

Bullying at age eight and criminality in adulthood: findings from the Finnish Nationwide 1981 Birth Cohort Study

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Abstract

Context There are no prospective population-based studies examining predictive associations between childhood bullying behavior and adult criminality.

Objective To study predictive associations between bullying and victimization at age eight and adult criminal offenses.

Design Nationwide birth cohort study from age 8 to 26 years.

Participants The sample consists of 5,351 Finnish children born in 1981 with information about bullying and victimization at age eight from parents, teachers, and the children themselves.

Main outcome measures National police register information about criminal offenses at age 23–26 years.

Results When controlled for the parental education level and psychopathology score, bullying sometimes and

frequently independently predicted violent (OR 3.9, 95% CI 1.9–7.9, $p < 0.001$; OR 2.5, 95% CI 1.6–4.1, $p < 0.001$, respectively), property (OR 2.3, 95% CI 1.2–4.7, $p < 0.05$; OR 1.7, 95% CI 1.1–2.7, $p < 0.05$), and traffic (OR 2.8, 95% CI 1.8–4.4, $p < 0.001$; OR 1.6, 95% CI 1.3–2.1, $p < 0.001$) offenses. The strongest predictive association was between bullying frequently and more than five crimes during the 4-year period (OR 6.6, 95% CI 2.8–15.3, $p < 0.001$) in adjusted analyses. When different informants were compared, teacher reports of bullying were the strongest predictor of adult criminality. In adjusted analyses, male victimization did not independently predict adult crime. Among girls, bullying or victimization at age eight were not associated with adult criminality.

Conclusions Bullying among boys signals an elevated risk of adult criminality.

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Introduction

Bullying is a component of an antisocial, rule-breaking pattern of behavior. A person is bullied when he or she is exposed, repeatedly and over time, to negative actions on the part of one or more other persons [1]. Previous cross-sectional studies have found a strong and consistent relationship between bullying and involvement in violent behaviors [1–7]. Age at onset, as well as level and form of aggression, has emerged as important factor in understanding antisocial development as early onset of conduct problems is regarded as a reliable predictor of adult antisociality [8].

There are very few population-based studies examining the effect of bullying prospectively [4, 7, 9–11]. Given the prevalence of bullying, it is important to determine the long-term consequences. The only previous population-based study to have prospectively assessed the crime outcome of bullied children into adolescence—based on the same birth cohort as the present study—involved only boys [10]. The results from the Finnish “From a boy to a man” birth cohort study show that boys who bully frequently at age eight are at elevated risk for criminality in adolescence [10].

Despite mounting evidence of a link between bullying in childhood and later adversities, several important questions remain unanswered. First, there are no previous population-based studies examining adulthood outcome of childhood bullying among males and females. Over the past half century, most studies on causes, correlates, and trends of crime have included only males [12]. The lower rate of adult female criminality has hindered study of the associations between childhood psychopathology and adult female criminality. Second, almost all previous clinical or population-based studies on childhood predictors of adult criminality have been conducted with convicted subjects or using self-reported information of crime as outcome [13–15]. Subjects convicted in a court of law are likely to be more severely deviant, and a huge number of offenders remain potentially unstudied. In addition, studies based only on self-reports of crime may constrain the applicability of the findings, especially among subjects with antisocial behavior who may be reluctant to disclose actual offenses. Third, there is a need to investigate empirically the impact of occasional versus frequent bullying on later antisocial behavior. Fourth, given the scarcity of long-term studies in this field, and for the purpose of developing prevention and treatment programs, it is of great

importance to examine the differential predictive value of different informants’ assessment of bullying and its relationship with criminality. If targeted prevention programs are planned, to what degree should they rely on parent, teacher, or child reports of bullying?

