

Race and risk behaviors: The mediating role of school bonding



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ABSTRACT

This study tests the hypotheses that school bonding mediates the relationship between adolescents' racial background and key risk behaviors (substance use, failing grades, and fighting). Data sources include an epidemiological survey administered at 50 urban schools to 16,169 students, linked to information about school context (socioeconomic composition, attendance rate, and grade-level). Results indicate that school bonding partially mediates the relationship between race and risk behavior. Findings suggest that culturally responsive efforts to strengthen educational attachment, connection, commitment, and involvement among youth of color may reduce gaps in outcomes that are perceived to be distal from schooling. Further development and testing of multi-level interventions that increase school bonding among youth from non-dominant racial groups are needed.

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1. Introduction

Racial inequities in education are again prominent in the public eye, with renewed attention to the differential experiences of students of color in public schools. The recently passed *Every Student Succeeds Act* (2015), which replaces *No Child Left Behind*, highlights the need to close racial gaps in test scores and school quality. For the first time, federal education policy requires states to include and disaggregate at least one “non-academic” indicator, such as climate or engagement, in their school performance frameworks. This continued emphasis of educational policy on reducing differential outcomes between White students and their peers of color reflects long-standing evidence that among the most profound disparities in adolescent developmental outcomes are those associated with racial status. Although economic disadvantage, inequitable distribution of school funding, and unequal access to healthcare explain some racial differences in behavioral health and academic achievement, disparities persist after accounting for these factors (Anyon, Ong, & Whitaker, 2014; Grubb, 2009; Lin & Harris, 2008; Priest et al., 2013). For example, quantitative measures of socioeconomic status fail to explain between 45% and 60% of the Black-White differences in test scores, and 20% of the White-Latino difference (Grubb, 2009). This unexplained variance has theoretically and empirically been linked to historical and contemporary structural racism, discrimination, and implicit bias; so much so that education leaders have argued that the term “achievement gap” should be reconceptualized as an “education debt” (Ladson-Billings, 2006; Lewis, James, Hancock, & Hill-Jackson, 2008).

Although structural inequalities often appear intractable, promising interventions for minimizing disparities in adolescents' developmental outcomes have targeted the relationships between youth of color and educational institutions (Yeager, Walton, & Cohen, 2013). This work is supported by evidence of the role of school bonding in the reduction of risk behaviors across multiple behavioral and academic domains (Catalano, Oesterle, Fleming, & Hawkins, 2004; Monahan, Oesterle, Rhew, & Hawkins, 2014). There is strong evidence that school bonding is a general protective factor for all youth, but few studies have provided empirical support for claims that positive social bonds to school mediate racial group differences in problem behavior. We do not know whether underlying racial differences in school bonding partially account for racial disparities in risk behaviors. The breadth of research and theory indicating differential expectations and treatment of students of color in the American educational system warrants a consideration of the relationships between race, school bonding, and risk behaviors.

Bingham and Okagaki (2012) use the concepts of cultural discontinuity and ecologies to explain why students of color may report weaker attachment, commitment, involvement, and connection to school. Cultural ecology refers to the degree to which a school is perceived as discriminatory by different sub-groups, whereas the concept of cultural discontinuity captures differences in the implicit norms and expectations of educators and students from oppressed groups (Bingham & Okagaki, 2012). Evidence of hostile cultural ecologies and substantive cultural discontinuities may be a powerful mechanism driving racial disparities in school bonding and risk behaviors among school-age adolescents. An extensive body of observational, experimental, and qualitative studies have documented biased perceptions, differential treatment, and disparate experiences in schools based on student racial background (e.g. Chang & Sue, 2003; Ferguson, 2001; Mattison & Aber, 2007; Neal, McCray, Webb-Johnson, & Bridgest, 2003; Okonofua &

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Eberhardt, 2015; Valenzuela, 1999). Black and Latino students are more likely to be the victims of the well-documented problem of lower teacher expectations, which can lead to disengagement and disconnection from school (Ferguson, 2001; Tenenbaum & Ruck, 2007; Tyler & Boelter, 2008; Weinstein, 2002). The psychological concept of stereotype threat helps clarify how these biases lead to racial disparities in academic and behavioral outcomes, as individuals in stereotyped groups perform poorly, or withdraw from an activity, if a negative stereotype is triggered by some action or word (Steele, 2010).

Likewise, cultural mismatches between students, teachers, and administrators likely reduce school bonding and increase the likelihood that students will be pushed out of school (Deschenes, Cuban, & Tyack, 2001). Examples of discontinuity include culturally unresponsive instruction, disagreements regarding appropriate behavior and consequences in school, and misunderstandings due to different norms around communication (Downey & Pribesh, 2004; Lau et al., 2004; Monroe, 2006). These mismatches between students and school staff can lead to disengagement and disruptive or defiant behaviors that increase students' risk for exclusionary discipline consequences, academic failure, and delinquency (Fabelo et al., 2011; Gregory, Skiba, & Noguera, 2010).

Drawing on this literature indicating that racially hostile cultural ecologies and discontinuities may lead to racial gaps in achievement and healthy behavior, this study tests the hypotheses that 1) there are racial differences in school bonding and risk behaviors 2) school bonding mediates the relationship between student racial background and risk behaviors, and 3) the degree of mediation depends on the racial group and risk behavior of interest.

2. Theoretical framework

2.1. Social development model

The social development model (SDM) outlines how multilevel risk and protective factors work together to influence behavior across the lifespan (Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996) (see Fig. 1). The SDM incorporates theories of social control (Hirschi, 1969), differential association (Matsueda, 1982), and social learning (Bandura, 1973) to conceptualize the relationships between learned behaviors, social influences, personal factors, and outcomes in adolescence (Hawkins & Weis, 1985). It specifies a pathway from individual characteristics to healthy behaviors that has multiple mediators: 1) opportunities, skills, and recognition; 2) bonding to prosocial institutions; and, 3) healthy beliefs and clear standards. Empirical evidence provides strong support for this approach to predicting young people's developmental pathways. For example, prosocial bonds directly impact youths' likelihood to engage in risk behaviors (Catalano et al., 1996; Hawkins et al., 1997), and indirectly effect individual academic and social skills (Williams, Ayer, Abbot, Hawkins, & Catalano, 1999). The current study examines whether one form of bonding to prosocial institutions (schools) mediates the direct effect of individual characteristics (race) on health behaviors (academic failure, delinquency and substance use).

