (SES), none of the derived clusters contained greater than 75% Caucasian residents and had low SES, none were greater than 75% Hispanic with high SES, and none contained at least 20% Hispanic and 20% African American residents and had high SES.

years (range = 8–17 years) at baseline, and 51% were female. The sample was ethnically diverse, with 47% of youth reporting their race/ethnicity as Hispanic (*n* = 870), 35% as African American (*n* = 644), and 15% (*n* = 272) as Caucasian.[2]

Measures

Four outcomes representing the most common forms of illegal drug use among adolescents were assessed: *past year cigarette use*, *past year alcohol use*, *past year marijuana use*, and *past month binge drinking*. These measures were reported by youth at Wave 2 using questions based on the National Household Survey on Drug Abuse (1991). Respondents reported the number of days in the past year they smoked cigarettes, used alcohol, and used marijuana (three separate items), based on a 9-point scale ranging from 0 days to 200 or more days. To measure binge drinking, youth were asked to report the number of times in the past 30 days they had five or more drinks in a row, based on a 6-point scale from none to 10 or more times. Responses to these four items were then dichotomized to distinguish users and nonusers for four outcomes: *past year cigarette use*, *past year alcohol use*, *past year marijuana use*, and *past month binge drinking* (0 = *no use*, 1 = *any use*).

Neighborhood disadvantage was based on principal components analysis using information from the 1990 U.S. Census. Four poverty-related variables (α = .88) were included: the percentage of residents in a NC who were below the poverty line, receiving public assistance, unemployed, and living under female-headed households. Higher values on this variable reflect greater disadvantage.

Multiple control variables, each measured at Wave 1, were included in the analysis to account for other possible predictors of youth substance use. Youth self-reports were used to assess age, gender, race/ethnicity, peer drug use, and prior drug use. *Age* was the youth's age in years. When conducting analyses using the full sample, three dichotomous variables, *Hispanic*, *African American*, and *other race/ethnicity*, denoted the race/ethnicity of the youth, with Caucasians serving as the reference category. *Gender* (1 = *male*, 0 = *female*) was also a dichotomous variable. *Peer substance use* was based on four items measuring the number of friends (on a 4-point scale, from none to all of them) who used tobacco, alcohol, marijuana, and other drugs in the past year. Items were summed (α = .77) and standardized. Youths' *prior drug use* was measured at Wave 1 and indicated whether the youth reported *any past year cigarette use*, *any past year alcohol use*, *any past month binge drinking*, and *any past year marijuana use* (1 = *yes*, 0 = *no* for each variable). These items were included as controls in the relevant models (e.g., models investigating predictors of cigarette use at Wave 2 controlled for cigarette use at Wave 1).

Responses from the primary caregiver or interviewer impressions were used to measure three additional variables. *Household salary* indicated the total income earned by the primary caregiver and his or her spouse/partner in the past year reported using an 11-point scale, from less than US$5,000 to more than US$90,000. *Parental problem drug use* was a dichotomous variable indicating that the primary caregiver reported either biological parent

[2]An additional 4% (*n* = 69) of the sample reported their race/ethnicity as "other." These respondents were included in the primary analyses but were excluded in race-specific analyses given their small sample size.

of the child as having problems with "health, family, job or police" due to drinking or drug use. *Parental warmth* toward the youth reflects the overall warmth displayed by parents toward children, as observed by trained PHDCN staff conducting in-home interviews who rated the occurrence of each of nine behaviors (e.g., praise, encouragement, and affection offered to children from parents) using a dichotomous rating scale (1 = *observed*, 0 = *not observed*). The summed variable ($\alpha = .76$) ranged from 0 to 9. Descriptive statistics for all the variables are provided in Table 1 for the full sample and for each of the three racial/ethnic groups.

Analysis

Hierarchical modeling techniques (hierarchical linear modeling [HLM]; Raudenbush & Bryk, 2002) using HLM 6.08 software (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) examined the effects of neighborhood disadvantage on neighborhood rates of youth substance use, taking the individual-level variables into account. Hierarchical Bernoulli models were used to analyze the dichotomous drug use outcomes. Analyses were performed for the full sample and were then repeated within the three racial/ethnic groups (African American, Hispanic, and Caucasian).

