

**Bullying in Childhood, Externalizing Behaviors, and Adult Offending: Evidence From a
30-Year Study**

DAVID M. FERGUSSON

JOSEPH M. BODEN

L. JOHN HORWOOD

*Department of Psychological Medicine, University of Otago, Christchurch School of Medicine
and Health Sciences, Christchurch, New Zealand*

Address correspondence to: Professor David M. Fergusson, Christchurch Health and
Development Study, University of Otago, Christchurch School of Medicine and Health Sciences,
PO Box 4345, Christchurch, New Zealand; E-mail: dm.fergusson@otago.ac.nz

Abstract

This study examined the developmental processes linking childhood bullying to criminal offending in adulthood, using data from a 30-year longitudinal study. The linkages between bullying in childhood and three criminal offending outcomes in adulthood were estimated both before and after control for a range of confounding factors. A series of protective factors that potentially mediated these linkages were also examined. The results of the study showed that while the majority of the association between childhood bullying and adult offending could be explained by confounding factors including childhood externalizing behavior, there was evidence for direct linkages from bullying to violent offending and arrest/conviction. There was little evidence to suggest mediation of the associations. The results suggest that bullying prevention requires interventions aimed specifically at bullying behavior.

KEYWORDS bullying, externalizing behavior, adult offending, longitudinal study

In a previous article, we examined the relation between bullying perpetration during middle childhood and subsequent criminal behavior to the age of 30 (Gibb, Horwood, & Fergusson, 2011). This study showed that even following control for a number of covariate factors, bullying during middle childhood was predictive of later crime including self-reported violent offending, property offending and arrests/convictions. After controlling for covariates, rates of these outcomes were 1.3 to 2.5 times higher in children described as bullying on the basis of parent and teacher report at ages 7 to 12 years. In this article, we focus on this finding to examine more closely the developmental processes linking bullying to later crime, and to examine possible protective factors that may mediate the association between early bullying and later crime.

The first focus of our analysis is on the extent to which the associations between bullying in middle childhood and later crimes are mediated by more general tendencies to conduct problems and externalizing behaviors in middle childhood. Specifically, it can be suggested that children who are on a life course persistent offending trajectory (Fergusson, Horwood, & Lynskey, 1993; Moffitt, 1993; Moffitt, Caspi, Harrington, & Milne, 2002) are more prone to engage in aggressive behaviors to their peers, thus accounting for the apparent associations between early bullying and later crime (Farrington & Ttofi, 2011; Sourander et al., 2006, 2007; Ttofi, Farrington, Losel, & Loeber, 2011).

Examining this issue is of considerable importance in developing interventions to reduce the linkages between early bullying and later antisocial behaviors. Specifically, if these associations are accounted for by the common effects of comorbid or correlated externalizing behaviors, then the appropriate approach is to use interventions which are targeted at addressing conduct problems in general (Fergusson & Boden, 2011; Scott, 2008; Webster-Stratton &

Taylor, 2001) rather than those which focusing specifically on bullying. If, however, bullying exerts an effect on later crime independently of comorbid externalizing problems this would suggest the need for interventions that are targeted specifically at reducing bullying behaviors (Rigby & Slee, 2008; Stevens, De Bourdeaudhuij, & Van Oost, 2001).

On the assumption that bullying has longer term effects on later crime independently of tendencies to externalizing behavior (Ttofi et al., 2011), an important issue is to examine possible intervening factors that may act to exacerbate or minimize the longer term risks of crime. Since it is clear that not all children who engage in bullying go on to have a criminal history, it is of interest to compare those young bullies who go on to commit crimes with those who do not progress to offending with the aim of identifying factors that might reduce risks of later offending. Possible factors that may reduce risks of later crime for those engaging in bullying include: school achievement and success; the formation of relationships with prosocial peers; and strong relationships with parents and caregivers (Brody, Kim, Murry, & Brown, 2005; Eliot & Cornell, 2009; Losel & Farrington, 2012; Perren & Alsaker, 2006; Ttofi & Farrington, 2012).

Against this background this article examines the associations between bullying perpetration in middle childhood and later crime using data gathered over a 30-year longitudinal study (the Christchurch Health and Development Study). The aims of the article are to elaborate on the association between bullying perpetration in middle childhood and later crime by:

1. examining the extent to which the association between bullying perpetration and later crime can be explained by the common effects of childhood externalizing on both outcomes; and

2. exploring possible developmental pathways that might mitigate the associations between early bullying perpetration and later crime.

