NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

School, Neighborhood, and Family Factors Are Associated With Children's Bullying Involvement: A Nationally Representative Longitudinal Study

LUCY BOWES, M.SC.,
Medical Research Council Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, King's College London

LOUISE ARSENEAULT, Ph.D.,
Medical Research Council Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, King's College London

BARBARA MAUGHAN, Ph.D.,
Medical Research Council Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, King's College London

ALAN TAYLOR, Ph.D.,
Medical Research Council Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, King's College London

AVSHALOM CASPI, Ph.D., and
Departments of Psychology and Neuroscience, Psychiatry and Behavioural Sciences, Duke University.

TERRIE E. MOFFITT, Ph.D.
Medical Research Council Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, King's College London

Abstract

Objective—To test whether school, neighborhood, and family factors are independently associated with children's involvement in bullying, over and above their own behaviors that may increase their risk for becoming involved in bullying.

Method—We examined bullying in the Environmental Risk (E-Risk) Longitudinal Twin Study, a nationally representative 1994Y1995 birth cohort of 2,232 children. We used mother and teacher reports to identify children who experienced bullying between the ages of 5 and 7 years either as victims, bullies, or bully-victims. We collected information about school characteristics from the Department for Children, Schools and Families. We collected reports from mothers about

Correspondence to Louise Arseneault, Ph.D., Institute of Psychiatry, SGDP Centre, Box Number p080, London, SE5 8AF, United Kingdom; louise.arseneault@iop.kcl.ac.uk..

children's neighborhood and home environments and reports from mothers and teachers about children's internalizing and externalizing problems when they were 5 years old.

Results—Multinomial logistic regressions showed that over and above other socioenvironmental factors and children's behavior problems, school size was associated with an increased risk for being a victim of bullying, problems with neighbors was associated with an increased risk for being a bully-victim, and family factors (e.g., child maltreatment, domestic violence) were associated with all groups of children involved in bullying.

Conclusions—Socioenvironmental factors are associated with children's risk for becoming involved in bullying over and above their own behaviors. Intervention programs aimed at reducing bullying should extend their focus beyond schools to include local communities and families.

Keywords

bullying; victimization; risk factors; children

Children involved in bullying are at risk for developing behavioral difficulties, physical health problems, and suicidal ideation.[1–4] Bullying involvement is highly prevalent, affecting up to half of children and adolescents worldwide.[5] Identifying early factors that may increase young children's risk for becoming involved in bullying may guide prevention strategies for reducing bullying behaviors and has the potential to change the trajectory of children at risk for becoming involved in persistent bullying.[6] In turn, this could help to reduce mental and physical health problems in youths. This study examines whether school, neighborhood, and family contexts are associated with children's risk for being involved in bullying, independent of their own behaviors.

It is not only bad luck and random events that lead to children's involvement in bullying. Increasing evidence indicates that children with adjustment problems such as internalizing and externalizing problems are likely to become involved in bullying either as victims, bullies, or bully-victims.[2–4,7] Broader socioenvironmental contexts, such as school, neighborhood, and family contexts, may also bear influences on children's risk for being involved in bullying. Previous studies focused on school environment for the development of school-based interventions.[8] School overcrowding, number of children receiving free school meals, and larger school size have been linked to problems in school including increased bullying behavior.[9] Extending the focus beyond the school setting and looking for other factors in a child's life that may increase their risk for becoming involved in bullying would be helpful for identifying targets for prevention strategies. Little is known about the impact of children's neighborhood on their risk for being involved in bullying. Studies have found that school problems, including bullying, are prevalent in disadvantaged areas,[10] suggesting that certain neighborhoods are associated with children's involvement in bullying.

Studies investigating more proximal factors such as family context have shown associations between maltreatment,[11] parental conflict,[12,13] parent's depression,[14] low socioeconomic status (SES),[15] and low cognitive stimulation[16] with children being involved in bullying. As socioenvironmental variables correlate with each other, it is important to take into account

the potential confounding effect of these factors. Few studies have used a multivariate approach to look at the unique effects of school, neighborhood, and family factors on children's risks of being involved in bullying. Findings indicate increased victims of bullying in overcrowded classes and in more deprived schools and neighborhoods.[17]

A further consideration when investigating risk factors for bullying involvement is the effect of children's behaviors that may predispose them to become involved in bullying. Behavioral problems have been linked to school, neighborhood, and home environments. Greater behavioral problems have been found in disadvantaged neighborhoods.[18] Child maltreatment, domestic violence, and low maternal warmth are associated with childhood depression and anxiety.[19,20] Thus, children's individual characteristics may be further confounding variables that could explain the relation between socioenvironmental factors and children's likelihood of being involved in bullying.

One cross-sectional study of preadolescents examined whether parenting contributed to bullying involvement after controlling for children's characteristics.[21] Results indicated that bully-victims and bullies experienced low parental warmth and rejection compared with victims and children not involved in bullying. They were also more likely to come from low socioeconomic background and have a family risk for externalizing disorder. However, after controlling for children's characteristics, only low socioeconomic background and family risk for externalizing disorder remained associated with being a bully-victim. Parenting was not associated with victims of bullying, and it did not influence bullying behavior over and above children's characteristics. It remains unclear whether school and neighborhood factors would exert an influence on young children's bullying involvement over and above family and individual factors.