The hierarchical analyses proceeded in several stages. The first step involved estimating an unconditional model for each outcome to determine whether the variation between neighborhoods was significant ($p \leq .05$). These analyses revealed that for the full sample, each of the four drug use outcomes varied significantly across NCs at the second wave[3] (*any cigarette use:* $p \leq .00$, $\delta^2 = .95724$, $\tau = .13640$; *any alcohol use:* $p \leq .00$, $\delta^2 = .96143$, $\tau = .16958$; *any binge drinking:* $p \leq .00$, $\delta^2 = .86924$, $\tau = .23388$; *any marijuana use:* $p \leq .01$, $\delta^2 = .94522$, $\tau = .10497$).[4]

The second step involved determining the main effects of the individual-level (Level 1) predictors on drug use. These Level 1 variables were all "fixed" so that they were not allowed to vary across NCs; these coefficients thus indicate the average effect of each variable across all NCs. All Level 1 predictors were grand mean centered, centering the variable around its mean across all neighborhoods. Grand mean centering is more appropriate when the substantive research question under exploration is at the aggregate level (Enders & Tofighi, 2007).

The third step, estimating the intercepts as outcomes, involved the examination of the main effects of neighborhood disadvantage on the Level 2 outcomes (i.e., neighborhood rates of adolescent substance use). This step also allowed all fixed Level 1 predictors to influence each outcome before the effects of disadvantage were estimated. When conducting analyses

[3]Intraclass correlation coefficients (ICCs) are not provided here because they are less informative when modeling binary outcomes due to the heteroskedastic nature of the data (see Raudenbush & Bryk, 2002). The sigma-squared and tau values can be used to calculate ICCs and, like ICCs, can be used as indicators of the variance in the outcome that exists within and between neighborhoods, respectively.

[4]When these analyses were conducted for each of the three racial/ethnic subgroups, three of the four outcomes (smoking, drinking, and binge drinking) varied by neighborhood among African American respondents. For Hispanic youth, only past year alcohol use varied significantly by neighborhood; the other three outcomes did not. For Caucasians, the smallest of the three racial/ethnic groups, none of the outcomes varied by neighborhood. Although these results present a mixed picture of neighborhood variation, enough of the outcomes varied to warrant exploration by racial/ethnic subgroups, particularly given the lack of prior empirical attention to this issue.

for each of the three racial/ethnic groups, the number of individuals nested within each NC was reduced and resulted in reduced reliability of the Level 1 intercepts and coefficients. To adjust for this situation, the empirical Bayes estimates of Level 1 intercepts and slopes were modeled at Level 2 for all analyses (Raudenbush & Bryk, 2002; Raudenbush et al., 2004).

In all models, the criterion for statistical significance when estimating individual-level effects was $p \leq .05$, but it was relaxed to $p \leq .10$ when estimating neighborhood-level effects due to the restricted Level 2 sample size (79 NCs). In Tables 3 to 6, in which effects were modeled separately for African American, Hispanic, and Caucasian youth, the strengths of the Level 1 and Level 2 coefficients were compared using the equality of coefficients test (Clogg, Petkova, & Haritou, 1995). Multicollinearity was not a problem for these models, with tolerance values ≥ .46. Although tolerance values for some of the models based on the full sample were not ideal (≥ .40), they were still considered acceptable (see Allison, 1999).

Results

Rates of drug use reported at Wave 2 are provided in Table 1 for the full sample and for each racial/ethnic group. Among the full sample, 19% reported cigarette use within the past year, 23% reported alcohol use within the past year, 6% reported binge drinking within the past month, and 11% reported marijuana use within the past year. Rates of drug use varied across the three race/ethnic groups assessed in this study. Caucasian adolescents reported the highest rates of smoking, drinking, binge drinking, and marijuana use; African American youth reported the lowest rates of cigarette use, alcohol use, and binge drinking; and Hispanics reported rates in between these two groups for cigarette use, alcohol use, and binge drinking, and the lowest rates for marijuana use.

Table 2 provides the results of models assessing the effects of neighborhood disadvantage on the likelihood of drug use for the full sample, controlling for Level 1 predictors. As shown, disadvantage was not significantly related to any of the four outcomes after individual covariates were accounted for. The most consistent predictors of future drug use were age (with older youth more likely to report use), peer substance use, and prior drug use.[5] In terms of other significant predictors, males were significantly more likely to report binge drinking and marijuana use compared with females, household income was positively related to past year cigarette and alcohol use, African American youth were less likely to report cigarette and alcohol use compared with Caucasian youth, and those from other racial/ethnic groups were less likely to report cigarette use.

