NEW RESEARCH

Being Bullied During Childhood and the Prospective Pathways to Self-Harm in Late Adolescence

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Objective: To assess whether being bullied between 7 and 10 years of age is directly associated with self-harm in late adolescence when controlling for previous exposure to an adverse family environment (domestic violence, maladaptive parenting); concurrent internalizing and externalizing behavior; and subsequent psychopathology (borderline personality disorder and depression symptoms). **Method:** A total of 4,810 children and adolescents in the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort were assessed to ascertain bullying exposure (between 7 and 10 years of age) and self-harm at 16 to 17 years. **Results:** A total of 16.5% of 16- to 17-year-olds reported self-harm in the previous year. Being bullied was associated with an increased risk of self-harm directly, and indirectly via depression symptoms in early adolescence. The association between an adverse family environment (exposure to maladaptive parenting and domestic violence) and self-harm was partially mediated by being bullied. **Conclusions:** Being bullied during childhood increases the risk of self-harm in late adolescence via several distinct pathways, for example, by increasing the risk of depression and by exacerbating the effects of exposure to an adverse family environment; as well as in the absence of these risk exposures. Health practitioners evaluating self-harm should be aware that being bullied is an important potential risk factor. J. Am. Acad. Child Adolesc. Psychiatry, 2013;52(6):608–618. **Key Words:** Avon Longitudinal Study of Parents and Children (ALSPAC), bullying, depression, self-harm, victimization

Self-harm is a widespread problem, with a self-reported prevalence of 14% to 17% among adolescents and young adults in the United States.[1,2] It results in a large number of presentations to hospitals, leading to high economic cost.[3] Typical self-harm behaviors include cutting, burning, or swallowing pills.[4,5] Self-harm may be used to relieve tension or to communicate stress, and, in the most extreme cases, may represent acts with suicidal intent.[6] Delineating the developmental antecedents of self-harm and highlighting at-risk groups is important, as single episodes often lead to a repetition of such behavior,[7]

and self-harm is a key predictor of completed suicide.[8]

Definitions of self-harm within the extant literature sometimes incorporate suicidal intent[9,10] and sometimes exclude this factor.[11,12] The extent to which these 2 constructs represent separate behaviors, with different risk and protective factors, rather than extreme variations of the same behavior, remains unclear.[13] Recent studies suggest that being bullied from early to mid-childhood is predictive of self-harm (both with and without inclusion of suicidal intent) at 11 to 12 years of age.[10,11,14-16] Other factors associated with a risk of self-harm include exposure to domestic violence,[17] conflict in parent–adolescent relationships,[12] and female sex.[18] Furthermore, high rates of psychiatric disorders, including depression[9] and borderline personality disorder (BPD),[19] have been associated with self-harm. Being bullied has been identified as a consequence, and precursor, of psychopathologies[20,21]

that are also associated with self-harm, suggesting that being bullied in childhood may represent a marker of present and later psychopathology, rather than a direct cause of self-harm.[22] Therefore, further research is required to delineate the etiological pathways involving being bullied in childhood to self-harm during late adolescence, while controlling for pre-existing and concurrent risk factors and psychopathology.[23]

In a previous study,[10] we found that being a victim of bullying between 4 and 10 years was associated with self-harm at 11 to 12 years, after controlling for potential confounders. We aim to expand on these findings by investigating the longer-term consequences of being bullied during childhood (between 7 and 10 years), and by delineating multiple pathways to self-harm during late adolescence (16–17 years). Using path analysis, confounding factors occurring before, during, and after being bullied can be controlled for, and the mediating relationships between early risk exposures, being bullied, psychopathology and later self-harm quantified. The specific research questions investigated are as follows:

- Is being bullied (child, mother, and teacher report) from 7 to 10 years associated with self-harm during late adolescence?
- Is the effect of being bullied on self-harm direct, or are the pathways mediated by depression or BPD symptoms in early adolescence?
- Does this association vary according to risk exposures occurring before (sex of child, exposure to maladaptive parenting, and domestic violence) and during (internalizing and externalizing behavior) exposure to bullying?

METHOD

Data Source

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a birth cohort study based in the United Kingdom. The cohort comprises children born to residents of the former Avon Health Authority area in South West England who had an expected delivery between April 1, 1991, and December 31, 1992. A total of 13,971 children were alive at 12 months, forming the original cohort. Ethical approval was obtained from the ALSPAC Law and Ethics committee and the local research committees. From the first trimester of pregnancy, parents completed postal questionnaires about themselves and the study child's health and development. Children were invited to attend annual assessment clinics, including face-to-face interviews and psychological and physical tests from age 7 years. Our

study is based on 4,810 children who answered the self-harm questionnaire at age 16 to 17 years.

Outcome Variable

Self-harm, in this study, is defined as an act with nonfatal outcome in which an individual deliberately hurts him- or herself with or without the intention to die.[24] The data were collected from participants 16 to 17 years of age (mean = 16.7 years; SD = 0.2 year), using a self-completion postal questionnaire. Participants were asked: "Have you ever hurt yourself on purpose in any way (e.g., by taking an overdose of pills or by cutting yourself)?" Those adolescents who responded positively were asked further questions regarding frequency and how they had hurt themselves.[4] This study focuses on adolescents who harmed themselves in the previous year only (yes = 792 [16.5%]; no = 4,018 [83.5%]) to preserve the time ordering of the analyses, that is, to verify that the risk exposures occurred before self-harming behavior.