Method

Participants

Data were gathered from the Christchurch Health and Development Study (CHDS), a longitudinal study of a birth cohort of 1,265 individuals born in Christchurch, New Zealand in 1977 and followed to age 30 (Fergusson & Horwood, 2001; Fergusson, Horwood, Shannon, & Lawton, 1989). Study participants were assessed at annual intervals from birth to age 16, then at ages 18, 21, 25 and 30, using a combination of semistructured interviews, standardized testing and teacher questionnaires. All phases of the study were subject to ethical approval and all information was collected on the basis of signed consent from study participants. Sample sizes in the present analysis ranged from 979-985, representing 78%-79% of the surviving adult cohort.

Bullying Perpetration, Ages 7-12 Years

When participants were aged 7 to 12, parents were questioned annually about their child's behavior using a questionnaire based on the Rutter (Rutter, Tizard, & Whitmore, 1970) and Conners (Conners, 1970) parent questionnaires (ages 7-12). As part of this questioning parents were asked the extent to which the statement "bullies other children" applied to their child. Parallel to parental reports, teacher ratings of child behavior were also obtained from ages 7-12 years using a questionnaire that combined the Rutter (Rutter et al., 1970) and Conners (Conners, 1969, 1970) teacher questionnaires. This questionnaire also included the item "bullies other children." All ratings were made on a 3-point scale (*doesn't apply, applies somewhat, certainly applies*), and children were classified as bullying others at each age if the parent or teacher responded that the item *certainly applies*. For the purposes of this analysis, these data

were used to define a measure of bullying perpetration during middle childhood (7-12 years) based on combined parent or teacher report. The definition was based on any positive report of bullying from the relevant source (parent, teacher) at any time during the interval.

Criminal Offending Outcomes, Ages 16-30

Three measures of criminal offending were obtained from the CHDS database.

Property offending/violent offending (ages 16-21, 21-25, 25-30). At ages 18, 21, 25 and 30, respondents were questioned about their criminal behaviors since the previous assessment using the Self-Report Delinquency Inventory (Elliott & Huizinga, 1989) supplemented by additional custom-written survey items. This information was used to derive count measures of the number of self-reported property offences and violent offences committed in the twelve months prior to each assessment over the period from age 16 to age 30 years. Property offenses were defined to include theft, burglary, breaking and entering, vandalism, fire setting, and related offenses; violent offenses included assault, fighting, use of a weapon, or threats of violence against a person. Respondents who reported at least one property offence or at least one violent offence during an assessment period (16-21 years, 21-25 years, 25-30 years) were classified using a dichotomous measure as having committed a property offence or violent offence for that assessment period.

Arrest/conviction (ages 16-21, 21-25, 25-30). At ages 18, 21, 25 and 30, cohort members were questioned about whether or not they had been arrested for any reason during each year since the previous assessment, and, if so, they were asked to provide details of the circumstances leading to the arrest and the consequences of the arrest, including court convictions. Those cohort members who reported having been arrested or convicted during an assessment period (16-21 years, 21-25 years, 25-30 years) were classified using a dichotomous

measure as having been arrested/convicted during that assessment period.

Confounding Factors

Several potential confounding factors were obtained from the CHDS database from a wider array of possible covariate factors spanning: perinatal factors, family socioeconomic factors, family functioning, and parental adjustment. Described below are those factors found to play a statistically significant ($p < .05$) role in the linkages between bullying in middle childhood and later offending outcomes.

Gender. Recorded at birth.

Maternal age < 20 years at birth. This was recorded at the birth of each cohort member. For the purposes of the present study, a dichotomous variable was created that represented whether the birth mother was aged less than 20 years at the birth of the cohort member.

Family living standards (ages 0-10). This was a measure of family material living standards from ages 0-10 was obtained using a global assessment made via interviewer rating. Ratings were made on a five point scale that ranged from 1 = *very good* to 5 = *very poor*. These ratings were summed over the 10-year period and divided by 10 to give a measure of typical family living standards during this period. For the purposes of the present study, a dichotomous measure representing those in the lowest quartile for family living standards over the period 0-10 years was created.

