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How Early do Social Determinants of Health Begin to Operate? Results From the Fragile Families and Child Wellbeing Study

Anao Zhang, MSW[*], **Yolanda C. Padilla, PhD**, and **Yeonwoo Kim, MA**

The University of Texas at Austin, United States

Abstract

Purpose: From a life course perspective, important insights about how social determinants of health operate can be gained by analyzing the various forms that social climate can take in different life periods. For children, a critical aspect of social climate is exposure to bullying. Bullying can serve as a proxy for power imbalance and social exclusion analogous to adult social climate of discrimination and racism.

Design and Methods: We used the Year 9 follow-up data of the Fragile Families and Child Wellbeing Study (N = 3301) that, for the first time included interviews with the children. We drew on a national sample of children and their families, which allowed us to account for broader contextual variables and represented a broad range of geographic areas and schools. Multinomial logistic regression was used to estimate the effects of expo- sure to bullying on self-rated health among primarily 9- to 10-year-old children while controlling for socio-de-mographic and diagnosed health-conditions.

Results: Both frequency and forms of bullying were positively associated with lower odds of reporting excellent, very good or good health. The effect of forms of bullying on children's self-rated health fell on a gradient. Subgroup analysis indicated a significant effect on self-rated health for children who experienced peer rejection but not for those who experienced physical aggression.

Conclusions: The results of the study provide new evidence that the harmful health consequences of power imbalance and discriminatory practices may extend to children in early development. It also accentuates the need to study social determinants of health from both an ecological/contextual and a developmental angle.

Practice Implications: Echoing a plethora of nursing literature on the critical role of psycho-social pediatric care, this study further encourages pediatric nurses to expand their assessment and intervention priorities beyond a familial and developmental perspective, and to consider the evident physical health consequence of a child's overall social climate determinants.

Keywords

Children; Social determinants of health; Self-rated health; Bullying; Social climate

[*]Corresponding author at: Anao Zhang, MSW. zhanganao@utexas.edu (A. Zhang).

Introduction

It is well established that social environmental factors, beyond biology, genetics and individual behaviors, can have a profound influence on health (Jensen, Currie, Dyson, Eisenstaedt, & Melhuish, 2013; Marmot, Allen, Bell, Bloomer, & Goldblatt, 2012; Wilkinson & Marmot, 2003). These social environmental factors, often referred to as “social determinants of health”, involve a constellation of determinants of health that can have real consequences by weakening the immune system (e.g. Johnson, Riley, Granger, & Riis, 2013), impairing neural substrates of cognitive and mental health functions (e.g. Krishnadas et al., 2013), and even disrupting resources, social relationships, and coping behaviors (e.g. Hatzenbuehler, Phelan, & Link, 2013). The effects are not confined to any subgroup of the general population but rather fall on a gradient, manifesting themselves across the whole spectrum of the social ladder depending on social conditions. This dose-response relationship further supports the biological plausibility of a fundamental causal role for one or more social determinants (Braveman, Egerter, & Williams, 2011).

The social environment plays a key role throughout the life course. We know that young children are disproportionately sensitive to the interplay of the developing brain with the external environment as the driving force of development (Hertzman, 2010). Subsequently, adolescents and young adults undergo numerous developmental processes whose course is influenced by their environment, including growing academic expectations, changing social and familial relationships, and physical and emotional changes associated with maturation (Sawyer et al., 2012; Viner et al., 2012). Studies show that developmental processes are likely to be disrupted when the immediate social environment is characterized by family instability or by poor parenting (Waylen, Stallard, & Stewart-Brown, 2008), harmful peer relations (Zambon et al., 2010), an unsafe school environment (Freeman et al., 2009), and deteriorating neighborhood conditions (Nichol, Jassen, & Pickett, 2010). The consequences for health can be significant as the immune system, cognitive functions, and health-related behaviors can become compromised (Kathol, Knutson, & Dehnel, 2016).

The powerful effects of social environment throughout the life span suggest the potential benefit of studying analogous social determinants at various periods of the life course. Indeed, studies indicate that mechanisms of social determinants evident in adults may also be observed in younger populations, albeit in different forms (Currie et al., 2012; Smith, 2014). We examined the effects of social climate on child health to see how they compared to what we know about the effects in adult populations. Based on data from the Fragile Families and Child Wellbeing Study, we analyzed the influence of school climate in elementary school on the health outcomes of 9- to 10-year-old children, using exposure to bullying as an indicator. We expand on a rich body of literature on the prevalence of bullying and its association with health problems. Unlike most studies on bullying, however, which use school samples, we draw on a national sample of children and their families, which allowing us to account for broader contextual variables. In addition, unique to our study was the availability of a global measure of child self-rated health for this very young population. The subjective assessment of health through self-rated health has been consistently shown to be strongly associated with objective health status, including disease prevalence, laboratory parameters, and other health-related factors (Wu et al., 2013).

Background

importance of Understanding Social Determinants of Health in Pre-adolescent Children

Pre-adolescence is one of the most critical yet challenging developmental stages. Children's health at this stage is key to later overall biopsycho-social well-being (e.g. Mendle & Ferrero, 2012; Turney, 2013). Positive health during pre-adolescence is associated with lower risk of substance use (Bekman, Goldman, Worley, & Anderson, 2011), healthier BMI scores (Nan et al., 2012), better cognitive performance (Chaddock et al., 2012), and overall superior health during adulthood (Case & Paxson, 2010). Although crucial, this stage is full of challenges. In addition to numerous peaks of neurological, cognitive, affective and brain development in preparation for adolescence (e.g. Giedd et al., 1999; Hartley & Lee, 2015; King, Lengua, & Monahan, 2013; Mills, Lalonde, Clasen, Giedd, & Blakemore, 2014), pre-adolescent children are simultaneously introduced to a much more complex social environment—primarily school—as their self-identity, self-concept, and many other capacities develop vastly (e.g. Hay & Ashman, 2003; Plante, 2007; Willoughby, Starks, & Taylor-Leech, 2015). This puts the social environmental context of pre-adolescent children at center stage, emphasizing the significance of understanding social determinants of health at this phase of life.

Why Would We Expect Bullying to Operate as a Social Determinant of Children's Health?

One of the mechanisms by which social determinants - for example, gender, race/ethnicity, education, income, and occupation (Solar & Irwin, 2010) - have been shown to have an effect on adult health is through perceptions of power and exclusion associated with discriminatory practices. Various forms of discrimination (e.g. racial discrimination and minority stress) have been consistently documented to significantly predict poorer adult health, including self-rated health, chronic diseases, high blood cholesterol, and depression (Chen & Yang, 2014; Frost, Lehavto, & Meyer, 2015; Harris, Cormack, Stanley, & Rameka, 2015). A key aspect of the environment is the inducement of vigilance, which in turn results in stress and harmful health effects. Social environmental factors and social status within the social hierarchy most often affect health via intermediary processes, such as negative emotions and/or low self-efficacy (Williams, Lavizzo-Mourey, & Warren, 1994), which set in motion harmful neuroendocrine responses (Operario, Adler, & Williams, 2004). This line of theory has been empirically supported by numerous studies that have shown a relationship between physical health and perceptions of power imbalance and exclusion (e.g. Raphael, 2016; Marmot et al., 2012).

