



Discrimination in Context: Examining Neighborhood-Level Variation in the Incidence and Adverse Effects of Perceived Racial and Ethnic Discrimination Among Chicago Youth

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Abstract

A growing body of research links interpersonal racial and ethnic discrimination to adverse youth outcomes. Yet, studies examining the relevance of neighborhood context for discrimination are sparse. This study examines neighborhood-level variation in the incidence and impact of perceived racial and ethnic discrimination on depressive symptoms, suicidal behavior, violent behavior, and substance use. Hierarchical regression models on a sample of 1333 African American and Hispanic youth (52.44% female; \bar{x} = 13.03 years, SD = 3.25 at wave 1) residing in 238 Chicago neighborhoods from the Project on Human Development in Chicago Neighborhoods indicated little to no neighborhood-level variation in the incidence and impact of discrimination. Findings suggest that the experience of discrimination among youth of color is ubiquitous.

Keywords Depression · Discrimination · Neighborhood · Substance use · Suicidal behavior · Violent offending

Introduction

Racial and ethnic discrimination occurs at multiple levels: institutional discrimination, which presents in organizational policies and practices that propagate racial segregation, stratification, and social isolation; and interpersonal racial and ethnic discrimination, the focus of this study, which manifests in interactions between individuals (Acevado-Garcia et al., 2013; Jones, 2000). Over the last two decades, there has been a substantial increase in research on the relationship between interpersonal racial and ethnic discrimination and adverse youth outcomes. The increased academic focus on the effects of interpersonal racial and ethnic discrimination has accompanied: nationwide and worldwide protests of highly-publicized deaths of racial and

ethnic minorities during encounters with the police (Rahim & Picheta, 2020); social movements such as Black Lives Matter (Camp & Heatherton, 2016); and unprecedented immigration and demographic shifts in gateway states and communities (Johnson & Lichter, 2007).

Much of the extant research has focused on the detrimental physical and mental health consequences of racial and ethnic discrimination (see Pascoe & Richman, 2009; Priest et al., 2013). Studies indicate that youth who experience racial and ethnic discrimination have elevated rates of depressive symptoms (Pieterse et al., 2012), suicidality (Arshanapally et al., 2017), offending behavior (Herda & McCarthy, 2018), and substance use (Rose et al., 2019). More generally, research suggests that racial and ethnic discrimination can negatively influence a wide range of adolescent and young adult outcomes, including socioemotional functioning, academic performance, health behavior, and well-being (Benner et al., 2018).

Largely missing from the literature is a consideration of how the experience of racial and ethnic discrimination among youth of color varies across factors such as socioeconomic disadvantage and racial and ethnic heterogeneity in the broader environment. However, the group threat perspective posits that antagonistic attitudes toward a minority group will increase as the size of the minority group increases (Blalock, 1967). Under this framework, living in

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a neighborhood with a higher proportion of persons of color, or a more heterogeneous area, increases the incidence of racial and ethnic discrimination. Conversely, the contact hypothesis posits that a larger minority group population increases opportunities for positive inter-group contact, which in turn assuages antagonistic attitudes toward the minority group (Pettigrew, 1998). In this case, living in a more heterogeneous neighborhood decreases the incidence of racial and ethnic discrimination. Despite the conflicting theoretical views, both perspectives support variation in the incidence of discrimination across neighborhood context.

Similarly, research has yet to examine whether the adverse effects of discrimination depend on factors such as socioeconomic disadvantage and racial and ethnic heterogeneity in the neighborhood context. It is possible that certain neighborhoods have more resources to facilitate coping and resiliency among youth who experience racial and ethnic discrimination. It is also possible that shared experiences within the localized context facilitate coping and resilience via racial and cultural socialization and preparation for bias (Burt et al., 2017). Therefore, certain neighborhoods may be better equipped to attenuate or neutralize the detrimental effects of racial and ethnic discrimination.

Accordingly, this study examines neighborhood-level variation in the incidence and impact of perceived racial and ethnic discrimination on an array of internalizing and externalizing problems: depressive symptoms, suicidal behavior, violent behavior, and substance use. While theory suggests that the incidence of racial and ethnic discrimination may vary across the neighborhood context, recent research suggests that perceived discrimination is ubiquitous among racial and ethnic minorities, with upward of 90% of African American youth reporting a discriminatory incident each year (Pachter et al., 2018; Seaton et al., 2008). The analysis thus examines whether, and to what extent, the incidence of perceived racial and ethnic discrimination varies across neighborhoods. The analysis also investigates whether the effects of perceived racial and ethnic discrimination on depressive symptoms, suicidal behavior, violent behavior, and substance use vary across neighborhoods. We test our hypotheses (enumerated below) using data from the Project on Human Development in Chicago Neighborhoods (PHDCN), a hierarchical study of Chicago youth that provides a unique opportunity to examine neighborhood-level variation in racial and ethnic discrimination. Additionally, as one of the most highly racially segregated cities in the United States (Earls et al., 2000), Chicago provides a diverse set of neighborhoods suitable to examine the study hypotheses. For these reasons, we follow recent research by using the PHDCN data (Herda, 2016; Herda & McCarthy, 2018; Zimmerman & Miller-Smith 2022) to study contextual variation in the incidence and effects of racial and ethnic discrimination.

Linking Racial and Ethnic Discrimination to Adverse Outcomes: What We Know

Several systematic and meta-analytic reviews over the past decade have examined the adverse developmental effects of racial and ethnic discrimination. For example, Pascoe and Richman (2009) found that racial and ethnic discrimination had a significant detrimental effect on mental and physical health in a meta-analysis of 134 studies. Similarly, Carter et al. (2017) found that racial and ethnic discrimination had an adverse effect on general health (physical and mental) in a meta-analysis of over 100 studies. Other meta-analytic reviews have similarly demonstrated that general discrimination, and racial and ethnic discrimination more specifically, leads to negative health outcomes (Lee & Ahn, 2011; Pieterse et al., 2012; Priest et al., 2013; Vines et al., 2017; Williams et al., 2003). Specifically, research has linked racial and ethnic discrimination to: low self-esteem (Harris-Britt et al., 2007); post-traumatic stress disorder (Kang & Burton, 2014); general psychological distress (Hwang & Goto, 2008); somatic problems (Alamilla et al., 2010); generalized anxiety (Gee et al., 2007; Tynes et al., 2008); hypertension (Sims et al., 2012); and cardiovascular disease and high body mass index (Serpas et al., 2020). As discussed below, racial and ethnic discrimination has also been linked to depressive symptoms, suicidal behavior, violent behavior, and substance use.

Depressive Symptoms and Suicidal Behavior as Outcomes of Discrimination

Multiple cross-sectional and longitudinal studies have demonstrated a positive association between racial and ethnic discrimination and depressive symptoms (Gayman & Bargar, 2013; Yang et al., 2019). Moreover, this association has been documented across racial and ethnic groups (Britt-Spells et al., 2018). For example, in samples of African American youth, Brody et al. (2006) and Unnever (2014) documented a significant association between racial and ethnic discrimination and depressive symptoms, a finding corroborated in a meta-analysis of 66 studies through 2011 (Pieterse et al., 2012). Similarly, the relationship between racial and ethnic discrimination and depressive symptoms has been documented in samples of Hispanic (Basáñez et al., 2013; Schwartz et al., 2015) and Asian (Lee & Ahn, 2011) adolescents. Importantly, the impact of racial and ethnic discrimination on depressive symptoms persists over time. For example, Stein et al. (2019) demonstrated that racial and ethnic discrimination during childhood predicted adolescent depressive symptoms; Cheng et al. (2015) demonstrated that racial and ethnic discrimination in adolescence predicted depressive symptomatology in young adulthood; and Assari

et al. (2017) found that racial and ethnic discrimination during youth and adolescence predicted depressive symptoms in adulthood.

Studies have also substantiated the relationship between racial and ethnic discrimination and suicidal behavior—in both children and adults (Assari et al., 2017; Walker et al., 2014). For example, Tobler et al. (2013) found that adolescents who experienced racial and ethnic discrimination were more likely to report suicidal ideation, and Assari et al. (2017) demonstrated that perceived racial and ethnic discrimination was a significant predictor of lifetime suicidal ideation. In samples of African American youth, Walker et al. (2017) demonstrated that experienced racial and ethnic discrimination increased subsequent suicide and morbid ideation, and Arshanapally et al. (2017) found that the odds of suicidality (ideation, planning, and attempting suicide) increased among adolescents who reported racial and ethnic discrimination (also see Oh et al., 2019). Similarly, researchers have linked perceived micro-aggressions to suicidal ideation (Hollingsworth et al., 2017); and perceived institutional racial and ethnic discrimination has been linked to the onset of suicidal behavior (Wang et al., 2021).

Delinquency and Offending as Outcomes of Racial and Ethnic Discrimination

Strong evidence of the relationship between racial and ethnic discrimination and delinquency/offending has also accumulated over the past two decades. While many studies have utilized samples of African American youth, research has also examined the relationship in broader cross-sections of the population, including Hispanic and Asian individuals. For example, Burt et al. (2012) found that racial discrimination had a positive and significant effect on delinquency in a sample of African American youth; moreover, more than two-thirds of the effect of racial discrimination on delinquency was indirect through depression, hostile views, and disengagement from conventional norms, with depression accounting for more than half of this mediation. Herda and McCarthy (2018) found that experienced and anticipated discrimination among Hispanic respondents increased the odds of violent delinquency by 19% and 14%, respectively, a finding replicated for African American youth. And Le and Stockdale (2011) found that Asian students with higher perceptions of prejudice among their student body had higher levels of delinquency, a finding that was replicated for white, African American, and Hispanic students.