The current study aimed to study the impact of bullying behavior at age eight on crime at age 23–26 years for both females and males, combining survey findings from childhood and data from the National Police Registry during adulthood. Information about bullying at age eight was gathered from parents, teachers, and children. Furthermore, our interest was to examine whether bullying or victimization correlate with criminality when controlled for the effect of psychopathology, and whether these correlations are different among males and females. The final aim of the present study was to examine the predictive association between frequency of bullying, as well as the differential predictive value of different informants’ assessment of bullying, and crime in adulthood.

Methods

This investigation is part of the nationwide “Finnish 1981 Birth Cohort Study”. The Joint Commission on Ethics of Turku University and Turku University Central Hospital have approved the research plan. Informed consent was obtained from the children’s parents at baseline. Identifying information was stripped from the data set to ensure that the ultimate information combined from questionnaires and registry data could be analyzed in such a way that the subject could not be identified.

The methodology of the study has been reported in greater detail previously [9, 10, 16, 17]. The original representative study sample was drawn from the total population of Finnish children born during 1981 ($n = 60,007$). The first assessment was conducted in October and November 1989. Of the selected 6,017 children, 5,813 (96.6%) took part in the study in 1989. Subjects who had died, who were not permanent residents in Finland in 2007, or whose social security number could not be linked with the National Police Registry were excluded. Of the 5,813 children, information about possible criminal offenses was obtained from 5,351 subjects (2,712 boys and 2,639 girls). Therefore, attrition during the follow-up was 11.1% of the initial sample and 7.9% of those who participated in the study in 1989. Child behavior was assessed using information collected from three different sources: parents, teachers, and children at age eight. Data collection was organized through teachers. Teachers sent parent questionnaires via the child to the parents, who returned them in sealed envelopes to the teachers.

Assessment of bullying and victimization at the age of eight

Children were asked about bullying by giving them three alternatives to choose from: (1) “I bully other children almost every day”, (2) “I bully sometimes”, and (3) “Usually I do not bully”. Victimization was assessed by the following alternatives: “Other children bully me”: (1) “almost every day”, (2) “sometimes”, and (3) “do not usually bully me”.

Similar questions focusing on bullying and victimization were included in parent and teacher questionnaires, with probe and response items worded as follows: the child bullies other children: (1) “does not apply”, (2) “applies somewhat”, and (3) “certainly applies”. An additional item about the child being a victim of bullying was also included in the parent and teacher questionnaires with the three alternatives (does not apply, somewhat applies, and certainly applies). The extent of bullying and victimization at age 8 was investigated by pooling the information obtained from self-reports, parents, and teacher. Combining the parent, teacher, and child reports is justified by previous study from the same data set showing that although the inter-rater agreement between informants was low (weighted kappa in range 0.11–0.22), all three informant groups’ reports were similarly predictive of adolescent psychopathology. The classification of “bully status” or “victim status” was based on the highest rating from any of the three informants. For example, if the child was bullying others frequently/certainly according to at least one informant, he/she was classified to the “frequent bully” group.

Confounding variables at age eight included: (1) Childhood total psychopathology score at age eight based on the sum score of Rutter parent and teacher scales [18, 19]. The bullying/victim items were removed from the sum scale. The Rutter scales comprise conduct, attention, and emotional subscales. The Rutter questionnaires for screening children’s emotional and behavioral problems are long-established and well-studied behavioral screening instruments that have proved valid and reliable in many contexts. (2) Information about parental education level based on father’s or mother’s completion of at least 12 years of education (in Finland, compulsory education consists of 9-year comprehensive school after which education can be continued in vocational school or in upper secondary school concentrating on theoretical subjects).

Data on the cohort’s criminal behavior were gathered through the Finnish National Police Register. This is a nationwide electronic database kept by the administration of the Finnish Police. Access to the register was granted by the Police Department, Ministry of the Interior. A nationwide police register was created after the reform of county

administration in 1997. The register includes all suspected offenders caught by the police. However, mere admonitions or municipal parking fines are not included in the register. The current study is limited to acts registered during a 4-year period, 1.1.2004–31.12.2007. Data are removed from the police register according to a certain schedule, pertaining to the limitation of prosecution by lapse of time. Data were collected from the register at two time points (in the beginning of the years 2006 and 2008) to ensure that the information concerning offenses during the years 2004–2007 is complete.

