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Understanding Racial and Ethnic Disparities in Arrest: The Role of Individual, Home, School, and Community Characteristics

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Abstract

Contact with the justice system can lead to a range of poor health and social outcomes. While persons of color are disproportionately represented in both the juvenile and criminal justice systems, reasons for these patters remain unclear. This study sought to examine the extent and sources of differences in arrests during adolescence and young adulthood among blacks, whites, and Hispanics in the USA. Multilevel cross-sectional logistic regression analyses were conducted using data from waves I and IV of the National Longitudinal Study of Adolescent to Adult Health ($n = 12,752$ respondents). Results showed significantly higher likelihood of having ever been arrested among blacks, when compared to whites, even after controlling for a range of delinquent behaviors (odds ratio = 1.58, 95 % confidence interval = 1.27, 1.95). These black–white disparities were no longer present after accounting for racial composition of the neighborhood, supporting the growing body of research demonstrating the importance of contextual variables in driving disproportionate minority contact with the justice system.

Keywords

Disparities; Arrest; Juvenile justice; Criminal justice; Multilevel model; Social determinants of health

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Introduction

Contact with the juvenile or criminal justice system can lead to a range of negative health and social outcomes. Contact with the justice system can damage social networks and family functioning, decrease high school graduation and employment rates, increase risk for involvement in violence and violent victimization, and worsen mental health outcomes and long-term life opportunities (Brame et al. 2012; Clear 2008; Gatti et al. 2009; Hjalmarsson 2007; Lambie and Randell 2013; Massoglia 2008; Pridemore 2014; Turney et al. 2012).

Persons of color are disproportionately represented in both the juvenile and criminal justice systems. Among youths, the evidence for racial differences is greatest at the earliest point of contact, particularly at the stages of arrest, referral to court, and placement in secure detention (National Research Council 2013). In 2013, more than one million youths in the USA had contact with the juvenile justice system; black youths experienced more than twice the rate of arrest than white youths (Puzzanchera and Hockenberry 2015). Despite decreases in the number of youths entering the justice system in the past 20 years, overall reductions have not narrowed the gap. Arrest rates among white youths, for example, have been decreasing at a faster pace than arrest rates for black youths (Stevens and Morash 2015). Data among adults show similar patterns; those who are arrested, incarcerated, and put on probation or parole come largely from disadvantaged segments of the population, mainly minority men who are poorly educated, lack work preparation or experience, and/or battle substance abuse disorders (National Research Council 2014).

Despite well-documented racial differences in contact with the justice system, reasons for these disparities remain unclear. Researchers have conceptualized racial disparities as potentially stemming from differences in individual behaviors (offending), policies and practices of the justice system, and/or environmental and social contexts (Piquero 2008). Unfortunately, the vast majority of studies conducted to date have focused on a narrow set of potential predictors and have not been able to fully examine the individual- and system-level characteristics that impact racial/ethnic disparities in justice system contact. The present study sought to help address these gaps by conducting a multilevel, cross-sectional analysis using data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) to simultaneously consider a more robust range of individual, home, school, and community factors in driving racial and ethnic disparities in the first point of contact with the justice system: arrest. Given the wide range of short- and long-term detrimental effects associated with justice system contact and its role in influencing inequities (Brame et al. 2012; Schnittker and John 2007), by better articulating the factors driving racial/ethnic disparities in arrests, we can begin to identify leverage points to help shift health, social, and economic trajectories.

Background

Disproportionate rates of minority contact with the justice system may be driven by a variety of factors; much of the extant literature has sought to distinguish between warranted factors (e.g., higher levels of criminal involvement) and unwarranted factors (i.e., those not explained by legally relevant variables) (Crutchfield et al. 2009; Spohn 2000). The

"differential involvement" hypothesis posits that minorities are overrepresented in the juvenile and criminal justice systems because they commit more crimes, for more extended periods of their lives, and partake in more of the types of crimes that lead to processing in the justice system, such as violence (Piquero 2008). A number of studies using official police records and self-reported data support the notion of differential patterns of offending, particularly for violent behaviors (Piquero 2008). Previous work by Felson and Deane (2007), for example, identified higher rates of violence among black adolescents, particularly armed violence, even after controlling for demographic factors such as family structure, residence, and socioeconomic status. While early studies strongly supported the central role of differential offending, more recent work calls into question reliance on this hypothesis alone (Piquero 2008; Piquero and Brame 2008). Longitudinal studies using data from Denver, Rochester, and Seattle showed that racial differences in police contact remain substantial after controlling for differences in self-reported offending (Huizinga et al. 2007). Likewise, minority youths have been shown to be more likely to be involved with the justice system after controlling for criminal behaviors, substance abuse, and mental health problems (Godette et al. 2011).

A contrasting explanation for disproportionate minority contact is the "differential selection and processing" hypothesis, the notion that juvenile and criminal justice system protocols and processes lead to more minorities being arrested, convicted, and incarcerated (Piquero 2008). A meta-analysis of data collected at the encounter or suspect level reported that blacks had an increased likelihood of being arrested as compared to whites even after controlling for factors such as demeanor, offense severity, quantity of evidence at the scene, prior record of the suspect, and requests to arrest by victims (Kochel et al. 2011). Experimental studies point to the role of unconscious racial stereotyping among law enforcement officials, for example, Graham and Lowery (2004) demonstrated the impact of racial priming on police and probation officer reports of negative traits, culpability, expected recidivism, and in endorsing harsher rates of punishment. Additionally, scholars have pointed to components of the system—including lack of adequate resources for legal counsel, pre-trial services, and drug treatment, which disproportionately impact racial/ethnic minority offenders—as contributing to the recycling of individuals within the system and further exacerbating disparities (Taxman et al. 2005).

A more nuanced picture of the differential involvement/differential selection and processing framework warrants an expanded focus on environmental context. Neighborhoods in the USA are highly segregated; racial/ethnic minorities frequently face worse environmental, educational, and economic conditions (Jargowsky 2015; Williams and Collins 2001). Differences in these environments can influence contact with the juvenile and criminal justice systems both indirectly (e.g., by influencing behavior) and directly (e.g., through increased crime rates and associated police presence). With regard to behavior, social disorganization theory suggests that conditions of socioeconomic disadvantage and residential instability disrupt social bonds and limit collective activity to maintain social control, thereby increasing the likelihood of deviant behaviors such as violence and child maltreatment (Beyer et al. 2013; Cullen and Agnew 2011; Maguire-Jack and Klein 2015; Sampson and Groves 1989). Studies point to the role of residential segregation in influencing structural (concentrated) disadvantage and social isolation, which lead to

structural barriers and cultural adaptations that undermine social organization, thereby increasing rates of neighborhood violence (Krivo et al. 2009; Sampson 2013). Additionally, neighborhood racial/ethnic composition may result in greater exposure to crime-control measures (i.e., more law enforcement officials). Whether such differential crime-control efforts stem from a "consensus" (i.e., race-neutral, problem-oriented techniques which signal society's uniform desire for law enforcement to control disorder) or "conflict" (a deliberate attempt by the dominant social group to maintain social control and order) perspective is unclear (Renauer 2012; Taxman et al. 2005). While conflict theories have been used to explain macro-level law enforcement behaviors, such as police force size and incarceration rates (Davis and Sorensen 2013; Renauer 2012), findings supporting their influence on micro-level law enforcement practices have been mixed (Arvanites 2014; Davis and Sorensen 2013; Parker et al. 2005: Petrocelli et al. 2003).