Childhood sexual abuse (0-16 years). At age 18 and 21 years, participants were questioned about their experience of sexual abuse in childhood (< 16 years; Fergusson, Lynskey, & Horwood, 1996). For the purposes of the present analysis, participants were classified as having experienced the most severe levels of childhood sexual abuse if they reported at either

age 18 or 21, any episode of abuse involving attempted/completed intercourse by a perpetrator.

Parental history of criminal offending. When participants were aged 15 years, parents were questioned about their involvement in criminal offending. Participants were classified as having a parental history of criminal offending if any parent reported a history of criminal offending.

Childhood conduct and attention problems (7-12 years). Conduct problems and attention problems in middle childhood were assessed at each year from 7 to 12 years using scales that combined items from the Rutter (Rutter et al., 1970) and Conners (1969, 1970) child behavior rating scales. Separate ratings were obtained from the child's parent and class teacher. Parent and teacher ratings were summed for each year and then averaged over the interval from 7-12 years to provide robust measures of the child's tendencies to conduct problems and attention problems during that period. Coefficients alpha ranged were .89 for conduct problems and .87 for attention problems.

Potential Mitigating (Mediating) Factors

Several potential mediating factors measured during adolescence that may mitigate the linkages between childhood bullying and adult offending outcomes were obtained from the CHDS database. Listed below are the factors that were: (a) significantly ($p < .05$) associated with the three criminal offending outcomes described above, and (b) employed in the analyses described below.

Affiliation with prosocial peers (14 years). At age 14, cohort members were questioned as to the number of friends with whom they associated that: (a) used alcohol or illicit drugs, or (b) had been in trouble with the law. Under the assumption that those individuals who were less likely to be affiliated with deviant peers were more likely to be affiliated with prosocial

peers, a measure of affiliation with prosocial peers was created using a dichotomous measure representing those cohort members who were in the lowest quartile for affiliation with deviant peers.

Achieving high school qualifications. A measure of secondary school achievement was provided by a count of the number of pass (A, B or C) grades attained in School Certificate examinations. School Certificate was a national (New Zealand) series of examinations available to all students that was usually undertaken in the third year of high school (ages 15-16 years). Cohort members who achieved at least one passing grade in a School Certificate examination were classified using a dichotomous variable as having achieved a high school qualification.

Parental attachment (15 years). The quality of parental attachment was assessed using the parental attachment scale developed by Armsden and Greenberg (1987) and administered when sample members were aged 15. The full parental attachment scale was used in these analyses and was found to have good reliability ($\alpha = .87$).

Parental bonding measures (maternal care and affection, paternal care and affection, maternal control and overprotection, paternal control and overprotection, 16 years). At age 16, sample members were questioned about their relationship with both their mother and father using the care and over-protection subscales of the Parental Bonding Instrument (PBI; Parker, Tupling, & Brown, 1979). The PBI is a 25-item retrospective measure of an adolescent's perception of his or her mother's and father's parenting attitudes and behavior towards them during childhood. The care scale measures the extent to which a parent was perceived to be supportive, affectionate, and nurturing, whilst the over-protection scale measures the extent to which a parent was perceived to be controlling and unwilling to allow the child autonomy. The maternal and paternal care and over-protection scales alpha coefficients ranged

from .85 to .91.

Statistical Analyses

Associations between bullying and offending outcomes. The associations between measures of bullying perpetration in middle childhood and criminal offending outcomes in late adolescence/adulthood were modeled by fitting logistic regression models to the data for each outcome using a generalized estimating equation (GEE) approach (Liang & Zeger, 1986; Zeger & Liang, 1986). The GEE approach pooled the repeated measures data over the three assessment periods (16-21, 21-25, and 25-30 years) to produce an estimate of the population averaged association between bullying and each outcome. The general models fitted were of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1X_i + A_t \quad (\text{EQ1})$$

where $\text{logit}(Y_{it})$ was the log odds of the outcome Y for the i th participant in the t th time period ($t = 16-21, 21-25, 25-30$), and X_{it} was a measure of bullying for the i th individual. In all cases the fitted models permitted the repeated measures of the outcomes within individuals over time to be correlated with an unstructured correlation matrix. In these models the coefficient B_1 represents the effect of bullying on the offending outcomes, pooled over the three observation periods. The fitted models also included an age term (A_t) to allow for across time changes in the rate of each outcome. Estimates of the odds ratio and corresponding 95% confidence interval between bullying and each outcome were calculated in the usual manner using the formula

$e^{B_1 \pm 1.96 \times SE_{B_1}}$ where SE_{B_1} was the standard error for regression coefficient B_1 . In addition, a term representing a bullying status x assessment period interaction was included in each model (not shown). All terms were tested for significance ($p < .05$) using a Wald chi-square test derived from the fitted GEE model. All GEE analyses were conducted in Stata v. 10.1.