The male sample was grouped according to the number of offenses during the 4-year period into those with (1) no offenses, (2) only one offense, (3) two or three offenses, (4) four or five offenses, and (5) more than five offenses. Because of the low number of female crimes when the predictors for number of offenses among females were studied, the groups 3–5 were pooled together. To study different crime types, criminality was divided into five categories: drug, violent, property, traffic offenses, and drunken driving. With this classification, the subject could belong to more than one offense group. Drug offenses refer to various kinds of drug-related activity: producing, importing, exporting, delivering, selling, purchasing, or merely possessing illegal drugs, which are forbidden in Finland. According to law, drug offenses can be categorized, for example, according to the quality and quantity of the drug. However, on the basis of these classifications made by the police, the exact nature of the drug offenses cannot be securely distinguished. We defined violence as overt aggressive behavior toward another human being. The main subgroups are various kinds of assault, battery, and robbery. Property crime included covert behavior targeted not at human beings but at property. This category includes different kinds of stealing, illicit use of a motor vehicle, receiving stolen goods, and vandalism. Economic crime (fraud, embezzlement, and various kinds of forgery) was also included in this category. Traffic offenses consist of reckless driving of various degrees and driving without a license. As mentioned above, minor traffic violations were ignored. Finally, drunken driving presumes a blood alcohol concentration $>0.05\%$.

Statistical analysis

The statistical significance of risk factors on outcome variables was tested with logistic regression analysis. Odds ratios (OR) and 95% confidence intervals (95% CI) were estimated using logistic regression. The multivariate analyses of the categorical predictors for number of criminal offenses were carried out by applying multinomial logistic regression analysis. The multinomial logistic regression analysis for a polychotomous response variable is a

generalization of the methodology of logistic regression analysis for a dichotomous response variable [20]. Statistical computations were done with SAS System for Windows, release 9.1/2006.

Results

Bullying behavior and crime among males

Males committed 3,222 crimes during the 4-year period between age 23 and 26 years. Frequent bullies (9% of the sample) were responsible for 23% of all crimes; those who bullied sometimes (47%) were responsible for 51% of crimes, while those who never bullied (44%) committed 26% of all crimes. Table 1 shows the predictive associations between bullying and victimization at age eight and crime at age 23–26 years among males. Of males who bullied frequently 51%, of those who bullied sometimes 38%, and of those who never bullied 28%, had committed at least one crime between age 23 and 26 years. Bullying was especially predictive of repeated crime. Ten percent of frequent bullies, 4% of males who bullied sometimes, and 1% of those who never bullied had committed more than five crimes during the 4-year period. When adjusted with parental education level and pooled information about psychopathology from parents and teachers, both bullying frequently and sometimes, independently predicted the number of crimes. The strongest predictive association was between bullying frequently and committing 4–5 and more than five crimes (OR 4.1, 95% CI 1.7–9.8, $p < 0.01$; OR 6.6, 95% CI 2.8–15.3, $p < 0.001$) in adjusted analyses.

When the strength of association with crime outcome among those who bullied “sometimes” versus those who bullied “frequently” was studied, frequent bullying predicted 2–3 crimes (OR 2.0, 95% CI 1.3–2.9, $p < 0.01$), 4–5 crimes (OR 2.4, 95% CI 1.3–4.5, $p < 0.01$), and more than five crimes (OR 2.8, 95% CI 1.6–4.7, $p < 0.001$).