Overall, much remains unknown about the relative contribution of individual, community, and system characteristics in influencing rates of disproportionate minority contact; a few multilevel studies help illustrate the complex array of factors that impact differential arrest rates among youths. Kirk's (2008) study of Chicago youths points to the importance of unstable family structure, concentrated poverty, and low levels of collective efficacy in influencing disparate arrest rates between whites and blacks. However, even after controlling for delinquent behaviors as well as other individual, family, and neighborhood-level factors, substantial differences in arrest remained between black youths and those in other racial groups. Work by Crutchfield and colleagues examining differences in rates of police contact (2012) and arrest (2009) among youths in Seattle illustrated the role of income, parental histories of arrest, delinquent peers, deviant adult networks, and school disciplinary practices in predicting disparities, after controlling for delinquent behaviors. Of interest was the importance of parental and other family criminal involvement which, as the authors concluded, may point to the role of law enforcement paying more attention to families known to be involved in crime. In one of the only studies of a nationally representative sample of youths, Anderson (2015) demonstrated disproportionate rates of arrest between black and white youths, but not between Hispanic and white youths, after controlling for self-reported delinquency. The study found these disparities to be magnified in predominantly non-black communities; however, it was only able to consider a limited number of community-level and no school-level factors in its analysis. Overall, there are likely to be a number of important contextual and individual factors that contribute to differential rates of contact with the justice system, many of which remain unexplored.

The present study sought to address some of the gaps in the current literature by examining a more comprehensive range of community, school, home (family), and individual characteristics to understand reasons underlying racial/ethnic disparities in arrest. To explore these issues, this study used the National Longitudinal Study of Adolescent to Adult Health (Add Health), which contains measures of a variety of factors, including adolescent self-reported delinquent behaviors, parental perceptions of home environments, and data on school and community characteristics. By using a nationally representative longitudinal dataset, this study sought to examine the extent and sources of disparities in arrests during adolescence and young adulthood among blacks, whites, and Hispanics in the USA. Specific research questions included: (1) To what extent are there racial/ethnic differences in arrest,

and if present, to what extent are they explained by differences in individual-level delinquent behaviors? and (2) what aspects of community and school environments are associated with differences in arrests, after controlling for individual-level delinquent behavior and other individual and family-level characteristics?

Methods

Sample

Add Health is a large longitudinal dataset based on a nationally representative cohort of US adolescents. Youths were in grades 7–12 during the first year of administration (conducted from September 1994 through December 1995) (wave I). The cohort has been followed into young adulthood with four in-home interviews, the most recent of which was conducted from January 2008 through February 2009, when the sample was aged 24–32 years old (wave IV).

The data were collected using a school-based, clustered sampling design. A sample of 80 high schools and 52 middle schools from the USA was selected with unequal probability of selection. A school was eligible for the sample if it included an 11th grade and had a minimum enrollment of 30 students. Multiple types of youths were oversampled, including disabled, blacks from well-educated families, Chinese, Cubans, Puerto Ricans, and twins and siblings. As described by the survey creators, incorporating systematic sampling methods and implicit stratification into the study design helps ensure that the sample is representative of US schools with respect to region, urbanicity, school size, school type, and ethnicity (Harris et al. 2009).

For this study, a subset of the data was extracted by merging variables from five Add Health files: the wave I adolescent in-home file, the wave I parental in-home questionnaire, the wave I school administrator questionnaire, the wave I contextual file, and the wave IV in-home questionnaire. Data from only waves I and IV were used to obtain information from the earliest formative years (wave I) and the most complete data on life experience (wave IV). Respondent data were collected in the youth's home during an in-person interview using standardized interview protocols. The majority of questions were asked directly by the interviewer; however, sensitive questions were administered using computer-assisted self-interview. For parental data, the mother (or other female head of the household) of the originally sampled adolescent was asked to participate in an interviewer-administered, paper-and-pencil survey. If the mother did not reside in the household, the following list was used to select the next most appropriate respondent: stepmother, other female guardian, father, stepfather, and other male guardian (Harris et al. 2009). For school data, an administrator from each school was asked to complete a questionnaire. Finally, the contextual file data elements were developed based on either respondent addresses, GPS readings that allowed for geocoding, or (in a small proportion of cases) ZIP code data.

Measures

Arrest—The outcome, whether an individual was ever arrested, was taken from the wave IV in-home question, "Have you ever been arrested?" To provide context related to the

outcome, descriptive analyses were conducted using the following three questions related to arrests: How old a respondent was the first time he/she was arrested (open-ended question, dichotomized for analysis as whether or not the arrest occurred before age 18); how many times a respondent had been arrested (closed-ended question with response options of "once" or "more than once"); and what the respondent was charged with the first time he/she was arrested (closed-ended question with response options of "driving under the influence," "other alcohol-related offenses," "marijuana offenses," "other drug offenses," "robbery," "theft," "forcible rape," "aggravated assault/intentional manslaughter/murder," "simple assault," "fraud, forgery, or embezzlement," and "other offenses").

Individual Characteristics

Demographics: All demographic characteristics were taken from the wave I in-home questionnaire. Respondents were asked to identify their race. Response options included: white, black or African American, Asian or Pacific Islander, American Indian or Native American, or other. In a separate question, respondents were asked whether they were of Hispanic or Latino origin. All individuals who selected Hispanic were able to select one (or more) subgroup from the following: Mexican, Cuban, Puerto Rican, or Central/South American. From these questions, four mutually exclusive racial/ethnic categories were developed: non-Hispanic white, non-Hispanic black, Hispanic, and other. If participants selected more than one race, their self-identified category that "best describes their racial background" was used. Due to the small number of those who identified as Asian or Pacific Islander or American Indian or Native American, these responses were grouped with "other." Based on the small number of respondents in each of the Hispanic subgroup categories, and results of preliminary analyses, which suggested no differences between Mexicans, Cubans, Puerto Ricans, or Central/South Americans in arrests, Hispanic ethnicities were grouped together.

Age at the time of survey administration was calculated using the respondent's reported date of birth. Respondents were asked whether they were born in the USA and, if not, when they moved to the USA. These variables were used to calculate the number of years the respondent had been in the USA. Respondents were asked to report how old they were when they moved to their current residence; their age was used to calculate the number of years they had lived in their current residence. The interviewer noted the respondent's gender.

Delinquent Behaviors: A robust set of delinquency measures were constructed from data provided during the waves I and IV in-home questionnaires, including property crime, violent crime, drug crime, youth delinquency (wave I only), school truancy (wave I only), alcohol use, and marijuana use. In accordance with previous studies using Add Health data (Felson and Deane 2007; McNulty and Bellair 2003), items from the property crime, violent crime, drug crime, and youth misbehaviors scales ("Appendix 1") were re-coded as 1 (yes) or 0 (no) and averaged. Truancy in wave I was constructed using the question "During this school year, how many times have you skipped school for a full day without an excuse?" Categories were defined based on the distribution of response (0, 1–9, or 10 or more), and a category was created for those who reported not currently being in school.

