THE JOURNAL OF
CHILD PSYCHOLOGY AND PSYCHIATRY

Journal of Child Psychology and Psychiatry 51:7 (2010), pp 809–817 doi:10.1111/j.1469-7610.2010.02216.x

Families promote emotional and behavioural resilience to bullying: evidence of an environmental effect

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Background: Bullied children are at risk for later emotional and behavioural problems. 'Resilient' children function better than would be expected given their experience of bullying victimisation. This study examined the role of families in promoting resilience following bullying victimisation in primary school. **Method:** Data were from the Environmental Risk (E-Risk) Study which describes a nationally representative sample of 1,116 twin pairs and their families. We used mothers' and children's reports to examine bullying victimisation during primary school and mothers' and teachers' reports to measure children's emotional and behavioural adjustment at ages 10 and 12. We used mothers' and interviewers' reports to derive measures of protective factors in the home including maternal warmth, sibling warmth and positive atmosphere at home. **Results:** Results from linear regression models showed that family factors were associated with children's resilience to bullying victimisation. Maternal warmth, sibling warmth and a positive atmosphere at home were particularly important in bullied children compared to non-bullied children in promoting emotional and behavioural adjustment. We used a twin differences design to separate out environmental protective factors in twins who are genetically identical. Differences in maternal warmth between twins from genetically identical monozygotic pairs concordant for bullying victimisation were correlated with twin differences in behavioural problems ($r = -.23$) such that the twin who received the most warmth had fewer behavioural problems. This shows that maternal warmth has an environmental effect in protecting children from the negative outcomes associated with being bullied. **Conclusions:** Warm family relationships and positive home environments help to buffer children from the negative outcomes associated with bullying victimisation. Warm parent–child relationships can exert an environmentally mediated effect on children's behavioural adjustment following bullying victimisation. Identifying protective factors that promote resilience to bullying victimisation could lead to improved intervention strategies targeting the home environment. **Keywords:** Resilience, bullying victimisation, protective factors, family.

Children who are bullied are at risk for a range of adjustment difficulties including emotional and behavioural problems (Arseneault et al., 2006), self-harm (Barker, Arseneault, Fontaine, & Maughan, 2008) and suicide ideation (Herba et al., 2008). Not all bullied children go on to experience adjustment difficulties, however. Some 'resilient' children function better than would be expected given their experience of bullying victimisation. Resilience can be defined as 'an interactive concept that refers to a relative resistance to environmental risk experiences or the overcoming of stress or adversity' (Rutter, 2006). Measuring resilience in bullied children and determining factors that promote positive adjustment following bullying victimisation can help in developing targeted interventions for victims of bullying. The present study focused on the protective role of family factors on children's adjustment following experiences of bullying victimisation.

The protective role of families

The capacity of supportive families to buffer children from the impact of stressful life events is well documented (Masten & Shaffer, 2006). Studies show that caring, sensitive and safe home environments foster adjustment in children (Collishaw et al., 2007; Jaffee, 2007). Several aspects of the home environment may be particularly relevant for victims of bullying, promoting resilience to this stressful experience. Parental warmth has been identified as a key aspect of positive parenting that is linked to children's social and emotional well-being (Egeland, Kalkoske, Gottesman, & Erickson, 1990; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004). Children rejected by their peers who had a warm and caring mother showed fewer behaviour problems than other rejected children (Patterson, Cohn, & Kao, 1989). Bullied children who have warm relationships with their mothers might have more favourable adjustment outcomes than would otherwise be predicted given their experiences of bullying victimisation.

Conflict of interest statement: No conflicts declared.

Published by Blackwell Publishing, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA

Studies have highlighted the role of sibling relationships in child development. After experiencing stressful life events, children who have affectionate relationships with their siblings are less likely to develop emotional problems over time compared to those children without affectionate sibling relationships (Gass, Jenkins, & Dunn, 2007). It is not known whether having a warm sibling relationship has an effect on the association between bullying victimisation and adjustment problems. Siblings may help to buffer children from the negative outcomes of being bullied by providing an additional source of support, possibly in the environment where bullying occurs. The overall atmosphere at home may also be a protective factor against bullied children developing adjustment difficulties. Home environments, in particular the level of routine and organisation, are associated with children's behavioural adjustment over and above other parent relationship measures (Coldwell, Pike, & Dunn, 2006). Having a calm, well-structured and positive home environment may reduce overall stress levels in bullied children and increase their likelihood of achieving positive adaptation.