Using prospective data from a nationally representative longitudinal study of children during their first years of formal schooling, this study investigates whether early school, neighborhood, and family factors are independently associated with different groups of children involved in bullying. Socioenvironmental variables examined in this study have been previously reported as being associated with bullying involvement. School variables included measures of school size and school level disadvantage. Neighborhood variables reflected both crime and conflict within the neighborhood. Family measures represented both parental difficulties (e.g., SES disadvantage, mothers with depression, parent's antisocial behavior, domestic violence) and parent–child relationships (maternal warmth, stimulating activities, and child maltreatment). This study aims to identify early school, neighborhood, and family factors associated with children's risk for becoming involved in bullying as victims, bullies, or bully-victims; examine which school, neighborhood, and family factors are independently associated with children's risks of being involved in bullying, controlling for the confounding effect of other socioenviron-mental variables; and determine whether school, neighborhood, and family factors are independently associated with children's risks for being involved in bullying after controlling for children's behaviors.

METHOD

Participants were members of the Environmental Risk Longitudinal Twin Study (E-Risk),[22] which tracks the development of a birth cohort of 2,232 children. This E-Risk sample was drawn from a larger 1994–1995 birth register of twins born in England and Wales.[23] The sample was constructed in 1999–2000 when 1,116 families with same-sex 5-year-old twins participated in home visit assessments, forming the base cohort for the longitudinal E-Risk study. Details of sample construction are reported elsewhere.[22] Briefly, we used a high-risk stratification strategy to replace any families lost to the original register at the time of birth because of selective nonresponse, and we included a further high-risk over-sample to ensure sufficient numbers of children with behavioral disorders for statistical power. All statistical analyses of data from the E-Risk cohort were weighted back to the population using information from Great Britain's General Household Survey.[24] Thus, findings reported herein can be generalized to the general population of British families with children born in the 1990s. During assessment of children at age 5 years, with parents' permission, questionnaires were mailed to the children's teachers, who returned questionnaires for 94% of the children. Two years later, when the children were 7 years old, a follow-up home visit was conducted for 98% of the 1,116 E-Risk families, and teacher questionnaires were obtained for 91% of the 2,232 E-Risk twins (93% of those followed up).

Measures

Groups of Children Involved in Bullying by Age 7 Years—As previously reported,[2] bullying was measured during interviews with mothers when children were 7 years. We asked mothers whether either twin had been bullied by another child between 5 and 7 years, responding "never" (0), "yes" (1), or "frequent" (2). A total of 17.4% of the children had been bullied by the age of 7 years ($n = 411$), 4.2% frequently ($n = 116$). Examples of children being victimized by bullies in the E-Risk sample included instances where the child was excluded from groups and games or cases in which a child was called names because she/he did not have a father. Other cases involved children being smacked across the face everyday for a month, children being stabbed with a pencil, and children being beaten up. The test-retest reliability of victims of bullying was 0.87 using a sample of 30 parents who were interviewed twice, between 3 and 6 weeks apart. An interrater reliability study indicated that of 100 mothers who reported a child as being bullied, 70% of the children agreed in a separate self-report; of 100 children who self-reported being victimized, 60% of their mothers agreed independently.

During the interview of children at age 7 years, we asked mothers and teachers whether children had been bullying others. Mothers reported that 12.1% of the children were bullies ($n = 302$), 1.4% frequently ($n = 41$). Teachers reported that 14.1% of children were bullies ($n = 313$), 0.9% frequently ($n = 24$). A child was considered to be a bully if reported by either source. A total of 519 children (21.6%) bullied others according to mothers and/or teachers.

We combined groups of children who had been victimized by bullies and children who had been bullying others to generate three groups of children involved in bullying. Victims have been victimized by bullies but have not bullied others (12.1%). Bullies have bullied others

but have not themselves been victimized by bullies (16.4%). Bully-victims have been victimized by bullies and have bullied others as well (5.2%).

Socioenvironmental and Individual Factors at Age 5 Years—Table 1 provides descriptive statistics for the school, neighborhood, family, and individual variables examined in this study.

Data Analyses

Statistical analyses were conducted using Stata 9.0 (StataCorp, College Station, TX).[25] To provide unbiased statistical estimates that can be generalized to British families with children born in the 1990s, all data reported were corrected with weighting to represent the proportion of young mothers in the study population. Participants in this study were pairs of same-sex twins, and hence, each family contained data for two children. This resulted in non-independent observations, which were adjusted for with tests based on the sandwich or Huber/White variance estimator.[26] These tests adjust estimated SEs to account for the dependence in the data.