Wave I alcohol use was constructed from three questions asking about the timing and frequency of use; responses were constructed to create four mutually exclusive categories: those who (a) had never had a drink of alcohol, (b) those who had tried alcohol, but had not consumed any in the past year, (c) those who had consumed in the past year, but had never had 5 or more drinks in a row (binge drinking), and (d) those reporting binge drinking at least once in the past year. For wave IV, responses were used to identify respondents who: (a) had never had a drink of alcohol, (b) those who had consumed in the past year, but had never binge drank, (c) those who binge drank less than once a month, and (d) those who binge drank once a month or more. Marijuana use in wave I was constructed from three questions asking about the timing and frequency of use; responses were constructed to identify those who: (a) had never tried marijuana, (b) had tried marijuana, but had not used in the past 30 days, and (c) had used in the past 30 days. For wave IV, responses were used to identify respondents who had used marijuana in the past year and those who had not.

Educational Factors: School connectedness was measured using five items which asked about student perceptions during the current school year or, if it was summer, the previous school year. Items were designed to capture the social belonging dimension of school connectedness (e.g., "you feel close to people at your school") and have demonstrated acceptable internal consistency (Joyce and Early 2014). Responses, each ranked on a five-point scale (ranging from 1 "strongly disagree" to 5 "strongly agree"), were averaged, and four categories were created. Educational attainment was constructed using responses to the wave IV in-home questionnaire that asked participants to indicate "the highest level of education that you have achieved to date." Responses were categorized as "less than high school," "high school graduate or GED," "some college," or "completed a bachelor's degree or higher."

Home Characteristics—All home characteristics were constructed using the wave I parental in-home questionnaire. The number of adults living in the home was defined as one or two. Two adults were counted as living in the home if the parental respondent was married and living with the spouse; married, not living with the spouse, but living in a marriage-like relationship with someone else; or not married, but living in a marriage-like relationship. Parent education level was coded as the highest level of education completed by either adult living in the house. Household income was categorized based on response to the question "about how much total income, before taxes did your family receive." A separate indicator was constructed to indicate refusals. Finally, parental relationship with youths was constructed by averaging responses to four items on relationship strength and quality (e.g., "you get along well with [child], you make decisions about [child's] life together") in accordance with previous studies (Johnson 2013) and dichotomized as weak (1.0–4.0) or strong (>4.0) based on the distribution of responses. For all home characteristic variables, because of the large number of respondents (10.6 %) for which no in-home questionnaire was completed, an indicator was created to specify that no parental interview was conducted (to retain these respondents in the multivariable analyses).

School Characteristics—All school characteristics were constructed using the wave I school administrator questionnaire. School type was coded as "comprehensive public school

(not including magnet school or school of choice)," "public magnet school or public school of choice," "area vocational school or other technical or vocational school," or "religious or non-religious private school." School size was coded as small (1–400 students), medium (401–1000 students), or large (1001–4000 students), for both middle and high schools. Average daily attendance was constructed using the original scale reported by school administrators—95 % or more, 90–94 %, 85–89 %, 80–84 %, or 75–79 %. The number of school-based services was constructed by summing the number of 18 services (athletic physical, non-athletic physical, treatment for minor illness and injuries, diagnostic screening, treatment for sexually transmitted diseases, immunizations, family planning counseling, family planning services, prenatal/postpartum health care, drug awareness and resistance education program, drug abuse program, alcohol abuse program, nutrition/weight loss program, emotional counseling, rape counseling program, physical violence program, day care for children of currently enrolled students, and physical fitness/recreation center) provided "on school premises." Finally, school discipline policy was constructed by averaging the number of first-time offenses (for cheating, fighting with another student, injuring another student, possessing alcohol, possessing an illegal drug, possessing a weapon, drinking alcohol at school, using an illegal drug at school, smoking at school, verbally abusing a teacher, physically injuring a teacher, stealing school property) that resulted in an "out of school suspension" or "expulsion."

Community Characteristics—All community characteristics were constructed using the wave I contextual file. Crime rate was the total crime rate per 100,000 population, as obtained from the Uniform Crime Reports; county-level counts of arrests and offenses for the violent crimes of murder, rape, robbery, and violent assault, and the property crimes of burglary, larceny, auto theft, and arson are provided to the US Federal Bureau of Investigation by local agencies. Poverty rate (the proportion of families with income in 1989 below the poverty level), unemployment rate (for the general population), the proportion of individuals who were white, and the proportion of housing units vacant were derived from the 1990 Census long-form questionnaire. With the exception of crime rate (only available at the county level), all variables were at the census block group level.

Analytic Methods

Bivariate analyses were first conducted to examine the association between race/ethnicity and the other individual, home, school, and community characteristics. To examine the two primary research questions, cross-sectional multilevel logistic regression was conducted using arrest (yes or no) as the dependent variable. Sets of predictor variables were sequentially added to create six versions of the model: (1) model 1, the base model, which included only race/ethnicity; (2) model 2, which included race/ethnicity along with individual characteristics and measures of delinquency; (3) model 3, which included all variables from model 2, plus home characteristics; (4) model 4, which included all variables from model 3, plus school characteristics; (5) model 5, which included all variables from model 3, plus community characteristics; and (6) model 6, which included all individual, home, school, and community characteristics. Across models, individual, home, and community variables were treated as level one variables, while school characteristics (the primary sampling unit) were treated as level two variables.

Multidegree of freedom tests were conducted in order to examine the significance of categorical variables (with more than two levels) as well as "groups" of home, school, and community characteristics. To judge magnitude of effects, predicted values and differences were computed using Taylor series standard errors to evaluate significance. All analyses were completed using the individual- and school-level weights provided by the survey developers in order to properly account for the study design. Due to the complexity of the multivariable models, all analyses were performed using cases with complete data for all variables of interest (86.2 % of the total sample). All analyses were conducted using Stata version 14.1 (*StataCorp LP, College Station, Texas*). All materials were reviewed and approved by the Los Angeles County Department of Public Health Institutional Review Board.

Results

Descriptive Statistics

More than a quarter of respondents (29.6 %) reported having ever been arrested (Table 1). There were significant differences in arrests between racial/ethnic groups, with 36.8 % of blacks, 30.3 % of Hispanics, and 27.9 % of whites having ever been arrested. Among those who had been arrested, 26.1 % reported having been arrested before the age of 18 and 50.7 % reported having been arrested more than once. The most commonly reported reasons for the first arrest included alcohol or drug-related offenses (46.0 %), theft or robbery (12.0 %), and violent offenses (e.g., assault, forcible rape) (10.3 %).

There were a number of differences among racial/ethnic groups for many of the observed individual, home, school, and community characteristics (Table 1). For example, whites reported the highest level of alcohol use at both wave I and wave IV and marijuana use at wave IV, in comparison with other groups. Differences among racial/ethnic groups with regard to property crime at wave I were detected, with Hispanics having higher levels than whites and blacks. Both blacks and Hispanics had higher levels of violent crime than whites at wave I. Blacks also reported higher levels of violent crime than whites at wave IV. Whites reported the highest levels of educational attainment, with 33.3 % having completed college, compared to 24.3 % of blacks and 19.6 % of Hispanics.