Tables 3 to 6 provide the relationships between disadvantage and each type of substance use by respondent race/ethnicity. As seen in Table 3, disadvantage did not predict cigarette use for African American, Hispanic, or Caucasian adolescents, and the strength of this effect did not differ across racial/ethnic groups. A few of the control variables had differential effects on smoking across groups, although there was no clear pattern of results. For example, the effect of age was weakest among Hispanic youth, whereas the effect of prior cigarette use was strongest for Caucasian and weakest for African American youth.

[5]Models omitting prior drug use also failed to show a significant effect of disadvantage on any of the outcomes (results not shown).

As shown in Table 4, controlling for Level 1 predictors, disadvantage significantly ($p \leq .10$) increased the likelihood of past year drinking among African American youth. The strength of this effect was significantly different ($p \leq .05$) from the effect of disadvantage on alcohol use among Hispanic respondents (but not Caucasian youth), although disadvantage was not a significant predictor of use for these youth. Few individual-level predictors were related to alcohol use within each group, and there were no race/ethnic differences in the impact of any of the predictors on the likelihood of past year drinking.

The results in Table 5 indicated that neighborhood disadvantage did not predict any binge drinking for African American, Hispanic, or Caucasian adolescents, and the strength of this effect did not differ across race/ethnicity. Only two of the control variables (age and gender) showed significant differences in effects across group, with age having a stronger effect for African American youth compared with Hispanic and Caucasian adolescents and male Hispanic youth reporting a greater tendency to binge drink compared with African American males.

Results for marijuana use (Table 6) are similar to those seen for binge drinking. Disadvantage again did not significantly predict the likelihood of marijuana use for any group, and the strength of this effect did not differ across racial/ethnic groups. The effect of age in increasing the likelihood of marijuana use was stronger for African American youth compared with Hispanic respondents, but no other racial/ethnic differences in the influence of control variables were evident.

Across all models, the multilevel analyses demonstrated very little evidence that neighborhood disadvantage affected the likelihood of drug use by adolescents or that the relationship varied by race/ethnicity. The number of NCs was relatively low for each of the racial/ethnic groups (see the footnotes in Tables 3–6), however, which may have limited the ability to detect differences in the effects of disadvantage between groups. The pattern of effects in Tables 3 to 6 suggested some disparity by race/ethnicity, with disadvantage typically increasing drug use among African Americans and decreasing the likelihood of substance use for Hispanic and Caucasian youth, although the only significant difference in the magnitude of these effects was evidenced for past year alcohol use. To further explore this pattern of results, we examined the bivariate relationship between drug use and disadvantage using a dichotomous measure that compared the NCs with the highest (top 25%) scores of disadvantage with all other clusters. No significant ($p \leq .05$) bivariate relationships were demonstrated for any of the three groups (results not shown), providing further support that neighborhood disadvantage did not have a substantial impact on the likelihood of adolescent substance use in this study.

Discussion

The goal of this article was to investigate the influence of neighborhood economic disadvantage on adolescent substance use and the degree to which this relationship differed for African American, Hispanic, and Caucasian youth. Examination of multilevel models that controlled for individual-level predictors of drug use suggested that disadvantage did not significantly impact reports of any past year smoking, alcohol, or marijuana use, or any

past month binge drinking. These findings were true for the full sample of adolescents participating in the study and were maintained in nearly all cases when findings were analyzed by race/ethnicity. In the race-specific analyses, neighborhood disadvantage significantly ($p \leq .10$) impacted drug use in only one case: Greater disadvantage predicted an increased likelihood of alcohol use among African American respondents. The strength of this effect differed significantly between African American and Hispanic (but not Caucasian) youth; although disadvantage increased drinking for the former, it had no effect on drinking among Hispanic youth. This was the only case in which race/ethnicity significantly moderated the effect of disadvantage on substance use, which suggests more similarity than difference in the (largely nonsignificant) influence of disadvantage on smoking, drinking, and marijuana use.