Adjustment for potential confounding. To adjust the observed associations between bullying and offending outcomes for confounding, the above models were extended to include the set of confounding factors described above. All factors were initially included, and the models were then refined to remove those that were not significant ($p < .05$) predictors. The models fitted were of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1X_{it} + \sum B_jZ_{ij} + A_t \quad (\text{EQ2})$$

where Z_{ij} were a set of confounding factors for individual i . Adjusted odds ratios were calculated using the adjusted regression coefficient B_1 and the formula described previously.

Structural equation modeling. In order to explore the developmental pathways leading from bullying, childhood externalizing behaviors (conduct problems; attention problems) to criminal offending outcomes, a structural equation model as shown in Figure 1 (below) was fitted to the data using LISREL 8.8. Model fitting was conducted using asymptotic distribution-free estimation fitted to the variance-covariance matrix of the observed measures of offending, externalizing (conduct problems and attention problems) and bullying. Model goodness of fit was assessed via the model chi-square statistic corrected for non-normality, the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean squared residual correlation (SRMR). In well-fitting models the CFI should be close to one, the RMSEA less than 0.05, and the SRMR close to zero (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

Adjustment for potential mediation. To examine whether the associations between bullying and offending outcomes were mediated by a series of protective factors observed in adolescence, the models shown in EQ2 (above) were extended to include the set of potentially mediating factors described above. In fitting these models, potentially mediating factors were

entered into the models successively (in order to maintain model stability) rather than simultaneously, and each was tested for statistical significance. These models were of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1X_{it} + \sum B_jZ_{ij} + B_kZ_{ik} + A_t \quad (\text{EQ3})$$

where Z_{ik} was the potentially mediating factor in question. In addition, terms representing a mediator x bullying status interaction were included in the fitted models (not shown). Then, each statistically significant ($p < .05$) potential mediating factor was tested for mediation using Sobel-Goodman tests of mediation.

Examination of possible protective effects of confounding factors. It could be argued that the confounding factors noted above could be construed as “protective” factors, being associated with reduced risk of adverse outcomes (for example, gender, in which female gender would be associated with lower risks of adverse outcomes). In order to examine this issue, the analyses described above in EQ2 (above) were extended to fit models that included interactions between each of the confounding factors and bullying for each of the outcome variables (violent offending; property offending; arrest/conviction).

Results

Associations Between Bullying Status and Criminal Offending Outcomes, Ages 16-30

Table 1 shows the bivariate associations between bullying status during the period 7-12 years and the three criminal offending outcomes (violent offending; property offending; arrest/conviction) during the period 16-30 years. The Table shows the rate of each offending outcome for each assessment period (16-21 years, 21-25 years, 25-30 years) and the population-averaged rates of each category offending for bullies and nonbullies. The Table also reports on the estimate of the odds ratio (OR) and 95% confidence interval (CI) pooled over the period 16-30 years, derived from generalized estimating equation (GEE) models (see Method). The Table

shows that for each outcome and at each assessment period, rates of criminal offending outcomes were higher for those cohort members reported to have bullied others during middle childhood than for those who were not reported to have bullied others. Estimates of the OR ranged from 2.5 to 4.8 for the three outcomes, and the pooled association was statistically significant in all cases ($p < .0001$).

In addition, the analyses showed that for each outcome there was a statistically significant effect for age ($p < .0001$), indicating that rates of offending declined for each outcome over time, with the highest rates during the period 16-21 years, and the lowest rates during the period 25-30 years. However, there was no evidence of age x bullying status interaction effects (all p values $> .10$), suggesting that the strength of association between bullying status and outcomes did not vary across age periods.