First, to examine the associations between socioenvironmental and individual variables at age 5 years with groups of children involved in bullying by age 7 years, we ran univariate multinomial logistic regression analyses, predicting victims, bullies, and bully-victims with each variable separately. Second, to test the unique associations between socioenvironmental variables with being involved in bullying, we entered all significant variables from the univariate analyses into a multivariate multinomial logistic regression. Third, to verify that the associations between socioenviron-mental variables and being involved in bullying remained over and above the confounding effect of children's behaviors, we added behavioral variables to the previous regression model.

The percentage of missing data was no greater than 11% for any one variable (Table 1). However, to minimize missing data in the presence of listwise deletion, we used multiple imputations by chained equation from the ICE program available in Stata[27] to impute missing data. Ten copies of the data were formed in the imputation process, each with missing data imputed. All analyses were conducted using imputed data.

RESULTS

Are Early Socioenvironmental and Individual Factors Associated With Children's Risks for Being Involved in Bullying?

Univariate analyses indicated that school, neighborhood, family, and individual factors assessed when children were 5 years were associated with children's risks for being involved in bullying by age 7 years (Table 2).

Are Early Socioenvironmental Factors Uniquely Associated With Children's Risks for Being Involved in Bullying?

Multivariate analyses indicated that some socioenvironmental variables remained associated with children's involvement in bullying by age 7 years when they were considered

simultaneously (Table 3, columns 1, 3, and 5). Results showed that a large number of children in schools were uniquely associated with an increased risk for being victims and a decreased risk for being bullies over and above other socioenvironmental factors. Experiencing problems with neighbors remained associated with an increased risk for being bully-victims. Most family factors remained associated with children's involvement in bullying. Having a mother with depression and spending few stimulating activities with mothers were uniquely associated with an increased risk for being bully-victims. Witnessing domestic violence and low maternal warmth remained associated with the risk for being bullies. Child maltreatment was uniquely associated with an increased risk for being victims of bullying, bullies, or bully-victims when considered simultaneously with other socioenvironmental factors.

Do Early Socioenvironmental Factors Increase Children's Risks for Being Involved in Bullying Over and Above Their Behaviors?

Whereas children's internalizing and externalizing behaviors were found to be strongly associated with increased risks for being involved in bullying, multivariate analyses controlling for these behaviors indicated that school, neighborhood, and family factors remained associated with involvement in bullying (Table 3, columns 2, 4, 6). Results showed that an increase of approximately 500 pupils in a school increased the risk for being victims of bullying after controlling for other socioenvironmental variables and children's internalizing and externalizing behaviors. Number of children in schools was no longer significantly associated with the risk for being a bully after controlling for children's behaviors. Children living in areas with problems with neighbors were still 1.3 times more likely to be bully-victims by age 7 years, even after controlling for children's behaviors.

Several family factors remained associated with being involved in bullying over and above children's behaviors. Witnessing domestic violence remained associated with an increased risk for being a bully. Spending few stimulating activities with mothers increased the risk for being bully-victims. Children who experienced mal-treatment were approximately twice as likely to be victims of bullying or bully-victims compared with children who had not been maltreated. Results also indicated that low maternal warmth and mother's depression were not associated with bullying after controlling for children's internalizing and externalizing problems.

DISCUSSION

Using prospective longitudinal data from a representative sample of children during their first years of formal schooling, this study identifies early socio-environmental factors uniquely associated with children's involvement in bullying as victims, bullies, or bully-victims. Findings suggest that interventions aiming at limiting bullying behavior and victimization should not be restricted to the school environment and should also target local communities and families.

School Factors

School size was associated with a decreased risk for being a bully when controlling for other socioenviron-mental factors. This counterintuitive finding could represent underreporting of children's bullying behaviors in larger schools where teachers may be less aware of children's social behaviors or may have increased difficulties in supervising children out of lesson time. However, this association was not robust, becoming nonsignificant after controlling for children's behaviors. School size was uniquely associated with victims of bullying. This finding is in keeping with previous studies of young children.[9] However, the present study also shows that school size remains a key factor even after controlling for more proximal factors such as family characteristics and children's behaviors. This indicates that, for young children, attending a large school may be a key factor in the likelihood of becoming a victim of bullying. Mechanisms by which this distal context influences children's involvement in bullying remain to be determined. One possible explanation is that large schools in the United Kingdom may have greater age ranges of pupils, increasing the risk for younger children being bullied by older pupils. School size was associated with being the victim of bullying even after controlling for the percentage of children eligible for free school meals, indicating that the association is independent of the collective level of general economic hardship in schools.

Neighborhood Factors

Experiencing problems with neighbors was uniquely associated with bully-victims. This effect could not be explained in terms of general neighborhood socioeconomic disadvantage because, in previous analyses not reported here, we found that a measure of neighborhood economic conditions[41] was not associated with groups of children involved in bullying. One possible explanation is that hostile interactions in local communities provide children with examples of bullying behaviors that they can reproduce among their peers. However, experiencing problems with neighbors was not associated with being a pure bully or victim. Bully-victims represent a particularly vulnerable group of individuals.[42] The association between experiencing problems with neighbors and bully-victims found in this study may represent wider social difficulties in the bully-victim group.