When adjusted with parental education level, bullying at age eight predicted all crime categories (Table 1). When adjusted with parental education level and the psychopathology score, bullying frequently and sometimes independently predicted violent (OR 3.9, 95% CI 1.9–7.9 $p < 0.001$; OR 2.5, 95% CI 1.6–4.1, $p < 0.001$, respectively), property (OR 2.3, 95% CI 1.2–4.7, $p < 0.05$; OR 1.7, 95% CI 1.1–2.7, $p < 0.05$), and traffic (OR 2.8, 95% CI 1.8–4.4, $p < 0.001$; OR 1.6, 95% CI 1.3–2.1, $p < 0.001$) offenses. The strongest association was between frequent bullying and violence. To illustrate this, of those who bullied frequently at age eight 20% had committed a violent offense at age 23–26 years, while 10% of those who bullied sometimes and only 3% of those who did not bully

had done so. Adjusting for victimization did not change the results.

When the predictive associations between bullying sometimes versus bullying frequently and crime was studied, frequent bullying predicted drug (OR 2.0, 95% CI 1.1–3.7, $p < 0.05$), violent (OR 2.2, 95% CI 1.4–3.6, $p < 0.001$), property (OR 2.4, 95% CI 1.5–3.9, $p < 0.001$), traffic (OR 1.7, 95% CI 1.2–2.5, $p < 0.01$), and drunken driving offenses (OR 2.4, 95% CI 1.4–4.0, $p < 0.01$).

As shown in Table 1, the predictive associations between victimization and adult crime were at most moderate. When adjusted for the parental education level, victimization predicted violent and property offenses. However, when adjusted additionally for psychopathology at age eight, no associations remained significant. Similarly, when bullying at age eight was included as a covariate with parental education level, no independent associations between victimization and crime were found. No significant bullying–victimization interactions were found with crime outcomes.

Bullying behavior and crime among females

Females committed 705 crimes during the 4-year period. Frequent bullies (0.9% of the sample) were responsible for only 0.3% of all crimes; those who bullied sometimes (23%) were responsible for 31% of crimes, while those who never bullied (76%) committed 69% of all crimes. Table 2 shows the predictive associations between bullying and victimization, and crime among females. The “sometimes” and “frequent” bully/victim categories were pooled together because of the low number of crimes and because only 22 females were frequent bullies according to parent, teacher, or child information. No significant associations were found between bullying or being bullied at age eight, and number of crimes or any of the crime categories. No significant bullying–victimization interactions were found with crime outcomes.

Different informants of bullying and crime

Given the strong association between bullying and crime among males, we further examined the association of different informants (parents, teachers, and children) about bullying and number of crimes. As shown in Table 3, in univariate analyses, all informant reports of bullying predicted crime. However, in multivariate analyses (including parent, teacher, and child reports), teacher reports of bullying had the strongest predictive association with crime in adulthood. The strongest predictive association was found between frequent bullying and more than five crimes (OR 5.7, 95% CI 2.9–11.3, $p < 0.001$). Parent reports of bullying did not independently predict crime in adulthood.

Table 1 Predictive associations between bullying and victimization at age eight and crime at age 23–26 years among males: results of logistic regression analyses