Warm relationships within the family and well-structured home environments are important for positive development in all children even in the absence of exposure to stressful life events. However, having a supportive family may be particularly important for children trying to cope with stressful experiences such as bullying victimisation. This study tests whether the protective effects of family factors on children's emotional and behavioural development are especially relevant following bullying victimisation.

At least two processes may explain the association between protective family factors and children's resilience to bullying. One possibility is that family factors may have a unique, environmentally mediated protective effect on bullied children's resilience. Having supportive families may itself buffer bullied children from developing adjustment difficulties by providing sources of support, alleviating stress or encouraging children to develop coping mechanisms to deal with bullying victimisation. A second possibility is that the association between family factors and children's adjustment following bullying victimisation may reflect genetic influences. For example, parents who provide caring home environments for their children and who have good parenting skills may also pass on to their children genes associated with resilience (Kendler & Baker, 2007). We aimed to investigate whether the protective effect of families on children's resilience to bullying victimisation is environmentally mediated by using a genetically sensitive monozygotic (MZ) twin differences design. This research strategy has unique advantages in being able to separate out environmental protective factors in twins who are genetically identical.

In the present study we used measures of resilience that encompassed adjustment over time following experience of bullying victimisation. We used multiple informants to reduce shared method variance. The study had three main goals. First, we tested whether family factors were associated with children's functioning in terms of emotional and behavioural resilience to bullying victimisation. We examined the protective role of these family factors over and above the effects of covariates including gender, children's cognitive abilities (IQ), socioeconomic status and adjustment difficulties prior to being bullied. Second, as family factors are likely to be important for children's positive development, even in the absence of exposure to stressors, we tested whether family factors were *particularly* important in promoting positive developmental outcomes in bullied children compared to non-bullied children. Third, focusing on a subgroup of MZ twins (allowing us to hold the effect of genetic factors constant between individuals), we tested whether protective factors in the family had an environmentally mediated effect in promoting children's positive adjustment following bullying victimisation. Observed effects cannot be due to genetic mediation because the two twins within the MZ pair do not differ genetically.

Methods

Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, which tracks the development of a birth cohort of 2,232 children. The E-Risk sample was drawn from a larger 1994–1995 birth register of twins born in England and Wales (Trouton, Spinath, & Plomin, 2002). In 1999–2000 1,116 families with same-sex twins who were 5 years old (93% of those eligible) participated in home-visit assessments, forming the base cohort for the E-Risk Longitudinal Twin Study. Details of sample construction are reported elsewhere (Moffitt & the E-Risk Study Team, 2002). Briefly, we used a high-risk stratification strategy to replace any families lost to the original register at the time of birth owing to selective non-response, and we included a further high-risk oversample to ensure sufficient numbers of children growing up in adverse environments. Mothers having twins via assisted reproduction were under-sampled to avoid any bias towards older mothers. Follow-up home visits were conducted when children were 7 years (98% of the 1,116 E-Risk Study families), 10 years (96%) and 12 years (96%). With the parent's permission, questionnaires were mailed to the children's teachers when children were 7 years (93% response rate), 10 years (90%) and 12 years (80%). The sample included 56% monozygotic twin pairs. Sex was evenly distributed within zygosity (49% male). Ethical approval was granted by the Maudsley Hospital Ethics Committee, London.

Measures

Bullying victimisation in primary school. We used mothers' and children's self-reports to measure