White respondents had the highest proportion of parents complete an interview and were more likely than other racial/ethnic groups to have two parents living in the house at wave I —82.5 % of whites had two parents in the home, compared to 66.0 % of blacks and 76.9 % of Hispanics. White parents reported having higher levels of educational attainment and higher household incomes, for example, 12.8 % of white parents reported an annual household income over $80,000, compared to 4.9 % of Hispanics and 4.7 % of blacks. With regard to schools, black youths were more likely to go to a school that reported lower levels of average daily attendance and more strict suspension policies, when compared to other racial/ethnic groups. Looking at community characteristics, both blacks and Hispanics lived in areas with more crime, family poverty, unemployment, and vacant housing, for example, the average family poverty rate at wave I for whites was 0.09 compared to 0.23 for blacks and 0.15 for Hispanics. In general, white youths were more likely to live in an area highly

concentrated with white residents, while black and Hispanic youths lived in areas with lower concentrations of white residents (Table 1).

Multivariable Analyses

To What Extent are Racial/Ethnic Differences in Arrest Explained by Differences in Delinquent Behaviors?—Results of the multivariable analyses suggest that racial/ethnic differences in arrest were not explained by differences in individual-level delinquent behaviors. After controlling for demographic characteristics, including gender, age, time in the USA, time in current residence, and region, as well as a range of delinquent and criminal behaviors (model 2), there were significant racial/ethnic differences in arrests. After controlling for these factors, the odds of being arrested increased among blacks, as compared to whites, from 1.40 (95 % confidence interval [CI] = 1.18, 1.68) (model 1) to 1.58 (95 % CI = 1.27, 1.95) (model 2). Other significant predictors associated with increased odds of arrest included male gender, having lived longer in the USA, having lived for a shorter time in one's current residence, educational attainment, and delinquent behavior, including property crime (in wave IV), violent crime (in both waves), drug crime (in both waves), truancy, and drug and alcohol use (in wave IV). Largest effect sizes were observed for gender, property and violent crime at wave IV, and educational attainment (Table 2).

Adding home characteristics (model 3) did not significantly alter the association between race/ethnicity and the odds of being arrested. In this model, the association between most of the demographic characteristics, delinquent behaviors, and educational factors and the odds of arrest remained similar in both strength and magnitude. As a group, the parental variables were shown to be associated with the odds of arrest ($X^2 = 2962.0$, $p < 0.0001$). In particular, parent's relationship with their child was a strong predictor of arrest; respondents whose parent reported a weak relationship with him/her had 1.26 the odds of arrest (95 % CI = 1.09, 1.46), compared to those whose parent reported a strong relationship (Table 2).

What Aspects of Community and School Environments are Associated with Racial/Ethnic Differences in Arrests?—Multivariable analyses suggest that neighborhood composition (the percent of white residents in the neighborhood) was the primary driver of racial/ethnic differences in arrests. In model 6, for every one percentage point increase in the proportion of individuals in a community who were white, respondents had less than half the odds of being arrested (odds ratio = 0.44, 95 % CI = 0.16, 0.69), after controlling for other factors. The predicted probability of arrest among whites was 0.29 (95 % CI = 0.27, 0.31), while the predicted probability among blacks was 0.30 (95 % CI = 0.26, 0.33); this difference was not statistically significant ($p = 0.58$). While other school characteristics (model 4 joint F test of school characteristics $X^2 = 41.33$, $p < 0.0001$) and community characteristics (model 5 joint F test of community characteristics $X^2 = 13.78$, $p = 0.0171$) were associated with the odds of being arrested, they were not the primary drivers of racial/ethnic disparities (Table 2). When model 6 was stratified by race/ethnicity, results suggested that the relationship between neighborhood composition and arrest differed by race/ethnicity, although there were few whites who lived in areas with a low concentration of white residents and few blacks who lived in areas with a high concentration of white residents. Specifically, as the percent of whites increased, the odds of arrest among whites

(odds ratio = 0.20, 95 % CI = 0.08, 0.47) and other races (odds ratio = 0.20, 95 % CI = 0.03, 1.42) decreased, whereas the odds of arrest among blacks (odds ratio = 1.10, 95 % CI = 0.53, 2.25) and Hispanics (odd ratio = 0.95, 95 % CI = 0.25, 3.63) remained fairly constant.

Discussion

Despite well-documented racial/ethnic differences in rates of contact with the justice system, reasons for these disparities remain unclear. This study sought to examine the extent of racial/ethnic differences in arrests among a national sample of adolescents and young adults to better understand the extent to which these differences were influenced by delinquent behavior as well as a range of other individual, home, school, and community characteristics. Overall, analyses showed significantly higher likelihood of having ever been arrested among blacks, when compared to whites, even after accounting for a range of delinquent behaviors. Importantly, after controlling for racial composition of the neighborhood, these disparities were no longer present, suggesting the importance of neighborhood context in influencing racial/ethnic disparities in arrests.

Results of the present study align with the well-documented disparities in arrests between blacks and whites (Puzzanchera and Hockenberry 2015). As expected, both youth and adult delinquent behaviors—including property crime, violent crime, drug use, drug-associated crime, and truancy—were significantly, positively associated with the likelihood of arrest. While rates of delinquent behavior were fairly consistent across racial/ethnic groups, some differences were noted, for example, blacks reported higher rates of involvement in violent crime in both youth and adulthood, when compared to whites, supporting previous research (Felson and Deane 2007; McNulty and Bellair 2003). In the present study, however, the vast majority of delinquent behaviors did not differ between racial/ethnic groups, and whites showed higher rates of some forms of delinquency, including alcohol and marijuana use. Results support criticisms raised about the "war on drugs," wherein racial/ethnic minorities have experienced significantly higher rates of arrests for drug offenses, despite comparable rates of drug possession and sales (Fellner 2009). In the present study, after controlling for delinquent behaviors, the magnitude of the disparity in arrests between blacks and whites remained significant, suggesting that observed differences in arrests were not driven by differences in delinquent behaviors. Instead, these results support the growing body of research demonstrating the importance of contextual variables in driving disproportionate minority contact with the justice system (Crutchfield et al. 2012; Huizinga et al. 2007; Kirk 2008)

Results of the present study suggest that neighborhood racial composition may be one of the key factors driving racial/ethnic disparities in arrest rates. Historically, people of color have been concentrated into areas that differ vastly in their level of economic, social, and political resources, including the quality of educational and employment opportunities, the level of poverty and family disruption, and other neighborhood resources (Krivo et al. 2009; Williams 1997; Williams and Collins 2001); such spatial inequality has been recognized as an important contributor to neighborhood disorganization and crime (Cullen and Agnew 2011; Sampson 2013). The current level of residential racial segregation and the concentration of poverty in the USA is the product of structural forces, political decisions,

and institutional arrangements, many of which continue to operate today (Jargowsky 2015). In the present study, both blacks and Hispanics tended to live in communities with higher rates of crime, poverty, and unemployment, when compared to whites. While many aspects of school and community contexts were associated with arrest, results of the present study point to the important role of neighborhood racial composition in influencing racial/ethnic disparities in arrest, above and beyond socioeconomic indicators of poverty, unemployment, vacant housing, or school quality.