Predictor Variables

Being bullied was assessed using child, mother, and teacher reports. Child reports were collected at 8 and 10 years, using a modified version of the Bullying and Friendship Interview Schedule (detailed in Wolke et al.[20]). There were 5 questions pertaining to experience of overt bullying: personal belongings taken; threatened or blackmailed; hit or beaten up; tricked in a nasty way; called bad/nasty names. There were also 4 questions pertaining to relational bullying: exclusion to upset the child; pressure to do things s/he didn't want to do; lies or nasty things said about others; and games spoiled. Because of the skewed distribution of responses, overt bullying was coded categorically as present if the participant confirmed that at least 1 of the 5 behaviors occurred repeatedly (4 or more times in the past 6 months) or very frequently (at least once per week in the past 6 months). Similarly, relational bullying was coded as present if the child confirmed that at least 1 of the 4 behaviors occurred repeatedly or very frequently.[25] The following victimization variables were derived: whether the children experienced any bullying (overt and/or relational versus neither); chronicity of being bullied, defined as unstable (reported only at age 8 years or age 10 years), stable (reported at both age 8 years and age 10 years), or never been bullied (none).[25] Mother and teacher reports were derived from a single item of the Strengths and Difficulties Questionnaire[26]: "child is picked on or bullied by other children." If the response was "somewhat applies" or "certainly applies" at any time point (mother: 7, 8, and 9 years; teacher: 7 and 10 years), the child was considered a mother or teacher reported victim.[10] In addition, mother (not bullied; unstable = 1 time point; stable = 2 or 3 time points) and teacher (not bullied; unstable = 1 time point; stable = 2 time points) chronicity variables

were constructed.[10] The overall agreement rates between informants were as follows: for mothers and children, κ= 0.21, *p* < .001; for mothers and teachers, κ = 0.18, *p* < .001; and for teachers and children, κ = 0.10, *p* < .001, which are largely consistent with previous reports.[22,25]

Confounding Factors

A preschool maladaptive parenting variable was constructed using mother reported hitting (daily or weekly at 2 and/or 3.5 years), shouting (daily at 2 and/or 3.5 years) and hostility.[27] Hostility (1.8 and/or 4 years) was constructed from 4 items, for example, "mum/mom often feels irritated by child," "mum/mom has battle of wills with child," previously identified as loading onto 1 distinct factor.[27] Hostility was recorded as present if 3 or more items were reported. Maladaptive parenting was categorized as follows: none, mild (1 or 2 indicators), and severe (3 indicators).[28] Domestic violence was considered present if the mother/partner reported that there was emotional and/or domestic physical violence (0.7, 1.8, 2.8, 4 years) and/or conflictual partnership (2.8 years, e.g., "shouting or calling partner names").[28] An internalizing/externalizing behavior variable was estimated using the sum of negative emotionality, hyperactivity, and conduct problems taken from the Strengths and Difficulties Questionnaire (SDQ),[26] reported by the mother across the 3 time-points of 7, 8, and 9 years.

Potential Mediating Factors Between Being Bullied and Self-Harm

Borderline personality disorder symptoms were assessed at 11.7 years using the semi-structured Childhood Interview for *DSM-IV* Borderline Personality Disorder, UK Version (CI-BPD-UK); based on the borderline module of the Diagnostic Interview for *DSM-IV* Personality Disorders (DIPD-IV).[29] The interview comprised 9 sections: intense inappropriate anger; affective instability; emptiness; identity disturbance; paranoid ideation; abandonment; suicidal or self-mutilating behaviors; impulsivity; and intense unstable relationships. A symptom was classified as definitely present if it occurred daily or approximately 25% of the time,[30] and as probable if it occurred repeatedly but did not meet criteria for definitely present. The BPD outcome was based on the presence of 5 or more (probable/definite) symptoms.[20] The self-harm symptom item was removed to avoid collinearity between the exposure and outcome. A total of 6.4% participants (n = 224) reported BPD symptoms.

Depression symptoms were assessed using the Short Mood and Feelings Questionnaire (SMFQ),[31] administered at 12, 13 (mother report), and 14 (child report) years. Each item is rated on a 3-point scale with respect to events from the previous 2 weeks. Positive items were summed yielding a total score (maximum of 26 points). Scores were collapsed into

a dichotomous variable according to previously identified cut-points (scores of <11 indicated nonclinical symptoms, whereas scores of ≥11 indicated clinically relevant depressive symptoms).[32,33] A total of 9.2% participants (n = 418) had depression symptoms at any time-point.

Statistical Methods

Selective dropout was determined by comparing those participants who completed the self-harm questionnaire to those who dropped out, using logistic regression analyses. Response rates significantly differed according to sex, ethnicity, birth weight, marital status, home ownership, educational level of the mother, and family adversity (see Table S1, available online). Subsequently, we conducted a weighted analysis using inverse probability (of having missing outcome data) weights to account for those lost to follow-up. Using the variables associated with selective drop-out as the independent variables, we fitted a logistic regression model (response vs. nonresponse as outcome) to determine weights for each individual using the inverse probability of response.[34] Associations were remarkably similar for the unweighted and weighted data, and thus we used the unweighted data in all subsequent analysis.