bullying victimisation during primary school. We explained that someone is being bullied when another child 1) says mean and hurtful things, makes fun or calls a person mean and hurtful names; 2) completely ignores or excludes someone from their group of friends or leaves them out of things on purpose; 3) hits, kicks, or shoves a person, or locks them in a room; 4) tells lies or spreads rumours about them; and 5) other hurtful things like these. We call it bullying when these things happen often, and when it is difficult for the person being bullied to make it stop. We do not call it bullying when it is done in a friendly or playful way. Mothers were interviewed when children were 7 and 10 years, and asked whether either twin had been bullied by another child, responding 'never', 'yes', or 'frequent'. Mothers reported that 42.1% of children had ever been bullied up to the age of 10 (N = 956). The test–retest reliability of victims of bullying was .87 using a sample of 30 parents who were interviewed twice, between 3 and 6 weeks apart. During private interviews with children when they were 12 years, they indicated whether they had been bullied by another child 'never', 'sometimes', or 'a lot', and whether the bullying occurred during primary school. As this report was retrospective, we included only those children reporting frequent bullying during this period. A total of 8.3% of children reported being frequently bullied during primary school (N = 196). When a mother or child reported bullying victimisation, the interviewer asked them to describe what happened. Notes taken by the interviewers were later checked by an independent rater to verify that the events reported could be classified as instances of bullying by looking for evidence of (1) repeated harmful actions (2) between children (3) where there is a power difference between the bully and the victim. Both mothers and children provided valid information that adhered to the definition of bullying. In addition, both mothers' and children's reports of early bullying victimisation were similarly associated with children's adjustment outcomes (Shakoor et al., in preparation). A total of 1,022 children (44.7%) were reported by either source as having been bullied when they attended primary school (i.e., when children were approximately 5–10 years). This prevalence rate is similar to that reported by a survey across 34 primary schools in the United Kingdom (Woods & Wolke, 2003).

Emotional and behavioural problems at age 10 and 12 years. We assessed emotional and behavioural problems using the Child Behavior Checklist for mothers (Achenbach, 1991a) and the Teacher's Report Form for teachers (Achenbach, 1991b). Mothers were given the instrument as a face-to-face interview and teachers responded by mail. Both informants rated each item as being 'not true', 'somewhat or sometimes true', or 'very true or often true'. The reporting period was 6 months before the interview. The Emotional Problems scale is the sum of items in the Withdrawn and Anxious/Depressed scales including items such as 'cries a lot', 'feels too guilty', and 'worries' (Somatic Complaints were not included as this scale was not assessed at age 12). The internal consistency reliability scores for mothers and teachers all exceeded .88. Mothers' scores when children were 10 years ranged from 0 to 39 (M = 6.64, SD = 5.74) and teachers' scores ranged from 0 to 38 (M = 4.92, SD = 5.83). Mothers' scores at 12 years ranged from 0 to 34 (M = 6.45, SD = 5.71), and teachers' scores ranged from 0 to 43 (M = 4.51, SD = 5.50). The Behavioural Problems scale is the sum of items from the Delinquency and Aggression scales. Mothers' scores when children were 10 years ranged from 0 to 57 (M = 10.19, SD = 8.73), and teachers' scores ranged from 0 to 61 (M = 5.45, SD = 9.02). Mothers' scores at 12 years ranged from 0 to 55 (M = 10.14, SD = 8.84) and teachers' scores ranged from 0 to 56 (M = 5.51, SD = 9.50). Mothers' and teachers' emotional and behavioural problems scores at each age were first standardised, summed and then averaged across age to represent children's emotional and behavioural problems over time.

Family factors between 5 and 10 years. We assessed *maternal warmth* (Caspi et al., 2004) using procedures adapted from the Five Minute Speech Sample method (Magana, Goldstein, Karno, Miklowitz, & Falloon, 1986). Mothers were asked to speak for 5 minutes about each of their children when they were aged 5 and again at age 10. Warmth is a global measure of the whole speech sample and was assessed by the tone of voice, spontaneity, sympathy, and/or empathy towards the child. Warmth was coded on a 6-point scale. *High warmth* (5) and *moderately high warmth* (4) were coded when there was definite warmth, enthusiasm, interest in, and enjoyment of the child. *Moderate warmth* (3) was coded when there was definite understanding, sympathy, and concern but only limited warmth of tone. *Some warmth* (2) was coded when there was a detached and rather clinical approach, with little or no warmth of tone, but moderate understanding, sympathy, and concern. *Very little warmth* (1) was rated when there was only a slight amount of understanding, sympathy, or concern or enthusiasm about or interest in the child. *No warmth* (0) was reserved for respondents who showed a complete absence of the qualities of warmth as defined. Two trained raters coded the tapes of the mothers' speech sample. Inter-rater reliability was established by having the raters individually code audio-tapes describing 40 children. The inter-rater agreement for maternal warmth was r = .90. The rater was blind to all other E-Risk Study data. Scores for maternal warmth at age 5 (M = 3.36, SD = .98) were significantly associated with scores at age 10 (M = 3.73, SD = .89; r = .38, p < .01).