Associations between neighborhood racial composition and the likelihood of arrest may reflect differences in criminal justice practices and policies, such as police presence. Previous studies have shown racial composition to be related to police force size (Parker et al. 2005) and police behaviors (Petrocelli et al. 2003; Renauer 2012). In the present study, whether the observed association between neighborhood racial composition and arrest is rooted in a consensus (race neutral) or conflict (social control), theoretical perspective cannot be fully determined. The statistically significant association between racial composition and the odds of arrest, after accounting for crime rates, provides some support for the role of social control. If policing practices are driven by a uniform desire to reduce disorder, then controlling for differences in crime rates should decrease the magnitude of racial/ethnic disparities in arrest; however, such results were not seen in the present study. This study is limited, though, in its measures of crime, which was not available at the neighborhood level, where "hot spots" for crime and association problem-oriented policing may be determined.

A somewhat unexpected finding was the lack of evidence supporting differences in arrests between Hispanics and whites. While Hispanics are often considered to be at higher risk for police contact, previous studies have been mixed, finding both positive (Vazsonyi and Chen 2010) and null (Anderson 2015; Tapia 2010) associations. Reasons for these contradictory findings remain unclear, but could be related to the fact that Hispanic ethnicity may be not be as readily discernible a characteristic as race by law enforcement officials (Tapia 2010). In addition, Hispanics represent a heterogeneous group of backgrounds and many previous studies have been unable to examine differences among Hispanic subgroups. While preliminary analyses in the present study did not find differences in arrests among those who reported being of Mexican, Cuban, Puerto Rican, or Central/South American descent, a more in-depth exploration of these and other Hispanic groups represents an important area for future research. As results of the present and previous studies (Kirk 2008) suggest the potentially protective role of being a recent immigrant, nativity should also be considered. Unfortunately, the small number of recent immigrants included in the present study sample prevented in-depth exploration of these issues.

Although this study is one of the first to examine an expansive range of individual, home, school, and community characteristics in influencing arrests among a national sample of adolescents and young adults, it has a number of limitations. First, data from youths, family members, and school administrators were collected through self-report. While self-reported measures of delinquency are not as ideal as objective measures, previous studies suggest that such methods are still reliable and valid (Thornberry and Krohn 2003) and that self-reporting of arrest does not vary systematically by race (Pollock et al. 2015). Second,

because of the small number of respondents, individuals who identified as Asian or Pacific Islander, American Indian or Native American, or other were combined into one category. Third, because of the complexity of the statistical model, complete case analysis was used. To help address some instances of item non-response, indicators were created for missing values (e.g., for income and whether the youth had a parental interview). To the extent that other variables are not missing at random, then results might be biased. Fourth, while the dataset provided information on a vast array of constructs, some were measured using only a single question (e.g., truancy, drug crime). In addition, no direct measures of law enforcement behaviors and practices or neighborhood measures of collective efficacy or social disorganization were available, making it difficult to articulate the specific mechanisms underlying the association between neighborhood composition and arrest. Moreover, because few white youths in the sample lived in areas with a low concentration of white residents and few black youths lived in areas with a high concentration of white residents, it was difficult to fully examine differential effects of neighborhood composition. Fifth, since Add Health is a school-based sample, individuals who are disconnected from school may be underrepresented. Finally, while the use of national-level data provides a generally representative picture, this study could not examine state- or city-level variations in the factors most likely to influence disparities in arrest.

Despite these limitations, this study provides insights on an issue that has vexed the US juvenile and criminal justice systems. Disproportionate rates of minority contact are a longstanding problem that has neither been well understood nor effectively addressed. Results underscore emerging research supporting the need to look beyond the role of individual behaviors, to instead target the underlying contextual factors—particularly neighborhood racial composition—that drive racial/ethnic disparities in justice system contact.

The deleterious health, social, and economic consequences created for low-income people of color as a result of contact with the justice system are closely intertwined (My Brother's Keeper Task Force 2015). By looking further upstream to better elucidate the social, economic, and other contextual factors—such as arrest—that drive health disparities, researchers, policymakers, and agency decision-makers can take a more holistic approach. Given its range of negative impacts, additional efforts to reduce disproportionate minority contact with the justice system may provide a potential lever to foster more equitable outcomes among our nation's most vulnerable communities.

Acknowledgments

original design. Information on how to obtain the Add Health data files is available on the Add Health Web site (http://www.cpc.unc.edu/addhealth). No direct support was received from grant P01-HD31921 for this analysis.

Appendix 1

See Table 3.

Table 3

National Longitudinal Study of Adolescent to Adult Health in-home survey questions used to measure delinquency

Construct	Wave I Items	Wave IV Items
Property crime	In the past 12 months, how often did you paint graffiti or signs on someone else's property or in a public place? In the past 12 months, how often did you deliberately damage property that didn't belong to you? How often did you take something from a store without paying for it? How often did you drive a car without its owner's permission? In the past 12 months, how often did you steal something worth more than $50? How often did you go into a house or building to steal something? How often did you steal something worth less than $50?	In the past 12 months, how often did you deliberately damage property that didn't belong to you? In the past 12 months, how often did you steal something worth more than $50? In the past 12 months, how often did you go into a house or building to steal something? In the past 12 months, how often did you steal something worth less than $50? In the past 12 months, how often did you buy, sell, or hold stolen property?
Violent crime	How often did you get into a serious physical fight? How often did you hurt someone badly enough to need bandages or care from a doctor or nurse? How often did you use or threaten to use a weapon to get something from someone? In the past 12 months, how often did you take part in a fight where a group of your friends was against another group? In the past 12 months, have you ever gotten into a physical fight? Have you ever used a weapon in a fight? During the past 12 months, how often did each of the following things happen? You pulled a knife or gun on someone. You shot or stabbed someone.	In the past 12 months, how often did you use or threaten to use a weapon to get something from someone? In the past 12 months, how often did you take part in a physical fight where a group of your friends was against another group? In the past 12 months, how often did you get into a serious physical fight? Which of the following things happened in the past 12 months. You pulled a knife or gun on someone? You shot or stabbed someone?
Drug crime	How often did you sell marijuana or other drugs?	In the past 12 months, how often did you sell marijuana or other drugs?
Youth delinquency	In the past 12 months, how often did you lie to your parents or guardians about where you had been or whom you were with? How often did you run away from home? How often were you loud, rowdy, or unruly in a public place?	–

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Table 1

Characteristics of the full sample and characteristics stratified by race/ethnicity