Analyses were conducted in 3 stages. First, to assess whether being bullied at school is associated with self-harm, 3 sets of binary logistic regression analyses were conducted (Table 1) using SPSS version 18 software. Model A is based on the full data showing unadjusted analyses. Model B controlled for sex, preschool domestic violence, preschool maladaptive parenting, and internalizing/externalizing behavior. Model C included all of the preceding variables, and also controlled for BPD symptoms and depression symptoms. Analyses were repeated for acts of self-harm with and without the intention to die; but as the results were almost identical, we combined these acts to maximize statistical power. Second, multiple mediation analysis was performed in Stata version 12.1 software to examine the extent to which the association between being chronically bullied and self-harm was mediated by depression symptoms and BPD symptoms, while controlling for sex, preschool domestic violence, preschool maladaptive parenting, and internalizing/externalizing behavior. The mediational variables were first entered simultaneously to examine their combined effect on the association between victimization and self-harm, and were then entered separately to investigate their individual impact on this relationship. Karlson, Holm, and Breen's *khb* command was used, which can be used with a combination of dichotomous, continuous and ordinal variables and which provides standardized coefficients.[35] Results are presented as odds ratios and 95% confidence intervals. Third, path analysis was conducted using Mplus version 6.12,[36] to assess associations between being bullied and self-harm, while

TABLE 1 Crude and Adjusted Associations Between Being Bullied and Self-Harm (Yes vs. No)

Bullying status	Model A[a] OR (95% CI)	Model B[b] OR (95% CI)	Model C[c] OR (95% CI)
Child report (8 years), n	3,712[d]	3,037[d]	2,563[d]
No	[reference][e]	[reference]	[reference]
Yes	**1.37 (1.15–1.63)**	**1.40 (1.14–1.71)**	**1.30 (1.04–1.63)**
Child report (10 years), n	3,908	3153	2,713
No	[reference]	[reference]	[reference]
Yes	**1.55 (1.28–1.87)**	**1.47 (1.18–1.84)**	**1.43 (1.12–1.82)**
Chronicity (child report), n	4,181	3,330	2,782
None	[reference]	[reference]	[reference]
Unstable	**1.43 (1.20–1.71)**	**1.44 (1.17–1.77)**	**1.38 (1.10–1.74)**
Stable	**1.78 (1.38–2.30)**	**1.79 (1.34–2.41)**	**1.66 (1.20–2.31)**
Mother report (7 years), n	4,114	3,519	2,737
No	[reference]	[reference]	[reference]
Yes	**1.46 (1.18–1.79)**	**1.45 (1.14–1.84)**	**1.50 (1.14–1.97)**
Mother report (8 years), n	4,083	3,609	2,798
No	[reference]	[reference]	[reference]
Yes	**1.62 (1.34–1.96)**	**1.56 (1.26–1.94)**	**1.60 (1.25–2.06)**
Mother report (9 years), n	4,093	3,532	2,742
No	[reference]	[reference]	[reference]
Yes	**1.51 (1.25–1.82)**	**1.28 (1.02–1.59)**	1.11 (.85–1.44)
Chronicity (mother report), n	4,557	3,623	2,810
None	[reference]	[reference]	[reference]
Unstable	1.18 (0.97–1.43)	1.19 (.95–1.50)	1.13 (.87–1.47)
Stable	**1.79 (1.45–2.21)**	**1.64 (1.28–2.11)**	**1.59 (1.19–2.13)**
Teacher report (7 years), n	2,199	1,823	1,423
No	[reference]	[reference]	[reference]
Yes	**1.74 (1.24–2.44)**	**1.63 (1.06–2.50)**	**2.01 (1.22–3.30)**
Teacher report (10 years), n	2,721	2,080	1,631
No	[reference]	[reference]	[reference]
Yes	**1.59 (1.21–2.10)**	1.37 (.94–1.99)	1.44 (.93–2.22)
Chronicity (teacher report), n	3,513	2,688	2,087
None	[reference]	[reference]	[reference]
Unstable	**1.52 (1.19–1.94)**	1.24 (.90–1.70)	1.39 (.97–2.00)
Stable	**2.68 (1.41–5.11)**	**3.50 (1.46–8.42)**	**4.75 (1.72–13.07)**

Note: Boldface type indicates significant associations at p < .05. Stable = bullying reported at 2 or more time points; Unstable = bullying reported only at 1 time point.

[a]Crude analysis.

[b]Controlling for sex, preschool domestic violence, preschool maladaptive parenting, and internalizing/externalizing behavior.