We assessed *sibling warmth* (Jaffee, Caspi, Moffitt, Polo-Tomas, & Taylor, 2007) by asking mothers a series of questions about the quality of their children's relationship with one another when the children were aged 7 and 10. Mothers responded on a 3-point scale to six questions (e.g., 'do your twins love each other,' 'do both your twins do nice things for each other'). The internal consistency reliability score at age 7 was .77 and at age 10 was .80. Scores for sibling warmth at age 7 (M = 10.20, SD = 1.77) were significantly associated with scores at age 10 (M = 9.88, SD = 1.91; r = .57, p < .01).

Atmosphere at home. Kim-Cohen, Caspi, Rutter, Polo-Tomas, and Moffitt (2006) incorporated items from the Coder's Impression Inventory, which is based on two main inventories, the Home Observation for

Measurement of the Environment (HOME; Bradley & Caldwell, 1977) and the University of Washington Parenting Clinic questionnaire (Parent–Child Observations; Webster-Stratton, 1998). The Coder's Impression Inventory was rated immediately following the study visit by interviewers. Interviewers underwent four-day training. The atmosphere at home measure comprised items representing the state of the home (e.g., 'Are visible rooms of the house clean?'), stimulation (e.g., 'Is the children's art displayed in the home?'), happiness (e.g., 'Is this a happy home?') and chaos (e.g., 'Is the house chaotic or overly noisy?'). The internal consistency reliability score at age 7 was .77 and .79 at age 10. Scores for atmosphere at home at age 7 (M = 26.47, SD = 5.81) were significantly associated with scores at age 10 (M = 27.13, SD = 5.29; $r = .58$, $p < .01$).

Covariates. To assess children's IQ, each child was individually tested at age 5, using a short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised (Wechsler, 1990) comprising Vocabulary and Block Design subtests. IQs were prorated following procedures described by Sattler (1992). The children's IQs ranged from 52 to 145, and were normally distributed (M = 98, SD = 14).

When children were aged 5, we assessed *socioeconomic disadvantage* (Kim-Cohen et al., 2004), using a scale defined as follows: (1) head of household has no educational qualifications; (2) head of household is employed in an unskilled occupation or is not in the labour force; (3) total household gross annual income is less than £10,000; (4) family receives at least one government benefit, excluding disability benefit; (5) family housing is government subsidised; (6) family has no access to a vehicle; and (7) family lives in the poorest of six neighbourhood categories, in an area dominated by government-subsidised housing, low incomes, high unemployment, and single-parent families. Summing across these seven items yielded a composite index of socioeconomic disadvantage, ranging from 0 to 7 (M = 1.19, SD = 1.71).

Baseline emotional and *behavioural problems* were assessed when the children were aged 5 using the Achenbach family of instruments, similar to the assessments at ages 10 and 12. The internal consistency reliability of the mothers' and the teachers' reports were .84 and .85, respectively. Mothers' scores for children's emotional problems at 5 years ranged from 0 to 36 (M = 6.70, SD = 5.60), and teachers' scores ranged from 0 to 43 (M = 5.43, SD = 5.39). Mothers' scores for children's behavioural problems ranged from 0 to 55 (M = 12.89, SD = 9.14) and teachers' scores ranged from 0 to 59 (M = 5.41, SD = 8.10).