Family Factors

Family factors were uniquely associated with all groups of children involved in bullying. Witnessing domestic violence by age 5 years was uniquely associated with bullies. Research has shown that children exposed to interparental violence are more likely to show physical aggression, including bullying behaviors, maybe as a result of social learning with children perceiving violence to be an acceptable method of resolving conflict.[43,44]

The association between spending few stimulating activities with mothers at age 5 years and bully-victims remained significant after controlling for family SES and maternal warmth. This indicates that the number of joint motherYchild activities is not simply a proxy of family income or the relationship between a mother and her child. This variable may indicate how involved parents are in their child's life. Our result is in keeping with previous findings that parents of bully-victims tend to be less involved with their children.[45,46] Child maltreatment was independently associated with being victims of bullying and bully-victims

after controlling for the effect of children's internalizing and externalizing problems. Experiencing maltreatment may have a direct influence on the risk for being a victim of bullying as a result of signs of neglect or visible marks from physical harm. Alternatively, the experience of child maltreatment may exert an indirect effect on being a victim of bullying by influencing children's behavior in ways not captured by the behaviors measured in this study (e.g., social approach). Low maternal warmth and maternal depression were associated with bullies after controlling for other socioenvironmental variables but not after controlling for the confounding effect of children's characteristics. This suggests that the association is a spurious one that can be accounted for by children's behaviors. However, this does not mean that maternal factors are unimportant with regard to research on bullying involvement. Both low maternal warmth and mother's depression are known to be associated with behavioral problems in childhood,[33,47] and these behavioral difficulties may increase children's risks for being involved in bullying.

Group Differences in Risk Factors for Bullying Involvement

Our results indicate that different socioenvironmental and individual factors are associated with different groups of children involved in bullying, highlighting the importance of investigating bullying in terms of distinct groups. The wide range of factors associated with bully-victims is specific to this group and is not merely the sum of factors associated with victims and bullies. Therefore, bully-victims represent an important subgroup to be isolated when examining bullying involvement.

Our results indicate that, for bullies, the effects of most socioenvironmental factors were confounded by children's behaviors. The effects of attending a large school, having a mother who has had depression, receiving less maternal warmth, and experiencing maltreatment are confounded by children's behavioral problems, and these behavioral problems may make them more likely to bully others. Managing children's internalizing and externalizing difficulties, in addition to working with families to minimize the impact of stressful family contexts on children's behavior, may help in reducing the number of children who bully others.

For victims of bullying, the most salient risk factor identified in this study was child maltreatment. Children who are victimized by bullies may also have experienced different forms of victimization in the home. This highlights the need to address polyvictimization[48] in childhood and develop interventions to break this cycle of victimization from the home to the school.

Socioenvironmental Variables as Risk Factors for Bullying Involvement

This study used longitudinal data with family and individual factors being measured at age 5 years, before bullying involvement by age 7 years. Thus, our findings provide an indication of family factors that might contribute to risk for bullying involvement. Such estimation of temporal priority has not been possible in previous cross-sectional studies of bullying involvement where both bullying involvement and potential risk factors have been measured concurrently.[21] However, repeated measurements of bullying involvement and family/

individual factors over time (allowing any preexisting bullying involvement to be controlled for) are needed to establish true temporal priority.

This study has some methodological limitations. First, the measure used to asses whether children had been a victim of bullying was mother reported only. It is possible that this may have led to underreporting as some mothers may be unaware of the social experiences of their child. However, age trends indicate that young children tend to tell adults when they experience bullying.[49] Furthermore, prevalence rates of involvement in bullying in the E-Risk sample closely match average rates across nationally representative samples of singletons from 25 countries.[5] Second, it was not possible to control for bullying involvement before age 5 years, before socioenvironmental factors. Examination of the instances of being a victim of bullying revealed that the vast majority occurred after children started formal schooling at age 5 years. Therefore, it is reasonable to conclude that family and individual factors measured when children were age 5 years preceded the time children became involved in bullying. Third, there are concerns as to whether twin studies of bullying involvement may not be generalized to singletons. It is possible that the unique bond between twins affects their likelihood of being involved in bullying by acting as a protective factor against victimization. As previously mentioned, prevalence rates of involvement in bullying observed in the E-Risk sample match those observed in studies of singletons, indicating that this is not the case. It is also possible that identical twins are more likely to be bullied because they are an unusual pair of physically similar individuals. However, there is no evidence that this is the case in the E-Risk sample, with similar rates of being the victim of bullying for monozygotic and dizygotic twin pairs (15% versus 14% were victims of bullying and 6% versus 7% were bully-victims, respectively). Fourth, this study examined early school, neighborhood, and family factors associated with children's involvement in bullying up to 7 years of age. Different factors may be important in older age groups, as children begin to spend less time at home and more time among their peers. However, it is particularly important to identify risk factors for early involvement in bullying to prevent children from becoming involved in persistent bullying. Whereas a majority of intervention programs for reducing bullying are tailored for the educational system, this study indicates that involving local communities, and especially families, may increase success in reducing bullying involvement during children's first years of formal schooling. Offering support services and community-based projects could prevent cases of bully-victims among youths living in areas with neighborhood problems. Strategies targeting violence in the home may also help to reduce bullying behavior in school. Providing additional support at school for those children known to have experienced violence in the home may help to decrease the likelihood of children becoming victims of bullying. Family therapy strategies focusing on the relationship between parent and child, and encouraging parents to take a more active role in their children's lives, may have an impact on children's likelihood of being involved in bullying.