Studies have also substantiated the relationship between racial and ethnic discrimination and offending in gender-specific samples, as well as in samples of children, adolescents, and young adults. For example, Burt and Simons (2015) demonstrated that higher levels of racial discrimination increased delinquency among African American females, an

effect that was completely mediated by criminogenic knowledge structure—a latent construct measured via discounting the future, hostile views of relationships, and disengagement from conventional norms. Additionally, Simons et al. (2003) found that exposure to discrimination among African American children aged 10–12 years was the strongest predictor of (increases in) subsequent delinquent behavior; Martin et al. (2011) found that higher levels of perceived personal discrimination among 10–17 year old youth were associated with significantly higher levels of general delinquency and violent behavior, controlling for lagged delinquency; and Jones and Greene (2016) found that self-reported offending behavior increased by more than 15% for every one unit increase in perceived discrimination among African American college students.

Several mechanisms may underlie the relationship between discrimination and offending. For example, discrimination is associated with exposure to violence, which is a robust predictor of offending behavior (Fine et al., 2020). Similarly, discrimination experiences often co-occur with disparate social conditions, which encourage offending through negative life events, hostile views of relationships, negative perceptions of the police, isolation from conventional norms, and moral cynicism (Simons & Burt, 2011). Additionally, discrimination may augment negative emotions, such as anger, shame, and depressive symptoms, which facilitate criminal behavior (Burt et al., 2012). Finally, anticipated discrimination (i.e., fear of discrimination) and vicarious discrimination (i.e., knowledge of others' experiences with discrimination) may impact offending behavior, in addition to experienced discrimination (Herda & McCarthy, 2018).

Racial and Ethnic Discrimination as an Enabler of Substance Use

Racial and ethnic discrimination has also been substantiated as an enabler of substance use. While the effects of discrimination on specific types of substance use may vary across race and ethnicity (Tran et al., 2010), there is strong evidence that perceived racial and ethnic discrimination is positively associated with the use of alcohol, tobacco, marijuana, and other illicit substances—in both adolescents and adults (Borrell et al., 2013; Gibbons et al., 2012; Pascoe & Richman, 2009; Rose et al. 2018). For example, Yang et al. (2019) found that perceived discrimination during adolescence increased substance use—including smoking, marijuana use, cocaine use, and sedative use—in early adulthood. Further, substance use accounted for 17% of the total effect of adolescent perceived discrimination on adverse health outcomes during mid-adulthood approximately 30 years later.

Several key mechanisms may be responsible for the relationship between discrimination and substance use. For example, Gibbons et al. (2007) demonstrated that the amplifying effect of discrimination on substance use was mediated by affiliation with substance-using peers. In particular, late childhood (age 10–11) experiences with racial discrimination predicted an increase in affiliation with substance-using peers, which in turn fostered adolescent (age 15–16) substance use. Relying on the critical period hypothesis, the authors posited that children who experience discrimination “should be more likely to ‘accept’ deviance”—by affiliating with others who are using and by using themselves” (Gibbons et al., 2007, p. S29). Additional research has indicated that early childhood experiences with discrimination increase distress (anxiety and depression), which in turn prompt youth to seek out substance-using peers as a coping mechanism (Gibbons et al., 2004).

Similarly, research suggests that substance use is a strategy to cope with the psychosocial distress from negative life events such as racial and ethnic discrimination (Bennett, 2006; Purnell et al., 2012; Sanders-Phillips et al., 2014). Accordingly, research has demonstrated that the relationship between racial and ethnic discrimination and substance use is linked through low self-esteem (Yang et al., 2019), diminished levels of self-control (Gibbons et al., 2012), and stress (Pascoe & Richman, 2009).

Examining Variation in the Incidence of Discrimination Across Neighborhood Context

Discrimination is distressingly ubiquitous among racial and ethnic minorities. There is evidence that upward of 90% of African American youth report discriminatory incidents each year (Pachter et al., 2018), and English et al. (2020) demonstrated that African American youth experience between two and five personal and/or vicarious (online, and/or offline) daily incidents of discrimination. Similarly, Lopez et al. (2010) found that a majority of Hispanic adolescents experience discrimination. Racial and ethnic discrimination is therefore omnipresent, virtually a constant among persons of color in the United States (Pachter et al., 2018).

Yet, theory suggests that the experience of racial and ethnic discrimination among persons of color may vary across the broader environment. For example, the group threat perspective posits that hostility toward a minority group will increase as the size of the minority group in an area increases (Blalock, 1967). According to this perspective, the majority population perceives an increase in the relative population of racial/ethnic minorities as a threat to their economic and political privileges (Parker et al., 2005; Stults and Swagar, 2018), as well as to their personal safety (Eitle et al., 2002). In turn, these perceived threats lead to increased efforts from the dominant group to control the rising population (Blalock,

1967; Jackson, 1989). Informal efforts include discrimination, segregation, and physical violence; and formal efforts include criminal justice processes such as increased police presence, arrests, use of force, detention, and imprisonment (Kane, 2003; Stolzenberg et al., 2004).

Conversely, the contact hypothesis presumes that inter-group contact mitigates perceived threats from the majority group toward the minority group (Pettigrew, 1998). A long-standing theory in social psychology, the contact hypothesis considers a growing minority population as a tool to combat prejudice, promote tolerance, and foster acceptance through positive inter-group contact (Allport et al., 1954). While the nature of inter-group contact is inherently complex, key aspects of positive inter-group contact include: common goals; shared cooperation; equal status; and mutual support of the outgroup’s authorities and customs (Pettigrew & Tropp, 2005).

Despite their conflicting theoretical assumptions, the group threat perspective and the contact hypothesis have both received empirical support. Consistent with the group threat perspective, research suggests that majority white populations view African American and Hispanic individuals as economic, political, and criminal threats (Eitle & Taylor, 2008; Kane, 2003; Parker et al., 2005; Stolzenberg et al., 2004; Stults & Swagar, 2018), leading to racial and ethnic discrimination. For example, in a sample of socioeconomically diverse African American adults in Baltimore, English et al. (2014) found that levels of experienced racial discrimination were elevated in neighborhoods with higher percentages of white residents. Relatedly, Lee et al. (2018) found that racial discrimination was negatively associated with cortisol concentration—an essential hormone affecting stress, metabolism, and other bodily functions—but only among African American emerging adults residing in neighborhoods with higher concentrations of white residents.

Research has also demonstrated that police agency size and police deployment increase as minority population increases (Kane, 2003; Stults & Baumer, 2007; Stults & Swagar, 2018), a relationship that is heightened in areas with increased levels of concentrated disadvantage among African American residents (Parker et al., 2005). Similarly, Stewart et al. (2009) examined whether neighborhood social conditions such as racial composition were related to perceptions of racially biased policing. They found that African American adolescents experienced more discrimination in predominately white neighborhoods—and in predominantly white neighborhoods that experienced a sudden growth in the African American population (also see Taylor, 1998). Taken together, these studies are supportive of the group threat perspective.

Consistent with the contact hypothesis, Williams (1947) found that inter-group contact decreases prejudice when the groups are of equal status, the situation fosters healthy

inter-group contact, persons do not fit the stereotype that is stressed upon their groups, and shared activities cut across groups lines. More recently, Ellison and Powers (1994) demonstrated that interracial contact, particularly early in life, increases the likelihood that African Americans will develop close friendships with whites; and Drakulich (2012) found that interracial interactions are associated with decreased crime stereotypes of minorities. Similarly, in a meta-analytic review of the contact hypothesis, Pettigrew and Tropp (2005) found that inter-group contact typically reduces prejudice, but with significant variation across studies. As a result, they called for future research to examine the factors that prevent inter-group contact from diminishing prejudice.

It is therefore still an empirical question whether inter-group contact breeds hostility (as group threat suggests) or understanding (as the contact hypothesis supports). In a test of these competing perspectives, Dixon (2006) found heightened levels of prejudice among white individuals living near African American individuals, consistent with group threat. But, consistent with the contact hypothesis, they found that white persons need to know and feel close to African American persons in order to experience reduced prejudice. Similarly, Schlueter and Scheepers (2010) found that perceptions of a larger outgroup were associated with the perceived threat of in-group interests; but more inter-group contact reduced these perceived threats. Empirical support for these competing perspectives therefore depends on the nature of the inter-group contact—mutual or competing goals, authorities, laws, and customs (Pettigrew & Tropp, 2005)—and the broader context in which the inter-group contact occurs—whether the county, state, or nation has integrative or combative socio-political policies (Green et al., 2019).

Do the Adverse Effects of Discrimination Vary Across Neighborhood Context?

Research also suggests that the effects of racial and ethnic discrimination on internalizing and externalizing problems may vary across neighborhood context. On one hand, some neighborhoods may have the resources to facilitate coping, resiliency, and positive outlets among youth exposed to racial and ethnic discrimination. For example, the expansion of “stabilizing” local institutions such as health centers, recreation centers, libraries, and employment in more affluent areas can encourage positive youth development through the development of a community’s organizational base (Peterson et al. 2000). Similarly, youth organizations can bring “residents (e.g., youth participants, parents, volunteers, employees) out of their homes and into the community,” thereby providing “opportunities for social exchange” and the development of social capital and positive support (Gardner & Brooks-Gunn 2009, p. 509). While there is mixed evidence

as to the relationship between neighborhood organizations and youth developmental outcomes (Slocum et al. 2013), organizations aimed at promoting coping and resiliency among youth may be one potential avenue to reduce the detrimental effects of racial and ethnic discrimination.