There are strong theoretical connections between adult and child health responses to social dominance. Indeed, recent empirical analyses of children have identified patterns similar to those observed in studies of social determinants of heath in adults, but in different forms. For children, one of the predominant dynamics that represents power imbalance and exclusion is bullying (Søndergaard, 2012). Bullying is a form of aggressive behavior intentionally and repeatedly imposed from a position of power - including physical, verbal, relational, sexual, cyber, and racist bullying (Craig & Pepler, 2007; Hymel & Swearer, 2015; Vieno, Gini, & Santinello, 2011). The form of bullying that U.S. adolescents most engaged in were verbal (37.8%) followed by relational (24.4%), physical (13.8%), and cyber (8.9%; Wang, Iannotti,

& Luk, 2012). Sources of power imbalance range from simply physical advantage, such as size and strength, to highly complicated systemic discrimination based on race or ethnicity, sexual orientation, and economic disadvantage. Bullying is particularly powerful and potentially harmful because it exists in a pre-adolescent child's immediate social context - school. School is the most important venue of children's socialization, optimally the context of healthy development, including the formation of behaviors and capacities that facilitate transitions in family, peer, and other social relationships, and, ultimately, the transition to adulthood (Kidger, Araya, Donovan, & Gunnell, 2012). Yet, harmful experiences of power imbalance at school associated with exposure to bullying can put children at the bottom of the social hierarchy and at the receiving end of subordination and victimization (Halpern, Jutte, Colby, & Boyce, 2015). Bullying at school puts children under constant vigilance and stress which, in turn, can cause detrimental health effects.

Empirical Evidence Linking Bullying and Children's Health

Studies demonstrate a strong association between exposure to bullying and children's mental health. Research shows that victims of bullying have a significantly higher risk of mental disorders (Benedict, Vivier, & Gjelsvik, 2015; Evans-Lacko et al., 2016) and significantly worse psychological well-being (Turner, Exum, Brame, & Holt, 2013). Children who are bullied are under a constant state of fear, stress, anxiety, isolation and insecurity coupled with poor self-esteem and self-concept (e.g. Boulton, 2013; Søndergaard, 2012; Malecki et al., 2015). These psychosocial challenges have a negative impact on children's overall wellbeing, such as a higher risk of social isolation (Hensley, 2013), increases in self-harming behaviors (Meltzer, Vostanis, Ford, Bebbington, & Dennis,2011),anda higher prevalence of psychosomatic problems (Gini & Pozzoli, 2009).

As with mental health, research findings on the association between bullying and children's health support the view that victimization from bullying is reliably associated with significantly impaired physical health (Due et al., 2005, Rigby, 2001). A population based cross-sectional study of 419 school-aged children between 7 and 16 years old revealed that, compared to children who had never being victimized, weekly/daily victimization was associated with approximately a seven-fold likelihood of experiencing stomach aches and an even higher likelihood of suffering from headaches (Løhre et al., 2011). Lower exposure to bullying was observed to be significantly associated with higher levels of children's positive self-assessed health and well-being in a prospective cohort study of 1479 children ranging from 9 to 14 years of age (Forrest, Bevans, Riley, Crespo, & Louis, 2013). To measure health outcomes, the study used the Healthy Pathways Child-Report Scale, a multiple-item scale of children's self-assessed health and well-being. Sample items include physical comfort, emotional comfort, low stress reactions, physical activity, active coping, self-worth, life satisfaction, and others. In a summative report on the health effects of bullying among children, Hensley (2013) concluded that bullying not only remains a serious threat to children's physical wellbeing during the time they are involved, it also can persist for many years into adulthood.

Contributions of the Current Study

Based on the compelling theoretical and empirical foundations of bullying as a social determinant of health in children, this study contributes to the literature in several important ways. First, most of the existing research on the relationship between exposure to bullying and health in younger populations is limited to children late in elementary school, generally no younger than 11 years of age. Yet, research indicates that the highest prevalence of bullying occurs in the early school years. An analysis of a stratified random sample of 2000 students across the United States in grades third through twelfth showed that the highest incidence of bullying occurs in the early elementary school years, decreasing across subsequent grade levels (Luxenberg, Limber, & Olweus, 2015). For the present study we use a rich national data set, the Fragile Families Study, which allows us to extend the investigation to an earlier developmental stage by looking at children during middle childhood, between 9 and 10 years of age and enrolled in the second, third, and fourth grades. Second, to measure children's health status, this study uses children's self-rated health based on a global measure of health. While children's health status is most often reported by the child's parents, recent studies report the validity of children's self-rated health and encourage using this measurement to reflect children's general health status (Herman, Sabiston, Tremblay, & Paradis, 2014; Eiser & Varni, 2013). Third, we examine gradient effects of bullying on child health by analyzing frequency of bullying as well cumulative effects of different forms of bullying.

Methods

Data and Sample

Data for the study were drawn from the Fragile Families and Child Wellbeing Study, a national, ongoing longitudinal survey conducted through a collaboration of Princeton University's Center for Research on Child Wellbeing and Columbia University's Population Research Center and National Center for Children and Families (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The survey oversampled unmarried parents (about 75%) and thus represents a generally more socioeconomically disadvantaged group. The baseline Fragile Families sample was made up of 4898 infants born between 1998 and 2000 and their parents drawn from a stratified sample of 20 U.S. cities of 200,000 or more. Subsequently, data was collected from mothers at one, three, five, nine, and fifteen years following the birth, using in-person or telephone interviews. We use data from the Year 9 follow-up, which took place from 2007 to 2010. In-home interviews were held with the child's primary caregiver (usually the mother) and for the first time included interviews with the children.

Of the 4688 families eligible for the 9 Year follow-up, 3630 families (77%) completed interviews (www.fragilefamilies.princeton.edu). For our study we excluded 329 children (9%) who did not live with their mothers at least half of the time, resulting in a final analytic sample of 3301 children and their biological mothers. Linking the Fragile Families data with data from the National Center for Education Statistics showed that the children in the Year 9 sample were spread across 2743 private and public schools. Most children in the sample attended different schools, while 13% of the schools had two students who were part of the Fragile Families Study and <5% had between three and eight students who were part of the

Study. We limit our sample to children whose mothers identified as either non-Hispanic white, non-Hispanic black, or Hispanic, and who were not missing information on our analysis variables. Rich information on the socioeconomic status of the children is obtained from the mother data.