Acknowledgments

REFERENCES

1. Williams K, Chambers M, Logan S, Robinson D. Association of common health symptoms with bullying in primary school children. BMJ. 1996; 313:17–19. [PubMed: 8664762]

2. Arseneault L, Walsh E, Trzesniewski K, Newcombe R, Caspi A, Moffitt TE. Bullying victimization uniquely contributes to adjustment problems in young children: a nationally representative cohort study. Pediatrics. 2006; 118:130–138. [PubMed: 16818558]

3. Kim YS, Koh YJ, Leventhal B. School bullying and suicidal risk in Korean middle school students. Pediatrics. 2005; 115:357–363. [PubMed: 15687445]

4. Kim YS, Leventhal BL, Koh YJ, Hubbard A, Boyce WT. School bullying and youth violence: causes or consequences of psychopathologic behavior? Arch Gen Psychiatry. 2006; 63:1035–1041. [PubMed: 16953006]

5. Nansel TR, Craig W, Overpeck MD, Saluja G, Ruan WJ. Cross-national consistency in the relationship between bullying behaviors and psychosocial adjustment. Arch Pediatr Adolesc Med. 2004; 158:730–736. [PubMed: 15289243]

6. Barker ED, Boivin M, Brendgen M, et al. The predictive validity and early predictors of peer victimization trajectories in preschool. Arch Gen Psychiatry. 2008; 65:1185–1192. [PubMed: 18838635]

7. Sourander A, Helstela L, Helenius H, Piha J. Persistence of bullying from childhood to adolescence - a longitudinal 8-year follow-up study. Child Abuse Negl. 2000; 24:873–881. [PubMed: 10905413]

8. Vreeman RC, Carroll AE. A systematic review of school-based interventions to prevent bullying. Arch Pediatr Adolesc Med. 2007; 161:78–88. [PubMed: 17199071]

9. Barnes J, Belsky J, Broomfield K, Melhuish E. the NESS Research Team. Neighbourhood deprivation, school disorder and academic achievement in primary schools in deprived communities in England. Int J Behav Dev. 2006; 30:127–136.

10. National Center for Education Statistics. Safety in Numbers: Collecting and Using Crime, Violence, and Discipline Incident Data to Make a Difference in Schools. U.S. Department of Education; Washington: 2002.

11. Shields A, Cicchetti D. Parental maltreatment and emotion dysregulation as risk factors for bullying and victimization in middle childhood. J Clin Child Psychol. 2001; 30:349–363. [PubMed: 11501252]

12. Baldry AC. Bullying in schools and exposure to domestic violence. Child Abuse Negl. 2003; 27:713–732. [PubMed: 14627075]

13. Baldry AC, Farrington DP. Protective factors as moderators of risk factors in adolescence bullying. Soc Psychol Educ. 2005; 8:263–284.

14. Beran TN, Violato C. A model of childhood perceived peer harassment: analyses of the Canadian National Longitudinal Survey of Children and Youth Data. J Psychol. 2004; 138:129–147. [PubMed: 15218785]

15. Wolke D, Woods S, Stanford K, Schulz H. Bullying and victimization of primary school children in England and Germany: prevalence and school factors. Br J Psychol. 2001; 92:673–696. [PubMed: 11762868]

16. Zimmerman FJ, Glew GM, Christakis DA, Katon W. Early cognitive stimulation, emotional support, and television watching as predictors of subsequent bullying among grade-school children. Arch Pediatr Adolesc Med. 2005; 159:384–388. [PubMed: 15809395]

17. Khoury-Kassabri M, Benbenishty R, Avi Astor R, Zeira A. The contributions of community, family and school variables to student victimization. Am J Community Psychol. 2004; 34:187–204. [PubMed: 15663206]

18. Schneiders J, Drukker M, van der EJ, Verhulst FC, van OJ, Nicolson NA. Neighbourhood socioeconomic disadvantage and behavioural problems from late childhood into early adolescence. J Epidemiol Community Health. 2003; 57:699–703. [PubMed: 12933776]

19. Fergusson DMH, Horwood DM. The Christchurch Health and Development Study: review of findings on child and adolescent mental health. Aust N Z J Psychiatry. 2001; 35:287–296. [PubMed: 11437801]

20. Scott S, Campbell C. Expressed emotion about children: reliability and validity of a Camberwell Family Interview for Childhood (CFI-C). Int J Methods Psychiatr Res. 2001; 9:3–10.