On the other hand, it is possible that more shared experiences within the localized contact facilitate coping and resiliency. In this case, youth in disadvantaged and racially/ethnically heterogeneous areas may benefit from the shared experiences of their peers, family members, and community leaders. For example, preparation for bias and racial and cultural socialization (Burt et al., 2017) promote coping skills for discrimination. Preparation for bias refers to parents’ and community leaders’ efforts to educate youth about the history, nature, and frequency of racial and ethnic discrimination (McHale et al., 2006). Similarly, racial socialization occurs through the exchange of information and experiences, and instills pride and cultural knowledge among youth in the face of discrimination (Bennett, 2006). In turn, preparation for bias and racial socialization can promote strong racial identities, which can reduce the deleterious effects of racial and ethnic discrimination by promoting coping and resiliency (Brown, 2008a, 2008b; Scott, 2003).

Current Study and Hypotheses

In accordance with prior research, we examine whether racial and ethnic discrimination is associated with an array of internalizing and externalizing problems. In particular, we examine whether perceived racial and ethnic discrimination increases the likelihood of depressive symptoms, suicidal behavior, violent behavior, and substance use (Hypothesis 1).

Grounded in research on group threat theory and the contact hypothesis, Hypothesis 2 examines whether the incidence of perceived racial and ethnic discrimination varies across the socioeconomic and racial/ethnic context. Under the group threat perspective, living in a disadvantaged or racially/ethnically heterogeneous neighborhood increases the incidence of racial and ethnic discrimination. Conversely, the contact hypothesis suggests that living in a racially/ethnically heterogeneous neighborhood increases opportunities for positive inter-group contact, which in turn decreases the incidence of racial and ethnic discrimination. Yet another possibility is that racial and ethnic discrimination is omnipresent and therefore occurs at similar rates, on average, in different neighborhoods.

Finally, we examine whether the effects of perceived racial and ethnic discrimination on the study outcomes vary across the socioeconomic and racial/ethnic context (Hypothesis 3). On one hand, research suggests that more affluent neighborhoods may have additional resources to facilitate

coping, resiliency, and positive outlets among youth exposed to racial and ethnic discrimination. On the other hand, it is possible that more shared experiences in neighborhoods with a higher proportion of racial and ethnic minorities will facilitate coping and resiliency. We also note the possibility that the effects of discrimination on internalizing and externalizing outcomes are invariant to the neighborhood context.

Methods

Study Sample

We test the hypotheses using data from the Project on Human Development in Chicago Neighborhoods (PHDCN), a hierarchical, longitudinal study of how individual and neighborhood factors affect youth development. The PHDCN's data collection process was grounded in the construction of 343 neighborhood clusters (NCs), which represented all of Chicago's 865 census tracts. The design of NCs was guided by geographical boundaries and resident social composition with respect to socioeconomic status and race/ethnicity. On average, NCs were comprised of just over two census tracts and approximately 8000 people, smaller than the 77 community areas in Chicago. Therefore, compared to census-designated geographies such as census tracts and block groups, NCs had the benefit of approximating local neighborhoods.

From a stratified random sample of 80 of the 343 NCs, and a simple random sample of households within these 80 NCs, the Longitudinal Cohort Study (LCS) identified over 6000 youth in seven age cohorts (within six months of their birth, 3rd, 6th, 9th, 12th, 15th, and 18th birthdays). Youth and their primary caregivers were interviewed up to three times (on average 2.5 years apart) between 1994 and 2002, with respective response rates of 78%, 85%, and 77%.

This study examines African American and Hispanic youth from cohorts aged 9, 12, 15, and 18 years at wave 1 who had: non-missing data on the study outcomes at wave 3 (2000–2002); non-missing data on perceived racial and ethnic discrimination at wave 3; and valid geographic identifiers. The average fraction of missing information (FMI) was 5.23%, indicating that 5.23% of the total sampling variance at the individual-level was attributable to missing data. All but one study variable (immigration status) had a FMI below 15%, suggesting that 15 imputed datasets was sufficient (Bodner, 2008; White et al., 2011) to produce unbiased results. Additionally, while Allison (2002) suggests that multiple imputation can perform well via simulations with up to 50% missing data, all models were re-estimated without immigrant status. The results yielded substantively identical results to those presented below. We also note that there is no evidence to suggest that respondents left the study

systematically (Sampson et al., 2005), and an analysis of attrition suggested that data were missing at random (MAR). Nonetheless, item-level missing data were imputed using chained equations. The original coding scheme of all variables (e.g., binary) was preserved during this process, and statistical models averaged results from 15 imputed datasets. Complete case analysis yielded results nearly identical to those described herein, lending credence to the methods and findings.

The final sample consisted of 1333 African American ($N=568$) and Hispanic ($N=765$) youth from cohorts aged 9 ($N=392$), 12 ($N=390$), 15 ($N=311$) and 18 ($N=240$). At wave 3, the 1333 sample youth resided in 238 NCs.

Measures

Depressive Symptoms

Depressive symptoms was measured at wave 3 by a 14-item self-reported scale from the Youth and Young Adult Self Report protocols, adapted from the well-validated and extensively used Child Behavior Checklist (Achenbach, 1991). Respondents were asked whether a series of statements described them at any time during the six months preceding the wave 3 interview. Statements included “I feel lonely;” “I cry a lot;” “I feel that no one loves me;” “I feel worthless or inferior;” “I am too fearful or anxious;” and “I am unhappy, sad, or depressed.” Response scores ranged from 0 (not true) to 2 (very true). Items were averaged ($\alpha=0.84$) to form a scale on which the average respondent reported a low level of depressive symptoms (0.38 out of 1.71). Hispanic respondents (0.41) had significantly higher levels of depressive symptoms than African American respondents (0.35).

Table 1 presents descriptive statistics for all study variables. Information for the outcome variables, and for perceived racial and ethnic discrimination, is presented for African American respondents, Hispanic respondents, and in totality.

Suicidal Behavior

Suicidal behavior is conceptualized as a continuum of behaviors ranging from thinking about suicide to attempting suicide (Mościcki, 2001). Accordingly, respondents reported whether or not (1 = yes; 0 = no) they: thought about suicide; thought seriously about suicide; or attempted suicide in the year preceding the wave 3 interview. The three dichotomous items were summed ($\alpha=0.92$). Because only 1% of respondents responded affirmatively to more than one of the three items, the outcome variable was dichotomized to capture whether or not (1 = yes; 0 = no) respondents reported suicidal ideation or attempted suicide. Less than one in ten respondents (7.13%, $N=95$) reported at least one suicidal

Table 1 Descriptive statistics for study variables

Variable	Mean/%	SD/N	Range
Outcome variables, wave 3			
Depressive symptoms ^a			
Total	.38	.32	0–1.71
Hispanic	.41	.33	0–1.71
African American	.35	.31	0–1.64
Suicidal behavior			
Total	7.13%	95	
Hispanic	6.80%	52	
African American	7.57%	43	
Violent behavior ^a			
Total	.42	.88	0–7
Hispanic	.28	.75	0–5
African American	.61	1.01	0–7
Alcohol use			
Total	46.96%	626	
Hispanic	48.37%	370	
African American	45.07%	256	
Cigarette use			
Total	28.66%	382	
Hispanic	29.80%	228	
African American	27.11%	154	
Marijuana use ^a			
Total	20.18%	269	
Hispanic	16.60%	127	
African American	25.00%	142	
Illicit drug use ^a			
Total	2.40%	32	
Hispanic	3.79%	29	
African American	0.53%	3	
Racial and ethnic discrimination, wave 3 ^a			
Total	1.47	1.62	0–8
Hispanic	1.35	1.55	0–8
African American	1.62	1.70	0–8
Demographic characteristics, wave 1			
Female	52.44%	699	
Age ^b	13.03	3.25	7.77–19.16
Race/ethnicity			
Hispanic (reference)	57.39%	765	
African American	42.61%	568	
Immigrant status			
1st generation immigrant (reference)	11.73%	156	
2nd generation immigrant	39.14%	522	
3rd generation immigrant	49.13%	655	
Individual covariates, wave 1			
Impulsivity	2.65	.56	1.2–4.60
Emotionality	2.83	1.10	1–5
Sociability	3.65	.82	1–5
Reading ability	95.14	19.07	44–154
Family factors			

Table 1 (continued)

Variable	Mean/%	SD/N	Range
Years at residence, wave 1	6.56	6.88	.08–59
Employment status, wave 1	57.89%	772	
Education, wave 1			
Less than high school (reference)	23.67%	316	
Some high school	27.98%	373	
Graduated high school	13.87%	185	
Beyond high school	34.48%	459	
Household salary, wave 1	3.77	1.82	1–7
Family support, wave 3	2.74	.35	1–3
Neighborhood covariates			
Socioeconomic disadvantage	0	1	–2.01 to 3.12
Residential instability	48.96	13.91	16.44–79.26
Racial/ethnic heterogeneity	.33	.23	0–.76

Mean, SD, and range reported for continuous variables; % and *N* reported for categorical variables; significance tests across racial and ethnic categories of the outcomes and racial and ethnic discrimination variables based on *t*-tests

SD = standard deviation; PC = primary caregiver

^aSignificant difference between Hispanic respondents and African American respondents

^bMean age at wave 3 is 17.60 (SD = 3.31; Range = 11.75–24.94)

behavior. Hispanic youth (6.80%, *N* = 52) and African American youth (7.57%, *N* = 43) reported similar levels of suicidal behavior.

Violent Behavior

In the wave 3 Self Report of Offending questionnaire, respondents reported their involvement (1 = yes; 0 = no) in eight violent acts during the year preceding the wave 3 interview: carrying a hidden weapon; hitting someone (outside of the house); attacking someone with a weapon; throwing objects (e.g., bottles) at people; shooting someone; shooting at someone; armed robbery; and being involved in a gang fight. Prior research has used these items to measure violence (see Raudenbush & Sampson, 1999; Sampson et al., 2005), which span more frequent, less serious behaviors (e.g., fighting), and less frequent, more serious offenses (e.g., shooting someone). Iterated principal components factors analysis suggested a one-factor solution with all factor loadings above 0.35 and a first eigenvalue of 1.57 (all other eigenvalues below 0.82), indicating that more than 52% of the total variance among the items was accounted for by the first factor. These items were summed ($\alpha = 0.60$) to form a scale on which the average respondent reported engaging in 0.42 of the eight behaviors. African American youth reported significantly higher levels of violence (0.61) than Hispanic youth (0.28).