Analysis Plan

We begin by providing descriptive sample characteristics and between-group comparisons by children's self-rated health. Multivariate analyses involved multinomial logistic regression to examine children's self-rated health as a function of frequency of bullying. In addition, we wanted to know if there were cumulative effects of different forms of bullying, which we examined in a separate model. Finally, we used logistic regression to investigate whether the effects of bullying on children's health differed by forms of social exclusion: deliberate peer rejection and embarrassment versus physical aggression. Distinctions in the harmful impact of different forms of social exclusion against children have been identified in theoretical literature (e.g. Juvonen & Graham, 2001; Grief & Furlong, 2006; Zins, Elias, & Maher, 2007) and in empirical literature (e.g. Peeters, Cillessen, & Scholte, 2010; Ttofi, Farrington, & Losel, 2012). Few studies, however, have examined the differential effects of subtypes of bullying especially in relation to children's health status, which is considered an important gap (Leff, 2007; Wang, Iannotti, Luk, & Nansel, 2010; Olweus, 2013). The sample was divided into those who only experienced peer rejection (kids "pick on you" or "left you out") [versus children who never experienced bullying] (n = 2180), and those who only experienced physical aggression (kids "hit you" or "take things from you") [versus children never experienced bullying] (n = 1281). The statistical model results shown are unweighted but the coefficients and standard errors in the regression models should not be affected by this because we controlled for mothers' characteristics that were used in creating weights for the Fragile Families data (Schmeer, 2012; Winship & Radbill, 1994). All analyses were conducted using SPSS 23.0 version.

Measures

Dependent Variable—Our key dependent variable was a measure of children's self-rated health. During the 9-year follow-up interview, children were asked "In general, how is your health? Would you say it is (poor, fair, good, very good, or excellent)?" Because relatively few children self-reported fair, poor, or very good health, responses were collapsed into three categories: excellent/very good, good, and fair/poor.

Social Climate—Exposure to bullying, the indicator of school climate (Twemlow, Fonagy, & Sacco, 2003), was measured in two ways (a) frequency of bullying and (b) forms of bullying. Frequency of bullying was measured by child reports on how often in the last month kids in their school or neighborhood (a) picked on them or said mean things to them, (b) hit them, (c) took their things, or (d) purposely left them out of activities. A child reported from no occurrence to everyday occurrences for each of the four forms of bullying, resulting in a frequency ranging from 0 to 16. Forms of bullying was measured by creating a summed score: no incidences of bullying, one form of bullying, two forms of bullying, and three or more forms of bullying. We combined three and four forms of bullying because very few children reported experiencing all four forms.

Sociodemographic Context—We measured the child's sociodemographic context, which is known to be related to health outcomes, using several characteristics of the mother: race or ethnicity, education, relationship status, and current housing situation. The variables were operationalized as follows: mothers' race or ethnicity (Hispanic, non-Hispanic black, non-Hispanic white), education level (less than high school, high school or equivalent, some college, college, and graduate degree or above), current relationship status with the child's biological father (no relationship, separated or divorced, married or cohabiting), and current housing situation (unstable housing, rent house, own house). As a measure of mother's social support, we included her religious involvement, operationalized as church attendance (rarely, several times a year, and several times a month). Finally, we controlled for mother's age.

Control Variables—We controlled for children's diagnosed health conditions based on medication use. Mothers were asked to read a list of 16 conditions and indicate for which their child regularly took prescription medication. Health conditions included food or digestive allergies, migraines, depression/anxiety, diabetes, asthma, and digestive problems. We used a summed score from 0 to 16. In addition, we controlled for children's age and gender.

Results

Descriptive Statistics

Approximately three quarters of the children (72.7%) reported excellent or very good health, 21.6% reported good health, and 5.7% reported fair to poor health. Table 1 provides descriptive statistics for the independent variables in the analyses and between-group comparisons by children's self-rated health. On the average, children reported having experienced bullying 2.4 times in the past month (SD = 3.04). The majority of the children (61.6%) reported experiencing bullying, and most of the children who were bullied suffered multiple form of bullying. While 38.4% reported no experiences with bullying and 14.8% reported only one form of bullying, 20.4%, and 14.8%, respectively, reported experiencing two and three or more forms of bullying. Additional analyses revealed that overall in the last month, 51.3% of the children had been picked on, 29.75 had been purposely left out of activities, 22.6% had been hit, and 12.7% had things taken away from them.

The second part of the table reports on the child's sociodemographic context using mother's indicators and the child's characteristics. The mother's mean age was 34.51 years. Nearly half (48.3%) identified as non-Hispanic black, 28.1% as Hispanic, and 21.4% as non-Hispanic white. They ranged from 21% with less than a high school education to 16.8% with a college or graduate degree. Nearly 42% were married to or cohabiting with their child's biological father, 31.8% were separated or divorced, and 26.5% did not have a relationship with the father. More than three quarters attended church at least several times per year. The majority of the mothers either rented or had an unstable housing situation. The mean age of the children was 9.29 years, with the majority in the 9- to 10-year-old range (<5% were over 10 years of age). The sample was generally evenly distributed by gender. A little over 10% were enrolled in the second grade, 62.3% in the third grade, and 23.8% in the fourth grade.

To avoid multicollinearity with age, we did not include grade level in the analyses. On the average children were taking medication regularly for 0.53 diagnosed health conditions.

Description of Variables by Children's Self-rated Health

This study examined the extent to which social climate, specifically dynamics of power and exclusion (Twemlow et al., 2003), influences children's health by investigating the effects of bullying. Descriptive statistics by children's self-rated health (excellent or very good, good, fair or poor), continuing on Table 1, show that children who experienced more frequent bullying within the past month were more likely to report fair or poor health, compared to those who reported less frequent bullying, $\chi^2(6, N = 2992) = 42.40$, $p < 0.001$. In addition, the more forms of bullying children experienced, the more likely they were to report fair or poor health, ranging from 3.8,4.9, 6.4, to 10.6% with no experiences of bullying to three or more forms of bullying, respectively. Children's self-rated health was significantly related to mother's education, $\chi^2(6, N = 3301) = 16.60$, $p < 0.05$. As expected, the presence of health conditions requiring regular prescription medication was related to child's self-rated health, $F(2,3014) = 7.347$, $p < 0.001$. Children with higher numbers of health conditions requiring medication were more likely to report fair or poor health.

Children's Self-rated Health as a Function of Social Climate

Results of multinomial logistic regression analyses estimating children's self-rated health as a function of both frequency of bullying (Model 1) and forms of bullying (Model 2) are shown in Table 2. Controlling for other variables in the analyses, both measures show a strong relationship with child health. Model 1 shows that frequency of bullying was associated with child self-rated health. For every additional time a child was bullied, he or she was 11.9% less likely to report "excellent or very good" versus "poor or fair" health (OR = 0.881, 95% CI = 0.840 to 0.923, $p < 0.001$) and 7.2% less likely to report "good" versus "poor or fair" health (OR = 0.928,95% CI = 0.882 to 0.976, $p < 0.01$).