[c]Controlling for borderline personality disorder symptoms and depression symptoms in addition to sex, preschool domestic violence, preschool maladaptive parenting, and internalizing/externalizing behavior.
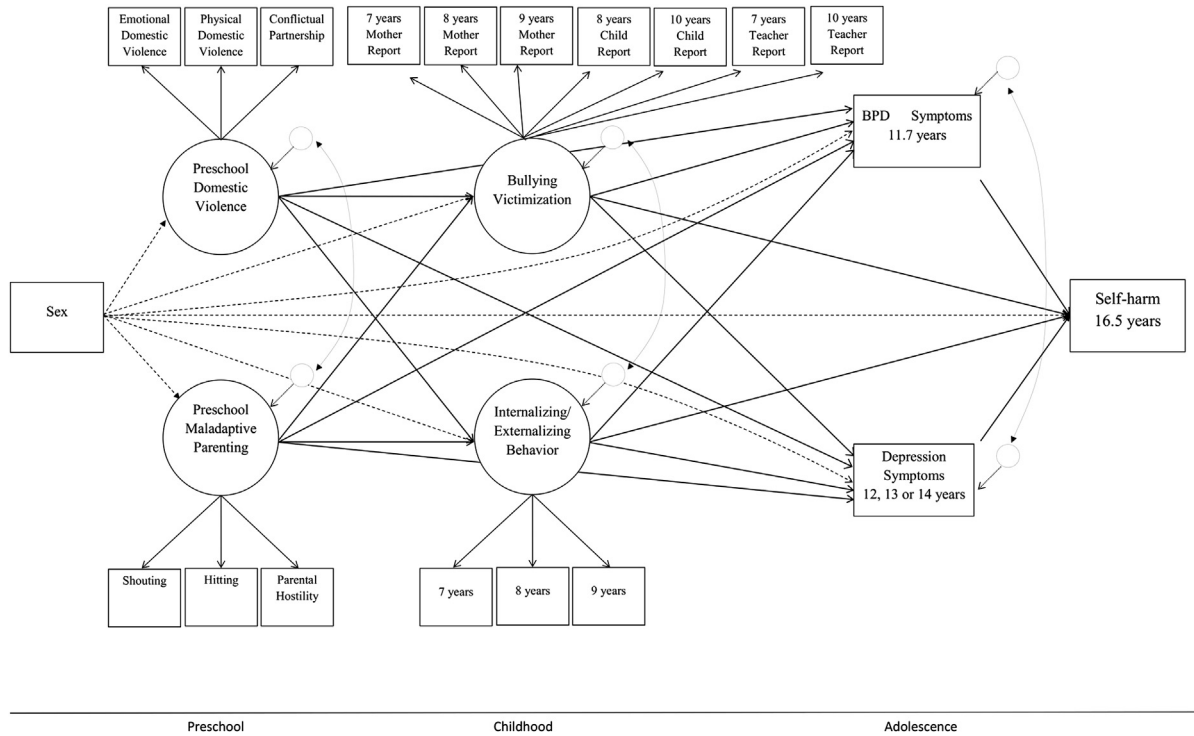
[d]Number of participants in analysis.

[e]Reference group in all analyses consists of participants who are not victims.

controlling for all potential confounding associations simultaneously. Domestic violence (emotional and physical domestic violence, and conflicting partnership), preschool maladaptive parenting (maternal shouting, hitting, and hostility), internalizing/externalizing behavior (negative emotionality, hyperactivity, and conduct problems at 7, 8, and 9 years), and being bullied (child report at 8 and 10 years; mother report at 7, 8, and 9 years; teacher report at 7 and 10 years) were specified as latent variables. Sex, adolescent psychopathology (BPD and depression symptoms). and self-harm were specified as observed variables. Figure 1

provides a representation of all potential pathways specified within the model. The weighted least squares with robust standard errors, mean, and variance adjusted (WLSMV) estimator was used because of its robustness when analyzing both continuous and categorical outcomes.[37] Associations are reported as linear regression coefficients for latent dependent variables and probit coefficients for categorical observed dependent variables. Probit coefficients indicate the strength of association between predictor variables and the probability of group membership, and represent the difference that a 1-unit change in the predictor variable

FIGURE 1 Path diagram representing the pathways estimated between risk exposures and self-harm outcome. Note: Dotted lines indicate direct effects of sex on other variables.

RESULTS

Prevalence of Being Bullied and Self-Harm

A total of 905 participants (18.8%; male, 180; female, 725) reported self-harm at any point in the past,[4] and 792 (16.5%; male, 162; female, 630) reported harming themselves in the previous year. Of these 792 individuals, 306 (38.6%) harmed themselves once, 286 (36.1%) 2 to 5 times; 80 (10.1%) 6 to 10 times, and 120 (15.2%) more than 10 times. Although 579 adolescents (74.7%; male, 118; female, 461) self-harmed without an intention to die, 213 (26.9%; male, 44; female, 169) wanted to die. Cutting (n = 489; 61.8%) was the most commonly reported method of self-harm (details in Kidger et al.[4]). According to child report, 38% of children were bullied at 8 years and 22.9% at 10 years. According to mother report, 16% of children were bullied at 7 years, 20.5% at 8 years, and 21.5% at 9 years. According to teacher report, 8.7% of children were bullied at 7 years and 12.3% at 10 years. The relative prevalence according to informant is congruent with previous findings, suggesting that some instances of being bullied may go unnoticed by teachers.[22] Among the 792 children who self-harmed, 514 (66%) were victims of bullying, according to child, mother, or teacher report. This yielded a Population-Attributable Fraction (PAF) of 19.9% (95% confidence interval = 12.3%–26.8%), indicating that if bullying could have been eliminated while other exposures remained constant, 20% of self-harm cases could potentially have been prevented.

Associations Between Being Bullied and Self-Harm, Controlling for Confounding Factors

In crude analysis (model A), there was a modest association between being bullied and self-harm, according to all respondents (Table 1). After controlling for sex, preschool domestic violence, preschool maladaptive parenting, and externalizing/internalizing behavior (model B), and after controlling for all potential confounders (model C), being bullied remained associated with

makes in the cumulative normal probability of the outcome variable.[36] Individuals with partially missing item-level data were included, and missing data were accommodated using a series of univariate and bivariate probit regressions that allow missingness to be a function of observed covariates.[38] Finally, the "punaf" command in Stata (v12.1) was used to calculate the Population-Attributable Fraction (PAF) for self-harm based on being bullied (reported by child/adolescent, mother, or teacher).

self-harm according to child reports at ages 8 and 10, mother reports at ages 7 and 8, and teacher report at age 7. Moreover, stable victimization remained strongly associated with self-harm according to child, mother, and teacher report.