21. Veenstra R, Lindenberg S, Oldehinkel AJ, De Winter AF, Verhulst FC, Ormel J. Bullying and victimization in elementary schools: a comparison of bullies, victims, bully/victims, and uninvolved preadolescents. Dev Psychol. 2005; 41:672–682. [PubMed: 16060813]

22. Moffitt TE. the E-Risk Study Team. Teen-aged mothers in contemporary Britain. J Child Psychol Psychiatry. 2002; 43:723–742.

23. Trouton A, Spinath FM, Plomin R. Twins Early Development Study (TEDS): a multivariate, longitudinal genetic investigation of language, cognition and behaviour problems in childhood. Twin Res. 2002; 38:444–448. [PubMed: 12537874]

24. Bennett, N.; Jarvis, L.; Rowlands, O.; Singleton, N.; Haselden, L. Living in Britain: Results from the General Household Survey. HMSO; London: 1996.

25. Stata [computer program]. Version 9.0. Manuals. Stata Press; Stata Corporation. College Station, TX: 2005.

26. Williams RL. A note on robust variance estimation for cluster-correlated data. Biometrics. 2000; 56:645–646. [PubMed: 10877330]

27. Royston P. Multiple imputation of missing values: update of ICE. Stata J. 2005; 5:527–536.

28. Sooman A, Macintyre S. Health and perceptions of the local environment in socially contrasting neighbourhoods in Glasgow. Health Place. 1995; 1:15–26.

29. Kim-Cohen J, Moffitt TE, Caspi A, Taylor A. Genetic and environmental processes in young children's resilience and vulnerability to socioeconomic deprivation. Child Dev. 2004; 75:651–658. [PubMed: 15144479]

30. Robins, L.; Cottler, L.; Bucholz, K.; Compton, W. Diagnostic Interview Schedule for DSM-IV. Washington University School of Medicine; St. Louis: 1995.

31. Kim-Cohen J, Caspi A, Moffitt TE, Harrington HL, Milne B, Poulton R. Prior juvenile diagnoses in adults with mental disorder: developmental follow-back of a prospective-longitudinal cohort. Arch Gen Psychiatry. 2003; 60:709–717. [PubMed: 12860775]

32. Achenbach, TM. Manual for the Young Adult Self-report and Young Behavior Checklist. University of Vermont, Department of Psychiatry; Burlington: 1997.

33. Caspi A, Taylor A, Smart M, Jackson J, Tagami S, Moffitt TE. Can women provide reliable information about their children's fathers? Cross-informant agreement about men's lifetime antisocial behaviour. J Child Psychol Psychiatry. 2001; 42:915–920. [PubMed: 11693586]

34. Straus, MA. Measuring intrafamily conflict and violence: the Conflict Tactics (CT) Scales.. In: Straus, MA., editor. Physical Violence in American Families: Risk Factors and Adaptations to Violence in 8,145 Families. Transaction; New Brunswick: 1990. p. 403-424.

35. Jaffee SR, Moffitt TE, Caspi A, Taylor A, Arseneault L. Influence of adult domestic violence on children's internalizing and externalizing problems: an environmentally informative twin study. J Am Acad Child Adolesc Psychiatry. 2002; 41:1095–1103. [PubMed: 12218431]

36. Caspi A, Moffitt TE, Morgan J, et al. Maternal expressed emotion predicts children's antisocial behaviour problems: using MZ-twin differences to identify environmental effects on behavioural development. Dev Psychol. 2004; 36:149–161. [PubMed: 14979757]

37. Dodge KA, Bates JE, Pettit GS. Mechanisms in the cycle of violence. Science. 1990; 250:1683–1990.

38. Jaffee SR, Caspi A, Moffitt TE, Taylor A. Physical maltreatment victim to antisocial child: evidence of an environmentally mediated process. J Abnorm Psychol. 2004; 113:44–55. [PubMed: 14992656]

39. Achenbach, TM. Manual for the Child Behavior Checklist/4-18 and 1991 Profile. University of Vermont, Department of Psychiatry; Burlington: 1991.

40. Achenbach, TM. Manual for the Teacher's Report Form and 1991 Profile. University of Vermont, Department of Psychiatry; Burlington: 1991.

41. Jaffee SR, Caspi A, Moffitt TE, Polo-Tomas M, Taylor A. Individual, family, and neighborhood factors distinguish resilient from non-resilient maltreated children: a cumulative stressors model. Child Abuse Negl. 2007; 31:231–253. [PubMed: 17395260]

42. Barker ED, Arseneault L, Fontaine N, Maughan B. The joint development of bullying and victimization in adolescence: relationships to delinquency and self-harm. J Am Acad Child Adolesc Psychiatry. 2008; 47:1030–1038. [PubMed: 18665001]

43. Bauer NS, Herrenkohl TI, Lozano P, Rivara FP, Hill KG, Hawkins JD. Childhood bullying involvement and exposure to intimate partner violence. Pediatrics. 2006; 118:235–242.