3. Literature review

3.1. School bonding

There is now considerable research indicating that when youth are invested in their education and view school as a positive force in their life, they are less likely to engage in problem behaviors (Cernkovich & Giordano, 1992; Payne, 2008). The relationship between students and schools has been conceptualized in a variety of ways, with terminology such as school bonding, engagement, connectedness, and climate. These terms are often used interchangeably and measured similarly by researchers. For example, school bonding and engagement both have behavioral and affective components (Finn & Voelkl, 1993) and are

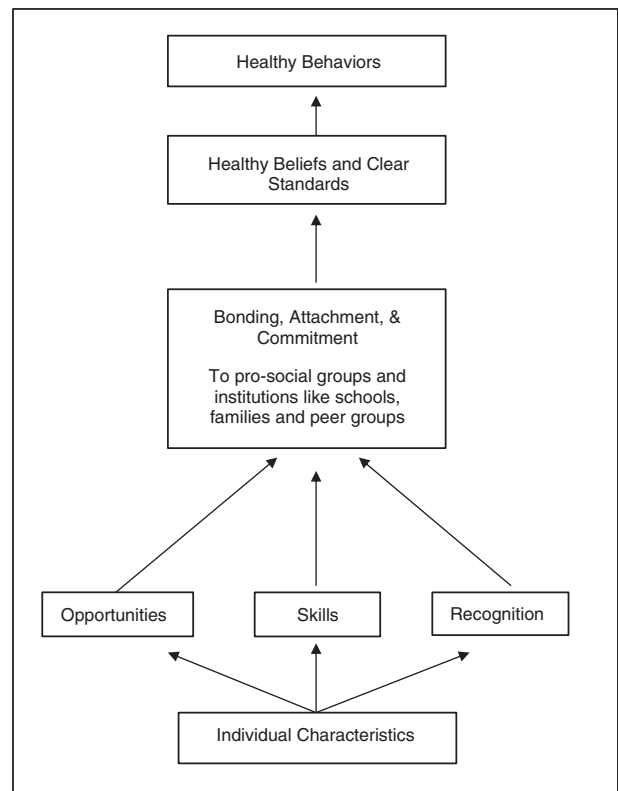


Fig. 1. The social development model.
Created from Hawkins and Weis (1985).

assessed using parallel indicators, such as homework completion (Libbey, 2004). Regardless of how the concept is named or operationalized, there is strong evidence that students' relationships to school are powerful influences on their health behaviors.

This manuscript will employ the construct of school bonding as it is aligned with the SDM, our theoretical framework. The four most recognized dimensions of school bonding are attachment to school, connection to school personnel, educational commitment, and school involvement (Catalano et al., 2004; Cernkovich & Giordano, 1992; Maddox & Prinz, 2003). Attachment to school refers to the degree that students feel positively about school overall. It is captured by feelings such as pride in one's school, a general sense of enjoyment about school, or the sense that school and classes are meaningful. Connection to school personnel involves students' affective relationships to teachers and other school adults. This could manifest in students' respect and admiration for school personnel, or their perception that teachers or administrators care about and encourage them. Educational commitment references students' willingness to prioritize school activities over others, both during-and after school. Finally, school involvement reflects *how often* students engage in school activities.

Generally speaking, as a young person's sense of school bonding increases, their likelihood of engaging in problem behaviors decreases. For example, youth who report a positive school bonds are at lower risk for using or abusing alcohol, tobacco, and marijuana before the age of 21 (Catalano et al., 2004; Eggert, Thompson, Herting, Nicholas, & Dicker, 1994; Monahan et al., 2014; Simons-Morton, Crump, Haynie, & Saylor, 1999; Williams et al., 1999). These results are echoed in systematic reviews of the influence of the school environment on adolescents' substance use, which found that school-level interventions (e.g. student-teacher relationships and school policies) can reduce students' substance use (Bonell et al., 2013; Fletcher, Bonell, & Hargreaves, 2008).

School bonding is also negatively associated with externalizing behaviors like juvenile delinquency and crime, internalizing behaviors such as depressive symptoms, and risk taking behaviors that can cause

self-harm, such as unsafe sexual practices (Catalano et al., 2004; Monahan et al., 2014; Wade & Brannigan, 1998). Similar constructs like teacher support, overall connectedness, and school happiness have a direct effect on students' emotional wellbeing (Kidger, Araya, Donovan, & Gunnell, 2011). Moreover, school bonding is positively associated with academic performance (GPA) and teachers' perceptions of student achievement (Bryan et al., 2012; Catalano et al., 2004; Murray & Greenberg, 2000; Williams et al., 1999). Finally, school bonding has indirect effects on other youth development outcomes. For example, school bonding mediates the relationship between family influence and adolescent substance use, delinquency and other problem behaviors (Maddox & Prinz, 2003).

3.2. Race, school bonding and risk behaviors

School bonding has been emphasized by the SDM scholars as a key malleable factor for targeting interventions (Catalano et al., 2004). Although there is a large body of research demonstrating the direct effects of school bonding on youth risk behaviors, less is known about its potential role in racial disparities in negative developmental outcomes. The authors are not aware of existing studies that have considered whether school bonding mediates the relationship between students' racial backgrounds and their likelihood of engaging in problem behaviors. However, several studies have found racial differences in both school bonding and risk behaviors, suggesting that it could be an underlying mechanism of disparities.