INSERT TABLE 1 HERE

Associations Between Potential Confounding Factors in Early and Middle Childhood and Bullying Status (Ages 7-12)

It may be argued that the linkages between bullying status in middle childhood and offending outcomes in late adolescence/early adulthood may to some extent reflect the influence of confounding factors in early and middle childhood, and in particular the potentially confounding effects of childhood externalizing behavior (conduct problems, attention problems). In order to examine this issue, several potential confounding factors were chosen from the study database (see Method). Table 2 shows the associations between a range of confounding factors and bullying status during ages 7-12. For the purposes of data display, only those confounding factors found to be statistically significant in the final models (below) are shown. The Table shows that those who were reported to have bullied others were also significantly more likely to:

be male ($p < .0001$); have had a mother aged < 20 years at the child's birth ($p < .05$); been in the lowest quartile for family living standards during ages 0 to 10 ($p < .0001$); been exposed to the most severe levels of sexual abuse ($p < .05$); have had at least one parent with a history of criminal offending ($p < .0001$); have been in the highest quartile for conduct problems during ages 7-12 ($p < .0001$); and have been in the highest quartile for attention problems during ages 7-12 ($p < .0001$).

INSERT TABLE 2 HERE

Adjustment for Confounding

In order to account for the possible influence of the confounding factors shown in Table 2, the associations between bullying status in middle childhood and adult offending outcomes were adjusted for the influence of these confounding factors (see Method). The adjusted associations are shown in Table 3, which displays the estimates of the adjusted odds ratios (AOR) and 95% CI for each offending outcome, pooled over the period 16-30 years. Table 2 also shows the statistically significant confounding factors for the association between bullying status and each outcome. Table shows 2:

1. After adjustment for confounding, the association between bullying status and violent offending remained statistically significant ($p < .05$), suggesting that bullying contributed modestly to predicting violent offending in adulthood, even after accounting for the possible effects of confounding factors. Statistically significant ($p < .05$) confounding factors included: conduct problems, attention problems, gender, exposure to sexual abuse, family living standards, and maternal age.
2. After adjustment, the association between bullying status and property crime was reduced to statistical nonsignificance ($p > .10$), suggesting that bullying was not

associated with an increased risk of property crime after accounting for the effects of confounding factors. Statistically significant confounding factors included: conduct problems and attention problems.

3. After adjustment, the association between bullying status and arrest/conviction was reduced to marginal statistical significance ($p < .10$), suggesting that bullying made a marginal contribution to predicting arrest/conviction in adulthood after accounting for the influence of confounding factors. Statistically significant ($p < .05$) confounding factors included: conduct problems, gender, parental offending history, and exposure to sexual abuse.

In general, the analyses above suggest that bullying made a small but detectable contribution to violent offending and a marginal contribution to arrest/conviction, after controlling for confounding factors, in particular externalizing behavior (conduct and attention problems).

INSERT TABLE 3 HERE

Structural Modeling of the Linkages Between Bullying, Conduct Problems, Attention Problems, and Criminal Offending Outcomes

The previous analyses suggested that childhood bullying had an independent effect on violent offending and arrest/conviction in adulthood, over and above the correlated effects of other childhood externalizing behaviors. In order to more fully explore the potential developmental pathways that lead from bullying and childhood externalizing behavior to criminal offending in late adolescence and early adulthood, a structural equation model of the form shown in Figure 1 was fitted to the data (see Method). This model assumes: (a) the observed measures of childhood conduct problems, attention problems and bullying are

indicators of an underlying latent variable reflecting childhood propensity to externalizing behavior, (b) the observed measures of violent offending, property offending and arrest/conviction in adulthood are indicators of corresponding latent variables reflecting corresponding propensities to offending and likelihood of arrest or conviction, (c) the latent adult offending variables are in turn influenced by latent childhood externalizing, and (d) the model also allows for specific direct paths from childhood bullying to latent adult offending outcomes. These pathways reflect the direct effects of bullying on latent outcomes over and above the general effects of childhood externalizing. The model also permitted the disturbances on the latent adult offending variables to be correlated (not shown).

Figure 1 shows the standardized parameter estimates for the fitted model (all estimates shown were statistically significant; $p < .05$). The model fit indices show that the model was well-fitting, $\chi^2(36) = 43.13$, $p = .27$; RMSEA = .012, CFI = 0.999, SRMR = 0.027. The standardized parameter estimates show that a general externalizing factor explained the majority of the associations between childhood bullying and later offending. However, the model also showed that bullying made a small but detectible contribution to both violent offending and arrest/conviction after taking into account the correlated effects of externalizing behaviors in middle childhood. There was also evidence of an additional direct path from childhood attention problems to adult violent offending.