Relatively few other investigations have examined the impact of structural disadvantage on multiple types of adolescent substance use or explored potential racial/ethnic differences in these relationships. However, some prior research has also failed to demonstrate a significant relationship between neighborhood disadvantage and adolescent substance drug use (Brenner et al., 2011; Ennett et al., 1997; Gottfredson et al., 1991; Novak et al., 2006; Xue et al., 2007; Zimmerman & Vasquez, 2011). In the present study, individual-level factors, particularly having close friends who used alcohol and other drugs, as well as one's own prior drug use, were stronger predictors of tobacco, alcohol, and marijuana use than was neighborhood disadvantage. However, even without controlling for prior use, disadvantage failed to significantly influence the likelihood of use of any of the substances examined.

Unconditional models indicated that rates of use for each outcome did vary across neighborhoods, suggesting that community characteristics other than structural disadvantage influence substance use among adolescents, and additional research is needed to identify these neighborhood features. Social disorganization theories (Kornhauser, 1978; Sampson & Groves, 1989; Sampson & Wilson, 1995; Shaw & McKay, 1942) tend to suggest that structural and social characteristics of neighborhoods affect deviance, and that the impact of structural factors often works through (i.e., are mediated by) more proximal social conditions. The present article investigated the direct relationship of neighborhood disadvantage on substance use because few empirical studies have previously examined or established a direct effect of this neighborhood characteristic on adolescent drug use. A logical next step is to investigate the impact of social factors, such as social control, social cohesion, or community norms regarding substance use. Although there is some evidence that community tolerance of drug use, widespread availability of drugs, and neighborhood disorder may affect adolescent drug use (Lambert et al., 2004; Tobler, Komro, & Maldonado-Molina, 2009; Van Horn, Hawkins, Arthur, & Catalano, 2007), studies assessing the effects of social conditions on adolescent substance use are relatively uncommon, and more research is needed to examine these relationships.

It is also important to note that our study assessed substance use using binary indicators that differentiated users from nonusers but did not explore the effect of disadvantage on the frequency of substance use. It is possible that a different pattern of results would arise when examining the frequency of use or problematic/heavy use. Similarly, our analyses focused

on explaining past year substance use and did not differentiate whether such use represented a child's first experimentation with substance use (i.e., onset) or continued or persistent use of substances. While it is possible that neighborhood disadvantage is more strongly related to the onset of drug use, and is less important in predicting the continuation of use once a child has begun experimenting with drugs, to our knowledge, there has been little if any investigation of this issue. We encourage additional research to systematically compare the effects of disadvantage on the likelihood and frequency of substance use as well as on the onset versus persistence of use. A related issue is that, to retain as many cases as possible given the neighborhood-level and racial/ethnic subgroup analyses, we selected respondents from three age cohorts of the PHDCN; as a result, our analysis sample included children and adolescents representing a large age span (8–17 years at Wave 1). It is possible that the effect of disadvantage may vary by age and/or developmental period, and future research is needed to investigate this possibility.

Our study is one of few investigations comparing the effects of disadvantage across multiple racial/ethnic groups. We found evidence of only one differing effect: the influence of disadvantage on alcohol use was significantly different ($p \leq .05$) for African American compared to Hispanic respondents. A few of the control variables did show differential effects by race/ethnicity, but generally, few differences were evidenced, which is consistent with the (limited) research investigating race/ethnic differences in the effects of risk factors on adolescence substance use (Unger, 2012; Wallace & Muroff, 2002). Although our study did not find much evidence to suggest that neighborhood structural factors vary across racial/ethnic groups, additional research is needed to replicate our findings and explore the degree to which other neighborhood characteristics (particularly social factors) may differentially affect drug use for youth of different racial/ethnic backgrounds. This is a challenging task, given that racial/ethnic groups are often not randomly or equally distributed across levels of neighborhood affluence (or lack thereof, see Sampson & Wilson, 1995). Nonetheless, more attention to the interacting effects of race/ethnicity, disadvantage, and substance use is warranted, especially given evidence that neighborhood residence and drug use vary by race/ethnicity.