Statistical analyses

Statistical analyses were conducted using STATA 10.0 (STATA, 2005). To provide unbiased statistical estimates that can be generalised to British families with children born in the 1990s, all data reported were corrected with weighting to represent the distribution of maternal age in the UK population with the use of information from the UK General Household Survey (Bennett, Jarvis, Rowlands, Singleton, & Haselden, 1996). 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 (Williams, 2000). All family factors were averaged across assessments and transformed into standardised *z*-scores. First, we examined the associations between each family factor and children's emotional and behavioural resilience to bullying victimisation using univariate linear regression models. We further examined whether associations remained when we included covariates found to be correlated with children's resilience scores. Second, we tested whether family factors might be especially relevant for bullied children compared to non-bullied children by testing a regression model that included an interaction term (bullying victimisation status by each protective family factor) predicting children's emotional and behavioural problems over time. Third, we studied MZ twin pairs concordant for bullying victimisation to investigate whether differences in a family factor, measured separately for each twin in a pair, had an environmentally mediated protective effect on emotional and behavioural problems. The MZ differences method capitalises on the fact that MZ twins are genetically identical, therefore any differences between MZ twins growing up in the same family are due to environmental reasons – more specifically non-shared environmental factors unique to each twin. Within-pair MZ differences are calculated by subtracting one MZ twin's score in a pair from the other twin's score. By testing whether within-pair differences in a child-specific measure of the environment are associated with differences in children's emotional and behavioural problems amongst a group of bullied MZ twin pairs, we ascertain whether the protective factor exerts an environmentally mediated effect.

Results

Does being bullied predict emotional and behavioural problems?

Being bullied was associated with emotional and behavioural problems over time, irrespective of children's pre-existing difficulties assessed at age 5. Children bullied during primary school had greater levels of emotional problems at ages 10–12 years (M = 12.84, SD = 8.22) when compared to children who had not been bullied (M = 9.34, SD = 6.18), even after controlling for difficulties prior to being bullied ($t = 8.62$, $p < .01$). Bullied children also had higher levels of behavioural problems over time (M = 16.62, SD = 13.47) compared to non-bullied children (M = 12.18, SD = 11.02), even after controlling for pre-existing behavioural problems ($t = 4.94$, $p < .01$).

Deriving resilience measures

To derive a measure of emotional resilience to bullying victimisation, we regressed average scores of emotional problems at ages 10 and 12 on levels of

bullying victimisation during primary school. We saved and reverse-coded the residual scores (–44.16 to 13.34) so that positive residual scores indicate children with fewer than expected emotional problems over time given their experiences of bullying victimisation. These children can be described as showing 'emotional resilience'. Negative residualised scores indicate vulnerable children with greater than expected emotional problems at ages 10 and 12. We derived a measure of behavioural resilience to bullying victimisation using the same method (–85.51 to 18.32). Scores for emotional and behavioural resilience were correlated (r = .40, p < .001).

Associations between covariates and children's emotional and behavioural resilience to bullying victimisation

Table 1 shows that girls were more likely to be behaviourally resilient to the effects of bullying victimisation compared to boys. Having a lower IQ and growing up with greater levels of SES disadvantage were associated with a decreased likelihood of being both emotionally and behaviourally resilient to the effects of bullying victimisation. Children with high levels of emotional or behavioural problems at age 5, prior to being bullied, were less likely to be resilient.

Are family factors associated with emotional and behavioural resilience among bullied children?

Univariate regression analyses indicated that family factors were associated with children's emotional and behavioural resilience to bullying victimisation (Table 2). Maternal warmth and atmosphere at home were both more strongly associated with behavioural resilience in boys compared to girls. When controlling for the effects of gender, IQ and SES the associations between maternal warmth, sibling warmth and atmosphere at home with children's emotional and behavioural resilience to bullying victimisation remained significant. Controlling for pre-existing emotional and behavioural problems reduced the association of each protective factor with children's resilience by 24–52%, but the associations remained significant. Each family factor also had a unique effect on children's emotional and behavioural resilience to bullying victimisation when examined in a multivariate model that included all protective factors (Emotional resilience: maternal warmth: ß = .09, p < .001; sibling warmth: ß = .15, p < .001; atmosphere at home: ß = .17, p < .001; Behavioural resilience: maternal warmth: ß = .12, p < .001; sibling warmth: ß = .24, p < .001; atmosphere at home: ß = .32, p < .001).

Table 1 Associations between covariates with emotional and behavioural resilience to bullying victimisation

Covariates	Emotional resilience score *r or M (SD)*	*t*	Behavioural resilience score *r or M (SD)*	*t*
Gender				
Male	.01 (1.05)	–.02	–.25 (1.12)	9.22*
Female	.01 (.94)		.25 (.79)	
IQ	.18*		.18*	
Socioeconomic disadvantage	–.15*		–.28*	
Age-5 problems				
Emotional	–.40*		–	
Behavioural	–		–.57*	

*p <.001.