INSERT FIGURE 1 HERE

Further Analyses

Adjustment for potential mediators. To extend the examination of the developmental pathways leading from bullying to criminal offending, the models described in Table 3 were extended to include a series of potentially mediating protective factors during adolescence that

were significantly ($p < .05$) related to lower rates of offending outcomes (see Method). These protective factors included: affiliation with prosocial peers, achieving high school qualifications, parental attachment, and maternal and paternal care and overprotection as measured by the PBI (Parker et al., 1979). Although the analyses revealed that each of these factors were significantly ($p < .05$) associated with offending outcomes upon inclusion in the GEE models, there was no evidence for a mediating role for any factor. Parameter estimates for the associations between bullying and (a) violent offending and (b) arrest/conviction remained largely unchanged by the inclusion of potentially mediating factors in the models (Baron & Kenny, 1986). For violent offending, parameter estimates for the mediation models ranged from .49 to .52, whereas the parameter estimate from the original (adjusted) model was .51. For arrest/conviction, parameter estimates for the mediation models ranged from .38 to .41, whereas the original (adjusted) model parameter estimate was .41. Finally, Sobel-Goodman tests of mediation revealed no evidence of statistically significant mediation for any model (all p values $> .05$). The results of these analyses would suggest that the linkages between bullying and offending outcomes could be largely explained by externalizing behaviors and other confounding factors during childhood, and that the small but detectable linkages between bullying and later outcomes were not mediated via adolescent environmental and social factors.

Examination of protective factors. As noted in the Method section, in order to examine the extent to which some of the confounding factors may protect against the adverse consequences of bullying, the analyses above were extended to fit models that included interactions between each of the covariate factors in Table 2 and bullying for each of the outcome variables (violent offending, property offending, arrest/conviction). No statistically significant interactions were found (all p values $> .05$), implying that the factors in Table 2 did

not act as protective factors that modified the effects of bullying on later antisocial behaviors. The fitted models were consistent with the view that the factors in Table 2 acted additively as compensatory variables in modifying the impacts of bullying on later outcomes.

Discussion

Findings and Implications

In this article, we elaborated on the relation between bullying perpetration in the middle school years and later crime, as first reported in an earlier study of the present cohort (Gibb et al., 2011). In the first stage of this analysis, we used regression methods and structural equation modeling methods to examine the extent to which associations between bullying in childhood and later crime could be explained by the associations between bullying and externalizing behaviors, including conduct problems and attention problems. This analysis showed that control for the correlated effects of externalizing behaviors reduced the magnitude of the associations between early bullying and later crime. However, a statistically significant ($p < .05$) relation remained between early bullying and later violent offending. These findings clearly suggest that bullying perpetration in middle childhood is a precursor of later antisocial behavior independently of the effects of childhood externalizing behaviors on later behavior.

The findings of this stage of the analysis have some important implications for the management of childhood bullying. First, to the extent that much of the association between early bullying and later crime can be explained by childhood externalizing disorders including conduct and attention problems, it is important that children identified as bullies in their middle childhood years are provide with an appropriate psychological assessment and if necessary referred to evidence-based intervention for childhood conduct and attention problems (Fergusson & Boden, 2011; Scott, 2008; Webster-Stratton & Taylor, 2001). In addition the findings suggest

that children with early conduct problems and attention problems who bully during their middle childhood years are a high-risk group for later violent crime and arrest (Fergusson et al., 1993; Moffitt, 1993; Moffitt et al., 2002). The results of the structural equation modeling suggested that while the majority of the linkages between bullying and adult offending were explained by a latent factor representing childhood externalizing, there were small but detectable direct pathways from bullying to violent offending and arrest/conviction, in confirmation of the findings of the GEE models. These results imply that the reduction of bullying requires interventions that are targeted specifically at reducing bullying behaviors (Rigby & Slee, 2008; Stevens et al., 2001), as well as interventions more generally aimed at reducing the incidence of externalizing behaviors.

In the second stage of the analysis, we attempted to identify compensatory or protective factors that mediated the association between early bullying and later crime. Factors considered included: school achievement, formation of prosocial peer relationships in adolescence, and measures of the quality of parent-child relationships in adolescence (Brody et al., 2005; Eliot & Cornell, 2009; Losel & Farrington, 2012; Perren & Alsaker, 2006; Ttofi & Farrington, 2012). While all of these factors were statistically significant ($p < .05$) predictors of later crime, tests of mediation showed that these factors did not mediate the associations between early bullying and later crime. In addition, tests of interaction between confounding factors and bullying revealed no evidence that these factors modified the effect of bullying on antisocial behaviors.