Substance Use

At wave 3, respondents were administered a Substance Use questionnaire adapted from the National Household Survey on Drug Abuse (National Institute on Drug Abuse 1991) to determine whether or not they had used a series of substances during the past year. Four dichotomous items representing substance use are used in the study: drinking alcohol (i.e., beer, wine, wine coolers, and liquor); smoking cigarettes; using marijuana (i.e., grass, pot, reefer, hash, and hash oil); and using other illicit substances (i.e., cocaine, crack, inhalants, psychedelics, heroin, methamphetamine, amphetamine, barbiturates, and tranquilizers). The frequencies of alcohol, cigarette, marijuana, and other illicit drug use were 46.96%, 28.66%, 20.18%, and 2.40%, respectively. Rates of alcohol and cigarette use were comparable for African American and Hispanic youth, whereas African American respondents reported higher levels of marijuana use (25%) and lower levels of illicit drug use (0.53%) than Hispanic respondents (16.60% and 3.79% for marijuana and illicit drug use, respectively). These estimates generally comport with those from the Monitoring the Future survey (Johnston et al. 2009) and the National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration 2009).

Racial and Ethnic Discrimination

At wave 3, the Personal Identity protocol was used to assess perceived racial and ethnic discrimination among youth (Earls et al., 2000). Respondents were asked whether they believed that they had been “discriminated against, or treated badly or differently because of their race, ethnicity, color, language, or the country they or their family come from” during the past year. Eight dichotomous items measured whether or not (1 = yes; 0 = no) respondents reported experiencing racial or ethnic discrimination in eight situations: in their neighborhood; outside of their neighborhood; at school; by a doctor, nurse, or other health provider; when seeking service, for example when buying something at a store or a restaurant; when meeting someone for the first time; by police; or from anywhere or by anyone else. Respondents only reported whether or not they experienced racial and ethnic discrimination in these situations; they were not asked to estimate the number of times that they experienced racial and ethnic discrimination. The eight dichotomous items were summed to create a count of the number of situations in which respondents experienced racial or ethnic discrimination ($\alpha = 0.71$). Respondents, on average, reported experiencing racial and ethnic discrimination in 1.47 of the situations described above (standard deviation = 1.62;

range = 0–8). African American youth reported higher levels of racial and ethnic discrimination (1.62) than Hispanic youth (1.35).

Demographic Characteristics

Demographic characteristics included gender, age, race/ethnicity, and immigrant status. Just over one-half of respondents were female ($N = 699$; 52.44%). Respondents were on average 13.03 years at wave 1 (standard deviation = 3.25; range = 7.77–19.16) and 17.60 years at wave 3 (standard deviation = 3.31; range = 11.75–24.94). The sample consisted of 568 (42.6%) African American and 765 (57.4%) Hispanic youth. Just over one in ten respondents were first generation immigrants (11.73%, $N = 156$), while 39.14% ($N = 522$) and 49.13% ($N = 655$) of respondents were second and third generation immigrants, respectively.

Individual Covariates

The analysis included four variables representing respondents’ individual differences: impulsivity, emotionality, sociability, and reading ability. Recent systematic reviews have identified impulsivity as a risk factor for suicidal behavior, aggression, substance use, and analogous behaviors (Bilsen, 2018; Pratt & Cullen 2000). Research has also substantiated negative emotionality as a predictor of internalizing (Khazanov & Ruscio, 2016) and externalizing (Garofalo & Velotti 2017) problems; and social isolation is a documented correlate of substance use as well as inward- and outward directed violence (Calati et al., 2019). Impulsivity, emotionality, and sociability scales were constructed from items in the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament Survey (Buss & Plomin, 1984), which was completed at wave 1 by youth comprising the age 18 cohort and by primary caregivers of youth belonging to the age 9, 12, and 15 cohorts.

Impulsivity is conceptualized as the proclivity to respond to impulses and urges with rapid, unplanned responses, as opposed to contemplating the negative consequences of these responses and acting accordingly (Buss & Plomin, 1984). Impulsivity was measured as the average of 20 statements capturing four dimensions of impulsivity: a lack of inhibitory control; a tendency to act quickly; a tendency toward sensation seeking; and a lack of persistence (Whiteside & Lynam 2001). Statements included “Has trouble resisting temptation;” “Acts on the spur of the moment;” “Seeks new and exciting experiences;” and “Tends to give up easily” ($\alpha = 0.75$). Item responses ranged from 1 (uncharacteristic of the respondent) to 5 (characteristic of the respondent). On average, youth had moderate levels of impulsivity (2.65 out of 4.60).

Emotionality refers to a respondent's intensity of reaction to internal or external stimuli (Buss & Plomin, 1984). Five statements ranging from 1 (uncharacteristic of the respondent) to 5 (characteristic of the respondent) described respondents: "Cries easily;" "Tends to be somewhat emotional;" "Often fusses and cries;" "Gets upset easily;" and "Reacts intensely when upset." Responses were averaged ($\alpha=0.70$) to form a scale on which the average respondent had moderate levels of emotionality (2.83 out of 5).

Sociability represents a respondent's desire for social interaction and tendency towards ease in social situations. Ten statements ranging from 1 (uncharacteristic of the respondent) to 5 (characteristic of the respondent) assessed sociability. Statements included: "Likes to be with people;" "Makes friends easily;" and "Is sociable." Responses were averaged to form a scale ($\alpha=0.65$) on which the average respondent had modestly high levels of sociability (3.65 out of 5).

Reading ability captures reading, spelling, and verbal comprehension (Wilkinson, 1993), and was measured at wave 1 by the Wide Range Achievement Test 3 (Wilkinson, 1993). On average, respondents had moderate reading levels (95.14 on a scale from 44 to 155).

Family Factors

Bilsen (2018) concluded that family factors are salient in approximately one-half of youth suicide cases. Similarly, family factors influence behavioral problems among adolescents and young adults, including violence and substance use (Dishion et al. 2003). Accordingly, the analysis includes several family-level variables: employment status; annual household income; years living at current residence; educational attainment; family size; and family support.

Employment status is a dichotomous variable indicating whether the respondent (for the age 18 cohort) or the respondent's primary caregiver (for the age 9, 12, and 15 cohorts) was employed full-time or part-time (1) or unemployed (0) at wave 1. Roughly 57.85% ($N=772$) of respondents or respondents' primary caregivers were employed. Annual household income was measured at wave 1 as an ordinal variable ranging from 1 = "less than \$5000" to 7 = "greater than \$50,000." The modal category for annual household income was "\$20,000–\$29,999." Respondents reported the length of time that they had lived at their current residence as of wave 1. On average, respondents lived in the same residence for 6.56 years (standard deviation = 6.88; range = 0.08–59). Educational attainment is an ordinal variable assessing the respondent's (for the age 18 cohort) or the respondent's primary caregiver's (for the age 9, 12, and 15 cohorts) education level at wave 1. Ranging from 1 = "less than high school" to 5 = "bachelor's degree or more," the modal category was between "some high school"

and "finished high school." Family size indicates the number of family members living in the respondent's residence. The average respondent had 5.53 family members living in their residence.

Family support captured the emotional and social support provided to respondents by their families at the time of the wave 1 interview. On a scale from 1 (not true) to 3 (very true), respondents were asked to rate their level of agreement with the following six statements: "I know my family will always be there for me;" "Sometimes I'm not sure I can rely on my family" (reverse-coded); "My family tells me they think I'm valuable;" "My family has confidence in me;" "My family helps me find solutions to problems;" and "I know my family will always stand by me." The scale was constructed as the average of the item responses ($\alpha=0.69$). On average, respondents had high levels of family support (2.74 out of 3).

Neighborhood Characteristics

Drawing from social disorganization theory, the analysis includes three neighborhood factors measured using the 2000 decennial census: socioeconomic disadvantage; racial and ethnic heterogeneity; and residential stability. All neighborhood measures are consistent with prior research using the PHDCN (Sampson et al., 1997).

The scale of socioeconomic disadvantage consisted of five items: percent of families below poverty; percent of households receiving public assistance; percent of non-intact families with children; percent of population unemployed; and median household income (reverse-coded). The items were combined via a weighted factor regression score; all factor loadings were above 0.83 using principal components analysis with oblique rotation.

Residential stability represents the standardized average of the percentage of owner-occupied homes and the percentage of residents living in the same house as five years earlier. These items were strongly correlated ($r=0.46$).

The ethnic heterogeneity index was constructed using Blau's (1977) equation: $1 - \sum p_i^2$, where p_i is the proportion of each neighborhood that is white, African American, Native American, Asian, Hispanic, and other. This scale takes into account the relative sizes of the groups and the number of groups in each neighborhood (Sampson 1984). The average neighborhood cluster had a heterogeneity score of 0.33, meaning that there was a 33% chance that two residents from a given neighborhood would be of the same race/ethnicity.

Figure 1 displays the distribution of socioeconomic disadvantage and racial/ethnic heterogeneity across the 238 NCs represented in the study. The figure indicates that there is diversity in socioeconomic disadvantage and racial/ethnic heterogeneity across the NCs.