3.3. Racial group differences in school bonding

Racial inequities in schools are intertwined with racial differences in school bonding. Structural racism, stereotypes and low expectations all contribute to school environments that inhibit school bonding among students of color. A few studies have considered whether there are racial differences in school bonding, but findings have not been consistent. In three studies, youth of color were less likely than their White peers to report a sense of connectedness or attachment to school (Bottiani, Bradshaw, & Mendelson, 2016; Peguero, Ovink, & Li, 2015; Voight, Hanson, O'Malley, & Adekanye, 2015). However, other researchers have found that Black students report similar or higher levels of school bonding than White youth, regardless of the racial composition of their schools and despite their lower levels of academic achievement (Cernkovich & Giordano, 1992; Wallace & Muroff, 2002). Although there are conflicting results regarding the nature and direction of racial differences in school bonding, scholars have also hypothesized that the relationship between school bonding and delinquency may be moderated by race. In one study, school experiences were found to be more strongly associated with substance using behavior for White students than for Black students (Wallace & Muroff, 2002). Crosnoe, Johnson, and Elder (2004) found that Latina girls benefited most from teacher bonding with regard to academic performance, more so than boys and White students. However, when teacher bonding was used as a predictor of school discipline outcomes, they found that the effect was strongest for White females (Crosnoe et al., 2004). Another study documented that race moderates the relationship between school bonding and math achievement (Sciarra & Seirup, 2008). Taken together, this body of research suggests that racial disparities in school bonding do exist, but the nature and direction of these differences is not consistent across studies or youth of different racial backgrounds.

3.4. Racial group differences in risk behaviors

Another body of research has consistently documented racial disparities in risk behaviors such as failing grades, substance use, and violent or delinquent behavior using epidemiological datasets. Results tend to mirror broader patterns of inequality; they reflect oppressive cultural and contextual factors on human behavior. Some research indicates

that youth from certain racial groups are more likely to engage in externalizing behaviors such as fighting, while others are more likely to engage in behaviors that are detrimental to the self, such as alcohol and substance use, because of their social location (Cernkovich & Giordano, 1992). For example, one study found Black and Latino youth were more likely than White and Asian youth to repeat a grade, be suspended or expelled, have lower GPAs, and engage in aggressive delinquent behavior (Choi & Lahey, 2006). Similarly, Grunbaum, Lowry, Kann, and Patemont (2000) found Black and Latino youth were more likely to report carrying a weapon and participating in a physical fight than their White and Asian counterparts. This finding was replicated in a different study using the same measures: Asian and White youth reported lower risk behaviors than their peers of other racial backgrounds (Removed for review, 2014). Finally, White and Asian students have historically been more likely than their Black and Latino counterparts to graduate high school (Kao & Thompson, 2003).

4. Study aims

Beyond this preliminary understanding of the ways in which race is related to school bonding and problem behaviors, no studies have considered whether school bonding mediates the relationship between race and risk behaviors. Such evidence would bolster claims that interventions to improve students' relationships with their school have the potential to disrupt disparities in behavioral health and academic achievement. The current study aims to address this gap by using secondary data from an epidemiological survey (Colorado Healthy Kids Survey), which consists of a unique large sample of urban middle and high school students ($n = 16,863$) to understand 1) Are there racial differences in school bonding and risk behaviors? 2) Does school bonding mediate the relationship between race and student risk behaviors? And 3) Does the strength of mediation vary by student racial group?

5. Methods

5.1. Study population

This secondary data analysis of an epidemiological survey (Colorado Healthy Kids Survey) considered results from student surveys administered to middle and high school students at 50 urban schools in the spring of 2011 ($n = 16,863$). Native American ($n = 206$) and Pacific Islander ($n = 83$) youth were dropped from the sample due to small numbers and low power to detect differences. The final sample ($n = 16,574$) was 55% Latino, 21% White, 13% Black, 7% Multiracial, and 4% Asian (Table 1).

The survey sample was compared to the general student population in grades 6–12 ($N = 41,873$) enrolled in this district using simple t-tests of proportion. Table 1 illustrates that there were statistically significant differences on nearly all demographic variables. Female, 7th graders, and 8th graders were overrepresented in the survey sample, whereas male and 12th grade students were underrepresented. Additionally, White and Multiracial youth were overrepresented in the sample of survey respondents, whereas Black and Latino students were underrepresented.

These patterns may partially be due to differences in how demographic data is gathered in the survey compared to district administrative data. In the case of the survey, students self-reported their racial background, whereas district data is based on parent report. Some students may identify with a different racial group than how their parents classify them, particularly among students who are multiracial. Similarly, data on English Language Learners is based on district testing, whereas students self-report the language they speak at home on the survey. It is also possible that Black and Latino students were disproportionately absent from school on the day of survey administration given their overrepresentation in out-of-school suspensions and lower attendance rates in this school district.

Table 1
Sample characteristics of students (pre-imputation).

Student demographics	All secondary school students (N = 41, 873)	Survey sample (n = 16, 574)
	(%)	(%)
Asian	3.60	3.91
Black	16.26	13.41***
Latino	58.17	54.48***
White	19.00	21.41***
Multiracial	2.97	6.79***
Boys	49.18	47.86**
Girls	50.82	52.14**
6th grade	16.21	15.83
7th grade	14.73	16.12***
8th grade	14.02	17.29***
9th grade	15.10	15.72*
10th grade	13.55	14.32*
11th grade	11.50	11.48
12th grade	14.90	9.24***
English speaker	55.97	64.9***
Another language	44.03	35.51***
Free and reduced lunch (FRL) students	72.25	68.54***
Alternatively configured school students	22.18	23.77***
High school students	47.44	36.94***
Middle school students	30.14	39.29***
Mean attendance	89.03	90.72***

All descriptive statistics reported are based on the original dataset, prior to multiple imputation.

* p < 0.05.

** p < 0.01.

*** p < 0.001 based on a two-sample test of proportions.

5.2. Measures

All measures come from the Colorado Healthy Kids Survey (HKCS), designed to gather information related to adolescent health attitudes and behaviors. As part of the Youth Risk Behavior Surveillance System, a Centers for Disease Control and Prevention program, this survey is administered to randomly selected schools in Colorado every other year. It contains questions from the Communities That Care (CTC) survey as well as the Youth Risk Behavior Survey (YRBS). The instrument assesses risk and protective factors in the following domains: physical activity, nutrition and health; alcohol, tobacco, and other substance use; personal safety, unintentional injuries and violence; mental health; sexual health; and school family and future aspirations (Colorado Department of Education & Coalition for Healthy Schools, 2011).