Bullying (n)	No bullying (n = 1,127) (%)	Bullying sometimes (n = 1,215) (%)	Bullying frequently (n = 213) (%)	Model 1		Model 2	
				Bullying sometimes OR (95% CI)	Bullying frequently OR (95% CI)	Bullying sometimes OR (95% CI)	Bullying frequently OR (95% CI)
No crime (1,681)	72.6	61.7	48.9				
One crime (452)	15.9	19.2	17.3	1.4 (1.1–1.7)**	1.5 (1.1–2.3)*	1.4 (1.1–1.8)***	1.8 (1.1–2.8)*
2–3 crimes (272)	8.5	11.2	17.3	1.5 (1.1–2.0)**	2.8 (1.8–4.3)***	1.4 (1.1–1.8)*	2.1 (1.2–3.5)**
4–5 crimes (76)	1.8	3.4	6.5	2.1 (1.2–3.7)**	5.2 (2.6–10.8)***	2.0 (1.1–3.5)*	4.1 (1.7–9.8)**
>5 crimes (92)	1.2	4.5	10.0	3.8 (2.1–7.0)***	9.9 (4.8–20.2)***	3.3 (1.8–6.2)***	6.6 (2.8–15.3)***
Drug offenses (77)	1.9	5.9	11.0	3.0 (1.7–5.3)***	4.6 (2.0–10.5)***	2.3 (1.3–4.3)**	2.2 (0.8–5.9)
Violent offenses (138)	3.2	10.0	19.9	3.0 (1.9–4.7)***	6.6 (3.7–11.9)***	2.5 (1.6–4.1)***	3.9 (1.9–7.9)***
Property offenses (138)	4.0	9.2	19.9	2.2 (1.5–3.4)***	5.5 (3.1–9.6)***	1.7 (1.1–2.7)*	2.3 (1.2–4.7)*
Traffic offenses (426)	14.9	23.0	34.3	1.7 (1.3–2.1)***	3.0 (2.1–4.3)***	1.6 (1.3–2.1)***	2.8 (1.8–4.4)***
Drunken driving (116)	4.2	7.3	15.7	1.7 (1.1–2.6)*	4.0 (2.2–7.3)***	1.3 (0.8–2.1)	1.9 (0.9–4.0)

Victimization (n)	No victimization (n = 1,098)	Victimization sometimes (n = 1,227)	Victimization frequently (n = 244)	Model 1		Model 2	
				Victimization sometimes OR (95% CI)	Victimization frequently OR (95% CI)	Victimization sometimes OR (95% CI)	Victimization frequently OR (95% CI)
No crime (1,681)	66.9	65.1	60.7				
One crime (451)	17.6	18.0	15.2	1.0 (0.8–1.3)	0.9 (0.6–1.4)	1.0 (0.8–1.3)	0.9 (0.6–1.4)
2–3 crimes (269)	10.5	10.4	11.1	1.0 (0.8–1.3)	1.1 (0.7–1.8)	0.8 (0.6–1.1)	0.7 (0.4–1.1)
4–5 crimes (76)	2.0	2.9	7.4	1.4 (0.8–2.5)	4.0 (2.0–7.8)***	1.3 (0.7–2.2)	2.9 (0.9–6.1)
>5 crimes (92)	3.1	3.6	5.7	1.1 (0.7–1.7)	1.5 (0.8–3.1)	0.7 (0.4–1.2)	0.6 (0.3–1.4)
Drug offenses (74)	3.4	4.7	5.7	1.3 (0.8–2.1)	1.1 (0.5–2.8)	0.9 (0.5–1.5)	0.4 (0.1–1.2)
Violent offenses (139)	4.9	8.7	14.5	1.6 (1.1–2.5)*	3.0 (1.8–5.2)***	1.3 (0.8–1.9)	1.5 (0.8–2.9)
Property offenses (136)	6.4	7.2	14.0	1.0 (0.7–1.6)	2.1 (1.2–3.6)**	0.7 (0.5–1.1)	0.8 (0.4–1.5)
Traffic offenses (424)	18.2	21.2	23.7	1.2 (0.9–1.5)	1.4 (0.9–2.0)	1.0 (0.8–1.3)	1.0 (0.6–1.5)
Drunken driving (115)	5.2	6.4	11.9	1.2 (0.8–1.8)	2.3 (1.3–4.2)**	0.9 (0.6–1.4)	1.1 (0.6–2.2)

Model 1: adjusted with parental education level; Model 2: adjusted with parental education level and parental and teacher report of psychopathology

OR odds ratio, CI confidence interval

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Child reports of bullying independently predicted only a high level of repeated crime.

Discussion

To our knowledge, there are no comparable prospective population-based studies examining predictive associations between bullying behavior at age eight and adult crime. There are several findings which have major importance for the early detection of children who are at risk of a severe antisocial life course. First, the study shows that bullying at age eight is a strong predictor of adult criminality among males, but bullying in childhood does not predict adult criminality among females. Second, being

victimized did not predict adult violence or criminality unless there was other childhood psychopathology. Third, teachers' reports of bullying among boys were the strongest predictor of adult crime.