BPD and Depression Symptoms as Mediators

The direct and indirect pathways (via BPD and depression symptoms) between being bullied and self-harm are presented in Table 2. The odds ratios (OR) and 95% confidence intervals (CI) are shown for each pathway while controlling for sex, preschool domestic violence, preschool maladaptive parenting, and externalizing/internalizing behavior. Respectively, 13%, 13%, and 1% of the association between being a stable victim of bullying (according to child, mother, and teacher report) and self-harm was accounted for by both mediators. According to child and mother report,

there was a significant indirect pathway, from stable victimization to self-harm via depression symptoms.

Path Analyses

A single model was specified using bullying reports by child, mother and teacher. The root-mean square error of approximation (RMSEA) and the Comparative Fit Index (CFI) were used to assess model fit. RMSEA values less than 0.05,[39] and CFI values greater than 0.90, indicate close fit.[40] The data showed good fit to the model (RMSEA = 0.03; CFI = 0.97).

All direct associations between risk factors and self-harm outcome are shown in Table 3. All other direct pathways specified within the model (Figure 1) are presented in Table S2, available online. Being bullied between 7 and 10 years was directly associated with self-harm in late

TABLE 2 Associations Between Being Bullied and Self-Harm, Split Into Total Effects, Direct, and Indirect Pathways via Potential Mediators Together and Then via Each Individual Mediator on Its Own

	Total OR (95% CI)	Direct OR (95% CI)	Indirect OR (95% CI)	% Mediated
Child report victimization, n = 2,782				
Unstable				
All mediators	**1.44 (1.14–1.81)**	**1.38 (1.10–1.74)**	1.04 (.99–1.10)	12
BPD only	**1.38 (1.10–1.74)**	**1.38 (1.10–1.74)**	1.00 (.99–1.01)	0
Depression only	**1.43 (1.14–1.81)**	**1.38 (1.10–1.74)**	1.04 (.99–1.10)	11
Stable				
All mediators	**1.78 (1.29–2.46)**	**1.66 (1.20–2.30)**	1.08 (.99–1.16)	13
BPD only	**1.66 (1.20–2.28)**	**1.66 (1.20–2.30)**	1.00 (.94–1.06)	0
Depression only	**1.76 (1.27–2.44)**	**1.66 (1.20–2.30)**	**1.06 (1.01–1.11)**	10
Mother report victimization, n = 2,810				
Unstable				
All mediators	1.13 (.87–1.48)	1.13 (.87–1.47)	1.00 (.96–1.05)	2
BPD only	1.13 (.87–1.48)	1.13 (.87–1.47)	1.00 (.99–1.01)	0
Depression only	1.13 (.87–1.48)	1.13 (.87–1.47)	1.00 (.96–1.05)	1
Stable				
All mediators	**1.70 (1.27–2.28)**	**1.59 (1.19–2.13)**	**1.07 (1.01–1.13)**	13
BPD only	**1.60 (1.19–2.14)**	**1.59 (1.19–2.13)**	1.00 (.98–1.03)	1
Depression only	**1.68 (1.25–2.25)**	**1.59 (1.19–2.13)**	**1.06 (1.01–1.11)**	10
Teacher report victimization, n = 2,087				
Unstable				
All mediators	**1.45 (1.01–2.09)**	1.40 (.97–2.01)	1.04 (.91–1.19)	10
BPD only	1.40 (.97–2.00)	1.40 (.97–2.01)	1.00 (.97–1.02)	0
Depression only	**1.45 (1.02–2.08)**	1.40 (.97–2.01)	1.03 (.91–1.18)	9
Stable				
All mediators	**4.57 (1.66–12.54)**	**4.48 (1.63–12.33)**	1.02 (.89–1.16)	1
BPD only	**4.48 (1.63–12.30)**	**4.48 (1.63–12.33)**	1.00 (.98–1.02)	0
Depression only	**4.55 (1.66–12.52)**	**4.48 (1.63–12.33)**	1.02 (.89–1.15)	1

Note: Boldface type indicates significant associations at p < .05. OR = odds ratio; Unstable = bullying reported only at 1 time point. Stable = bullying reported at both 2 or more time points.

[a]Adjusting for sex, preschool maladaptive parenting, preschool domestic violence, internalizing/externalizing behavior, and borderline personality disorder (BPD) symptoms (for depression symptoms, only mediation model) and depression symptoms (for BPD symptoms, only mediation model).