5.3. Independent variables

5.3.1. Race and ethnicity

The following items from the HKCS were used to classify student race: "What is your race? (Select one or more responses)" Responses included: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White. Additionally, respondents were asked, "Are you Hispanic or Latino?" Responses to this question were Yes and No. For the purpose of this study, each racial category was recoded into dummy variables. The Multiracial dummy variable included students who marked multiple racial categories.

5.4. Mediator variable

5.4.1. School bonding

School bonding was captured using a composite measure created by the Social Development Research Group, developed to be aligned with the SDM. This measure is comprised of the following seven items capturing how relevant, meaningful, and enjoyable school was to respondents: "During the last four weeks how many whole days of school

have you missed because you skipped or "cut"?" Responses to this item included none, 1 day, 2 days, 3 days, 4 to 5 days, 6 to 10 days, and 11 or more days. "How often do you feel that the school work you are assigned is meaningful and important?" Responses to this item include never, seldom, sometimes, often, and almost always. "How interesting are most of your courses to you?" Responses to this item include very interesting and stimulating, quite interesting, fairly interesting, slightly boring, and very boring. "How important do you think the things you are learning in school are going to be for you later in life?" Responses to this item included very important, quite important, fairly important, slightly important, and not at all important. "Now thinking back over the past year in school, how often did you enjoy being in school?" Responses to this item included never, seldom, sometimes, often, and almost always. "Now thinking back over the past year in school, how often did you hate being in school?" Responses to this item included never, seldom, sometimes, often, and almost always. "Now thinking back over the past year in school, how often did you try to do your best work in school?" Responses to this item included never, seldom, sometimes, often, and almost always. Items were coded so that positive responses had higher values (the measure captured school bonding as a protective factor, rather than as a risk factor), and were then averaged to create the composite measure of school bonding, with higher scores indicating greater school bonding.

5.5. Dependent variables

Risk behaviors that are often the target of school-based interventions and community-based youth services were the dependent variables in these analyses. Specific behaviors included failing grades, fighting, cigarette smoking, alcohol use, and marijuana use. These risk behaviors are widely used in empirical literature on adolescent risk for negative health, social, and developmental outcomes. The following items from the HKCS were used to assess these risk factors, recoded into binary outcomes due to their highly skewed distribution (0 = absence of risk factor, 1 = presence of risk factor):

5.5.1. Failing grades

To determine whether students had earned failing grades in school, students were asked, "During the past 12 months, how would you describe your grades in school?" Responses to this item included mostly A's, mostly B's, mostly C's, mostly D's, mostly F's, none of these grades, and not sure.

5.5.2. Fighting

To assess whether a student had engaged in violence, they were asked, "During the past 12 months how many times were you in a physical fight?" Responses to this question included 0 times, 1 time, 2 or 3 times, 4 or 5 times, 6 or 7 times, 8 or 9 times, 10 or 11 times, and 12 or more times.

5.5.3. Cigarette smoking

To assess whether a student had engaged in tobacco use, students were asked, "During the past 30 days, on how many days did you smoke cigarettes?" Responses to this item included 0 days, 1 or 2 days, 3 to 5 days, 6 to 9 days, 10 to 19 days, 20 to 29 days, and all 30 days.

5.5.4. Alcohol use

To assess whether a student had used alcohol, students were asked, "During the past 30 days, on how many days did you have at least one drink of alcohol?" Responses to this item included 0 days, 1 or 2 days, 3 to 5 days, 6 to 9 days, 10 to 19 days, 20 to 29 days, and all 30 days.

5.5.5. Marijuana use

To assess whether a student had used marijuana, students were asked, "During the last 30 days, how many times did you use

marijuana?” Responses to this item included 0 times, 1 or 2 times, 3 to 9 times, 10 to 19 times, 20 to 39 times, and 40 or more times.

5.6. Student-level covariates

The following items from the HKCS were used as covariates in accordance with the literature: sex, grade-level, and native language.

5.6.1. Grade-level

To determine grade level, students were asked, “In what grade are you?” Responses included: 6th grade, 7th grade, 8th grade, 9th grade, 10th grade, 11th grade, 12th grade, and ungraded or other grade. No students selected ungraded or other grade, so the measure was retained as continuous.

5.6.2. Sex

In order to classify student's gender, students were asked, “What is your sex?” and responses included female or male. The item was recoded so that a one indicated male sex.

5.6.3. Native language

To establish students' native language, students were asked “What is the language you use most often at home?” Responses included, English, Spanish, and another language. Responses were recoded into a dummy variable in which a one equaled being a non-Native speaker of English.

5.7. School-level covariates

In addition to the student-level control variables, administrative data from the school district was used to construct the following measures: racial composition, grade configuration, and attendance rate.

5.7.1. Racial composition

Racial segregation is consistently related to academic and behavioral outcomes (e.g. Arcia, 2007; Payne & Welch, 2010; Skiba et al., 2014). In this study, racial composition was operationalized as the percent of a school's student body that was Black, Latino, or Multiracial.

5.7.2. Grade configuration

Schools were classified as high, middle, and alternatively configured (e.g. K-8 or K-12), with middle schools as the reference group because of evidence that students relationships to school declines most dramatically at the middle grade levels (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006).

5.7.3. Attendance rate

A variable for the overall attendance rate of each school because of the link between truancy and school bonding (Simons-Morton et al., 1999).