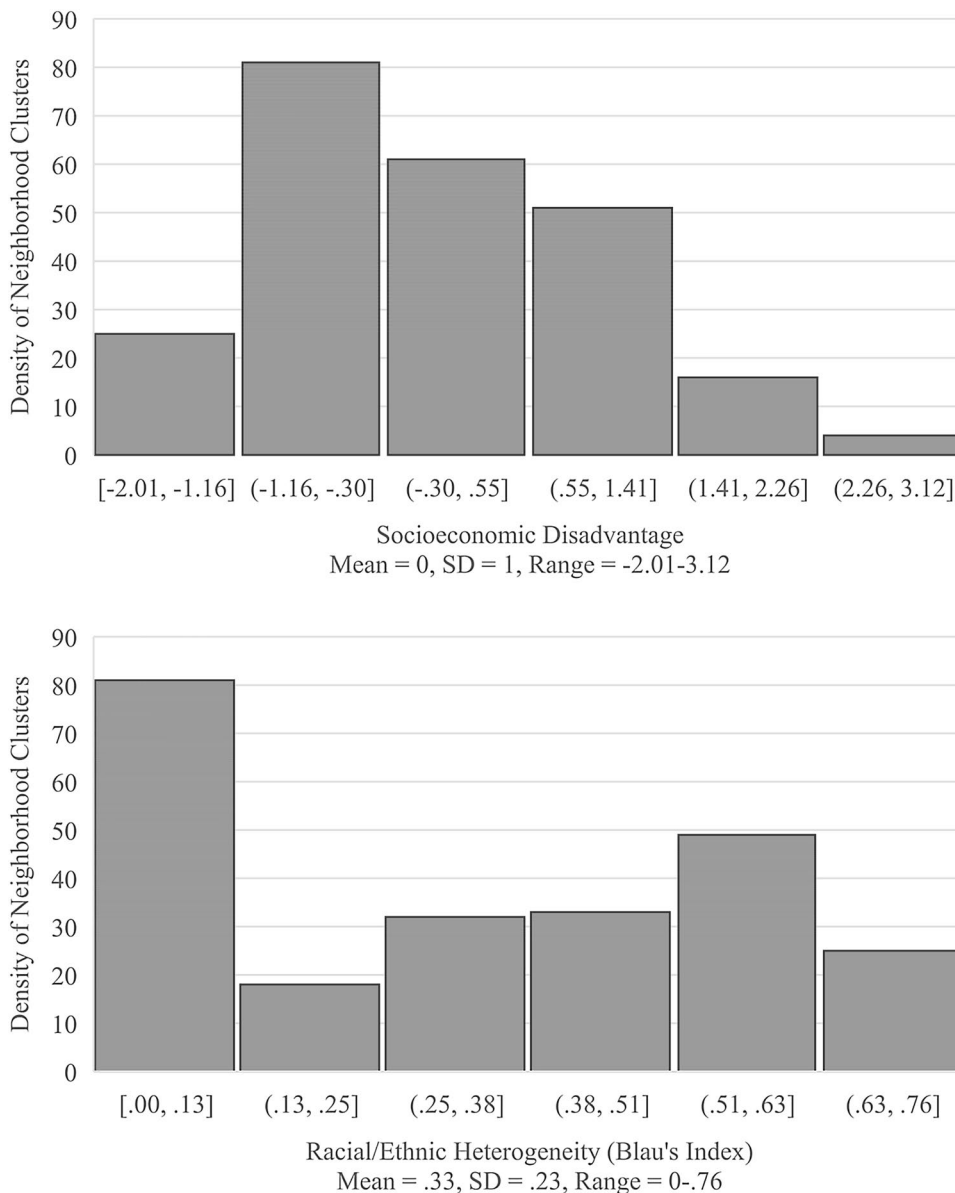
Analytic Strategy

A series of regression models examined the relationships among perceived racial and ethnic discrimination, socioeconomic and racial/ethnic context, and the study outcomes (depressive symptoms, suicidal behavior, violent behavior, and substance use). All models adjusted standard errors for the clustering of respondents within their residential neighborhoods at wave 3 of the study using the `vce(cluster)` option in *Stata 15*. This strategy accounted for the clustering of the 1333 sample respondents within 238 NCs. In [sensitivity analysis](#), multilevel models generated findings that were substantively identical to those presented below. Nonetheless, the decision to use robust-clustered standard errors was justified by the high prevalence of singletons (neighborhoods

with only one respondent) in the data (27.31%, $N = 65/238$) and neighborhoods with less than five respondents (69.75%, $N = 166/238$). Logistic regression models were used to model the binary outcomes—suicidal behavior and each of the four substance use behaviors (alcohol, cigarette, marijuana, and illicit drug use); ordinary least squares modeled the continuous outcome (depressive symptoms); and negative binomial regression modeled the count outcome (violent behavior).

The analysis proceeded in three stages. In the first stage, a series of regression models examined whether perceived racial and ethnic discrimination was associated with depressive symptoms, suicidal behavior, violent behavior, and substance use (Hypothesis 1), controlling for the array of study covariates. The neighborhood-level characteristics were

Fig. 1 Distribution of socioeconomic disadvantage and racial/ethnic heterogeneity across the 238 neighborhood clusters represented in the study



also included at this stage of analysis to investigate possible direct contextual effects on the study outcomes.

In the second stage of analysis, a descriptive comparison examined whether the incidence of perceived racial and ethnic discrimination varied across the neighborhood context (Hypothesis 2). Neighborhoods were divided into quartiles based on levels of socioeconomic disadvantage and racial and ethnic heterogeneity, and Kruskal–Wallis equality-of-populations rank tests were used to determine whether there was a statistically significant difference in median levels of perceived racial and ethnic discrimination across the quartiles. In [sensitivity analysis](#), we experimented with different thresholds (e.g., quintiles and deciles) and comparison tests (e.g., *t*-tests and ANOVA). We also estimated multivariate negative binomial models that regressed perceived racial and ethnic discrimination on the neighborhood characteristics, with and without the full array of individual covariates. In all cases, we reached the same substantive conclusions.

In the third stage of analysis, the inclusion of a series of interactions between the perceived racial and ethnic discrimination variable and the neighborhood-level variables (socioeconomic disadvantage and racial and ethnic heterogeneity) tested for effect modification to determine whether the effects of perceived racial and ethnic discrimination on the study outcomes varied across the socioeconomic and racial and ethnic context (Hypothesis 3). Sensitivity analysis further tested for effect modification across the proportion of the neighborhood African American and Hispanic with no change in the substantive results.

Given differences in the outcomes and in perceived racial and ethnic discrimination across African American and Hispanic respondents, we estimated all models after disaggregating race and ethnicity in [sensitivity analysis](#). Because the substantive findings did not differ across African American and Hispanic respondents, the results below are presented for the full sample of respondents. Nonetheless, Appendices 1 through 3 disaggregate the results by race/ethnicity.

Results

Examining the Association Between Racial and Ethnic Discrimination and the Outcomes

Table 2 presents the results from a series of regression models examining the association between perceived racial and ethnic discrimination and the study outcomes, controlling for the study covariates. The table presents coefficients and standard errors across the logistic, negative binomial, and ordinary least squares regression models. All models adjust standard errors to account for the clustering of persons within neighborhoods. Significant results are shown in bold.

The results indicate that perceived racial and ethnic discrimination was positively and significantly associated with each of the study outcomes, controlling for the study covariates. In support of Hypothesis 1, and consistent with prior research, perceived racial and ethnic discrimination was positively associated with: depressive symptoms ($b = 0.03$, $SE = 0.01$, $p < 0.001$); suicidal behavior ($b = 0.14$, $SE = 0.06$, $p < 0.05$); violent behavior ($b = 0.21$, $SE = 0.03$, $p < 0.001$); alcohol use ($b = 0.22$, $SE = 0.05$, $p < 0.001$); cigarette use ($b = 0.12$, $SE = 0.04$, $p < 0.01$); marijuana use ($b = 0.18$, $SE = 0.04$, $p < 0.001$); and illicit drug use ($b = 0.27$, $SE = 0.09$, $p < 0.01$).

Table 2 also indicates significant variation in the outcomes across gender, race/ethnicity, and age. Female respondents were significantly more likely than male respondents to experience depressive symptoms ($b = 0.09$, $SE = 0.02$, $p < 0.001$); conversely, females were significantly less likely than males to engage in violent behavior ($b = -0.80$, $SE = 0.11$, $p < 0.001$) and to use alcohol ($b = -0.25$, $SE = 0.12$, $p < 0.05$), cigarettes ($b = -0.63$, $SE = 0.14$, $p < 0.001$), and marijuana ($b = -0.56$, $SE = 0.14$, $p < 0.001$). African American respondents were significantly less likely than Hispanic respondents to experience depressive symptoms ($b = -0.10$, $SE = 0.03$, $p < 0.01$) and to use illicit drugs ($b = -2.30$, $SE = 0.68$, $p < 0.01$), but significantly more likely than Hispanic respondents to engage in violent behavior ($b = 0.50$, $SE = 0.17$, $p < 0.01$). Older respondents were significantly more likely to engage in each of the four types of substance use: alcohol ($b = 0.39$, $SE = 0.02$, $p < 0.001$); cigarettes ($b = 0.28$, $SE = 0.02$, $p < 0.001$); marijuana ($b = 0.23$, $SE = 0.02$, $p < 0.001$); and illicit drugs ($b = 0.24$, $SE = 0.06$, $p < 0.001$).

Regarding the individual factors, impulsivity was positively and significantly associated with violent behavior ($b = 0.28$, $SE = 0.13$, $p < 0.05$), cigarette use ($b = 0.62$, $SE = 0.16$, $p < 0.001$), and marijuana use ($b = 0.44$, $SE = 0.16$, $p < 0.01$). Similarly, reading ability was positively and significantly associated with suicidal behavior ($b = 0.02$, $SE = 0.01$, $p < 0.05$), alcohol use ($b = 0.02$, $SE = 0.01$, $p < 0.01$), and marijuana use ($b = 0.01$, $SE = 0.00$, $p < 0.01$).