TABLE 3 Nonstandardized Direct Associations Among Sex, Preschool Maladaptive Parenting, Domestic Violence, Internalizing/Externalizing Behavior, Being Bullied, Borderline Personality Disorder (BPD) and Depression Symptoms, and Self-Harm Outcome

	B	SE	p Value[a]
Sex → Self-harm[b,c]	**0.580**	**0.052**	**0.000**
Preschool domestic violence → Self-harm[b]	**0.094**	**0.041**	**0.022**
Preschool maladaptive parenting → Self-harm[b]	−0.046	0.054	0.392
Being bullied → Self-harm[b]	**0.235**	**0.063**	**0.000**
Internalizing/Externalizing Behavior → Self-harm[b]	−0.003	0.011	0.791
BPD symptoms → Self-harm[b]	0.006	0.049	0.898
Depression symptoms → Self-harm[b]	**0.211**	**0.036**	**0.000**

Note: Boldface type indicates significant associations at p < .05. B = nonstandardized probit coefficients. Model fit: Root mean square error of approximation (RMSEA) = 0.025 (0.023–0.027); confirmatory fit index (CFI) = 0.97. Values are given as non-standardized probit coefficients.
[a]The p value is 2-tailed.
[b]Probit regression coefficient.
[c]A probit coefficient of 0.58 indicates that for each unit increase in sex (from male to female) there is an increase of 0.58 SDs in the predicted z score of the cumulative normal distribution of self-harm.

adolescence. For example, a probit coefficient of 0.24 indicates that a 1-unit increase in being bullied (i.e., going from not bullied to bullied) resulted in an increase of 0.24 SD in the predicted z score of self-harm (of the cumulative normal probability distribution) (Table 3). Female sex, preschool domestic violence, and depression symptoms directly related to self-harm. Being bullied directly increased the risk of BPD and depression symptoms in early adolescence (Table S2, available online).

Table 4 shows all indirect associations between risk factors and self-harm outcome. The association between being bullied and self-harm was partially mediated by depression symptoms. Being bullied partially mediated the relationships between domestic violence, maladaptive parenting, and subsequent self-harm. The indirect association between the sex of the child and self-harm via depression symptoms was significantly stronger for females. The indirect association from the sex of the child to self-harm via being bullied was significantly stronger for males (Table 4). Boys were more likely to be victims of bullying, to exhibit internalizing/externalizing behavior, and to be exposed to maladaptive parenting (Table S2, available online).

DISCUSSION

This study considers multiple etiological pathways from risk factors during early childhood onward, to self-harm during late adolescence. When assessing all potential pathways occurring before (maladaptive parenting, domestic violence, sex), concurrently with (internalizing/externalizing behavior), or after (depression and BPD symptoms) being bullied, we found that being a victim of bullying was associated with increased risk of self-harm. Furthermore, being bullied indirectly increased the risk of self-harm via depression, and mediated the association following preschool exposures, in 2 separate pathways.

An association between being bullied and self-harm has been reported in previous studies; however, most were cross-sectional.[15,41–43] Our results extend findings from the few prospective studies[10,11] by investigating the relationship between being bullied and self-harm while controlling for risk factors occurring before, during, and after exposure to being bullied simultaneously. Results showed that being bullied in mid to late childhood has serious consequences persisting into late adolescence. Moreover, for a significant proportion of youth who were bullied, self-harm was not a consequence of psychopathology such as depression or BPD symptoms. Self-harm during adolescence is usually precipitated by stressful life problems,[44] and being bullied is independently associated with high levels of distress. Congruent with the experiential avoidance model, deliberately harming oneself may represent a maladaptive strategy, independent of recognized psychopathology, for escaping from distressing internal experiences.[45] Our analyses revealed multiple etiological pathways to self-harm involving exposure to bullying. In 1 pathway, being bullied was associated with subsequent depression symptoms,[9,46] which in turn increased the risk of self-harm,[47] suggesting that depression symptoms are a second mechanism via which the association between being bullied and subsequent self-harm manifests. In 2 further pathways, there were significant indirect associations from domestic violence and maladaptive parenting to self-harm via being bullied. The resulting stress of exposure to a negative family environment may have caused some children to become dysregulated in their behavior,[48] thereby attracting negative attention from peers.[49] Indeed, strong positive associations between internalizing/externalizing

TABLE 4 Nonstandardized Probit Coefficients (B) for Indirect Paths Between Sex, Being Bullied, Borderline Personality Disorder (BPD), and Depression Symptoms, Domestic Violence, Maladaptive Parenting, and Subsequent Self-Harm Outcome

	Sex			Being Bullied			Preschool Domestic Violence			Preschool Maladaptive Parenting		
	B	SE	p Value[a]	B	SE	p Value[a]	B	SE	p Value[a]	B	SE	p Value[a]
Via being bullied	**−0.04**	**0.01**	**.001**	—	—	—	**0.05**	**0.02**	**.001**	**0.06**	**0.02**	**.001**
Via BPD symptoms	0.00	0.01	.898	0.04	0.03	.898	0.00	0.00	.902	0.00	0.00	.995
Via depression symptoms	**0.10**	**0.02**	**.000**	**0.07**	**0.02**	**.000**	0.02	0.01	.107	0.01	0.01	.500

Note: Boldface type indicates significant associations at p < .05. Self-harm outcome is categorical (yes vs. no). A significant positive B value for sex demotes that the strength of association is significantly stronger for females than for males.
[a]The p value is 2-tailed.

behavior and being bullied were observed, and there were significant indirect associations from domestic violence and maladaptive parenting to self-harm via being bullied. This suggests that children exposed to maladaptive family experiences are more likely to become victims of bullying, subsequently increasing the risk of self-harm in late adolescence.

Boys were significantly more likely to be bullied, and the association between the sex of the child and self-harm via being bullied was stronger for boys; overall, girls were more likely to engage in self-harm and to develop depression symptoms.[41,50,51] Furthermore, the indirect association between child sex and self-harm via depression symptoms was significantly stronger for girls. These findings are congruent with literature suggesting that girls are twice as likely as boys to experience depression during adolescence[52] and are also more likely to turn their distress inward,[53] that is, to engage in self-harm.