6. Analytic strategy

6.1. Multilevel logistic regression

Using the approach outlined by Baron and Kenny (1986) to establish mediation, we conducted a series of multilevel regression models (students nested within schools) to estimate relationships between school bonding and race (Path a), school bonding and risk behaviors (Path b) and risk behaviors and race (Path c). Although there are more sophisticated statistical tools for mediation analyses, such as structural equation modeling (Imai, Keele, & Yamamoto, 2010; MacKinnon, Fritz, Williams, & Lockwood, 2007), they cannot yet estimate models of categorical independent variables and binary dependent variables. As a result, other studies that have used structural equation modeling to assess mediators between racial background and youth outcomes have collapsed all racial groups into two categories (e.g. White vs. All Others). This practice

is problematic given the unique cultural and contextual factors faced by members of different sub-groups in terms of schooling experiences and engagement in risk behaviors (Anyon et al., 2013; Anyon et al., 2014; Anyon, Whitaker, Shields, & Franks, 2013; Anyon, Zhang, & Hazel, 2016). For example, in this study, we anticipate that the degree of mediation between school bonding and risk behaviors will not be the same for each racial group. Similarly, the use of a categorical independent variable precludes us from calculating the statistical significance of indirect effects, as the Sobel (1986) test is based on parameter estimates for one continuous or binary independent variable. As such, this manuscript focuses on the magnitude of observed changes in effects rather than statistical significance (Kline, 2004).

7. Results

7.1. Racial differences in school bonding and risk behaviors

In Path A of the model, the relationship between the independent variable (race) and the hypothesized mediator (school bonding) were assessed using bivariate correlations. As indicated in Table 2, a significant relationship between race and school bonding was observed for Black, Multiracial, and Latino students. Each of these groups reported significantly lower school bonding than White students, whereas Asian students reported higher school bonding, thus establishing the first criteria for mediation. Bivariate correlations were also used to test Path B, the relationship between the dependent variable (risk behaviors) and the mediator (school bonding). School bonding had significant correlations with each of the risk behaviors establishing the second criteria for mediation. See Table 2 for details of these analyses.

7.2. School bonding as a mediator of racial disparities

To establish the final criteria for mediation, Path C (the direct effect of the independent variable on the dependent variable) was assessed through a series of multilevel logistic regression models whereby race was regressed on each of the risk behaviors (academic failure, fighting, cigarette use, alcohol use, & marijuana use). Then, the impact of school bonding on each of these relationships was tested by including school bonding in the second iteration of each of the regression models. In order to satisfy the final condition for mediation, the relationship between race and the risk behavior must be attenuated in the second model with the mediator included (Baron & Kenny, 1986). Results of these regressions are presented in Tables 3 and 4. Table 3 displays the regressions pertaining to fighting and academic performance and Table 4 displays regressions pertaining to three types of substance use. Overall, the effect of student racial background on each risk behavior was reduced after accounting for school bonding, indicating partial mediation. However, there were differences in the degree of mediation, depending on the type of risk behavior and racial group of interest.

7.2.1. Failing grades & fighting

Models 1 and 2 in Table 3 present the results of regressions assessing the relationship between failing grades and race. Evidence of mediation was observed for Black, Latino, and Multiracial students. The most substantial decrease in effect was observed with regard to failing grades for Multiracial youth with a decrease of 11.94%. A similar pattern was observed when fighting was regressed over each of the racial categories (Models 3 and 4 of Table 3). Results indicate that for Black, Multiracial, and Latino students, school bonding partially mediated the effect of race on fighting to varying degrees. The strongest evidence of mediation was observed for Latino students, in which the addition of the school bonding variable led to a 17.40% decrease in the association between race and fighting.

Table 2
The relationship between race, school bonding (mediator), and risk behaviors. (n = 16, 574).

	School bonding	Failing grades	Cigarette use	Alcohol use	Marijuana use	Fighting
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
Race (ref group = White)						
Asian	0.07 (0.31)*	0.14 (0.12)	−0.47 (0.19)*	−0.54 (0.11)***	−0.36 (0.13)**	−0.33 (0.11)***
Black	−0.11 (0.02)***	0.92 (0.07)***	0.08 (0.10)	−0.23 (0.06)***	0.49 (0.07)***	0.59 (0.06)***
Multiracial	−0.16 (0.03)***	0.64 (0.08)***	0.35 (0.11)**	0.20 (0.07)**	0.55 (0.08)***	0.65 (0.08)***
Latino	−0.11 (0.02)***	0.70 (0.06)***	0.32 (0.08)***	0.26 (0.05)***	0.34 (0.06)**	0.36 (0.05)***
School bonding	−	−0.58 (0.03)***	−0.94 (0.04)***	−0.67 (0.03)***	−0.84 (0.03)***	−0.76 (0.03)***

* p < 0.05.
** p < 0.01.
*** p < 0.001.

7.2.2. Substance use

Table 4 presents the regression models first estimating the relationship between race and use of each substance (cigarettes, alcohol, & marijuana), then adding school bonding in the second regression. For example, Models 5 and 6 display results pertaining to cigarette use. Findings indicate that there is evidence of mediation for all racial groups and all types of substance use. The magnitude of the mediation of school bonding between race and substance use was larger for alcohol and cigarettes than marijuana.

8. Discussion

Compared to White and Asian students, Black, Latino, and Multiracial youth in this study more often reported failing grades, substance use, and violent behavior. This finding parallels the results from other analyses of racial differences in risk behaviors, which generally find that youth of color disproportionately experience negative outcomes related to academics and behavioral health overall (Choi & Lahey, 2006; Grunbaum et al., 2000; Kao & Thompson, 2003; Lee & Rotheram-Borus, 2009; Removed for review, 2014). Theoretical approaches such as the SDM suggest these patterns reflect the disadvantaged social locations of Black, Latino and Multiracial youth relative to White and Asian adolescents (Hawkins & Weis, 1985). In particular, SDM highlights the ways in which the lives of

young people are shaped by their attachment, connection, and commitment to educational institutions (Catalano et al., 2004; Cernkovich & Giordano, 1992; Maddox & Prinz, 2003). Indeed, recent scholarship indicates that youth of color report lower levels of school attachment, commitment, and involvement than their more privileged counterparts (Bottiani et al., 2016; Peguero et al., 2015; Anyon et al., 2016; Sciarra & Seirup, 2008; Voight et al., 2015). Findings from this study replicate these trends, as Black, Latino, and Multiracial youth reported lower school bonding than White or Asian students. Our mediation model links these two bodies of research together, proposing that disparities in school bonding partially explain racial differences in risk behaviors.