Sociodemographic context and child characteristics partly accounted for child self-rated health. Children of mothers with lower education levels had significantly lower likelihood of reporting "excellent or very good" or "good" self-rated health in comparison to their counterparts whose mothers had college or graduate degrees. In addition the effect of education fell on a gradient. Children of mothers with lower than a high school degree were 58.9% less likely to report "excellent or very good" health versus "poor or fair health" than those of mothers with college or graduate degrees (OR = 0.411, 95% CI = 0.208 to 0.811, $p < 0.01$) and children's of mothers with high school or equivalent degree were 59.9% less likely to report "excellent or very good" health versus "poor or fair health" than those of mothers with college or graduate degrees (OR = 0.401, 95% CI = 0.205 to 0.782, $p < 0.01$). As expected, Model 1 revealed that children's diagnosed health conditions were significantly associated with their self-rated health. With each additional diagnosed health condition, a child was 28.7% less likely to report "excellent or very good" versus "poor or fair" health (OR = 0.713,95% CI = 0.592 to 0.860, $p < 0.001$), and 21.2% less likely to report "good" versus "poor or fair" health (OR = 0.788,95% CI = 0.644 to 0.966, $p < 0.05$).

Model 2 in Table 2 revealed a significant gradient effect of increasing forms of bullying on children's health. Children who had experienced three types of bullying over the past month had a significantly lower likelihood, 66.6%, of reporting "excellent or very good" health versus "poor or fair" health than their counterparts who reported not being bullied in the past month (OR = 0.334, 95% CI = 0.212 to 0.525, $p < 0.001$) or "good health", 48%, (OR = 0.515, 95% CI = 0.314 to 0.842, $p < 0.01$). Children who experienced two types of bullying were 39.8% less likely to report "excellent or very good" health (OR = 0.602, 95% CI = 0.376 to 0.965, $p < 0.05$) versus "poor or fair" health. Interestingly, children who experienced only one type of bullying at school did not differ significantly from children who were not exposed to bullying.

Finally, we conducted separate analyses of the effects of subtypes of bullying on children's health. For this analysis, we created a dichotomous variable for self-rated health: "excellent health" (excellent and very good health) versus "otherwise" (good, fair and poor health). As shown in Table 3, among children who experienced bullying, exposure to bullying was a significant predictor of children's health only for those who were exposed to peer rejection but not for those who were exposed to physical aggression. Children who were exposed to peer rejection (were picked on or left out) were 23.2% less likely to report "excellent health" relative to their counterparts who were not exposed to bullying (OR = 0.768,95% CI = 0.621 to 0.950, $p < 0.05$). In contrast, children who were exposed to physical aggression (were hit or got things taken away from them) did not differ from their peers who were not exposed to bullying (OR = 0.826, 95% CI = 0.521 to 1.309, $p = 0.36$).

Discussion

The results of our study suggest that patterns of social determinants of health related to social climate observed among very young children mirror those evident in adult populations. Specifically, real or perceived power imbalance in the form of exposure to bullying in childhood parallels social exclusion and discrimination in adulthood. Based on a national sample of children mostly 9 and 10 years of age predominantly in the third and fourth grades, we found that exposure to bullying resulted in lower odds of excellent or very good self-rated health. Furthermore, both frequency and forms of bullying had graded effects on children's health. The results were significant even when accounting for child's objective health in terms of diagnosed health conditions and several contextual sociodemographic variables likely to affect health, including mother's race and ethnicity, education, relationship to the child's father, and housing stability as well as one measure of social support (religious involvement). Despite the well-established empirical support for the relationship between social determinants and individuals' health, most of what we know is based on research with adults and on accumulating evidence on adolescent populations (e.g. Viner et al., 2012).

The effects of power imbalance experienced by children, in the form of exposure to bullying, reflects patterns found in research with adult populations. We were able to distinguish between frequency of bullying and forms of bullying and found that each was significantly associated with child's self-reported health status. Although we might expect that frequency of bullying would be likely to be detrimental to children's health, we found that forms of

bullying matter as well. The more different ways a child is bullied, including being hit, having things taken away, being left out, or being picked on, the poorer their perceptions of their health. The effects of distinctive forms over simple frequency of aggression have been similarly analyzed in the adult literature. For example, adult studies of discrimination have examined the effects of multiple disadvantages on health. Interaction effects of multiple forms of discrimination on self-rated health among adults have been found to be associated with intersecting stigmatized identities, such as race and ethnicity, gender, and sexual orientation (Grollman, 2012).

Contrary to what may be expected, despite the consistent effects of persistence and cumulative forms of bullying, distinctive forms of bullying had different effects on health. We found a significant association between bullying and children's health among children who experienced peer rejection—who were left out or picked on—but not in children who experienced physical aggression—who were hit or had things taken away from them. Thus, children who experienced peer rejection were less likely to report excellent or very good health. Given the young age of the children, we expected that direct physical aggression would pose greater harm to a child's health status. Yet, we found that perceptions of power and exclusion had stronger ramifications for children's health status than did direct aggression and physical harm. Our findings concerning the distinction between the effects of deliberate peer rejection and embarrassment versus physical aggression motivate important questions about the parallel consequences of power imbalance for a sense of well-being among children and adults. For example, is it possible that the effects of childhood experiences reveal themselves during adulthood? Research shows that among adults, perceptions of power and exclusion associated with discriminatory practices induce vigilance and stress, which lead to various health problems. Yet the manifestation of discrimination on health is complex and the length of time between a trigger and the onset of symptoms may vary depending, for example, on acute versus chronic exposure. An analysis of empirical research by Williams and Mohammed (2009) suggests that because of the complex effects of stress there may exist lag times that would be necessary for a relationship to exist between exposure to discrimination and subsequent illness.

Given our analyses of social determinants among a younger age group than has been studied in the past, our study was intended as a baseline analysis, using a parsimonious model and a cross-sectional design. As such, the study has several limitations. The results in this study should not be considered causal relationships but associational. In addition, due to the nature of the dataset design, findings in this study have higher generalizability to urban and relatively disadvantaged children born in the United States and living with mostly unmarried mothers and thus likely attending schools in lower income neighborhoods. In addition, we used child self-rated health, which has been demonstrated to be a valid measure, but more studies are needed for this age group. Finally, though not the focus of this study, cyberbullying is another powerful form of bullying that is likely to increasingly affect younger children and which needs to be included in future surveys. Taken together, however, the results in this study offer an important contribution to the understanding of social determinants of health at a much younger age. Because we used a national sample rather than a school-based sample, the processes related to bullying that we observed were evident across a very wide range of schools throughout the United States and thus were not limited

to the dynamics of one school or group of schools or to specific geographic areas. Furthermore, this is one of the first studies of bullying that utilizes children's report of global self-rated health, rather than parental reports and rather than self-rated health and well-being based on multiple-item scales (e.g., the Healthy Pathways Child-Report Scale).