	Full sample	Non-Hispanic white	Non-Hispanic black	Hispanic	Other	p value[a]
Percent or mean (standard deviation) [b]						
Individual characteristics						
Demographics						–
Race/ethnicity						
Non-Hispanic white	65.6	–	–	–	–	
Non-Hispanic black	17.5	–	–	–	–	
Hispanic	12.0	–	–	–	–	
Other	4.9	–	–	–	–	
Gender						0.1652
Female	49.5	49.1	51.8	49.9	45.9	
Male	50.5	50.9	48.2	50.1	54.1	
Age (years)[c]	15.4 (1.77)	15.4 (1.60)	15.3 (1.97)	15.5 (2.07)	15.4 (2.21)	0.8854
Time in the USA (years)[c]	15.0 (2.51)	15.3 (1.72)	15.2 (2.25)	13.8 (4.64)	13.1 (5.35)	<0.001
Time in current residence (years)[c]	7.10 (5.64)	7.56 (5.20)	6.48 (6.18)	5.82 (6.11)	6.30 (6.60)	<0.001
Ever arrested						
Yes	29.6	27.9	36.8	30.3	25.8	<0.001
No	70.4	72.1	63.2	69.7	74.2	
Delinquent behaviors						
Wave I						
Property crime (range 0–1)[d]	0.13 (0.21)	0.13 (0.19)	0.11 (0.20)	0.17 (0.27)	0.15 (0.28)	<0.001
Violent crime (range 0–1)[e]	0.13 (0.19)	0.12 (0.17)	0.17 (0.23)	0.17 (0.25)	0.12 (0.25)	<0.001
Drug crime (range 0–1)[f]	0.08 (0.27)	0.07 (0.24)	0.08 (0.29)	0.11 (0.35)	0.08 (0.35)	0.2165
Youth delinquency (range 0–1)[g]	0.37 (0.30)	0.37 (0.27)	0.35 (0.32)	0.37 (0.35)	0.37 (0.38)	0.4552
Truancy[h]						0.014
Never	72.8	73.9	74.8	65.4	68.6	
1–9 times	21.5	20.4	20.5	27.7	23.4	
10+ times	5.8	5.7	4.7	6.9	8.0	
Alcohol use						<0.001
Never tried	44.3	41.9	53.5	42.7	47.3	
Tried	8.9	8.2	10.9	9.4	10.0	
No binge	20.3	20.1	21.0	19.2	23.1	
Any binge	26.5	29.9	14.6	28.7	19.6	
Marijuana use						0.3849
Never tried	72.4	71.7	75.7	70.2	74.6	
Past use >30 days	13.5	13.9	11.5	15.2	11.0	
Past use 30 days	14.2	14.5	12.7	14.6	14.4	

	Full sample	Non-Hispanic white	Non-Hispanic black	Hispanic	Other	p value[a]
Wave IV						
Property crime (range 0–1)[i]	0.03 (0.10)	0.03 (0.09)	0.03 (0.12)	0.03 (0.13)	0.03 (0.13)	0.3475
Violent crime (range 0–1)[j]	0.03 (0.10)	0.02 (0.08)	0.04 (0.13)	0.03 (0.10)	0.02 (0.09)	<0.001
Drug crime (range 0–1)[k]	0.05 (0.21)	0.05 (0.19)	0.05 (0.25)	0.04 (0.23)	0.04 (0.24)	0.5543
Alcohol use						<0.001
Never tried	26.6	22.0	40.5	32.1	26.4	
No binge	24.3	22.8	30.6	23.3	24.8	
Moderate binge	28.2	32.1	15.7	25.7	28.0	
Heavy binge	20.8	23.2	13.2	18.9	20.8	
Marijuana use						0.0224
Past use >1 year	77.0	75.5	79.8	80.8	77.4	
Past use 1 year	23.0	24.5	20.2	19.2	22.6	
Educational factors						
Currently in school[c]						0.1571
Yes	98.3	98.3	98.4	97.6	99.6	
No	1.7	1.7	1.6	2.4	0.4	
School connectedness[h]						0.6336
1.0–2.0	3.4	3.5	3.6	2.5	4.3	
2.1–3.0	18.7	19.3	18.5	17.6	14.9	
3.1–4.0	55.7	55.2	55.1	57.9	59.1	
4.1–5.0	22.2	22.1	22.9	22.0	21.7	
Educational attainment						<0.001
Less than high school	8.8	7.5	11.0	13.7	6.2	
High school graduate	16.8	16.2	18.9	19.1	13.3	
Some college	43.9	43.1	45.8	47.7	40.0	
College graduate	30.5	33.3	24.3	19.6	40.6	
Home characteristics						
Any parental interview						<0.001
Yes	89.4	91.7	85.5	87.0	78.9	
No	10.6	8.3	14.6	13.0	21.1	
Adults in home[l]						<0.001
One	23.0	17.5	44.0	23.1	25.5	
Two	77.0	82.5	66.0	76.9	74.5	
Parent education level[l]						<0.001
Less than high school	10.7	5.8	14.5	33.1	12.2	
High school graduate	26.2	26.2	31.3	22.9	16.1	
Some college	32.2	34.1	30.4	22.5	27.9	
College graduate	30.9	33.9	23.9	18.5	43.8	
Household income[l]						<0.001

	Full sample	Non-Hispanic white	Non-Hispanic black	Hispanic	Other	p value[a]
>20 K	18.5	8.1	12.3	9.3	11.0	
20–39 K	27.5	13.1	33.7	28.1	18.1	
40–59 K	22.3	25.7	29.7	35.2	26.5	
60–79 K	12.2	25.7	13.0	16.6	20.0	
80 K+	10.5	14.6	6.6	6.0	12.9	
Refused	9.1	12.8	4.7	4.9	11.5	
Relationship with child[1]						<0.001
Weak (1.0–4.0)	39.6	40.3	43.4	30.9	37.3	
Strong (>4.0)	60.4	59.7	56.6	69.1	62.7	
School characteristics						
Type						0.2512
Public	48.4	49.7	45.2	41.5	58.6	
Choice/magnet	36.1	33.8	45.4	41.1	22.0	
Vocational/trade	7.5	7.7	4.9	11.9	4.4	
Private	8.0	8.9	4.5	5.5	8.0	
Size						0.0476
Small	16.8	17.1	19.0	13.7	11.4	
Medium	45.0	47.1	51.5	26.1	39.6	
Large	38.3	35.8	29.5	60.2	49.0	
Average daily attendance						<0.001
95 %+	39.6	43.9	31.0	29.4	37.9	
90–94 %	44.2	47.5	34.0	47.6	28.4	
85–89 %	10.4	5.6	16.8	20.8	26.7	
80–84 %	3.8	1.3	13.8	1.9	5.2	
75–79 %	2.0	1.7	4.4	0.3	1.8	
Number of school services (range 0–18)[m]	4.80 (3.14)	4.89 (2.90)	4.04 (2.92)	5.44 (3.97)	4.68 (3.90)	0.1295
Suspension policy (range 0–1)[n]	0.74 (0.18)	0.73 (0.17)	0.79 (0.14)	0.69 (0.23)	0.77 (0.22)	0.0038
Community characteristics						
Crime rate (per 100,000 population)[o]	5671.3 (2661.1)	4952.7 (2167.8)	7240.3 (2751.5)	7178.8 (3451.2)	5998.7 (2441.7)	<0.001
Family poverty rate[p]	0.12 (0.13)	0.09 (0.09)	0.23 (0.18)	0.15 (0.15)	0.10 (0.15)	<0.001
Unemployment rate[p]	0.08 (0.06)	0.06 (0.05)	0.12 (0.08)	0.09 (0.07)	0.07 (0.06)	<0.001
Vacant housing[p]	0.08 (0.08)	0.08 (0.08)	0.10 (0.08)	0.08 (0.08)	0.07 (0.09)	0.0059
Proportion white[p]	0.78 (0.29)	0.92 (0.12)	0.38 (0.34)	0.71 (0.27)	0.66 (0.35)	<0.001