Contrary to previous research,[19] we found no association between borderline personality disorder symptoms (BPD) and self-harm. Emotional and behavioral dysregulation are core features of BPD,[54] and it is these features within the symptom constellation that appear to be most strongly associated with self-harm behavior.[55] Therefore, controlling for both depression and internalizing/externalizing behavior within the path analyses may have occluded any relationship between BPD and self-harm. Furthermore, it has been suggested that the reported association between BPD and self-harm may have been inflated because of cultural bias within psychiatry.[56] Although BPD is commonly diagnosed in persons who self-harm, these individuals may often display no other signs or symptoms of BPD.[57]

Our study has a number of strengths. We used a large prospective cohort, with multiple informants, providing converging evidence for an association between being bullied and self-harm. We controlled for a wide range of confounders associated with both bullying and self-harm. Taking a life-span approach, we considered pathways from negative exposures during toddlerhood to self-harm during late adolescence.

With regard to limitations, self-harm was measured via self-report rather than clinical examination; however, this method may have encouraged adolescents to be more honest in their answers than an interview situation.[58] Not all participants completed the self-harm questionnaire. Those with greater family adversity were more likely to drop out. Nonetheless, empirical simulations demonstrate that, even when dropout is correlated with predictor/confounder variables, the relationship between predictors and outcome is unlikely to be substantially altered by selective dropout processes.[59] Indeed, our initial analyses with weighted and unweighted data yielded very similar results.

As we were using path analysis to determine prospective and mediational associations between various risk exposures and self-harm, variables were entered at discrete time points (based on theoretical models) to ensure that certain exposures preceded others, that is, bullying was assessed before depression, which was assessed before self-harm. Therefore, it is possible that, in some cases, the significant indirect and prospective associations between risk factors and subsequent self-harm outcome were the result of continuing exposure to risk factors rather than long-term effects.

Because of the very low prevalence of mother-reported sexual abuse in this sample (0.05%), it

was excluded as a confounder in the analysis. However, meta-analysis reveals that the association between sexual abuse and self-harm is relatively small, and that when psychiatric risk factors are controlled for, sexual abuse, explains little or no unique variance in self-harm behavior.[60]

Our results indicate that being bullied is a potent risk factor for self-harm. As suggested by the Population-Attributable Fraction (PAF), if bullying could have been eliminated while other exposures remained constant, 20% of self-harm cases could potentially have been prevented. This level of attributable fraction is considerable when compared, for example, to being obese (body mass index [BMI] >30) which occurs in 15% of the population but accounts for only about 2.8% of myocardial infarctions.[61] Therefore, prevention of bullying is important to reduce the risk of self-harm. Not all victims of bullying who engage in self-harm show the typical psychopathological profiles (depression, BPD symptoms) that have previously been linked with self-harm, but may present with physical symptoms such as headaches, backaches, stomach aches, and dizziness.[62] Subsequently, general practitioners should also be aware of the physical indicators of bullying to identify at-risk youths.[63] Targeted interventions should focus on improving the ways in which children and adolescents cope with emotional distress arising from being bullied, and mental health practitioners evaluating self-harm should consider being bullied as a serious potential risk factor. &

CG Clinical Guidance

- Being bullied by peers is highly distressing for children and adolescents, and substantially increases the risk of self-harm.

- Many children and adolescents do not tell their teachers or parents and suffer in silence. Clinicians should routinely ask children and adolescents about experiences of being bullied.

- Although many children and adolescents who are bullied do not show overt depression, they may present a range of nonspecific symptoms,[23] such as headaches, backaches, stomach aches, dizziness, sleep problems, may be reluctant to go to school, may withdraw from social activities, and may self-harm.

- Targeted interventions may place emphasis on teaching children how to deal with bullying and how to cope with emotional distress arising from being bullied.

- If bullying could be eliminated while other exposures remained constant, 20% of self-harm cases could potentially be prevented. This level of attributable fraction is considerable when compared, for example, to being obese (body mass index [BMI] >30) which occurs in 15% of the population but accounts for only about 2.8% of myocardial infarctions.[61]

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TABLE S1 Dropout Analysis With Regard to Availability of Self-Harm Questionnaire