Are family factors especially relevant for bullied children?

We examined whether family factors were more strongly associated with fewer emotional and behavioural problems in bullied children compared to non-bullied children. Significant interaction effects were observed between being bullied and each family factor in predicting children's emotional and behavioural problems. Maternal warmth interacted with bullying victimisation status (i.e., bullied versus non-bullied) in predicting both emotional (ß = –1.21, p < .01) and behavioural (ß = –2.34, p < .01) problems over time. Interaction effects were also observed between sibling warmth and bullying victimisation status (emotional problems: ß = –.75, p < .01; behavioural problems: ß = –1.65, p < .001), and between atmosphere at home and bullying victimisation status (emotional problems: ß = –.23, p < .01; behavioural problems: ß = –.44, p < .01). Bullied children who had highly supportive families had fewer emotional and behavioural problems over time than bullied children from less supportive families (Figure 1). Although maternal warmth, sibling warmth and a positive atmosphere at home were significantly associated with positive adjustment for both bullied and non-bullied children, the effects of these protective family factors were significantly stronger for bullied children compared to those who had not been bullied.

Do family factors exert an environmentally-mediated effect on children's emotional and behavioural resilience to bullying victimisation?

Within-pair correlations showed that although bullied MZ twins were similar in their emotional (r = .52, p < .001), behavioural (r = .80, p < .001) and maternal warmth (r = .72, p < .001) scores, they were not identical. These within-pair differences indicated that we could test for a non-shared environmental effect of maternal warmth, as MZ correlations were less than 1. Differences in maternal warmth were significantly correlated with differences in behavioural problems (r = –.25, p < .001), indicating that maternal warmth exerts an environmental protective effect on bullied children's likelihood of developing

Table 2 Summary of linear regression models testing for associations between protective family factors and children's emotional and behavioural resilience to bullying victimisation.

		Adjusted for	
Family factors	Unadjusted ß (95% CIs[a])	Covariates[b] ß (95% CIs)	Baseline problems ß (95% CIs)
Emotional resilience			
Maternal warmth	.20 (.15–.26)	.17 (.11–.22)	.14 (.09–.19)
Sibling warmth	.23 (.17–.28)	.21 (.15–.26)	.17 (.12–.22)
Atmosphere at home	.25 (.20–.30)	.23 (.16–.29)	.19 (.14–.24)
Behavioural resilience			
Maternal warmth			
Boys	.37 (.29–.45)	.29 (.21–.37)	.22 (.15–.30)
Girls	.23 (.17–.29)	.18 (.12–.24)	.11 (.06–.16)
Sibling warmth	.36 (.31–.42)	.29 (.23–.34)	.20 (.16–.25)
Atmosphere at home			
Boys	.48 (.40–.56)	.44 (.35–.54)	.33 (.25–.40)
Girls	.33 (.25–.40)	.28 (.19–.37)	.22 (.16–.28)

[a] 95% Confidence Intervals; [b] IQ, SES and gender.
Note: To investigate whether gender differentially influenced the associations between each family factor and children's resilience to bullying victimisation, an interaction term (gender by family factor) was included in the regression models.