Applications to Pediatric Nursing

The effects of children's social climate on their health status further highlights the importance for pediatric nurses and other pediatric healthcare professionals to directly evaluate and address pediatric patients' own psychosocial systems. To date, the family system remains the most important aspect in addressing children's psychosocial wellbeing in health care settings, with somewhat less attention extended to outside systems (Harrison, 2010). The results of this study accentuate the importance of the child's family system but simultaneously further highlight the equally important role of other social systems - such as schools. Even when accounting for family demographic and control variables, the association between bullying and a child's self-rated health remains significant. This result supports the unique contribution of a child's external social climate in addition to family influences. More specifically, the results of our study emphasize that detecting some aspects of a child's social environment will require vigilance on the part of pediatric nurses and collaboration with the child's school. A key aspect of bullying is that it can remain hidden from adult attention. As our study demonstrated, some forms of bullying are less "visible" because they do not involve physical aggression, yet they may be just as harmful to health. Further research on how early and to what extent social determinants influence children, as well as the mechanisms underlying their relationship to health, will help enhance interventions with pediatric patients.

The pre-adolescence period is marked by rapid brain development and sensitive reactions to both biological and psychosocial influences, marking its vital role in later development. Given the very real consequences of social climate for health - extending to early in elementary school - our findings have implications for the recognition of harmful effects and the creation of interventions at much earlier stages in life as well as the establishment of social protections across the life course (Marmot, Friel, Bell, Houweling, & Taylor, 2008). Pediatric nursing, at the front line of a child's bio-psycho-social caring, is well suited for this demanding task. The psycho-social impact can be long lasting with proven effects on health-related quality of life in adulthood (Allison, Roeger, & Reinfeld-Kirkman, 2009; Takizawa, Maughan, & Arseneault, 2014; Wolke, Copeland, Angold, & Costello, 2013). Echoing a plethora of nursing literature on the critical role of psycho-social pediatric care (e.g. Dysart-Gale, 2010; Harrison, 2010; Shonkoffetal.,2012), this study further encourages pediatric nurses to expand their assessment and intervention priorities beyond a familial and developmental perspective and to consider the evident health consequence of a child's overall social climate.

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References

Allison S, Roeger L, & Reinfeld-Kirkman N (2009). Does school bullying affect adult health? Population survey of health-related quality of life and past victimization. Australian and NewZealand Journal of Psychiatry, 43(12), 1163–1170.

Bekman NM, Goldman MS, Worley MJ, & Anderson KG (2011). Pre-adolescent alcohol expectancies: Critical shifts and associated maturational processes. Experimental and Clinical Psychopharmacology, 19(6), 420–432. [PubMed: 21942260]

Benedict FT, Vivier PM, & Gjelsvik A (2015). Mental health and bullying in the United States among children aged 6 to 17 years. Journal of Interpersonal Violence, 30(5), 782–795. [PubMed: 24920001]

Boulton MJ (2013). The effects of victim of bullying reputation on adolescents' choice of friends: Mediation by fear of becoming a victim of bullying, moderation by victim status, and implications for befriending interventions. Journal of Experimental Child Psychology, 114(1), 146–160. [PubMed: 22703707]

Braveman P, Egerter S, & Williams DR (2011). The social determinants of health Coming of age.: Annual Review of Public Health, 32,381–389.

Case A, & Paxson C (2010). Cause and consequences of early life health. Demography, 47, s65–s85. [PubMed: 21302429]

Chaddock L, Hillman CH, Pontifex MB, Johnson CR, Raine LB, & Kramer AF (2012). Childhood aerobic fitness predicts cognitive performance one year later. Journal of Sports Sciences, 30(5), 421–430. [PubMed: 22260155]

Chen D, & Yang TC (2014). The pathways from perceived discrimination to self-rated health: An investigation of the roles of distrust, social capital, and health behaviors. Social Science & Medicine, 104(1), 64–73. [PubMed: 24581063]

Craig WM, & Pepler DJ (2007). Understanding bullying: From research to practice. Canadian Psychology, 48(2), 86–93. 10.1037/cp2007010.

Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, ... Barnekow V(2012). Social determinants of health and well-being among young people Health behavior in school-aged children (HBSC) study: International report from the 2009/2010 survey. World Health Organization Regional Office for Europe Retrieved from https://www.researchgate.net/profile/Oddrun_Samdal/publication/265034558_Social_determinants_of_health_and_well-being_among_young_people/links/548ae0310cf225bf669e135e.pdf.

Due P, Holstein BE, Lynch J, Diderichsen F, Gabhain SN, Scheidt P, & Currie C (2005). Bullying and symptoms among school-aged children: International comparative cross sectional study in 28 countries. European Journal of Public Health, 15(2), 128–132. [PubMed: 15755782]

Dysart-Gale D (2010). Social justice and social determinants of health: Lesbian, gay, bisexual, transgendered, intersexed, and queer youth in Canada. Journal of Child and Adolescent Psychiatric Nursing, 23(1), 23–28. [PubMed: 20122085]

Eiser C,& Varni JW (2013). Health-related quality of life and symptom reporting: Similarities and differences between children and their parents. European Journal of Pediatrics, 172(10), 1299–1304. [PubMed: 23715654]

Evans-Lacko S, Takizawa R, Brimblecombe N, King D, Knapp M, Maughan B, & Arseneault L (2016). Childhood bullying victimization is associated with use of mental health services over five decades: A longitudinal nationally representative cohort study. Psychological Medicine, 1–9. 10.1017/S0033291716001719.

Forrest CB, Bevans KB, Riley AW, Crespo R, & Louis TA (2013). Health and school outcomes during children's transition into adolescence. Journal of Adolescent Health, 52(2), 186–194. [PubMed: 23332483]

Freeman JG, Samdal O, Klinger DA, Dur W, Griebler R, Currie D, & Rasmussen M (2009). The relationship of schools to emotional health and bullying. International Journal of Public Health, 54(2), 251–259. [PubMed: 19652909]

Frost DM, Lehavto K, & Meyer IH (2015). Minority stress and physical health among sexual minority individuals. Journal of Behavioral Medicine, 38(1), 1–8. [PubMed: 23864353]

Giedd JN, Blumenthal J, Jeffries NO, Castellanos FX, Liu H, Zijdenbos A, ... Rapoport JL (1999). Brain development during childhood and adolescence: A longitudinal MRI study. Nature Neuroscience, 2(10), 861–863. [PubMed: 10491603]

Gini G, & Pozzoli T (2009). Association between bullying and psychosomatic problems: A meta-analysis. Pediatrics, 123(3), 1059–1065. [PubMed: 19255040]

Grief JL, & Furlong MJ (2006). The assessment of school bullying: Using theory to inform practice. Journal of School Violence, 5(3), 33–50.