Although the present investigation had several methodological strengths, including the use of longitudinal data, multiple control variables, and multilevel statistical techniques to separate explained variance at different levels of analysis, some limitations of the study must be noted. Most importantly, the number of neighborhoods (i.e., NCs) available for analysis, particularly neighborhoods that contained enough variation in their racial/ethnic composition and levels of disadvantage, was less than ideal for conducting the race-specific analyses. The PHDCN is among the most methodologically advanced investigations of contextual effects on adolescent development (Leventhal & Brooks-Gunn, 2000), and Chicago was explicitly selected as the study site because of its ethnic and socioeconomic diversity (Earls et al., 2002). Nonetheless, the city had very few disadvantaged neighborhoods containing primarily Caucasian residents and very few high SES areas containing primarily minority residents at the time the longitudinal sample was drawn. It is possible that these limitations hindered our ability to detect racial/ethnic differences in the effects of disadvantage on substance use, and additional research based on a larger and more diverse set of

neighborhoods is needed to investigate these issues. We also acknowledge that our data were collected in only one city—Chicago—at only one time point—the mid-1990s—which limits the generalizability of these findings to other contexts. Despite these limitations, our study has attempted to address a large gap in the existing literature on the effects of macrolevel influences on adolescent substance use.

Acknowledgments

Points of view or opinions stated in this study are those of the authors and do not necessarily represent the official position of the National Institute of Drug Abuse. The data used in this study were made available by the Inter-University Consortium for Political and Social Research. Neither the collectors of the original data nor the consortium bear any responsibility for the analyses or conclusions presented here.

Funding The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by Grant R01DA30387-01 from the National Institute of Drug Abuse. Points of view or opinions stated in this study are those of the authors and do not necessarily represent the official position of The National Institute of Drug Abuse.

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Biographies

Abigail A. Fagan's scholarly work focuses on the etiology and prevention of juvenile delinquency, with an emphasis on family and community influences, the relationship between victimization and offending, gender differences in delinquency, and the identification and effective implementation of delinquency prevention programs.

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Table 1

Sample Means and Standard Deviations for the Full Sample and by Race/Ethnicity

	Full sample[a]		African American[b]		Hispanic[c]		Caucasian[d]	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Substance use (Wave 2)								
Cigarette use	0.19	0.39	0.15	0.35	0.20	0.40	0.28	0.45
Alcohol use	0.23	0.42	0.19	0.39	0.24	0.43	0.29	0.45
Binge drinking	0.06	0.23	0.03	0.18	0.06	0.24	0.10	0.30
Marijuana use	0.11	0.31	0.12	0.32	0.10	0.29	0.13	0.34
Individual level								
Age	11.94	2.42	11.96	2.37	11.91	2.43	12.02	2.47
Male	0.51	0.50	0.48	0.50	0.52	0.50	0.52	0.50
Household salary	4.73	2.51	4.36	2.48	4.25	1.98	6.93	2.82
African American	0.35	0.48	—	—	—	—	—	—
Hispanic	0.47	0.50	—	—	—	—	—	—
Caucasian	0.15	0.35	—	—	—	—	—	—
Other race/ethnicity	0.04	0.19	—	—	—	—	—	—
Peer substance use	−0.02	0.98	0.03	0.98	−0.04	1.00	−0.03	0.95
Parental problem drug use	0.16	0.37	0.21	0.41	0.12	0.33	0.19	0.39
Parental warmth	6.18	2.02	5.93	2.00	6.31	2.07	6.36	1.82
Prior (Wave 1) cigarette use	0.10	0.30	0.08	0.27	0.09	0.29	0.17	0.38
Prior (Wave 1) alcohol use	0.13	0.34	0.09	0.29	0.14	0.35	0.20	0.40
Prior (Wave 1) binge drinking	0.02	0.15	0.01	0.10	0.03	0.16	0.03	0.18
Prior (Wave 1) marijuana use	0.07	0.25	0.07	0.26	0.06	0.23	0.08	0.27
Neighborhood level								
Disadvantage	−0.01	1.00	0.28	1.00	−0.16	0.84	−0.48	0.80

[a] The full sample included 1,856 individuals residing in 79 neighborhood clusters.

[b] The African American sample included 644 individuals residing in 54 neighborhood clusters.

[c] The Hispanic sample included 870 individuals residing in 65 neighborhood clusters.

[d] The Caucasian sample included 272 individuals residing in 46 neighborhood clusters.