	Self-Harm Questionnaire Status		Associations
	Questionnaire Not Available	Questionnaire Available	Available vs. Not Available
Sex			
Male	5,248 (57.3)	1,972 (41.0)	[Reference]
Female	3,918 (42.7)	2,838 (59.0)	**1.93 (1.80–2.07)**
Ethnicity			
White	7,036 (94.2)	4,438 (96.1)	[Reference]
Non-white	431 (5.8)	178 (3.9)	**.66 (.55–.78)**
Birth weight			
> 2,499 g	8,514 (94.1)	4,537 (95.5)	[Reference]
< 2,500 g	535 (5.9)	212 (4.5)	**.74 (.63–.88)**
Marital status			
Single	2,469 (29.5)	812 (17.2)	[Reference]
Married	5,905 (70.5)	3,901 (82.8)	**2.01 (1.84–2.20)**
Home ownership			
Mortgaged	5,581 (66.8)	3,978 (85.2)	[Reference]
Rent	2,775 (33.2)	693 (14.8)	**.35 (.32–.38)**
Educational level mother			
Below O level	2,854 (36.9)	874 (18.7)	[Reference]
O level or above	4,881 (63.1)	3,809 (81.3)	**2.55 (2.34–2.78)**
FAI			
None	3,560 (42.3)	2,765 (58.2)	[Reference]
1 or more adversities	4,852 (57.7)	1,989 (41.8)	**.53 (.49–.57)**
Preschool domestic violence			
No	4,723 (63.7)	3,264 (68.9)	[Reference]
Yes	2,693 (36.3)	1,473 (31.1)	**.79 (.73–.86)**
Preschool maladaptive parenting			
No	2,287 (38.0)	1,806 (39.6)	[Reference]
1	3,285 (54.6)	2,408 (52.8)	.93 (.86–1.01)
2	444 (7.4)	350 (7.7)	1.00 (.86–1.16)
Being bullied (child report)[a]			
No	1,997 (52.8)	2,306 (55.2)	[Reference]
Yes	1,787 (47.2)	1,875 (44.8)	**.91 (.83–.99)**
Being bullied (mother report)[b]			
No	3,261 (65.9)	2,985 (65.5)	[Reference]
Yes	1,691 (34.1)	1,572 (34.5)	1.02 (.94–1.11)
Being bullied (teacher report)[c]			
No	4,851 (81.8)	3,014 (85.8)	[Reference]
Yes	1,082 (18.2)	499 (14.2)	**.74 (.66–.83)**
BPD Symptoms			
No	2,341 (92.9)	3,289 (93.6)	[Reference]
Yes	179 (7.1)	224 (6.4)	.89 (.73–1.09)
Depression Symptoms[d]			
No	3,407 (90.7)	4,119 (90.8)	[Reference]
Yes	351 (9.3)	418 (9.2)	.99 (.85–1.14)

Note: Boldface type indicates significant associations. BPD = borderline personality disorder; FAI = Family Adversity Index.

[a]Overt or relational bullying at 8 or 10 years.

[b]Being bullied at 7, 8, or 9 years.

[c]Being bullied at 7 or 10 years.

[d]Depression symptoms at 12, 13, or 14 years.

TABLE S2 Direct Associations Among All Predicted Pathways

	B	SE	p Value[a]
Sex → Self-harm[b,c]	**0.580**	**0.052**	**.000**
Preschool domestic violence → Self-harm[b]	**0.094**	**0.041**	**.022**
Preschool maladaptive parenting → Self-harm[b]	−0.046	0.054	.392
Being bullied → Self-harm[b]	**0.235**	**0.063**	**.000**
Internalizing/Externalizing Behavior → Self-harm[b]	−0.003	0.011	.791
BPD symptoms → Self-harm[b]	0.006	0.049	.898
Depression symptoms → Self-harm[b]	**0.211**	**0.036**	**.000**
Sex → Preschool domestic violence[d]	0.062	0.038	.099
Sex → Preschool maladaptive parenting[d]	**−0.133**	**0.030**	**.000**
Sex → Being bullied[d]	**−0.180**	**0.032**	**.000**
Sex → Internalizing/Externalizing behavior[d]	**−0.285**	**0.105**	**.007**
Sex → BPD symptoms[b]	**0.175**	**0.069**	**.011**
Sex → Depression symptoms[b]	**0.462**	**0.056**	**.000**
Preschool domestic violence → Being bullied[d]	**0.212**	**0.029**	**.000**
Preschool domestic violence → Internalizing/Externalizing behavior[d]	**0.608**	**0.092**	**.000**
Preschool domestic violence → BPD symptoms[b]	−0.029	0.060	.627
Preschool domestic violence → Depression symptoms[b]	0.074	0.045	.098
Preschool maladaptive parenting → Being bullied[d]	**0.237**	**0.032**	**.000**
Preschool maladaptive parenting → Internalizing/Externalizing Behavior[d]	**1.994**	**0.119**	**.000**
Preschool maladaptive parenting → BPD symptoms[b]	0.000	0.079	.995
Preschool maladaptive parenting → Depression symptoms[b]	0.040	0.058	.496
Being bullied → BPD symptoms[b]	**0.585**	**0.075**	**.000**
Being bullied → Depression symptoms[b]	**0.335**	**0.057**	**.000**
Internalizing/Externalizing Behavior → BPD symptoms[b]	−0.008	0.016	.602
Internalizing/Externalizing Behavior → Depression symptoms[b]	**0.050**	**0.011**	**.000**
Covariance between preschool domestic violence and preschool maladaptive parenting	**0.137**	**0.018**	**.000**
Covariance between being bullied and internalizing/externalizing behavior	**0.758**	**0.056**	**.000**
Correlation between BPD symptoms and depression symptoms	**0.203**	**0.047**	**.000**

Note: Boldface type indicates significant associations at p < .05. Model fit: Root mean square error of approximation (RMSEA) = 0.025 (0.023 −0.027); confirmatory fit index (CFI) = 0.97. Values are given as nonstandardized linear regression coefficients and probit coefficients, covariance and correlations. B = nonstandardized coefficients; BPD = borderline personality disorder.
[a]The p value is 2-tailed.
[b]Probit regression coefficient.
[c]A probit coefficient of 0.58 indicates that, for each unit increase in sex (from male to female), there is an increase of 0.58 standard deviation in the predicted z score of the cumulative normal distribution of self-harm.
[d]Linear regression coefficient.