Grollman EA (2012). Multiple forms of perceived discrimination and health among adolescents and young adults. Journal of Health and Social Behavior, 53(2), 199–214. [PubMed: 22588219]

Halpern J,Jutte D, Colby J, & Boyce T (2015). Social dominance, school bullying, and child health: What are our ethical obligations to the very young? Pediatrics, 135(S2), S24–S30. [PubMed: 25733722]

Harris R, Cormack D, Stanley J, & Rameka R (2015). Investigating the relationship between ethnic consciousness, racial discrimination and self-rated health in New Zealand. PloS One, 10(2), e0117343. [PubMed: 25706560]

Harrison TM (2010). Family-centered pediatric nursing care: State of the science. Journal of Pediatric Nursing, 25(5), 335–343. [PubMed: 20816555]

Hartley CA, & Lee FS (2015). Sensitive periods in affective development: Nonlinear maturation of fear learning. Neuropsychopharmacology, 40(1), 50–60. [PubMed: 25035083]

Hatzenbuehler ML, Phelan JC, & Link BG (2013). Stigma as a fundamental cause of population health inequalities. American Journal of Public Health, 103(5), 813–821. [PubMed: 23488505]

Hay I, & Ashman AF (2003). The development of adolescents' emotional stability and general self-concept: The interplay of parents, peers, and gender. International Journal of Disability, Development and Education, 50(1), 77–91.

Hensley V (2013). Childhood bullying: A review and implications for health care professionals. Nursing Clinics of North America, 48(2), 203–213. [PubMed: 23659808]

Herman KM, Sabiston CM, Tremblay A, & Paradis (2014). Selforated health in children at risk for obesity: Associations of physical activity, sedentary behavior, and BMI. Journal of Physical Activity and Health, 11 (1), 543–552. [PubMed: 23416732]

Hertzman C (2010). Framework for the social determinants of early child development In Center of Excellence for Early Childhood Development (Ed.), Encyclopedia on early childhood development. Vancouver, Canada: University of British Columbia Retrieved from http://www.child-encyclopedia.com/importance-early-childhood-development/according-experts/framework-social-determinants-early-child. (on Oct. 9th, 2016)

Hymel S, & Swearer SM (2015). Four decades of research on school bullying: An introduction. American Psychologist, 70(4), 293–299. [PubMed: 25961310]

Jensen BB, Currie C, Dyson A, Eisenstaedt N, & Melhuish EC (2013). Review of social determinants of the health divide in the WHO European Region: Final report. World Health Organization Regional Office for Europe Retrieved from: http://www.euro.who.int/__data/assets/pdf_file/0004/251878/Review-of-social-determinants-and-the-health-divide-in-the-WHO-European-Region-FINAL-REPORT.pdf.

Johnson SB, Riley AW, Granger DA, & Riis J (2013). The science of early life toxic stress for pediatric practice and advocacy. Pediatrics, 131(2), 319–327. [PubMed: 23339224]

Juvonen J, & Graham S (2001). Peer harassment in school: The plight of the vulnerable and victimized. New York: The Guilford Press.

Kathol RG, Knutson KH, & Dehnel PJ (2016). Health complexity and the interaction between physical and behavioral health conditions in children and youth In Kathol RG, Knutson KH, & Dehnel PJ (Eds.), Physician's guide: Understanding and working with integrated case manager (pp. 51–77). Switzerland: Springer International Publishing.

Kidger J, Araya R, Donovan J, & Gunnell D (2012). The effect of the school environment on the emotional health of adolescents: A systematic review. Pediatrics, 129(5), 925–949. [PubMed: 22473374]

King KM, Lengua LJ, & Monahan KC (2013). Individual differences in the development of self-regulation during pre-adolescence: Connections to context and adjustment. Journal of Abnormal Child Psychology, 41 (1), 57–69. [PubMed: 22865096]

Krishnadas R, McLean J, Batty GD, Burns H, Deans KA, Ford I,... Shiels PG (2013). Socioeconomic deprivation and cortical morphology: Psychological, social, and biological determinants of ill health study. Psychosomatic Medicine, 75(7), 616–623. [PubMed: 23975946]

Leff SS (2007). Bullying and peer victimization at school: Considerations and future directions. School Psychology Review, 36(3), 406–412.

Løhre A, Lydersen S, Paulsen B, Mæhle M, & Vatten LJ (2011). Peer victimization as reported by children, teachers, and parents in relation to children's health symptoms. BMC Public Health, 11(1), 1. [PubMed: 21199570]

Luxenberg H, Limber SP, & Olweus D (2015). Bullying in US schools: 2014 status report. Center City, MN: Hazelden Foundation.

Malecki CK, Demaray MK, Coyle S, Geosling R, Rueger SY, & Beckerd LD (2015). Frequency, power differential, and intentionality and the relationship to anxiety, depression, and self-esteem for victims of bullying. Child & Youth Care Forum, 44(1), 115–131.

Marmot M, Allen J, Bell R, Bloomer E, & Goldblatt P (2012). WHO European review of social determinants of health and the health divide. The Lancet, 380(9846), 1011–1029.

Marmot M, Friel S, Bell R, Houweling TAJ, & Taylor S (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. The Lancet, 372(8),1661–1669.

Meltzer H, Vostanis P, Ford T, Bebbington P, & Dennis MS (2011). Victims of bullying in childhood and suicide attempts in adulthood. European Psychiatry, 26(8), 498–503. [PubMed: 21310592]

Mendle J, & Ferrero J (2012). Detrimental psychological outcomes associated with pubertal timing in adolescent boys. Developmental Review, 32(1), 49–66.

Mills KL, Lalonde F, Clasen LS, Giedd JN, & Blakemore SJ (2014). Developmental changes in the structure of social brain in late childhood and adolescence. Social Cognitive and Affective Neuroscience, 9(2), 123–131. [PubMed: 23051898]

Nan C, Guo B, Warner C, Fowler T, Barrett T, Boomsma D, ... Maes HH (2012). Heritability of body mass index in pre-adolescence, young adulthood and late adulthood. European Journal of Epidemiology, 27(4), 247–253. [PubMed: 22426805]

Nichol M, Jassen I, & Pickett W (2010). Associations between neighborhood safety, availability of recreational facilities, and adolescent physical activity among Canadian youth. Journal of Physical Activity & Health, 7(4), 442. [PubMed: 20683085]

Olweus D (2013). School bullying: Development and some important challenges. Annual Review of Clinical Psychology, 9, 751–780.

Operario D, Adler D, & Williams DR (2004). Subjective social status: Reliability and predictive utility for global health. Psychology & Health, 19(2), 237–246.

Peeters M, Cillessen AHN, & Scholte RHJ (2010). Clueless or powerful? Identifying subtypes of bullies in adolescence. Journal of Youth and Adolescence, 39(9), 1041–1052. [PubMed: 20625880]

Plante LG (2007). Bleeding to ease the pain: Cutting, self-injury, and the adolescent search for self. London, UK: Greenwood Publishing Group.

Raphael D (2016). Social structure, living conditions, and health (2016) In Raphael D (Ed.), Social determinants of health: Canadian perspectives (pp. 32–56) (3rd Ed). Toronto: Canadian Scholars' Press Inc.