The only family factor to be consistently associated with the outcomes was family support. Higher levels of family support were significantly associated with lower levels of depressive symptoms ($b = -0.18$, $SE = 0.03$, $p < 0.001$), suicidal behavior ($b = -1.19$, $SE = 0.28$, $p < 0.001$), violent behavior ($b = -0.48$, $SE = 0.15$, $p < 0.01$), alcohol use ($b = -0.71$, $SE = 0.18$, $p < 0.001$), cigarette use ($b = -0.82$, $SE = 0.19$, $p < 0.001$), marijuana use ($b = -0.81$, $SE = 0.20$, $p < 0.001$), and illicit drug use ($b = 1.55$, $SE = 0.49$, $p < 0.01$). None of the neighborhood factors was significantly associated with the study outcomes after controlling for the individual covariates.

Table 2 Association between the wave 3 study outcomes and wave 3 perceived racial and ethnic discrimination, controlling for study covariates (N = 1333 person, 238 neighborhoods)

Variable	Depressive symptoms		Suicidal behavior		Violent behavior		Alcohol use		Cigarette use		Marijuana use		Illicit drug use	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Discrimination	.03***	(.01)	.14*	(.06)	.21***	(.03)	.22***	(.05)	.12**	(.04)	.18***	(.04)	.27**	(.09)
Demographics factors														
Female	.09***	(.02)	.36	(.22)	-.80***	(.11)	-.25*	(.12)	-.63***	(.14)	-.56***	(.16)	-.16	(.37)
African American	-.10**	(.03)	-.32	(.41)	.50**	(.17)	-.14	(.25)	-.10	(.24)	.40	(.27)	-2.30**	(.68)
Age	.00	(.00)	-.07	(.04)	.01	(.02)	.39***	(.02)	.28***	(.02)	.23***	(.02)	.24***	(.06)
Immigrant status														
2nd generation	-.04	(.03)	-.28	(.39)	.39	(.27)	-.18	(.25)	-.39	(.24)	.23	(.29)	1.14	(1.09)
3rd generation	-.04	(.04)	.00	(.56)	.80**	(.30)	-.11	(.34)	-.46	(.32)	.30	(.37)	1.28	(1.13)
Individual factors														
Impulsivity	.03	(.02)	.28	(.24)	.28*	(.13)	.13	(.11)	.62***	(.16)	.44**	(.16)	.61	(.37)
Emotionality	.02	(.01)	-.01	(.11)	-.05	(.06)	-.06	(.07)	-.06	(.07)	-.05	(.09)	-.38	(.23)
Sociability	-.01	(.01)	.14	(.14)	.12	(.09)	-.03	(.09)	.06	(.07)	.02	(.09)	.65	(.34)
Reading Ability	.00	(.00)	.02*	(.01)	.00	(.00)	.01**	(.00)	.01	(.00)	.01**	(.00)	.00*	(.01)
Family factors														
Years at residence	.00	(.00)	-.04	(.02)	-.03**	(.01)	-.01	(.01)	-.01	(.01)	-.02	(.01)	.00	(.04)
Employment status	.01	(.02)	-.29	(.24)	-.09	(.13)	-.11	(.15)	.00	(.15)	-.06	(.16)	.35	(.53)
Education														
Some high school	-.01	(.03)	-.07	(.31)	.07	(.21)	-.26	(.20)	-.32	(.23)	-.28	(.22)	-.04	(.64)
Graduate high school	-.05	(.03)	-.73	(.50)	-.12	(.24)	-.20	(.24)	-.37	(.28)	-.49	(.31)	-.63	(.73)
Beyond high school	.00	(.03)	.13	(.36)	-.07	(.23)	-.54*	(.23)	-.34	(.23)	.05	(.26)	.16	(.58)
Household salary	.00	(.01)	-.03	(.08)	.00	(.04)	.10*	(.04)	.07	(.04)	.03	(.04)	.09	(.11)
Family size	.00	(.00)	-.03	(.05)	-.02	(.03)	-.06	(.03)	-.06	(.04)	-.03	(.04)	-.23	(.12)
Family support	-.18***	(.03)	-1.19***	(.28)	-.48**	(.15)	-.71***	(.18)	-.82***	(.19)	-.81***	(.20)	-1.55**	(.49)
Neighborhood factors														
Disadvantage	.02	(.01)	.35	(.19)	.06	(.08)	-.10	(.11)	-.13	(.12)	-.03	(.12)	-.30	(.26)
Residential instability	-.01	(.01)	-.07	(.15)	-.06	(.07)	-.02	(.10)	.02	(.09)	.14	(.11)	-.07	(.22)
Heterogeneity	-.01	(.01)	.09	(.15)	.11	(.08)	.01	(.10)	-.10	(.09)	-.07	(.11)	.34	(.28)

Results based on logistic regression for suicidal behavior and the substance use outcomes, ordinary least squares regression for depressive symptoms, and negative binomial regression for violent behavior. All models adjust for the clustering of persons within neighborhoods via robust-clustered standard errors

b = regression coefficient; SE = standard error

***p < .001; **p < .01; *p < .05 (two-tailed test)

Appendix 1 investigates the association between perceived racial and ethnic discrimination and the study outcomes separately for African American and Hispanic respondents. The appendix shows the bivariate associations as well as the associations controlling for the full array of study covariates as in Table 2. With the exception of suicidal behavior (racial and ethnic discrimination was significant for African American but not Hispanic respondents) and illicit drug use (racial and ethnic discrimination was significant for Hispanic but not African American respondents), the results were comparable across respondents.

Does the Incidence of Discrimination Vary Across Neighborhood Context?

Table 3 presents a descriptive comparison of the incidence of perceived racial and ethnic discrimination

Table 3 Levels of perceived racial and ethnic discrimination across quartiles of socioeconomic disadvantage and racial and ethnic heterogeneity

	Socioeconomic Disadvantage	Racial and Ethnic Heterogeneity
1st quartile	1.44	1.63
2nd quartile	1.56	1.40
3rd quartile	1.36	1.52
4th quartile	1.52	1.37
Rank test	<i>p</i> = .221	<i>p</i> = .217

Significance values were based on the Kruskal–Wallis equality-of-populations rank test, which determines whether there is a statistically significant difference in median levels of perceived racial and ethnic discrimination across the quartiles

across the socioeconomic and racial/ethnic context. Contrary to Hypothesis 2, levels of perceived racial and ethnic discrimination did not vary across quartiles of socioeconomic disadvantage or racial and ethnic heterogeneity. Kruskal–Wallis tests did not detect meaningful variation or trends in perceived racial and ethnic discrimination across quartiles of socioeconomic disadvantage and racial and ethnic heterogeneity.

Appendix 2 presents the results disaggregated by race/ethnicity. In addition to examining levels of perceived racial and ethnic discrimination across quartiles of socioeconomic disadvantage and racial and ethnic heterogeneity, the appendix also investigates variation in racial and ethnic discrimination across quartiles of the proportion of the population African American and the proportion of the population Hispanic. In each case, the results were wholly consistent with those presented in Table 3—there was no evidence of variation in levels of perceived racial and ethnic discrimination across the neighborhood context.

Does the Effect of Racial and Ethnic Discrimination Vary Across Neighborhood Context?

Table 4 examines whether the effects of perceived racial and ethnic discrimination on the study outcomes vary across the socioeconomic and racial/ethnic context. Inclusion of an interaction term between perceived racial and ethnic discrimination and socioeconomic disadvantage in the full models presented in Table 2 is used to investigate whether the effect of perceived racial and ethnic discrimination on the study outcomes varies across neighborhood levels of socioeconomic disadvantage. Similarly, an interaction term between racial and ethnic discrimination and racial/ethnic heterogeneity investigates whether the effect of perceived

TABLE 4. Modeling the wave 3 study outcomes as a function of cross-level interactions between wave 3 racial and ethnic discrimination and neighborhood socioeconomic status and racial and ethnic heterogeneity, controlling for study covariates (*N* = 1333 person, 238 neighborhoods)

Variable	Depressive symptoms		Suicidal behavior		Violent behavior		Alcohol use		Cigarette use		Marijuana use		Illicit drug use	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Discrimination	.03***	(.01)	.12*	(.06)	.21***	(.03)	.22***	(.04)	.13**	(.04)	.19***	(.04)	.20*	(.10)
Disadvantage	.02	(.02)	.11	(.23)	.05	(.10)	-.12	(.14)	-.29*	(.14)	-.16	(.16)	-.32	(.34)
Heterogeneity	-.01	(.01)	.14	(.18)	-.01	(.09)	.03	(.12)	-.17	(.11)	-.23	(.15)	-.01	(.34)
Discrimination × Disadvantage	.00	(.01)	.14	(.09)	.01	(.03)	.01	(.07)	.09	(.06)	.07	(.05)	.02	(.10)
Discrimination × Heterogeneity	.00	(.01)	-.03	(.07)	.06*	(.03)	-.02	(.05)	.03	(.04)	.08	(.05)	.15	(.08)

Results based on logistic regression for suicidal behavior and the substance use outcomes, ordinary least squares regression for depressive symptoms, and negative binomial regression for violent behavior. All models adjust for the clustering of persons within neighborhoods via robust-clustered standard errors and control for the full array of study covariates as in Table 3

Significance values indicate at the bottom are given in bold

b = regression coefficient; SE = standard error

****p* < .001; ***p* < .01; **p* < .05 (two-tailed test)

racial and ethnic discrimination varies across neighborhood levels of heterogeneity. Contrary to Hypothesis 3, the interaction terms were not significant in any of the models. The results indicate that the effects of perceived racial and ethnic discrimination did not vary across respondents' neighborhoods.