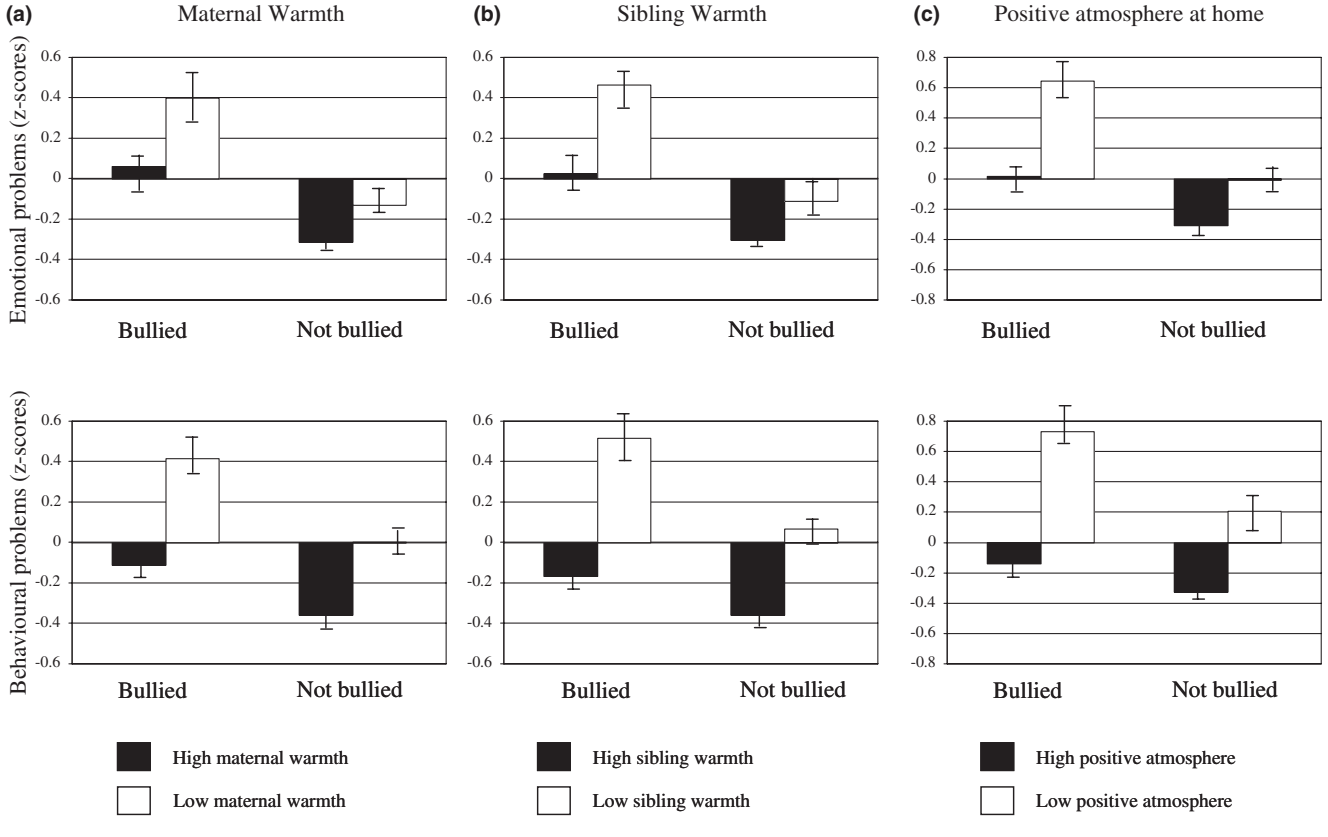

Figure 1 Interaction effects between being bullied and each family factor in predicting children's emotional and behavioural problems

behavioural problems. The bullied twin who received more maternal warmth within a twin-pair had fewer behavioural problems (M = .17, SD = 1.14) than the twin who received less maternal warmth (M = .37, SD = .98). Differences in maternal warmth were not significantly correlated with differences in emotional scores.

Discussion

This study investigates the protective role of family factors on children's emotional and behavioural development following experiences of bullying victimisation. Using prospective longitudinal data

from a nationally representative sample of children, our findings show that family factors are uniquely associated with positive emotional and behavioural adaptation over a two-year period following bullying victimisation. We showed that the effects of maternal warmth, sibling warmth and a positive atmosphere at home on emotional and behavioural development were significantly greater for bullied children compared to non-bullied children. Thus warm relationships in families and a positive atmosphere at home are of particular relevance for understanding the risk of adjustment difficulties in the context of bullying victimisation. Finally, this study used a powerful genetically sensitive twin differences design to show that the effect of maternal warmth on bullied children's behavioural adjustment over time is, at least in part, environmentally mediated.

The pathways through which family factors help to buffer children from negative outcomes associated with risk exposure are still not known (Rutter, 1990). Warm relationships within the family were associated with both emotional and behavioural resilience to bullying victimisation. Having a positive parent–child relationship may translate into an opportunity for parents to guide their children in how to cope with bullying experiences. The protective effect of sibling warmth was present over and above the effects of maternal warmth. Therefore, the effects of positive sibling relationships on bullied children's adjustment over time are not dependent on the quality of relationship that exists between mother and child. Siblings can make a unique contribution to bullied children's adjustment over time, perhaps by fulfilling the social needs of children and providing an additional source of support. A calm, well-structured environment at home may help to alleviate symptoms of stress and provide security to children experiencing stressful events outside the home environment. The effects of maternal warmth and a positive atmosphere at home on behavioural adjustment appear to be particularly important for boys compared to girls. It is possible that boys are more sensitive to the effects of these family factors in promoting positive behaviours and discouraging them from 'acting out' in behaviourally inappropriate ways.