Reichman NE, Teitler J, Garfinkel I, & McLanahan S (2001). The fragile families and child wellbeing study: Background, research design, and sampling issues. Children and Youth Services Review, 23(1), 303–326.

Rigby K (2001). Health consequences of bullying and its prevention In Juvonen J, & Graham S (Eds.), Peer harassment in school: The plight of the vulnerable and victimized. New York: The Guilford Press.

Sawyer SM, Afifi RA, Bearinger LH, Blakemore SJ, Dick B, Ezeh AC, & Patton GC (2012). Adolescence: A foundation for future health. The Lancet, 379(9826), 1630–1640.

Schmeer KK (2012). Early childhood economic disadvantage and the health of Hispanic children.Social Science & Medicine, 75(8), 1523–1530. [PubMed: 22818489]

Shonkoff JP, Richter L, van der Gaag J, & Bhutta ZA (2012). An integrated scientific framework for child survival and early childhood development. Pediatrics, 129(2), e460–e472. [PubMed: 22218840]

Smith PK (2014). Understanding school bullying: Its nature and prevention strategies. New York: Sage.

Solar O, & Irwin A (2010). A conceptual framework for action on the social determinants of health: Social determinants of health discussion paper 2 (policy and practice). Geneva, Switzerland: Commission on Social Determinants of Health, World Health Organization.

Søndergaard DM (2012). Bullying and social exclusion anxiety in schools. British Journal of Sociology of Education, 33(3), 355–372.

Takizawa R, Maughan B, & Arseneault L (2014). Adult health outcomes of childhood bullying victimization: Evidence from a five-decade longitudinal British birth cohort. American Journal of Psychiatry, 171(1), 777–784. [PubMed: 24743774]

Ttofi MM, Farrington DP, & Losel F (2012). School bullying as a predictor of violence later in life: A systematic review and meta-analysis of prospective longitudinal studies. Aggression and Violent Behavior, 17(5), 405–418.

Turner MG, Exum ML, Brame R, & Holt TJ (2013). Bullying victimization and adolescent mental health: General and typological effects across sex. Journal of Criminal Justice, 41(1), 53–59.

Turney K (2013). Perceived instrumental support and children's health across the early life course. Social Science & Medicine, 95(1), 34–42. [PubMed: 22974718]

Twemlow SW, Fonagy P, & Sacco FC (2003). Modifying social aggression in schools. Journal of Applied Psychoanalytic Studies, 5(2), 211–222.

Vieno A, Gini G, & Santinello M (2011). Different forms of bullying and their association to smoking and drinking behavior in Italian adolescents. Journal of School Health, 81(7), 393–399. [PubMed: 21668879]

Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, & Currie C (2012). Adolescence and the social determinants of health. The Lancet, 379(9826), 1641–1652.

Wang J, Iannotti RJ, & Luk JW (2012). Patterns of adolescent bullying behaviors: Physical, verbal, exclusion, rumor, and cyber. Journal of School Psychology, 50(4), 521–534. [PubMed: 22710019]

Wang J, Iannotti RJ, Luk JW, & Nansel TR (2010). Co-occurrence of victimization from five subtypes of bullying: Physical, verbal, social exclusion, spreading rumors, and cyber. Journal of Pediatric Psychology, 35(10), 1103–1112. [PubMed: 20488883]

Waylen A, Stallard N, & Stewart-Brown S (2008). Parenting and health in mid-childhood: A longitudinal study. European Journal of Public Health, 18(3), 300–305. [PubMed: 18202085]

Wilkinson R, & Marmot M (Eds.). (2003). Social determinants of health: The solid facts (2nd Ed). World Health Organization: WHO Library Cataloguing in Publication Data.

Williams DR, Lavizzo-Mourey R, & Warren RC (1994). The concept of race and health status in America. Public Health Reports, 109(1), 26–41. [PubMed: 8303011]

Williams DR, & Mohammed SA (2009). Discrimination and racial disparities in health: Evidence and needed research. Journal of Behavioral Medicine, 32(1), 20–47. [PubMed: 19030981]

Willoughby L, Starks D, & Taylor-Leech K (2015). What their friends say about the way they talk: The metalanguage of pre-adolescent and adolescent Australians. Language Awareness, 24(1), 84–100.

Winship C, & Radbill L (1994). Sampling weights and regression-analysis. Sociological Methods & Research, 23(2), 230–257.

Wolke D, Copeland WE, Angold A, & Costello EJ (2013). Impact of bullying in childhood on adult health, wealth, crime, and social outcomes. Psychological Science, 24(10), 1958–1970. 10.1177/0956797613481608. [PubMed: 23959952]

Wu S, Wang R, Zhao Y, Ma X, Wu M, Yan X, & He J (2013). The relationship between self-rated health and objective health status: A population-based study. BMC Public Health, 13(1), 320. [PubMed: 23570559]

Zambon A, Morgan A, Vereecken C, Colombini S, Boyce W, Mazur J, ... Cavallo F (2010). The contribution of club participation to adolescent health: Evidence from six countries. Journal of Epidemiology and Community Health, 64(01), 89–95. [PubMed: 20007634]

Zins JE, Elias MJ, & Maher CA (2007). Bullying, victimization, and peer harassment: A handbook of prevention and intervention. New York: The Haworth Press.

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Table 1

Descriptive statistics and between-group comparisons of children's self-rated health (N = 3,301)[a].

	Total	Excellent or very good health	Good health	Fair or poor health	χ^2 or F-tests	p Value[β]
Social climate						
Frequency of bullying	2.40 (3.04)	2.21 (2.96)	2.68 (3.08)	3.69 (3.61)	22.304	0.000
Forms of bullying						
3 or more forms of bullying	14.8	65.2	24.2	10.6	42.400	0.000
2 forms of bullying	20.4	69.5	24.1	6.4		
1 form of bullying	26.4	73.0	22.1	4.9		
0 form of bullying	38.4	77.3	18.9	3.8		
Sociodemographic context						
Mother's age	34.51 (6.02)	34.44 (5.97)	34.17 (5.87)	34.78 (6.64)	0.321	0.726
Mother's race						
Hispanic	29.3	71.5	22.1	6.5	3.921	0.417
Non-Hispanic black	48.3	73.5	21.6	4.9		
Non-Hispanic white	22.4	70.9	22.5	6.6		
Mother's education						
Less high school	21.0	69.5	23.6	6.9	16.598	0.011
High school or equivalent	21.0	70.1	23.1	6.8		
Some college	41.3	73.3	21.3	5.4		
College or graduate degree	16.7	78.8	17.8	3.5		
Mother's relationship status						
No relationship at all	26.5	70.3	23.0	6.7	4.556	0.336
Separated or divorced	31.8	72.2	22.3	5.6		
Married or cohabiting	41.7	74.3	20.3	5.4		
Church attendance						
Almost never	14.6	77.1	18.5	4.3	5.142	0.273
Several times a year	47.0	71.9	22.2	5.9		
Several times a month	38.4	72.1	22.0	5.9		
Current housing						
Unstable housing	14.5	73.7	20.8	5.5	0.566	0.967

	Total	Excellent or very good health	Good health	Fair or poor health	χ^2 or F-tests	p Value[β]
Rent house	64.1	72.1	22.2	5.7		
Own house	21.3	73.1	21.4	5.5		
Control variables						
Child's age	9.29 (0.37)	9.28 (0.37)	9.27 (0.36)	9.25 (0.35)	0.853	0.426
Child's gender						
Male	52.2	73.9	21.1	5.0	20.115	0.000
Female	47.8	71.4	22.2	6.4		
Diagnosed health conditions (SD)	0.53 (0.80)	0.50 (0.78)	0.56 (0.82)	0.74 (0.97)	7.347	0.001

[a]Percentages presented for categorical variables and means and standard deviations (in parentheses) for continuous variables.