Limitations

The present study has some limitations that might affect the extent to which the findings are generalizable to other populations. First, the data were obtained from a specific cohort at a specific time period. Social change, such as changes to school behavior policies in recent years

(Rigby & Slee, 2008) may affect the linkages between bullying and outcomes in a manner that were not observed in the present cohort. Second, there were a relatively small number of bullies observed in the present cohort ($n = 87$), which may have reduced the precision of estimates. Finally, the data on offending outcomes were obtained via self-report, which may have underestimated to some extent the actual scope of offending among cohort members.

Summary

In summary the findings of this study suggest the presence of small to modest associations between early bullying and later crime independent of the correlated effects of childhood externalizing behaviors, and intervening effects of a number of potential compensatory or protective factors. These findings highlight the significance of childhood bullying as a factor that may have longer-term consequences for the development of future antisocial behaviors. The present analysis suggests that, in part, these problems can be addressed through the provision of evidence-based programs targeted at the prevention, treatment and management of childhood externalizing behaviors. However, the weight of the evidence from this study suggests that such intervention may not be sufficient to mitigate the longer-term effects of early bullying, suggesting the need for programs targeted specifically at the prevention, treatment and management of bullying perpetration in middle childhood.

Conflict of Interest

The authors declare no conflicts of interest.

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Table 1
Associations Between Bullying Status (Ages 7-12) and Offending Outcomes, Ages 16-30

Outcome (%)	Bullying status		<i>p</i> ¹
	Not reported to bully others (<i>n</i> = 854)	Reported to bully others (<i>n</i> = 78)	
<i>Violent offending</i>			
Ages 16-21	19.1	47.3	
Ages 21-25	4.6	22.1	
Ages 25-30	4.5	13.6	
Population-averaged rate	9.4	27.3	
OR [95% CI]	1	3.6	
	—	[2.6, 4.9]	< .0001
<i>Property offending</i>			
Ages 16-21	21.0	45.5	
Ages 21-25	6.2	15.6	
Ages 25-30	2.8	5.9	
Population-averaged rate	10.0	21.9	
OR [95% CI]	1	2.5	
	—	[1.8, 3.4]	< .0001
<i>Arrest/conviction</i>			
Ages 16-21	13.1	37.5	
Ages 21-25	7.4	31.2	
Ages 25-30	4.8	23.7	
Population-averaged rate	8.4	30.7	
OR [95% CI]	1	4.8	
	—	[3.4, 6.7]	< .0001

¹Wald χ^2 from generalized estimating equation models.

Table 2

Associations Between Bullying Status (Ages 7-12) and Potentially Confounding Factors in Early/Middle Childhood

<i>Confounding factors</i>	Bullying status		<i>p</i> ¹
	% Not reported to bully others (<i>n</i> = 854)	% Reported to bully others (<i>n</i> = 78)	
Male gender	47.1	71.4	< .0001
Mother aged < 20 years at birth	8.9	14.3	< .05
Lowest quartile for family living standards (ages 0-10)	20.7	46.3	< .0001
Exposed to most severe levels of sexual abuse	5.2	9.5	< .05
Parental history of criminal offending	10.4	30.2	< .0001
Highest quartile for conduct problems (ages 7-12)	15.3	83.7	< .0001
Highest quartile for attention problems (ages 7-12)	19.6	64.0	< .0001

¹ Martel-Haenszel χ^2 test of independence.

Table 3

Adjusted ORs (AOR) and 95% CI for the Associations Between Bully Status and Criminal Offending Outcomes

Outcome	AOR	95% CI	p^1	Significant covariates ²
Violent offending (ages 16-30)	1.66	1.07, 2.55	< .05	1, 2, 3, 4, 5, 6, 7
Property offending (ages 16-30)	1.36	0.85, 2.17	> .10	6, 7
Arrest/conviction (ages 16-30)	1.50	0.96, 2.36	< .10	1, 4, 5, 6

¹ Wald χ^2 from GEE model.

²Significant ($p < .05$) covariates include: 1 = gender, 2 = maternal age, 3 = family living standards (ages 0-10), 4 = exposure to sexual abuse, 5 = parental history of criminal offending. 6 = conduct problems (ages 7-13), 7 = attention problems ages 7-13.

Figure 1. Structural Model with Standardized Coefficients