Results indicate that school bonding partially mediated the relationship between race and risk behaviors among Black, Latino, and Multiracial student. This finding suggests that improving school bonding among these student groups may minimize racial disparities in developmental outcomes. However, the pattern of mediation for Asian students was much less robust. Few statistically significant differences between White and Asian students persisted in the regression analyses controlling for grade, gender, and school composition. In other words, there were no longer substantial race effects for school bonding to mediate among Asian youth. In terms of types of risk behaviors, the strongest evidence of school bonding as a mediator was observed with regard to substance use, especially alcohol and cigarette use. The strength of this finding may be due to a bidirectional relationship between substance use and school bonding, as students who abuse alcohol also

Table 3
School bonding as a mediator of student risk behaviors: failing grades and fighting. (n = 16,574).

Model	Failing grades			Fighting		
	b (SE)		% change	b (SE)		% change
	(1)	(2)		(3)	(4)	
Independent variables						
Race (ref group = White)						
Asian	0.15 (0.12)	0.18 (0.12)	20.00	−0.19 (0.11) ⁺	−0.15 (0.12)	21.10
Black	0.93 (0.07)***	0.89 (0.07)***	4.30	0.61 (0.06)***	0.56 (0.07)***	8.20
Multiracial	0.67 (0.09)***	0.59 (0.09)***	11.94	0.70 (0.08)***	0.62 (0.08)***	11.43
Latino	0.69 (0.07)***	0.63 (0.07)***	8.70	0.46 (0.06)***	0.38 (0.06)**	17.40
Student-level covariates						
Sex (ref group = female)	0.30 (0.04)***	0.26 (0.04)***		0.62 (0.03)***	0.60 (0.04)***	
Grade	−0.14 (0.02)***	−0.19 (0.02)***		−0.11 (0.01)***	−0.17 (0.02)***	
Non-native speaker of English	0.06 (0.05)	0.11 (0.05)*		−0.19 (0.04)***	−0.14 (0.04)**	
School-level covariates						
Free and reduced lunch	0.95 (0.33)**	0.91 (0.33)**		0.43 (0.18)*	0.37 (0.16)*	
High school (ref group = middle)	0.14 (0.22)	0.17 (0.22)		−0.04 (0.12)	0.01 (0.10)	
Alternative grade configured school (ref group = middle)	−0.13 (0.16)	−0.14 (0.16)		0.06 (0.09)	0.04 (0.08)	
Attendance rate	−2.59 (1.47)	−2.27 (1.49)		−3.40 (0.92)***	−3.26 (0.88)***	
Mediator variable						
School bonding		−0.60 (0.03)***			−0.77 (0.03)***	

⁺ p < 0.10.
* p < 0.05.
** p < 0.01.
*** p < 0.001.

Table 4
The mediating effect of school bonding on student risk behaviors: substance use. (n = 16,574).

Model	Cigarette use			Alcohol use			Marijuana use		
	b (SE)			b (SE)			b (SE)		
	(5)	(6)	% change	(7)	(8)	% change	(9)	(10)	% change
Independent variables									
Race (ref group = White)									
Asian	-0.44 (0.19)*	-0.41 (0.20)*	6.82	-0.61 (0.11)***	-0.61 (0.11)***	0.00	-0.21 (0.14) ⁺	-0.19 (0.14)	9.52
Black	0.08 (0.10)	0.01 (0.10)	87.50	-0.23 (0.06)***	-0.30 (0.06)***	30.04	0.49 (0.07)***	0.44 (0.07)***	10.20
Multiracial	0.35 (0.11)**	0.22 (0.12)	37.14	0.19 (0.07)*	0.09 (0.08)	52.63	0.56 (0.08)***	0.46 (0.09)***	17.85
Latino	0.36 (0.09)***	0.26 (0.09)**	27.78	0.24 (0.05)***	0.16 (0.06)**	33.33	0.50 (0.06)***	0.42 (0.06)***	16.00
Student-level covariates									
Sex (ref group = female)									
	0.12 (0.05)*	0.05 (0.05)		-0.15 (0.03)***	-0.20 (0.03)***		0.22 (0.04)***	0.16 (0.04)***	
Grade	0.17 (0.02)***	0.13 (0.02)***		0.25 (0.01)***	0.22 (0.01)***		0.19 (0.02)***	0.15 (0.02)***	
English Language Learner	-0.14 (0.06)*	-0.07 (0.06)		-0.01 (0.04)	0.04 (0.04)		-0.40 (0.05)***	-0.36 (0.05)***	
School-level covariates									
Free and Reduced Lunch									
High school (ref group = middle)	0.38 (0.27)	0.28 (0.25)		0.16 (0.19)	(0.09) (0.17)		0.68 (0.28)*	0.63 (0.26)**	
Alternative grade configured school (ref group = middle)	-0.07 (0.16)	-0.05 (0.14)		-0.05 (0.12)	-0.01 (0.10)		-0.08 (0.18)	-0.04 (0.16)	
Attendance rate	0.03 (0.13)	0.02 (0.12)		0.07 (0.09)	0.06 (0.08)		-0.01 (0.13)	0.00 (0.12)	
	-7.6 (1.11)***	-7.27 (1.06)***		-1.78 (0.93)*	-1.39 (0.86) ⁺		-4.56 (1.25)***	-4.18 (1.16)***	
Mediator variable									
School Bonding									
		-0.91 (0.04)***			-0.65 (0.03)***			-0.80 (0.03)***	

⁺ p < 0.10.
* p < 0.05.
** p < 0.01.
*** p < 0.001.

tend to be truant more often and thus have fewer opportunities to strengthen their connection to school adults (Simons-Morton et al., 1999). Efforts to increase school attachment among youth of color may therefore reduce substance abuse, which could lead to improvements in school involvement and commitment, and in turn, strengthen students' overall bonding to school.