[β]If a p value = 0.000, it means that $p < 0.001$.

Table 2

Multinomial logistic regression of children's self-rated health as a function of social climate.

	Reference group for both models = "fair to poor" health							
	Model 1: frequency of bullying				**Model 2: forms of bullying**			
	Excellent/very good health		**Good health**		**Excellent/very good health**		**Good health**	
	OR [95%]		**OR [95%]**		**OR [95%]**		**OR [95%]**	
Social climate								
Frequency of bullying	0.881 ***	[0.840, 0.923]	0.928 **	[0.882–0.976]				
Forms of bullying (ref: no bullying)								
3 or more forms of bullying					0.334 ***	[0.212, 0.525]	0.515 **	[0.314, 0.842]
2 forms of bullying					0.602 *	[0.376, 0.965]	0.906	[0.547, 1.498]
1 form of bullying					0.794	[0.502, 1.256]	0.997	[0.611, 1.627]
Sociodemographic context								
Mother's age	0.978	[0.950, 1.008]	0.981	[0.950, 1.013]	0.975	[0.948, 1.003]	0.976	[0.947, 1.007]
Mother's race (non-Hispanic white)								
Hispanic	0.804	[0.501, 1.289]	0.786	[0.473, 1.307]	0.990	[0.635, 1.545]	0.985	[0.609, 1.595]
Non-Hispanic black	1.132	[0.720, 1.780]	1.097	[0.677, 1.778]	1.313	[0.858, 2.012]	1.315	[0.832, 2.080]
Mother's education (college or higher)								
Less than high school	0.411 **	[0.208, 0.811]	0.563	[0.273, 1.158]	0.352 **	[0.194, 0.679]	0.502	[0.250, 1.009]
High school or equivalent	0.401 **	[0.205, 0.782]	0.564	[0.277, 1.148]	0.366 **	[0.200, 0.697]	0.517	[0.260, 1.026]
Some college0.566		[0.299, 1.072]	0.660	[0.335, 1.301]	0.535 *	[0.289, 0.993]	0.640	[0.332, 1.233]
Mother's relationship status (no relationship)								
Separated or divorced	0.974	[0.636, 1.494]	1.057	[0.669, 1.670]	0.902	[0.598, 1.361]	0.993	[0.639, 1.543]
Married or cohabiting	0.824	[0.534, 1.271]	0.904	[0.567, 1.441]	0.764	[0.502, 1.162]	0.865	[0.550, 1.360]
Church attendance (almost never)								
Several times a year	1.298	[0.742, 2.268]	1.145	[0.629, 2.085]	1.403	[0.808, 2.435]	1.170	[0.647, 2.116]
Several times a month	0.969	[0.669, 1.405]	1.040	[0.698, 1.549]	0.995	[0.697, 1.420]	1.023	[0.698, 1.500]
Current housing (owns house)								
Rent	1.024	[0.568, 1.846]	0.948	[0.503, 1.784]	0.990	[0.584, 1.679]	0.878	[0.497, 1.551]
Unstable housing	1.070	[0.683, 1.677]	1.014	[0.627, 1.640]	1.022	[0.653, 1.600]	0.972	[0.602, 1.571]

	Reference group for both models = "fair to poor" health							
	Model 1: frequency of bullying				Model 2: forms of bullying			
	Excellent/very good health		Good health		Excellent/very good health		Good health	
	OR [95%]		OR [95%]		OR [95%]		OR [95%]	
Control variables								
Child's age	1.056	[0.655, 1.703]	1.084	[0.651, 1.808]	1.118	[0.703, 1.779]	1.127	[0.685, 1.853]
Male	1.435 *	[1.017, 2.025]	1.253	[0.866, 1.813]	1.371	[0.984, 1.911]	1.234	[0.864, 1.763]
Diagnosed health conditions	0.713 ***	[0.592, 0.860]	0.788 *	[0.644, 0.966]	0.721 ***	[0.603, 0.863]	0.780 *	[0.642, 0.948]

Reference categories in parentheses.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

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Table 3

Subgroup logistic regression of children's self-rated health as a function of social climate for children exposed to peer rejection and physical aggression.

	Rejection (n = 2,180) (other kids picked on you or left you out)		**Aggression (n = 1,281) (other kids hit you or took things from you)**	
	OR[95%CI]		**OR [95% CI]**	
Social climate				
Exposed to bullying	0.768 *	[0.621, 0.950]	0.826	[0.521, 1.309]
Sociodemographic context				
Mother's age	0.997	[0.977, 1.017]	1.006	[0.979, 2.162]
Mother's race (non-Hispanic white)				
Hispanic	0.967	[0.716, 1.305]	1.416	[0.927, 2.162]
Non-Hispanic black	1.011	[0.767, 1.332]	1.103	[0.761, 1.598]
Mother's education (college or higher)				
Less than high school	0.672 *	[0.459, 0.986]	0.692	[0.403, 1.190]
High school or equivalent	0.697	[0.480, 1.012]	0.589	[0.349, 0.994]
Some college	0.752	[0.535, 1.056]	0.663	[0.408, 1.075]
Mother's relationship (not in a relationship)				
Married or cohabiting	0.911	[0.693, 1.198]	0.973	[0.673, 1.407]
Separated or divorced	0.891	[0.689, 1.152]	0.891	[0.631, 1.259]
Church attendance (almost never)				
Several times a year	1.075	[0.767, 1.507]	1.168	[0.729, 1.871]
Several times a month	0.871	[0.690, 1.098]	0.938	[0.691, 1.274]
Current housing (owns home)				
Rent	1.063	[0.740, 1.527]	0.937	[0.567, 1.546]
Unstable housing	1.064	[0.811, 1.396]	0.915	[0.625, 1.340]
Control variables				
Child's age	0.973	[0.725, 1.306]	1.181	[0.792, 1.761]
Male	1.213	[0.981, 1.500]	1.352	[1.016, 1.801]
Diagnosed health conditions	0.854 *	[0.748, 0.975]	0.839	[0.700, 1.006]

Reference categories in parentheses.

* $p < 0.05$.