[a] p values calculated using Chi-square tests (categorical variables) or analysis of variance (continuous variables) to examine associations between race/ethnicity and other individual, home, school, and community factors

[b] Weighted percentages or means calculated for the sample with no missing data on any variables of interest ($n = 12,752$)

[c] At wave I

*d*Average of seven items ("Appendix 1")

*e*Average of eight items ("Appendix 1")

*f*Measured using one item ("Appendix 1")

*g*Average of three items, including lying to parents and running away from home ("Appendix 1")

*h*Among youths currently in school

*i*Average of five items ("Appendix 1")

*j*Average of five items ("Appendix 1")

*k*Measured using one item ("Appendix 1")

*l*Among youths with a parental interview

*m*Sum of the number of 18 services provided "on school premises"

*n*Average of the number of first-time offenses that resulted in an "out of school suspension" or "expulsion"

*o*Measured at the county level

*p*Measured at the census bock level

Table 2

Results of multilevel logistic regression: factors associated with ever being arrested among a national sample of adolescents and young adults

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Odds Ratio (95 % Confidence Interval)[a]						
Individual characteristics						
Demographics						
Race/ethnicity						
Non-Hispanic white (ref)	—	—	—	—	—	—
Non-Hispanic black	1.40 ** (1.18, 1.68)	1.58 ** (1.27, 1.95)	1.57 * (1.24, 1.98)	1.47 ** (1.17, 1.85)	1.11 (0.81, 1.53)	1.09 (0.80, 1.50)
Hispanic	1.27 * (1.03, 1.56)	1.09 (0.83, 1.44)	1.19 (0.89, 1.60)	1.16 (0.85, 1.59)	1.10 (0.79, 1.53)	1.08 (0.77, 1.52)
Other	0.77 (0.50, 1.18)	0.79 (0.49, 1.28)	0.82 (0.51, 1.31)	0.79 (0.50, 1.27)	0.71 (0.43, 1.16)	0.70 (0.43, 1.14)
Gender						
Female (ref)		—	—	—	—	—
Male		3.03 ** (2.61, 3.51)	3.05 ** (2.63, 3.54)	3.06 ** (2.64, 3.55)	3.10 ** (2.68, 3.57)	3.09 ** (2.68, 3.57)
Age (years)[b]		0.94 (0.88, 1.00)	0.94 (0.88, 1.01)	0.94 (0.88, 1.01)	0.94 (0.88, 1.00)	0.94 (0.88, 1.00)
Time in the USA (years)[b]		1.05 (1.00, 1.09)	1.05 (1.00, 1.09)	1.05 (1.01, 1.10)	1.05 * (1.00, 1.09)	1.05 * (1.01, 1.10)
Time in current residence (years)[b]		0.97 ** (0.96, 0.98)	0.97 ** (0.96, 0.98)	0.97 ** (0.96, 0.98)	0.97 ** (0.96, 0.98)	0.97 ** (0.96, 0.98)
Region						
West (ref)		—	—	—	—	—
Midwest		1.40 (0.96, 2.03)	1.44 (0.98, 2.12)	1.43 * (1.04, 1.97)	1.56 ** (1.11, 2.18)	1.51 ** (1.12, 2.05)
South		1.35 * (1.05, 1.73)	1.42 ** (1.10, 1.84)	1.51 ** (1.17, 1.95)	1.40 ** (1.11, 1.77)	1.48 ** (1.16, 1.89)
Northeast		1.32 (0.96, 1.82)	1.34 (0.98, 1.83)	1.52 (1.08, 2.13)	1.39 * (1.04, 1.86)	1.52 * (1.09, 2.10)
Delinquent behaviors						
Wave I						
Property crime (range 0–1)[c]		1.59 (0.98, 2.59)	1.56 (0.95, 2.57)	1.58 (0.96, 2.60)	1.58 (0.96, 2.62)	1.59 (0.96, 2.64)
Violent crime (range 0–1)[d]		2.48 ** (1.56, 3.94)	2.44 ** (1.53, 3.90)	2.42 ** (1.50, 3.89)	2.35 ** (1.47, 3.77)	2.36 ** (1.47, 3.78)
Drug crime (range 0–1)[e]		1.44 ** (1.13, 1.82)	1.41 * (1.11, 1.79)	1.42 * (1.12, 1.80)	1.41 * (1.11, 1.79)	1.42 * (1.12, 1.81)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Youth delinquency (range 0–1)[f]		1.26 (0.85, 1.87)	1.23 (0.82, 1.86)	1.25 (0.83, 1.88)	1.25 (0.83, 1.87)	1.26 (0.84, 1.88)
Truancy[g]						
Never (ref)		–	–	–	–	–
1–9 times		1.26** (1.10, 1.45)	1.27** (1.10, 1.45)	1.27** (1.10, 1.45)	1.26** (1.10, 1.44)	1.26** (1.09, 1.44)
10+ times		1.38* (1.06, 1.80)	1.35* (1.03, 1.77)	1.35* (1.02, 1.78)	1.35* (1.03, 1.79)	1.35* (1.02, 1.79)
Alcohol use						
Never tried (ref)		–	–	–	–	–
Tried		1.52 (0.98, 2.37)	1.53 (1.00, 2.34)	1.52 (0.99, 2.32)	1.55* (1.02, 2.38)	1.54* (1.01, 2.36)
No binge		1.21 (0.96, 1.51)	1.19 (0.95, 1.48)	1.18 (0.95, 1.46)	1.19 (0.96, 1.47)	1.18 (0.95, 1.46)
Any binge		1.29* (1.01, 1.65)	1.27 (0.99, 1.63)	1.28 (1.00, 1.63)	1.30* (1.01, 1.66)	1.30* (1.01, 1.65)
Marijuana use						
Never tried (ref)		–	–	–	–	–
Past use >30 days		1.28* (1.00, 1.63)	1.25 (0.99, 1.59)	1.25 (0.99, 1.59)	1.24 (0.98, 1.58)	1.24 (0.97, 1.58)
Past use ≤ 30 days		1.33 (0.95, 1.87)	1.31 (0.94, 1.84)	1.30 (0.93, 1.83)	1.30 (0.93, 1.81)	1.29 (0.93, 1.80)
Wave IV						
Property crime (range 0–1)[j]		3.66** (1.99, 6.73)	3.72** (1.98, 6.99)	3.69** (1.97, 6.91)	3.75** (2.00, 7.04)	3.71** (1.98, 6.94)
Violent crime (range 0–1)[i]		11.81** (5.39, 25.88)	11.14** (5.30, 23.39)	10.83** (5.25, 22.36)	10.95** (5.26, 22.78)	10.71** (5.21, 22.01)
Drug crime (range 0–1)[j]		1.57** (1.14, 2.16)	1.55** (1.13, 2.14)	1.54** (1.12, 2.11)	1.55** (1.13, 2.13)	1.54** (1.12, 2.11)
Alcohol use						
Never tried (ref)		–	–	–	–	–
No binge		0.88 (0.67, 1.14)	0.87 (0.67, 1.13)	0.87 (0.67, 1.14)	0.86 (0.66, 1.12)	0.86 (0.66, 1.13)
Moderate binge		1.26 (1.00, 1.60)	1.25 (0.99, 1.58)	1.25 (0.99, 1.56)	1.25* (1.00, 1.56)	1.24 (1.00, 1.55)
Heavy binge		2.14** (1.69, 2.70)	2.12** (1.67, 2.69)	2.12** (1.67, 2.68)	2.11** (1.69, 2.64)	2.11** (1.69, 2.64)
Marijuana use						
Past use >1 year (ref)		–	–	–	–	–
Past use ≤ 1 year		2.36** (2.04, 2.74)	2.35** (2.03, 2.74)	2.38** (2.05, 2.76)	2.37** (2.04, 2.76)	2.39** (2.06, 2.78)
Educational Factors						