Table 2

The Effect of Neighborhood Disadvantage on Adolescent Substance Use for the Full Sample

	Cigarette use		Alcohol use		Binge drinking		Marijuana use	
	B	***SE***	***b***	***SE***	***b***	***SE***	***b***	***SE***
Intercept	−1.919***	0.072	−1.715***	0.084	−3.702***	0.155	−3.177***	0.138
Individual level								
Age	0.373***	0.033	0.493***	0.035	0.531***	0.053	0.547***	0.039
Male	0.047	0.144	0.156	0.138	0.574***	0.202	0.551**	0.222
Household salary	0.070**	0.032	0.064**	0.026	0.068	0.048	0.023	0.044
African American[a]	−0.637***	0.237	−0.480**	0.200	−0.509	0.397	−0.291	0.262
Hispanic[a]	−0.090	0.222	−0.062	0.186	−0.201	0.332	−0.423	0.266
Other race/ethnicity[a]	−0.787**	0.378	−0.434	0.409	−0.697	0.394	−0.859	0.541
Peer substance use	0.174**	0.073	0.259***	0.074	0.245**	0.110	0.357***	0.076
Parental problem drug use	0.236	0.181	0.042	0.189	−0.144	0.263	0.271	0.194
Parental warmth	−0.023	0.032	−0.039	0.031	−0.043	0.048	−0.067	0.045
Wave 1 cigarette use	1.835***	0.271	—	—	—	—	—	—
Wave 1 alcohol use	—	—	1.114***	0.176	—	—	—	—
Wave 1 binge drinking	—	—	—	—	1.856***	0.427	—	—
Wave 1 marijuana use	—	—	—	—	—	—	2.104***	0.246
χ^2	87.823		87.607		167.593		170.001	
Neighborhood level								
Disadvantage	0.004	0.011	0.001	0.009	−.039	0.065	0.004	0.058
Proportion of variance explained	0.002		0.000		0.005		0.000	

Note: EB = empirical Bayes. Results are based on Bernoulli models using EB estimates and fixed effects for all individual-level variables; the sample included 1,856 individuals residing in 79 neighborhood clusters.

[a]Compared with Caucasian youth.

**$p \leq .05$.

***$p \leq .01$.

Table 3

The Effects of Neighborhood Disadvantage on Adolescent Cigarette Use, by Race/Ethnicity

	African American		Hispanic		Caucasian	
	b	***SE***	***b***	***SE***	***b***	***SE***
Intercept	−2.437***a,b	0.161	−1.738***	0.086	−1.304***	0.218
Individual level						
Age	0.476***a	0.066	0.306***c	0.044	0.471***	0.068
Male	0.122b	0.252	0.302c	0.188	−1.148***	0.426
Household salary	0.062	0.052	0.119**	0.048	0.093	0.062
Peer substance use	0.303***	0.115	0.192	0.098	−0.233	0.253
Parental problem drug use	0.544	0.289	−0.198	0.328	0.518	0.399
Parental warmth	0.025	0.056	−0.042	0.046	−0.147**	0.068
Prior cigarette use	1.455***b	0.297	1.685***	0.427	3.049***	0.701
χ^2	72.461		63.707		79.701	
Neighborhood level						
Disadvantage	0.031	0.040	−0.000	0.000	0.006	0.132
Proportion of variance explained	0.011		0.001		0.000	

Note: EB = empirical Bayes. Results are based on Bernoulli models using EB estimates and fixed effects for all individual-level variables; sample sizes are as follows: 644 African Americans living in 54 NCs, 870 Hispanics from 65 NCs, and 272 Caucasians from 46 NCs.

[a] Difference between African American and Hispanic groups significant at $p \leq .05$.

[b] Difference between African American and Caucasian groups significant at $p \leq .05$.

[c] Difference between Hispanic and Caucasian groups significant at $p \leq .05$.

** $p \leq .05$.

*** $p \leq .01$.

J Drug Issues. Author manuscript; available in PMC 2014 August 19.