44. Bandura A. Social learning theory of aggression. J Commun. 1978; 28:12–29. [PubMed: 690254]

45. Bowers L, Smith PK, Binney V. Perceived family relationships of bullies, victims and bully/victims in middle childhood. J Soc Pers Relat. 1994; 11:215–232.

46. Haynie DL, Nansel T, Eitel P, et al. Bullies, victims, and bully/victims: distinct groups of at-risk youth. J Early Adolesc. 2001; 21:29–49.

47. Kim-Cohen J, Moffitt TE, Taylor A, Pawlby SJ, Caspi A. Maternal depression and children's antisocial behavior: nature and nurture effects. Arch Gen Psychiatry. 2005; 62:173–181. [PubMed: 15699294]

48. Finkelhor D, Ormrod RK, Turner HA. Re-victimization patterns in a national longitudinal sample of children and youth. Child Abuse Negl. 2007; 31:479–502. [PubMed: 17537508]

49. Whitney I, Smith PK. A survey of the nature and extent of bullying in junior/middle and secondary schools. Educ Res. 1993; 35:3–25.

TABLE 1

Descriptive Statistics for Socioenvironmental and Individual Factors

Characteristics at Age 5 y	Informants	Mean (SD) or (%)	Range	n	Interrater/Test-Retest Reliability (r)	Internal Consistency (α)	Instruments or Examples of Items	Reference Citations
School								
Total no. of children in school	DCSF	290.6 (135.7)	40-934	1,989			Based on data for schools attended by study participants	Sooman and Macintyre, (1995)[28]
Percentage of children eligible for free school meals	DCSF	14.3 (12.8)	0-83.9	1,981			Based on data for schools attended by study participants	Sooman and Macintyre, (1995)
Neighborhood								
Vandalism	Mother	1.3 (1.6)	0-6	2,226		.8	Vandalism; graffiti and damage to property; cars broken into or stolen	Kim-Cohen et al., (2004)[29]
Problems with neighbors	Mother	0.8 (1.2)	0-6	2,226		.6	Noisy neighbors, arguments, loud parties; teenagers hanging around	
Family								
Socioeconomic disadvantage	Mother	1.0 (1.5)	0-6	2,232		.8	Total household income <£10K; head of household no education	
Mothers with depression	Mother	32.7	–	2,228	.9		Diagnostic Interview Schedule	Robins et al., (1995)[30], Kim-Cohen et al., (2003)[31]
Parent's antisocial behavior	Mother	22.1	–	2,226	.8	.9	YASR, YABCL	Achenbach (1997)[32], Caspi et al., (2001)[33]
Domestic violence	Mother	36.9	–	2,218		.9	Conflict Tactics Scales	Straus (1990)[34], Jaffee et al., (2002)[35]
Maternal warmth	2 Raters	3.4 (1.0)	0-5	2,000	.9		Maternal Expressed Emotion scales based on the Five-Minute Speech Sample method	Caspi et al., (2004)[36]
Stimulating activities	Mother	8.5 (1.9)	1-12	2,230		.6	Been to the park; been to the cinema; been on a long walk	Km-Cohen et al., (2004)[29]
Child maltreatment	Mother	12.3	–	2,230	.8		Adapted Parenting Interview Schedule	Dodge et al., (1990)[37], Jaffee et al., (2004)[38]
Child								
Internalizing behaviors	Mother and teacher	14.2 (9.4)	0-62	2,232		.9	CBCL, TRF	Achenbach (1991)[39],[40]
Externalizing behaviors	Mother and teacher	16.5 (12.5)	0-93	2,232		.9	CBCL, TRF	Achenbach (1991)[39],[40]

Note: CBCL = Child Behavior Checklist; DCSF = Department for Children, Schools and Families, U.K. government department; TRF = Teacher Report Form; YABCL = Young Adult Behavior Checklist; YASR = Young Adult Self-Report.

TABLE 2

Associations Between Socioenvironmental and Individual Factors at Age 5 Years With Involvement in Bullying by Age 7 Years

	Involvement in Bullying Between Ages 5 and 7 y			
	Not Involved	**Victims**	**Bullies**	**Bully-Victims**
Characteristics at Age 5 y	Mean (SD) or %	Mean (SD) or %	Mean (SD) or %	Mean (SD) or %
School				
Total no. of children in school	291.1 (133.0)	320.1 (141.0)[*]	271.4 (140.7)[*]	273.9 (128.2)
Percentage of children eligible for free school meals	13.8 (12.6)	15.1 (12.9)	14.2 (13.1)	18.2 (13.2)[**]
Neighborhood				
Vandalism	1.2 (1.5)	1.5 (1.7)[*]	1.2 (1.5)	1.6 (1.7)[*]
Problems with neighbors	0.7 (1.1)	0.9 (1.3)[**]	0.8 (1.2)	1.5 (1.6)[**]
Family				
SES disadvantage	–0.1 (0.9)	0.1 (1.1)[**]	0.1 (1.1)[**]	0.6 (1.2)[**]
Mothers with depression	29.8	36.9	35.5	52.3[**]
Parent's antisocial behavior	18.2	25.0[*]	29.6[**]	42.0[**]
Domestic violence	32.9	39.3	47.5[**]	48.4[**]
Maternal warmth	0.1 (1.0)	0.1 (1.0)	–0.2 (1.1)[**]	–0.3 (1.0)[**]
Stimulating activities	0.1 (0.9)	–0.1 (1.1)	–0.1 (1.1)	–0.5 (1.1)[**]
Child maltreatment	9.1	18.3[**]	16.1[**]	28.0[**]
Child				
Internalizing behaviors	–0.1 (0.9)	0.2 (1.0)[**]	0.0 (1.1)	0.5 (1.2)[**]
Externalizing behaviors	–0.2 (0.8)	–0.1 (0.9)[*]	0.6 (1.3)[**]	0.8 (1.2)[**]