Appendix 3 examines Hypothesis 3 separately for African American and Hispanic respondents. The results were substantively identical to those presented in Table 4—the effect of perceived racial and ethnic discrimination did not vary across neighborhood context for either African American or Hispanic respondents.

Sensitivity Analysis

We estimated a series of supplemental statistical models to examine the robustness of the study findings. First, to more fully investigate Hypothesis 2, socioeconomic disadvantage was disaggregated into its components, and the percent of the population African American and Hispanic were substituted for Blau's racial and ethnic heterogeneity index. In both cases, the results were consistent with those presented in Table 3—there was no evidence of variation in levels of perceived racial and ethnic discrimination across the neighborhood context.

Second, as discussed above, the hypotheses were examined separately for African American and Hispanic respondents. The results shown in Appendices 1, 2, and 3 indicate overwhelming consistency across African American and Hispanic respondents and complete agreement with the aggregate results presented in Tables 2, 3, and 4. Relatedly, we also investigated whether the reliability of our key measures varied across African American and Hispanic respondents. Overall, the measures had very similar Cronbach's alpha across racial and ethnic groups. The overall reliability of the depressive symptoms scale was $\alpha=0.84$, while the race and ethnicity specific reliability was $\alpha=0.83$ and $\alpha=0.84$ for African American and Hispanic respondents, respectively. The overall reliability for suicidal behavior was $\alpha=0.92$, while the race and ethnicity specific reliability was $\alpha=0.92$ and $\alpha=0.93$ for African American and Hispanic respondents, respectively. The overall reliability for violent behavior was $\alpha=0.60$, which varied from $\alpha=0.55$ for African American respondents to $\alpha=0.63$ for Hispanic respondents. The overall reliability for perceived racial and ethnic discrimination was $\alpha=0.71$, which varied from $\alpha=0.68$ for African American respondents to $\alpha=0.73$ for Hispanic respondents.

Third, in lieu of models that accounted for clustering through robust-clustered standard errors, we estimated multilevel models that nested respondents in their neighborhoods of residence at wave 3 of the study. Fourth, to avoid potential bias due to skewness and non-normality of

the depressive symptoms scale, we created an additive index of the 14 indicators included in the scale and estimated a negative binomial model. Fifth, instead of imputing data, we re-estimated all models with only the cases with complete data. Finally, we included lagged dependent variables in the models to: control for heterogeneity in the outcomes preceding the measurement of the explanatory variables; and contribute to our confidence in the causal order of racial and ethnic discrimination and the outcomes. In each case, the results were substantively identical to those presented above, lending strong support to the results presented above.

Discussion

Summary of Findings

A growing body of research links racial and ethnic discrimination to adverse youth outcomes, including depressive symptoms (Pieterse et al., 2012), suicidal behavior (Arshanapally et al., 2017), violent behavior (Herda & McCarthy, 2018), and substance use (Rose et al. 2018). Yet, studies examining the relevance of neighborhood context for discrimination are sparse. Using data from the Project on Human Development in Chicago Neighborhoods (PHDCN), this study examined whether racial and ethnic discrimination increased the likelihood of depressive symptoms, suicidal behavior, violent behavior, and substance use (Hypothesis 1). We also examined whether the incidence of perceived racial and ethnic discrimination varied across neighborhood context (Hypothesis 2), and whether the effects of perceived racial and ethnic discrimination varied across the socioeconomic and racial/ethnic context (Hypothesis 3). Findings indicated strong support for Hypothesis 1: racial and ethnic discrimination had appreciable effects on the study outcomes. Conversely, the results indicated little to no neighborhood-level variation in the incidence and effects of racial and ethnic discrimination.

Implications for Theory, Policy, and Future Research

The results affirm key insights for theory, policy, and future research. Consistent with prior research and Hypothesis 1, the results indicated that perceived racial and ethnic discrimination was significantly and positively associated with depressive symptoms, suicidal behavior, violent behavior, and substance use. These findings support the robust research literature that has advanced over the past two decades on the relationship between racial and ethnic discrimination and adverse youth outcomes. Much of this research has focused on the poor physical and mental health consequences of racial and ethnic discrimination, including

depression (Pieterse et al., 2012), suicidality (Arshanapally et al., 2017), and offending (Herda & McCarthy, 2018).

These outcomes are particularly impactful during adolescence, a time of development and change when youth are forming their personal identity and self-esteem. Moreover, these mental health and behavioral outcomes may persist into adulthood or lead to additional disadvantageous life outcomes, including those related to education, employment, and positive socialization. For example, a meta-analysis of 27 studies found that poor mental health in adolescence was associated with: a lower likelihood of completing secondary and post-secondary education; a higher likelihood of unemployment and needing public assistance such as welfare; and significantly lower earnings, on average, compared to healthier peers (Hale et al., 2015). Given the potential for these disadvantageous outcomes to contribute to a perpetuating cycle of social disadvantage, especially amongst marginalized groups, mitigating the experience and impact of racial and ethnic discrimination is critical to also addressing larger societal issues and inequities.

Regarding Hypothesis 2, the results indicated little to no neighborhood-level variation in the incidence of discrimination. Rather, rates of perceived racial and ethnic discrimination did not vary across the socioeconomic and racial/ethnic context. This finding contrasts both the group threat perspective and the contact hypothesis, which despite conflicting theoretical assumptions, both assert that broader neighborhood factors influence the incidence of discrimination (Blalock, 1967; Pettigrew, 1998). This finding, coupled with the field's split empirical support for both theoretical perspectives, suggests that living in a racially/ethnically or socioeconomically heterogeneous neighborhood is neither a risk factor for, nor protective factor against, racial and ethnic discrimination. As such, the experience of racial and ethnic discrimination may go beyond the development of interpersonal relationships based on proximity or commonalities in socioeconomic status, indicating more macro-level roots in societal norms, values, and institutions. This is consistent with research demonstrating that more than nine out of ten African American youth face discrimination annually (Pachter et al., 2018), a phenomenon that is exacerbated by exposure to virtual settings (English et al., 2020). Tackling discrimination therefore requires efforts to create societal shifts in values and norms, unlearning of biases and prejudices, and reforming social institutions through an anti-racist lens (Berman & Paradies, 2010). While these goals are heady, they are essential to undoing centuries of racist attitudes.

With respect to Hypothesis 3, interaction models indicated that the effects of discrimination on the outcomes did not vary across neighborhood context. Rather, discrimination was significantly, positively, and similarly associated with depressive symptoms, suicidal behavior, violent

behavior, and substance use across all neighborhood settings. As a result, the impact of experiencing discrimination—at least for the respondents in the study sample—was the same for youth living in: an affluent, majority African American, suburban neighborhood; a middle-class, mixed-race neighborhood; and a socially disadvantaged, majority Hispanic neighborhood. While youth in some families, schools, or social networks may be in a better position to address the harmful outcomes associated with discrimination—empirical questions that should be studied more extensively in future research—the outcomes of experiencing discrimination remain the same across neighborhood types.

The effects of discrimination therefore transcend community types and socioeconomic backgrounds, suggesting that the key to coping with discrimination may lie in the preparation of bias, cultural socialization, and education. Teaching youth about the history, nature, and prevalence of discrimination (McHale et al., 2006), along with instilling a sense of cultural pride and belonging (Bennett, 2006), play key roles in coping and resilience among youth (Brown, 2008a, 2008b; Scott, 2003).

As schools often serve youth from various backgrounds and communities, they may be in a prime position to discuss and facilitate coping strategies for discrimination. Schools are not only a key source of learning and socialization for youth, but most youth spend approximately half of their waking hours on school grounds. Whether intentional or not, schools are already sites of racial and ethnic socialization (Aldana & Byrd, 2015), occurring through inter-group interactions, course-curriculums, teachers and staff, and organizational characteristics and policies. Such factors are referred to by Saleem and Byrd (2021) as transmitters. It is important to note that not all transmitters of racial ethnic socialization are healthy ones. To mitigate the frequency and impact of racial ethnic discrimination, the adoption of a formal, intentional, and multicultural approach is essential. This is not an easy task, as concepts of racial and ethnic socialization in schools and prejudice interventions are nascent (Grapin et al., 2019; Saleem & Byrd, 2021). Additionally, research in this area is sparse, with scholars only recently beginning to consider the school's unique role in racial and ethnic socialization. But, initial evidence is promising. Del Toro and Wang (2021), for example, found that adolescent African American males who perceived more school cultural socialization had higher academic achievement via ethnic-racial identity commitment and development. Moreover, it is possible that healthy racial and ethnic socialization in schools would not only assist youth in dealing with the ubiquitous realities of discrimination, but also encourage youth not to be perpetrators of discrimination themselves.

More broadly, the findings raise several questions for future research. As the findings of this study contradict the group threat perspective and the contact hypothesis, we

encourage researchers to test the consistency of our results across cities and neighborhood types (e.g., urban, rural, and suburban), and among other racial and ethnic groups. While discussions of discrimination often center on African American and Hispanic/Latino youth, Native Americans also experience discrimination with similar mental health impacts (Vines et al., 2017), and discrimination against Asian Americans has increased since 2020 and the start of the global Covid-19 pandemic.

Additionally, we note that while there is often an assumed correlation between neighborhood characteristics and access to stabilizing institutions and community organizations, the latter were not factors measured in this study and should not be ruled out as mechanisms of mitigating the harmful effects of discrimination. Future research should consider the existence and prevalence of stabilizing institutions and community organizations within a neighborhood, and how they impact both the incidence and effects of discrimination.