Numerous studies have shown that childhood conduct behaviors predict a wide range of later adversities, including crime [15, 17, 21–28]. However, most studies aggregate different types of conduct behaviors into a single global index as though the nature of the problems is the same. Previous studies have revealed that frequent bullying is correlated with antisocial behavior. However, it is not known whether this correlation is simply the result of confounding by other variables. The present study shows that occasional and especially frequent bullying among males at age eight is associated with increased odds of

Table 2 Predictive associations between bullying and victimization at age eight and crime at age 23–26 years among females: results of logistic regression analyses

Bullying (<i>n</i>)	No bullying (<i>n</i> = 2,037) (%)	Sometimes or frequent bullying (<i>n</i> = 612) (%)	Model 1 Bullying sometimes or frequently OR (95% CI)	Model 2 Bullying sometimes or frequently OR (95% CI)
No crime (2,367)	89.6	88.4		
One crime (193)	7.4	7.0	1.0 (0.7–1.4)	1.0 (0.7–1.4)
More than one crime (89)	3.0	4.6	1.6 (0.9–2.5)	1.3 (0.8–2.1)
Drug offenses (26)	1.0	1.3	1.2 (0.5–3.0)	1.1 (0.4–2.7)
Violent offenses (28)	1.0	1.6	1.5 (0.6–3.5)	1.1 (0.4–2.8)
Property offenses (50)	1.9	2.5	1.4 (0.7–2.6)	1.1 (0.6–2.2)
Traffic offenses (113)	4.5	4.8	1.1 (0.7–1.7)	1.0 (0.6–1.7)
Drunken driving (25)	1.0	1.3	1.3 (0.5–3.2)	1.1 (0.4–2.8)
Victimization (<i>n</i>)	No victimization (<i>n</i> = 1,098) (%)	Sometimes or frequent victimization (<i>n</i> = 1,227) (%)	Model 1 Victimization sometimes or frequently OR (95% CI)	Model 2 Victimization sometimes or frequently OR (95% CI)
No crime (2,367)	89.5	89.2		
One crime (193)	7.4	7.0	1.0 (0.7–1.3)	1.0 (0.7–1.4)
More than one crime (89)	3.1	3.8	1.3 (0.8–1.9)	1.0 (0.6–1.6)
Drug offenses (26)	1.1	1.0	0.9 (0.3–2.0)	0.7 (0.3–1.7)
Violent offenses (28)	1.2	1.1	1.0 (0.5–2.3)	0.8 (0.3–1.8)
Property offenses (50)	2.3	1.6	0.7 (0.4–1.3)	0.6 (0.3–1.1)
Traffic offenses (113)	4.6	4.6	1.1 (0.7–1.6)	1.0 (0.7–1.5)
Drunken driving (25)	1.1	1.0	0.9 (0.4–2.1)	0.8 (0.3–1.9)

Model 1: adjusted with parental education level; Model 2: adjusted with parental education level, and parental and teacher report of total psychopathology score

OR odds ratio, CI confidence interval

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

adult criminality. The strongest association was between frequent bullying, and violent and repeated crime. Importantly, the findings advance our understanding of this relationship by showing that after adjusting for total psychopathology score and parental education level (i.e., potential confounds) these associations remain significant. In other words, especially frequent bullying among boys has an independent effect that goes beyond childhood psychopathology.

In a longitudinal study including a 10-month follow-up by Kim et al. [4], bullies were more likely to exhibit externalizing problems and aggression (such as cruelty) even after baseline psychopathology is controlled for. Moreover, children who bullied others were more likely to have developed new aggressive behaviors at the end of the 10-month follow-up period. In agreement with the present findings, the Korean study suggested that bullying is a strong risk factor for the later development of psychopathologic behaviors [4]. A novel finding in the present

study is the strong association between bullying and crime after an almost 20-year follow-up. Our study indicates that during the school years crime preventive interventions should focus on male bullies, especially those who are frequently involved.