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Currently in school [b]						
Yes		0.54 * (0.31, 0.93)	0.54 * (0.31, 0.93)	0.55 * (0.32, 0.95)	0.55 * (0.33, 0.94)	0.56 * (0.33, 0.96)
No (ref)		–	–	–	–	–
School connectedness [g]						
1.0–2.0 (ref)		–	–	–	–	–
2.1–3.0		1.26 (0.82, 1.96)	1.26 (0.81, 1.94)	1.26 (0.81, 1.96)	1.25 (0.81, 1.93)	1.25 (0.81, 1.93)
3.1–4.0		1.23 (0.78, 1.94)	1.23 (0.77, 1.94)	1.22 (0.76, 1.94)	1.21 (0.76, 1.92)	1.20 (0.76, 1.91)
4.1–5.0		1.07 (0.65, 1.76)	1.08 (0.65, 1.80)	1.07 (0.65, 1.78)	1.08 (0.65, 1.79)	1.07 (0.64, 1.76)
Educational attainment						
Less than high school		3.50 ** (2.48, 4.92)	3.71 ** (2.74, 5.01)	3.67 ** (2.70, 4.98)	3.66 ** (2.71, 4.94)	3.65 ** (2.69, 4.96)
High school graduate		2.69 ** (2.27, 3.19)	2.79 ** (2.27, 3.41)	2.76 ** (2.27, 3.35)	2.76 ** (2.26, 3.37)	2.76 ** (2.27, 3.35)
Some college		2.06 ** (1.58, 2.67)	2.07 ** (1.67, 2.57)	2.06 ** (1.65, 2.56)	2.06 ** (1.65, 2.56)	2.05 ** (1.64, 2.57)
College graduate (ref)		–	–	–	–	–
Home characteristics						
Any parental interview						
Yes (ref)						
No			0.94 (0.65, 1.36)	0.95 (0.65, 1.38)	0.98 (0.67, 1.44)	0.99 (0.68, 1.45)
Adults in home [k]						
One			1.13 (0.89, 1.45)	1.13 (0.88, 1.45)	1.12 (0.89, 1.42)	1.12 (0.88, 1.42)
Two (ref)			–	–	–	–
Parent education level [k]						
Less than high school			0.80 (0.55, 1.17)	0.80 (0.55, 1.17)	0.78 (0.54, 1.14)	0.78 (0.54, 1.15)
High school graduate			0.99 (0.76, 1.30)	1.01 (0.78, 1.32)	0.99 (0.75, 1.29)	1.00 (0.77, 1.30)
Some college			1.21 (0.97, 1.50)	1.21 (0.97, 1.51)	1.18 (0.95, 1.47)	1.19 (0.95, 1.48)
College graduate (ref)			–	–	–	–
Household income [k]						
>20 K			0.90 (0.71, 1.13)	0.89 (0.70, 1.12)	0.86 (0.66, 1.10)	0.86 (0.66, 1.11)
20–39 K			0.82 (0.60, 1.12)	0.80 (0.59, 1.10)	0.79 (0.57, 1.08)	0.78 (0.56, 1.07)
40–59 K			0.92 (0.68, 1.24)	0.91 (0.68, 1.22)	0.90 (0.67, 1.21)	0.89 (0.67, 1.19)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
60–79 K			1.14 (0.72, 1.78)	1.13 (0.73, 1.76)	1.11 (0.71, 1.73)	1.11 (0.72, 1.71)
80 K+ (ref)					—	—
Refused			0.74* (0.55, 0.98)	0.73* (0.55, 0.96)	0.71* (0.54, 0.95)	0.71* (0.53, 0.94)
Relationship with child[k]						
Weak (1.0–4.0)			1.26** (1.09, 1.46)	1.26** (1.09, 1.45)	1.27** (1.11, 1.46)	1.27** (1.11, 1.45)
Strong (>4.0) (ref)				—	—	—
School characteristics						
Type						
Public (ref)				—		—
Choice/magnet				1.26* (1.01, 1.55)		1.23* (1.02, 1.49)
Vocational/trade				1.06 (0.70, 1.60)		1.04 (0.70, 1.54)
Private				1.22 (0.90, 1.66)		1.18 (0.88, 1.59)
Size						
Small (ref)				—		—
Medium				0.95 (0.74, 1.21)		0.98 (0.79, 1.23)
Large				1.00 (0.72, 1.39)		1.05 (0.77, 1.43)
Average daily attendance						
95 %+ (ref)				—		—
90–94 %				0.85 (0.69, 1.05)		0.88 (0.73, 1.07)
85–89 %				1.36 (0.98, 1.88)		1.23 (0.90, 1.68)
80–84 %				1.25 (0.82, 1.90)		1.09 (0.66, 1.78)
75–79 %				1.65** (1.26, 2.16)		1.63** (1.22, 2.17)
Number of school services (range 0–18)[l]				0.99 (0.96, 1.02)		0.99 (0.96, 1.02)
Suspension policy (range 0–1)[m]				0.81 (0.44, 1.47)		0.76 (0.45, 1.29)
Community characteristics						
Crime rate (per 100,000 population)[n]					1.00 (1.00, 1.00)	1.00 (1.00, 1.00)
Family poverty rate[o]					1.34 (0.47, 3.82)	1.11 (0.42, 2.96)

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	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Unemployment rate [o]					0.32 (0.03, 3.52)	0.44 (0.05, 3.89)
Vacant housing [o]					2.18 (0.77, 6.20)	2.17 (0.74, 6.36)
Proportion white [o]					0.42** (0.26, 0.69)	0.44** (0.28, 0.71)

Data from the National Longitudinal Study of Adolescent to Adult Health

h Average of five items ("Appendix 1")

[a] Multilevel weighted logistic regression models calculated for the sample with no missing data on any variables of interest ($n = 12{,}752$)

[b] At wave I

[c] Average of seven items ("Appendix 1")

[d] Average of eight items ("Appendix 1")

[e] Measured using one item ("Appendix 1")

[f] Average of three items, including lying to parents and running away from home ("Appendix 1")

[g] Among youths currently in school

[i] Average of five items ("Appendix 1")

[j] Measured using one item ("Appendix 1")

[k] Among youths with a parental interview

[l] Sum of the number of 18 services provided "on school premises"

[m] Average of the number of first-time offenses that resulted in an "out of school suspension" or "expulsion"

[n] Measured at the county level

[o] Measured at the census bock level

*
$p < 0.05$

**
$p < 0.01$