Finally, research has demonstrated that online experiences with discrimination can be as prevalent, if not more so, than offline discrimination experiences (English et al., 2020). Given the time of data collection (2000–2002) in the current study, and advancements in technology since, research would benefit from utilizing recent data that capture contemporary avenues of discrimination such as cyberbullying and online trolling (Ortiz, 2020).

Limitations

These findings should be considered alongside several potential limitations. First, the measure of perceived racial and ethnic discrimination, while consistent with prior research using the PHDCN (Herda, 2016; Herda & McCarthy, 2018; Zimmerman & Miller-Smith 2022), did not capture all of the key components of discriminatory experiences, including their “chronicity, recurrence, severity, and duration” while “distinguishing incidents that are traumatic from those that are not” (Williams et al., 2019, p. 114). For example, respondents only reported whether or not—and not how many times—they experienced racial and ethnic discrimination. The binary items were summed to create a count of the number of situations in which respondents experienced racial or ethnic discrimination. Proper measurement is critical to racial and ethnic discrimination research, and research on self-reported discrimination is rife with measurement issues like this that likely underestimate the effects of discrimination (Williams, 2016).

Additionally, we acknowledge that some of the neighborhood processes relevant to understanding the link between racial and ethnic discrimination and youth outcomes may function at a different contextual unit of analysis than studied herein. For example, while the geographic unit in this study—a neighborhood cluster (NC)—may reflect the

macrosystem, some of the mechanisms discussed in this article may occur in the microsystem, which refers to the “relationship between a developing person and the immediate environment” (Bronfenbrenner, 1994, p. 37). Relatedly, researcher-defined and census-designated boundaries may not align with residents’ perceived neighborhood boundaries. Furthermore, respondents likely encounter and participate in multiple neighborhoods and “activity spaces” (Browning & Soller, 2014), which are not accounted for in this study. Nonetheless, we reiterate that the researcher-defined NCs in this study were: guided by geographical boundaries and resident social composition (with respect to socioeconomic status and race/ethnicity); comprised of just over two census tracts, on average; and averaged 8000 people, smaller than the 77 community areas in Chicago. As such, the geographic units of analysis in this study at least approximated a local “neighborhood.”

Finally, there may be questions about the causal order between perceived racial and ethnic discrimination and the outcome variables, given their concurrent measurement at wave 3 of the study. To address this concern, we included lagged dependent variables as covariates in supplemental models. We acknowledge that this approach cannot account for the cross-sectional measures of perceived racial and ethnic discrimination and the study outcomes; and that including lagged dependent variables in multilevel models can lead to severe bias of coefficients (Allison et al., 2017). Additionally, more dynamic approaches were not possible because the PHDCN data did not include measures of the key study variables over time. Nonetheless, these supplemental models increase our confidence in the causal processes suggested in this study.

Conclusion

We conclude by reiterating two key observations: (1) racial and ethnic discrimination has adverse youth developmental effects, from depressive symptoms and suicidal behavior to violent behavior and substance use; and (2) racial and ethnic discrimination is alarmingly common and has similarly debilitating effects across neighborhood context. Therefore, regardless of setting, racial socialization, preparation for bias, and racial identity development among youth of color in the U.S. may hold promise for coping and resiliency. Similarly, inter-group contact may hold promise for a shared understanding among in-groups and out-groups that reduces discrimination from its roots. Change requires open dialogue about discriminatory practices across social and racial/ethnic contexts, an understanding of minority individuals’ daily experiences, and strong opposition to institutional prejudice and cultural bias.

Appendix 1

Bivariate and multivariate associations between the wave 3 study outcomes and wave 3 perceived racial and ethnic discrimination, disaggregated by African American (N = 568 persons, 136 neighborhoods) and Hispanic (N = 765 persons, 148 neighborhoods) respondents

Outcome variable	African American respondents				Hispanic respondents			
	Bivariate		Multivariate		Bivariate		Multivariate	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Depressive symptoms	0.03**	(0.01)	0.03***	(0.01)	0.03**	(0.01)	0.03**	(0.01)
Suicidal behavior	0.21*	(0.08)	0.23*	(0.09)	0.01	(0.09)	0.02	(0.10)
Violent behavior	0.17***	(0.03)	0.17***	(0.04)	0.33***	(0.05)	0.28***	(0.05)
Alcohol use	0.29***	(0.05)	0.24**	(0.07)	0.33***	(0.05)	0.22***	(0.06)
Cigarette use	0.25***	(0.05)	0.17**	(0.06)	0.22***	(0.05)	0.09***	(0.06)
Marijuana use	0.26***	(0.05)	0.18**	(0.06)	0.29***	(0.05)	0.18**	(0.06)
Illicit drug use	0.49	(0.33)	0.40	(0.31)	0.38***	(0.07)	0.25*	(0.10)

Results based on logistic regression models for suicidal behavior and the substance use outcomes, ordinary least squares regression for depressive symptoms, and negative binomial regression for violent behavior. The multivariate results represents associations controlling for the full array of study covariates as in Table 2. All models adjust for the clustering of persons within neighborhoods via robust-clustered standard errors.

b=regression coefficient; SE=standard error

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$ (two-tailed test)

Appendix 2

Levels of perceived racial and ethnic discrimination across quartiles of socioeconomic disadvantage and racial and ethnic composition, disaggregated by African American (N = 568 persons, 136 neighborhoods) and Hispanic (N = 765 persons, 148 neighborhoods) respondents

Quartiles of socioeconomic disadvantage	African American respondents	Hispanic respondents
1st quartile	1.29	1.47
2nd quartile	1.86	1.39
3rd quartile	1.52	1.27
4th quartile	1.59	1.22
Rank test	$p = 0.153$	$p = 0.870$

Quartiles of racial and ethnic heterogeneity	African American respondents	Hispanic respondents
1st quartile	1.61	2.00
2nd quartile	1.60	1.24
3rd quartile	1.71	1.47

Quartiles of racial and ethnic heterogeneity	African American	Hispanic
4th quartile	1.60	1.29
Rank test	$p = 0.969$	$p = 0.322$

Quartiles of percent of the population African American	African American	Hispanic
1st quartile	1.00	1.41
2nd quartile	1.83	1.27
3rd quartile	1.58	1.46
4th Quartile	1.61	1.50
Rank Test	$p = 0.948$	$p = 0.765$

Quartiles of percent of the population Hispanic	African American	Hispanic
1st quartile	1.66	1.50
2nd quartile	1.62	1.78
3rd quartile	1.47	1.37
4th quartile	1.73	1.29
Rank test	$p = 0.484$	$p = 0.358$

Significance values were based on the Kruskal–Wallis equality-of-populations rank test, which determines whether there is a statistically significant difference in racial and ethnic discrimination across the quartile medians.

Appendix 3

Modeling the Wave 3 Study Outcomes as a Function of Cross-Level Interactions between Wave 3 Racial and Ethnic Discrimination and Neighborhood Socioeconomic Status and Racial and Ethnic Heterogeneity, Disaggregated by African American ($N = 568$ Persons, 136 Neighborhoods) and Hispanic ($N = 765$ Persons, 148 Neighborhoods) Respondents

Models estimated for African American respondents

Variable	Depressive symptoms		Suicidal behavior		Violent behavior		Alcohol use		Cigarette use		Marijuana use		Illicit drug use	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Discrimination	0.02**	(0.01)	0.19	(0.10)	0.17***	(0.04)	0.18*	(0.08)	0.16*	(0.07)	0.18*	(0.08)	0.40	(0.31)
Disadvantage	0.00	(0.03)	-0.03	(0.34)	-0.01	(0.13)	-0.13	(0.27)	0.07	(0.26)	0.04	(0.26)	-0.32	(0.34)
Heterogeneity	-0.03	(0.02)	-0.13	(0.28)	0.01	(0.10)	0.16	(0.18)	0.11	(0.19)	-0.13	(0.26)	-0.01	(0.34)
Discrimination × Disadvantage	0.01	(0.01)	0.12	(0.11)	0.02	(0.04)	0.07	(0.10)	0.04	(0.08)	0.08	(0.08)	0.02	(0.10)
Discrimination × Heterogeneity	0.00	(0.01)	0.02	(0.08)	0.02	(0.03)	-0.08	(0.07)	0.01	(0.06)	0.06	(0.07)	0.15	(0.08)

Models estimated for Hispanic respondents

Variable	Depressive symptoms		Suicidal behavior		Violent behavior		Alcohol use		Cigarette use		Marijuana use		Illicit drug use	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Discrimination	0.02	(0.01)	0.08	(0.10)	0.24***	(0.07)	0.20**	(0.06)	0.09	(0.07)	0.13	(0.07)	0.31*	(0.13)
Disadvantage	0.03	(0.02)	0.30	(0.31)	0.01	(0.21)	-0.13	(0.16)	-0.49**	(0.18)	-0.29	(0.23)	-0.49	(0.35)
Heterogeneity	0.02	(0.02)	0.36	(0.27)	0.05	(0.20)	-0.11	(0.17)	-0.37*	(0.18)	-0.33	(0.19)	0.49	(0.40)
Discrimination × Disadvantage	-0.01	(0.01)	0.13	(0.16)	0.10	(0.08)	-0.04	(0.08)	0.12	(0.10)	0.04	(0.08)	0.09	(0.12)
Discrimination × Heterogeneity	0.00	(0.01)	-0.11	(0.13)	0.14	(0.08)	0.03	(0.09)	0.08	(0.08)	0.15	(0.08)	0.00	(0.13)

Results based on logistic regression for suicidal behavior and the substance use outcomes, ordinary least squares regression for depressive symptoms, and negative binomial regression for violent behavior. All models adjust for the clustering of persons within neighborhoods via robust-clustered standard errors and control for the full array of study covariates as in Table 3.

b = regression coefficient; SE = standard error

*** $p < .001$; ** $p < .01$; * $p < .05$ (two-tailed test)

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