The finding that bullying was especially predictive of repeated crime makes sense in light of the nature of the repetition and consistency in bullying behavior [29]. Our results may indicate that bullying is attributable to the individual's personality style. Our study supports Olweus' [30] notion that bullying reflects a stable aggressive personality pattern, predisposing children to later social maladjustment and delinquency. In addition, the finding that the strongest association was between frequent bullying and violence is not surprising given that bullying is interpersonal violent behavior.

For girls, bullying at age eight did not predict adult crime. This supports previous reports which indicate that gender is a well-established independent risk factor for

Table 3 Parent, teacher, and child reports of bullying at age eight and crimes at age 23–26 years

	No bullying (%)	Sometimes (%)	Frequently (%)	Univariate analyses		Multivariate analyses	
				Sometimes OR (95% CI)	Frequently OR (95% CI)	Sometimes OR (95% CI)	Frequently OR (95% CI)
Parent (<i>n</i>)	1,938	659	26				
One crime	17.0	19.0	15.4	1.2 (0.9–1.6)	1.2 (0.4–3.8)	1.2 (0.9–1.5)	1.1 (0.3–3.4)
2–3 crimes	10.1	10.9	19.2	1.2 (0.9–1.6)	2.6 (0.9–7.3)	1.0 (0.7–1.4)	1.8 (0.6–5.3)
4–5 crimes	2.5	4.1	0	1.8 (1.1–2.9)*	NA	1.4 (0.8–2.3)	NA
>5 crimes	2.9	5.2	15.4	1.9 (1.3–3.0)**	7.1 (2.2–22.3)***	1.1 (0.7–1.8)	2.9 (0.9–9.9)
Teacher (<i>n</i>)	1,821	679	176				
One crime	17.1	19.2	14.8	1.4 (1.1–1.8) **	1.2 (0.8–1.9)	1.3 (1.1–1.7)**	1.0 (0.6–1.6)
2–3 crimes	8.6	13.3	19.9	1.9 (1.4–2.6)***	3.3 (2.1–5.0)***	1.9 (1.4–2.5)***	2.6 (1.6–4.2)***
4–5 crimes	2.1	4.3	5.7	2.5 (1.5–4.2)***	3.8 (1.8–7.9)***	2.6 (1.5–4.3)***	3.4 (1.5–7.4)***
>5 crimes	2.0	6.8	9.7	4.3 (2.7–6.7)***	6.9 (3.7–12.7)***	4.1 (2.5–6.6)***	5.7 (2.9–11.3)***
Child (<i>n</i>)	1,854	744	53				
One crime	17.3	17.9	22.6	1.1 (0.9–1.4)	1.9 (0.9–3.8)	1.1 (0.8–1.4)	1.7 (0.8–3.5)
2–3 crimes	9.9	12.2	9.4	1.4 (1.1–1.8)*	1.4 (0.5–3.6)	1.2 (0.9–1.6)	0.8 (0.3–2.3)
4–5 crimes	2.8	2.7	11.3	1.1 (0.6–1.8)	5.9 (2.3–15.0)***	0.8 (0.4–1.3)	3.5 (1.3–9.4)***
>5 crimes	2.6	6.1	9.4	2.6 (1.7–3.9)***	5.2 (1.9–14.2) **	1.7 (1.1–2.7)**	2.5 (0.9–7.2)

NA not available

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

both bullying behavior and externalizing problems [31, 32]. One possible explanation is the low number of crimes and the low number of girls who were frequent bullies according to parent, teacher, or child information. Boys are usually found to be more aggressive and violent than girls [33]. The finding may also be explained by the different types of bullying behavior among girls and boys. Bullying among 8-year-old boys tends to be more often physical, whereas girls tend to bully in a relational (e.g., social exclusion) and indirect way (e.g., rumor spreading). The incidents of girl bullying might remain hidden, with parents and teachers often assuming that the problem is limited to name-calling and the social exclusion of victims. Furthermore, bullying may be a way to gain social acceptance and to confirm belonging to the group [34].