Our findings apply to both resilience and vulnerability to bullying victimisation as we used a continuous measure of residual scores. Therefore, low scores for each family factor help to explain why some children have more emotional and behavioural problems than expected given their experience of bullying victimisation. It is possible that the highly resilient children at one end of the continuum may be qualitatively different from children who were more vulnerable following bullying victimisation. We repeated the analyses and compared the top 25th percentile of residual scores with the remaining 75% of the sample using logistic regression analyses. Each of the protective factors was significantly associated with the top 25th percentile of residual scores for both emotional and behavioural resilience. This indicates that the observed associations do not simply reflect low scores on family factors making children more vulnerable to the effects of being bullied.

We found that the association between maternal warmth and bullied children's behavioural adjustment is environmentally mediated. This indicates that maternal warmth protects against the development of adjustment difficulties for victims of bullying independent of other protective factors common to members of the family in which the bullied twins grew up, including genetic factors. It also indicates that the association between maternal warmth and bullied children's behavioural adjustment does not simply reflect a genetic tendency to both elicit maternal warmth and cope with adversity.

This study has some methodological limitations. First, our sample comprised twins and we cannot be certain that our results generalise to singletons. However, findings on the association between bullying and mental health outcomes in twins are similar to studies of singletons (Arseneault et al., 2006; Nansel, Craig, Overpeck, Saluja, & Ruan, 2004). Second, as mother's reports for both bullying victimisation and children's adjustment outcomes were used, results could be inflated by shared method variance. This potential problem is limited by using multiple measurement modalities (e.g., mother speech sample, home visitor rating, mother and teacher reports). Third, our measure of sibling warmth reflected warmth between twins in a pair, therefore it is possible that the protective effect may be different from siblings of a different age. However, our finding that sibling warmth exerts a protective effect on child adjustment in the context of adversity over and above that of maternal warmth is in keeping with the findings reported for singletons (Gass et al., 2007). Fourth, our findings indicated a protective effect of family factors on children's adjustment at ages 10–12 years. It is possible that other factors are important in older age groups as children begin to spend less time at home. Also, additional outcome measures should be studied in older samples such as alcohol abuse, drug use or self-harm.

Our findings highlight the importance of including families in school-based intervention programmes aimed at reducing difficulties experienced by bullied children. Understanding the mechanisms by which family factors help to buffer children from emotional and behavioural difficulties following bullying victimisation is a particularly important aim for future work on resilience in bullied children and may represent a key area for clinical intervention. Having warm relationships at home may help to reduce stress levels and enable bullied children to develop coping mechanisms. Furthermore, bullied children will benefit from a calm, structured atmosphere at home.

Acknowledgements

Our thanks to Michael Rutter and Robert Plomin, to Thomas Achenbach for his kind permission to adapt the Child Behavior Checklist and to the members of the E-Risk Study team for their hard work and insights.

Lucy Bowes is supported by the Economic and Social Research Council. Louise Arseneault is supported by a Career Scientist Award from the Department of Health, UK. Barbara Maughan is supported by the Medical Research Council, UK. Avshalom Caspi is a Royal Society Wolfson Research Merit Award holder. The Environmental Risk (E-Risk) Study is funded by the Medical Research Council (UK-MRC grant G9806489). Additional support was provided by the Johan Jacobs Foundation, the British Academy , and the Nuffield Foundation. We are grateful to the Study families and teachers for their participation.

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Key points

- Bullying is a risk factor for a number of adjustment difficulties in childhood, including emotional and behavioural problems.
- Not all bullied children develop adjustment difficulties – some 'resilient' children function better than would be expected given their experience of bullying victimisation.
- Warm, supportive and well-structured families help to protect children from the negative outcomes associated with bullying victimisation.
- The effect of maternal warmth on children's behavioural adaptation following bullying victimisation is environmentally-mediated.

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Manuscript accepted 1 December 2009