Table 4

The Effects of Neighborhood Disadvantage on Adolescent Alcohol Use, by Race/Ethnicity

	African American		Hispanic		Caucasian	
	b	***SE***	***b***	***SE***	***b***	***SE***
Intercept	−2.092***a,b	0.172	−1.592***c	0.109	−1.199***	0.159
Individual level						
Age	0.575***	0.069	0.463***	0.046	0.484***	0.092
Male	−0.004	0.219	0.376	0.235	−0.159	0.405
Household salary	0.026	0.044	0.106**	0.052	0.023	0.047
Peer substance use	0.128	0.135	0.291***	0.104	0.561	0.346
Parental problem drug use	0.008	0.279	0.390	0.311	−0.443	0.467
Parental warmth	−0.010	0.064	−0.048	0.042	−0.111	0.077
Prior alcohol use	1.352***	0.326	1.002***	0.242	0.642	0.422
χ^2	51.305		68.427		47.687	
Neighborhood level						
Disadvantage	0.012*a	0.007	−0.005	0.004	0.000	0.002
Proportion of variance explained	0.054		0.025		0.000	

Note: EB = empirical Bayes. Results are based on Bernoulli models using EB estimates and fixed effects for all individual-level variables; sample sizes are as follows: 644 African Americans living in 54 NCs, 870 Hispanics from 65 NCs, and 272 Caucasians from 46 NCs.

[a] Difference between African American and Hispanic groups significant at $p \leq .05$.

[b] Difference between African American and Caucasian groups significant at $p \leq .05$.

[c] Difference between Hispanic and Caucasian groups significant at $p \leq .05$.

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

Table 5

The Effects of Neighborhood Disadvantage on Adolescent Binge Drinking, by Race/Ethnicity

	African American		Hispanic		Caucasian	
	b	***SE***	***b***	***SE***	***b***	***SE***
Intercept	−5.820***a,b	0.339	−3.457***c	0.197	−2.757***	0.258
Individual level						
Age	1.368***a,b	0.136	0.443***	0.062	0.315***	0.071
Male	−0.104a	0.332	0.843***	0.263	0.573	0.451
Household salary	0.148***	0.052	0.024	0.070	0.045	0.088
Peer substance use	−0.156	0.196	0.247	0.153	0.536	0.337
Parental problem drug use	−0.428	0.532	−0.212	0.365	0.042	0.631
Parental warmth	0.019	0.070	−0.029	0.070	−0.063	0.088
Prior binge drinking	3.292***	1.018	1.798***	0.640	1.373	0.847
χ^2	289.271		100.591		59.971	
Neighborhood level						
Disadvantage	0.065	0.259	−0.035	0.069	−0.138	0.128
Proportion of variance explained	0.001		0.004		0.027	

Note: EB = empirical Bayes. Results are based on Bernoulli models using EB estimates and fixed effects for all individual-level variables; sample sizes are as follows: 644 African Americans living in 54 NCs, 870 Hispanics from 65 NCs, and 272 Caucasians from 46 NCs.

[a] Difference between African American and Hispanic groups significant at $p \leq .05$.

[b] Difference between African American and Caucasian groups significant at $p \leq .05$.

[c] Difference between Hispanic and Caucasian groups significant at $p \leq .05$.

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

Table 6

The Effects of Neighborhood Disadvantage on Adolescent Marijuana Use, by Race/Ethnicity

	African American		Hispanic		Caucasian	
	b	***SE***	***b***	***SE***	***b***	***SE***
Intercept	−3.349***a	0.235	−3.198***b	0.161	−2.375***	0.388
Individual level						
Age	0.670***c	0.070	0.472***	0.052	0.578***	0.064
Male	0.819***	0.292	0.311	0.353	0.054	0.389
Household salary	0.015	0.055	−0.052	0.079	0.071	0.056
Peer substance use	0.410**	0.182	0.333***	0.097	0.309	0.243
Parental problem drug use	0.693**	0.303	−0.071	0.341	0.589	0.371
Parental warmth	−0.077	0.088	−0.077	0.061	−0.067	0.124
Prior marijuana use	1.957***	0.385	2.309***	0.352	1.629	0.974
χ^2	64.424		126.926		172.073	
Neighborhood level						
Disadvantage	0.025	0.037	−0.047	0.094	−0.354	0.330
Proportion of variance explained	0.009		0.004		0.026	

Note: EB = empirical Bayes. Results are based on Bernoulli models using EB estimates and fixed effects for all individual-level variables; sample sizes are as follows: 644 African Americans living in 54 NCs, 870 Hispanics from 65 NCs, and 272 Caucasians from 46 NCs.

[a] Difference between African American and Caucasian groups significant at $p \leq .05$.

[b] Difference between Hispanic and Caucasian groups significant at $p \leq .05$.

[c] Difference between African American and Hispanic groups significant at $p \leq .05$.

** $p \leq .05$.

*** $p \leq .01$.