Being a victim of bullying is reported to be a risk factor for later psychiatric problems like anxiety, depression, suicidal behavior, and personality disorder [9, 11, 35–38], and also in some studies, for violence-related behavior [39]. Many of the recent school shooters have reported that they were targets of bullying and claimed that their shootings were in response to their victimization [40]. However, according to our results, being a victim of bullying is not an independent risk factor for future violence. Among males, when accompanied with concurrent psychopathology, the risk of later violent offenses is increased. The finding that there were no independent associations between victimization and crime may be explained by the

mechanisms that victims use to deal with their victimization; they may respond to the victimization in a more internalized way.

When the strengths of different informants were compared among males, teacher reports of bullying were the strongest predictor of adult criminality. How can the predictive strength of teachers' report be explained? First, most bullying takes place in school settings where teachers are the only adult observers of children's peer relationships. However, the finding that teachers' reports have such a strong predictive strength for later adversities is interesting in light of the fact that incidents of aggression and bullying in school are often subtle, indirect, and not easily observable. Second, teachers, in particular, are in a good position to assess children's social and academic skills and disruptive behavior because they observe them in class every day and can make comparisons among children of the same developmental level [41, 42]. Third, bullying is often associated with learning disabilities and ADHD [43, 44], which may divert the teacher's attention to bullying. From the point of view of early problem recognition, the teacher's role is important and further supports earlier findings that the education system and school health care in mid-childhood are of central importance in the early detection of later social maladjustment.

Teachers are also in a position to facilitate preventive measures which are of great importance taking into account the severe consequences of bullying. Information

concerning the impact of peer relations on bullying, as well as results showing that bullying behaviors depend on classroom norms of behavior [45], can most easily be taken into account in prevention taking place in schools.

The study has several strengths: a nationwide sample, a low attrition rate, combining information about childhood bullying behavior from parent, teacher, and child self-reports, and the use of national registers. However, several limitations should be considered when interpreting the results. It is very likely that many simultaneous factors (e.g., rearing practices, maltreatment and neglect, parent's crime record, and sibling bullying), which could not be tested in the present study, affect the outcome. Furthermore, this study lacks specification of bullying and victimization. Only bullying in general was asked about; different types of bullying were not specified (physical aggression, physical bullying, verbal aggression, and social exclusion). Assessment of bullying and victimization was based on only two items. Future prospective longitudinal research on bullying and victimization should thus include measures of different forms of bullying, who is the aggressor, whether social support is available, and whether the child sought this support.

In any research on crime, a key question is how to gather comprehensive data on crime. While court data would be limited to convictions, the police register includes all criminal offenses that have come to the police's notice. Admittedly, the police may exercise some discretion about which incidents to register, and the practices may vary by officer, suspect, and district. Yet, corruption in Finland is among the lowest in the world [46], and the importance of accurate registering of every offense is emphasized in the instructions given by the Police Administration. Furthermore, the problem of "false positives" is not considered a critical source of bias either because of the strict regulation and control of the Finnish police. Therefore, the Finnish National Police Registry yields valuable and unique population-based information on crime.

Bullying among boys signals an elevated risk of criminality. Childhood bullying has potentially serious consequences, and therefore, early identification of children at risk is a major public health issue. Frequent bullying is not just part of growing up; it should be considered serious interpersonal violence that requires constant vigilance. Obviously bullying behavior is a result of preceding psychic development. Due to the fact bullying behavior at early school age has a lot of negative consequences in young adulthood; it would be of utmost importance to study the background and etiological factors behind this behavior. Unfortunately, the negative effects of bullying do not disappear with time. The education system and specifically teachers are of central importance in the early detection of bullying as a warning

sign of later criminality among boys. Failure of the school system to take preventive actions should be considered as a failure to discharge the school authority's duty of care [47].

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