In comparison to the results about substance use, there were relatively smaller reductions in the relationship between race and fighting or failing grades once school bonding was added to the statistical models. School bonding and failing grades also had the weakest negative correlation of all the risk behaviors. This is surprising, as one would expect that school bonding would predict academic outcomes and mediate related racial disparities most strongly since it measures behaviors, attitudes, and experiences about learning and education. It may be that other factors are more powerful explanations of academic failure among youth of color than school bonding, such as low teacher expectations, differential treatment, stereotype threat, and testing bias, or racial identity development (Dotterer, McHale, & Crouter, 2009). That said, our results do replicate other research showing direct effects of school bonding on academic performance and skills (e.g. Marchant, Paulson, & Rothlisberg, 2001; Williams et al., 1999).

Potential mechanisms driving racial disparities in school bonding include issues of cultural discontinuity and cultural ecologies in schools (Bingham & Okagaki, 2012). Cultural discontinuity describes how privileged ways of being and knowing can contrast with those learned by youth of color in their families and communities. When expectations are not explicitly taught to all students, but are implicitly valued, students from non-dominant racial groups can feel as though their teachers, administrators, and school staff do not care or value them (Monroe, 2006; Morris, 2005). Students of color may therefore become

less attached and committed to school because they perceive the educational environment to be exclusionary of their group norms, values, and behaviors (Bingham & Okagaki, 2012). With respect to cultural ecologies, racial bias among educators has been substantiated in many different domains of the school environment, including, but not limited to, punitive discipline practices and academic expectations (Bingham & Okagaki, 2012; Byrd, 2015; Dotterer et al., 2009; Mattison & Aber, 2007; Smalls, White, Chavous, & Sellers, 2007). In an attempt to cope with these forms of discrimination, students of color may disengage and focus their time and energy on institutions or relationships that are perceived to be more equitable (Bingham & Okagaki, 2012). Indeed, when students of color perceive the school environment to be racially hostile, they are likely to experience poorer academic performance and discipline outcomes (Byrd, 2015; Dotterer et al., 2009; Mattison & Aber, 2007; Smalls et al., 2007).

Alternatively, it is possible that racial differences in school bonding are shaped primarily by the distribution of resources across schools, rather than issues of cultural discontinuity and ecologies within schools (Bottiani et al., 2016; Peguero et al., 2015; Voight et al., 2015). Racial disparities in school bonding may not indicate differential treatment by educators or disparate opportunities within a school, but instead the disproportionate concentration of students of color in under-resourced educational environments. In particular, school-level racial and socioeconomic composition and geographic location (urban, rural or suburban) can influence the extent to which students feel attached to educators and committed to their academic achievement (Bottiani et al., 2016; Peguero et al., 2015; Voight et al., 2015). This interpretation is not mutually exclusive from this study's focus on within-school disparities. However, the use of multi-level models that accounted for school-level variation in socioeconomic composition, size, attendance

rate, and grade configuration suggests that the observed racial differences within schools are not only driven by inequalities between sites.

9. Study limitations

The limited measurement depth and breadth in available data sources are the primary limitations of this study. Only a small number of relevant covariates were available from the Colorado Healthy Kids Survey and school district administrative datasets, which may have limited our ability to isolate the unique relationships between race, school bonding, and risk behaviors. For example, the SDM model also includes opportunities, skills and recognition as mediators between students' individual characteristics and health behaviors, but these factors were not measured in our dataset. The inclusion of other indicators of the school environment (e.g. school climate, connectedness, teacher-student relationships, etc.), would also strengthen study findings, as students' perceptions of these dimensions are strongly related to school bonding. Although some scholars consider these concepts to be interchangeable, further empirical research would help clarify the dimensions that differentiate these features of the school environment (Maddox & Prinz, 2003).

This type of study would also be strengthened by the inclusion of additional student-level demographic variables. Measures of individual socioeconomic status, such as free and reduced lunch eligibility or parent education, would be especially valuable because of the interconnectedness of race and class in American public schools. The race effects observed in this study may have been reduced if an individual indicator of socioeconomic status was included in the analyses. However, according to administrative data provided to the second author by the school district, student-level poverty is most strongly correlated with school-level poverty rates ($B = 0.51, p < 0.001$), a measure that is accounted for in our statistical models. Moreover, the correlation between individual racial background and free and reduced lunch eligibility in this district is quite small for Black ($B = 0.05, p < 0.001$), Asian ($B = -0.02, p < 0.001$), and Multiracial students ($B = -0.06, p < 0.001$). The strongest relationship between race and poverty at the student-level is for Latino youth ($B = 0.34, p < 0.001$). These relatively weak correlations between individual student racial background and socioeconomic status in this district strengthen confidence in our findings about observed race effects on risk behaviors and suggest that our results would not be substantially different with the inclusion of student-level socioeconomic status. This is not entirely true for Latinos, but the poverty rate among this racial group is partially due to the overrepresentation of English Language Learners, who are also more likely to be low-income ($B = 0.31, p < 0.001$). We do account for English proficiency (a proxy for ELL) in our models, and the direct effect is much weaker than it is for racial group membership.

Finally, due to the cross-sectional nature of this study, conclusions about causality cannot be determined. It is possible that the relationships between student racial background, school bonding, and problem behaviors function differently than the model tested in this paper. Longitudinal data and randomized trials of school bonding interventions with diverse samples are needed in to clarify the nature and direction of these effects. There are also limits to the generalizability of the study, as it was conducted within the confines of one urban location. Replication of using data from other urban school districts as well as suburban, and rural settings are needed, and are possible given the use of the Healthy Kids Survey in other locales across the country.