Note: Analyses controlled for the potential confounding effect of sex. To investigate whether sex differentially influenced the associations between each socioenvironmental factor and being involved in bullying, an interaction term (sex by socioenvironmental variables) was included in the univariate logistic regression models. None of the interaction terms yielded improvements in the fit of models predicting being involved in bullying above and beyond main effects only. Thus, analyses were conducted for the whole sample collapsed across sex. SES = socioeconomic status.

[*] $p < .05$

[**] $p < .01$ in univariate multinomial regression analyses with noninvolved children as the base outcome.

TABLE 3

Multivariate Regressions Testing the Unique Associations Between School, Neighborhood, and Family Factors at Age 5 Years With Bullying Involvement by Age 7 Years, Without and With Control for Individual Factors

Characteristics at Age 5 y	Victims Control for Individual Factors		Bullies Control for Individual Factors		Bully-Victims Control for Individual Factors	
	Without 1 OR (95% CI)	With 2 OR (95% CI)	Without 3 OR (95% CI)	With 4 OR (95% CI)	Without 5 OR (95% CI)	With 6 OR (95% CI)
School						
Total no. of children in school	1.2 (1.0-1.3)*	1.2 (1.0-1.3)*	0.9 (0.7-1.0)*	0.9 (0.8-1.0)	0.8 (0.7-1.1)	0.8 (0.7-1.1)
Percentage of children eligible for free school meals	1.0 (0.8-1.2)	1.0 (0.8-1.2)	1.0 (0.8-1.1)	1.0 (0.9-1.2)	1.0 (0.8-1.4)	1.1 (0.8-1.4)
Neighborhood						
Vandalism	1.0 (0.9-1.1)	1.0 (0.9-1.1)	0.9 (0.9-1.1)	0.9 (0.8-1.0)	0.9 (0.8-1.0)	0.9 (0.7-1.0)
Problems with neighbors	1.1 (1.0-1.3)	1.1 (1.0-1.3)	1.1 (0.9-1.2)	1.0 (0.9-1.2)	1.4 (1.1-1.7)**	1.3 (1.1-1.6)**
Family						
SES disadvantage	1.1 (0.9-1.3)	1.1 (0.9-1.3)	1.0 (0.9-1.2)	1.0 (0.8-1.2)	1.2 (1.0-1.6)	1.2 (0.9-1.5)
Mothers with depression	1.2 (0.8-1.7)	1.1 (0.8-1.6)	1.0 (0.8-1.6)	0.9 (0.7-1.3)	1.7 (1.0-2.8)*	1.5 (0.9-2.4)
Parent's antisocial behavior	1.1 (0.8-1.7)	1.1 (0.7-1.7)	1.4 (0.9-2.1)	1.1 (0.7-1.7)	1.6 (0.9-2.9)	1.3 (0.7-2.3)
Domestic violence	1.0 (0.7-1.5)	1.0 (0.7-1.5)	1.5 (1.1-2.0)*	1.4 (1.0-1.9)*	0.9 (0.5-1.6)	0.9 (0.5-1.5)
Maternal warmth	1.1 (0.9-1.3)	1.1 (1.0-1.4)	0.8 (0.7-1.0)*	1.0 (0.8-1.1)	0.9 (0.7-1.1)	1.1 (0.8-1.3)
Stimulating activities	0.9 (0.8-1.1)	0.9 (0.8-1.1)	0.9 (0.8-1.1)	0.9 (0.8-1.1)	0.8 (0.6-1.0)*	0.8 (0.6-1.0)*
Child maltreatment	2.0 (1.3-3.0)**	1.9 (1.2-3.0)**	1.5 (1.0-2.3)*	1.3 (0.9-2.1)	2.6 (1.6-1.3)**	2.1 (1.3-3.6)**
Child						
Internalizing behavior		1.2 (1.0-1.4)*		0.8 (0.7-1.0)*		1.1 (1.0-1.4)
Externalizing behavior		1.0 (0.8-1.3)		2.2 (1.9-2.6)**		1.9 (1.6-2.4)**

Note: CI = confidence interval; OR = odds ratio; SES = socioeconomic status.

*
$p < .05$

**
$p = .01$ in multivariate multinomial regression analyses with noninvolved children as the comparison group.