10. Implications for practice

Findings suggest that interventions to minimize racial disparities in school bonding may also reduce racial group differences in risk behaviors. Fortunately, there is growing evidence in support of school-based social-emotional learning (SEL) programs that improve students' attachment to school, connection to school personnel, educational

commitment, and school involvement (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Effective school-based SEL programs increase opportunities for students to learn new skills and receive feedback about competencies that are not measured by standardized tests (Durlak et al., 2011). Indeed, the SDM highlights the importance of skills, opportunities, and recognition as important mediators of school bonding (Catalano et al., 2004). However, evidence-based SEL programs rarely respond to the unique schooling contexts and challenges faced by youth from non-dominant racial backgrounds and it therefore seems unlikely they will eliminate racial gaps (Durlak et al., 2011). Interventions are needed that address issues such as cultural discontinuity and discriminatory cultural ecologies (Bingham & Okagaki, 2012; Monroe, 2006; Morris, 2005). Moreover, since school bonding is a construct that incorporates how relevant, meaningful, engaging, and enjoyable school is to students, these interventions to reduce racial gaps will likely need to be multi-level, targeting students, classrooms, and the larger school environment.

With respect to addressing cultural discontinuities, gap-reducing school bonding programs might require interventionists work with teachers and school administrators to explicate their norms and expectations about appropriate vocabulary, physical expression, and interpersonal communication styles, critically evaluate them for racial bias and privilege, and then intentionally teach them to students (Monroe, 2006; Townsend, 2000). Involving young people in the creation of school and classroom rules and decisions about course content or assignments are another promising strategy; when students have a stake in their learning community, differences in norms become less pronounced and students feel a greater bond and sense of belonging (Catalano et al., 1996; Hawkins et al., 1997; Rimm-Kaufman et al., 2014). To create more meaningful and relevant school experiences, school discipline, instructional and assessment strategies should also show respect the knowledge students develop at home and in their neighborhoods, incorporate varied materials that reflect the diversity of their student body, and involve tasks that are aligned with students' responsibilities or interests outside of the classroom (Banks & Banks, 2004).

In addition to addressing issues related to cultural discontinuity, cultural ecologies that are perceived as discriminatory by students of color must also be addressed. When youth perceive the academic environment to be racially hostile, school bonding and academic performance often suffer (Bingham & Okagaki, 2012; Mattison & Aber, 2007). There are many aspects of the school environment that students of color may perceive to be discriminatory, but discipline policies and procedures appear to be a key lever (Bingham & Okagaki, 2012; Byrd, 2015; Dotterer et al., 2009; Mattison & Aber, 2007; Smalls et al., 2007). Therefore, strategies such as consulting with school administrators and staff about ways to integrate culturally responsive behavior management approaches are critical.

Furthermore, teachers should be trained about understanding and responding to biases in their perceptions of students. When students feel as though their teachers expect less from them or hold them in a lower regard, they are more likely to disengage (Bingham & Okagaki, 2012). Encouraging teachers to reflect on their own bias may help to make implicit norms more explicit, but also illuminate when teachers have different expectations for youth of color. Providing training to teachers about ways to identify and respond to their own biases and differential expectations for students of color is essential in creating environments where students of color feel respected and challenged academically. Providing spaces for teachers and staff to engage in conversations about ways to address privilege and structural racism in schools may further help to reduce perceptions of racial hostility for students of color, subsequently improving school bonding.

Conversely, schools should also create spaces where students of color can reflect on their own biases about the value of education and their relationships with educators (Yeager et al., 2013). Encouraging students to examine their own biases and expectations about education

and academic performance helps students see how their cultural values and expectations align or differ from those of their school. Highlighting the places where values align so that this can be incorporated into their student and their racial identity, along with promoting positive associations with academic activities, and providing culturally relevant role models in the school setting are all avenues to improve school bonding for these youth (Bingham & Okagaki, 2012). Opportunities for peer among students of color should be promoted as well, as strong prosocial peer relationships and narratives that reflect positive assumptions about education increase school bonding for students of color (Abbott et al., 1998; Bingham & Okagaki, 2012).

Study results also have implications for the delivery of youth services and provider training. Findings suggest that interventions targeting adolescent risk behaviors need to attend to young people's school contexts, even when addressing problems that are perceived to be distal outcomes from schooling. All types of practitioners should receive education about the impact of malleable features of the school environment on behavioral health and educational outcomes, along with related disparities. For example, social work programs are expected to provide educational opportunities for students to think critically about how to serve diverse populations and address multi-level influences on health disparities (Council on Social Work Education, 2008). Evidence of school bonding as a mediator between student racial background and risk behaviors suggests there are institutional contributions to individual student outcomes. Such a finding supports long-standing calls for graduate programs in social work, education, and psychology to strengthen their training in mezzo-level interventions that target interactions between youth and their school environment (Adelman & Taylor, 1997; Berzin & O'Connor, 2010; Frey & Dupper, 2005; Hoagwood et al., 2007; Ringeisen, Henderson, & Hoagwood, 2003).

Finally, despite the overall reduction in risk observed for Black, Latino, and Multiracial students with the inclusion of school bonding, racial disparities in substance use, grades, and fighting persisted. Clearly, school bonding is not the only factor that must be addressed in order to eliminate these racial gaps. Until the "education debt" is fully resolved, it should be expected that race will continue to be a meaningful predictor of young people's developmental trajectories.

11. Conclusion

Racial disparities in adolescent outcomes are a persistent challenge facing the field of children and youth services. Findings that the effect of student race on these risk behaviors was partially mediated by students' self-reported attachment and commitment to school suggest that underlying racial gaps in school bonding may be related to Black, Latino and Multiracial youths' elevated risk for school failure, substance, use and delinquency. Results reinforce trends toward the increasing provision of preventive interventions for adolescents in schools. However, this study suggests a need for approaches respond to the unique experiences of cultural discontinuity and discriminatory cultural ecologies students of color often face in educational environments. In light of increasing evidence of racial differences in school bonding, priorities for future research and practice include the development and testing of new, or adapted, culturally-responsive interventions. These approaches should create opportunities for students and staff to collectively clarify and teach norms for behavior and performance, promote culturally responsive teaching and behavior management, minimize racial bias, and strengthen positive associations with academic achievement among youth of color.

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