Open access • Journal Article • DOI:10.1016/J.JAAC.2012.01.001

Involvement in Bullying and Suicide-Related Behavior at 11 Years: A Prospective Birth Cohort Study — Source link

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Published on: 01 Mar 2012 - Journal of the American Academy of Child and Adolescent Psychiatry (Elsevier)

Topics: Suicidal ideation, Poison control, Suicide prevention and Peer victimization

ABSTRACT

Objective To study the prospective link between involvement in bullying (bully, victim, bully/victim), and subsequent suicide ideation and suicidal/self-injurious behavior, in preadolescent children in the United Kingdom.

Method 6043 children in the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort were assessed to ascertain involvement in bullying between 4 and 10 years and suicide ideation at 11.7 years.

Results Peer victimization (victim, bully-victim) was significantly associated with suicide ideation and suicidal/self-injurious behavior after adjusting for confounders. Bully/victims were at heightened risk for suicide ideation (Odds Ratio; 95% Confidence Interval): child report at 8 years (OR: 2.84; CI: 1.81 to 4.45); child report at 10 years (3.20; 2.07 to 4.95); mother report (2.71; 1.81 to 4.05); teacher report (2.79; 1.62 to 4.81); as were chronic victims: child report (3.26; 2.24 to 4.75); mother report (2.49; 1.64 to 3.79); teacher report (5.99; 2.79 to 12.88). Similarly, bully/victims were at heightened risk for suicidal/self-injurious behavior: child report at 8 years (2.67; 1.66 to 4.29); child report at 10 years (3.34; 2.17 to 5.15); mother report (2.09; C.I = 1.36 to 3.20); teacher report (2.44, 1.39 to 4.30); as were chronic victims: child report (4.10; 2.76 to 6.08); mother report (1.91; 1.22 to 2.99); teacher report (3.26; 1.38 to 7.68). Pure bullies had increased risk of suicide ideation according to child report at age 8 (3.60; 1.46 to 8.84); and suicidal/self-injurious behavior according to child report at age 8 (3.02; 1.14 to 8.02); and teacher report (1.84; 1.09 to 3.10).

Conclusions: Children involved in bullying, in any role, and especially bully/victims and chronic victims, are at increased risk of suicide ideation and suicidal/self-injurious behavior in preadolescence.

Keywords: Suicide ideation; suicidal/ self-injurious behavior; bully/victim; victim; bully; ALSPAC

INTRODUCTION

Suicide is a significant global health problem among youth, being one of the leading causes of death in many countries. [1] Suicidal behavior occurs along a continuum, from suicide ideation (thinking or communicating about committing suicide) to suicide behavior/attempt and ultimately, in some cases, successful completion of suicide. [1] Bullying was first seriously considered a cause of suicide in 1982 when three separate suicides in Norway occurred in short succession, with all three victims leaving suicide notes indicating that they had been "whipping boys." [2, 3]

Bullying is characterized by aggressive behavior, engaged in repeatedly, by an individual or group of peers with more power than the victim. The aggressive behavior may be verbal, physical or psychological; [4] and individuals may be involved by virtue of being: a victim, a bully or a bully/victim (both a bully and a victim). [5]

While bully/victims appear especially at risk for a range of negative mental health outcomes, [6-8] findings regarding links with suicidal behavior are mixed. [9-11] Most existing studies pertaining to suicide ideation [9, 12-14] and behavior (suicidal/self-injurious behavior) [9, 15, 16] focused on adolescent populations (13 to 18 years), and were cross-sectional, precluding causal interpretation.

Population-based, prospective studies are infrequent, with few pertaining to suicide ideation from early to late adolescence [17-19] and suicide behavior from early adolescence to early adulthood. [17, 19, 20] Further, these studies tend not to control for *all* suicide related risk factors simultaneously, including exposure to family conflict, harsh parenting, abuse [21] and concomitant mental health problems, such as depression; [22] potentially confounding observed associations. [23]

The link between bullying and suicide ideation or behavior in preadolescent children has received even less research attention; [11] due to lower prevalence of suicidal behavior in

this age group, [1] and ethical concerns pertaining to asking younger individuals about these experiences. [24] The one prospective preadolescent study published reported a complex association between being victimized and suicide ideation; which was moderated by parental internalizing disorders and feelings of rejection at home. This study [11] did not include pure bullies, and those defined as bully-victims were not found to be at increased risk of suicide ideation. [11]

Suicide ideation has been repeatedly observed in child populations, [11, 25, 26] and crucially, there is consistent evidence linking preadolescent suicidal ideation with later suicide attempts in adolescence. [27, 28] With adolescence comes an increased risk of psychopathology, more freedom and cognitive resources; [1] all of which may heighten the risk of acting upon suicide ideation. Therefore, clarifying the extent of suicide ideation and behaviors within child populations, and the strength of associations with peer victimization, is important in order to assess the optimal period for prevention and intervention strategies.

The aim of this study was to investigate the prospective relationship between involvement in bullying (bully, victim, and bully/victim status) and suicide behaviors/ ideations in a preadolescent population. Further, the extent to which these associations were independent of other risk factors for suicide was tested. Both psychopathological (internalizing and externalizing problems [17, 26]) and psychosocial (abuse, domestic violence [25] and harsh parenting [29]) risk factors were incorporated into the analyses.

METHOD

Sample

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a birth cohort study, set in the UK, examining the determinants of development, health and disease during childhood and beyond. The study has been described in detail elsewhere.[30] In summary, 14 541 women were enrolled, providing they were resident in Avon while pregnant, and had an expected

delivery date between 1st April 1991 and 31st December 1992. As shown in Figure 1, 13, 971 children, alive at 12 months, formed the original cohort. 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, psychological and physical tests from 7 years onwards.

[Insert Figure 1]

There were 11,510 children who were living in the study area and eligible for invitation to the 11 year annual assessment clinic. 6,423 attended and started the interview session, including the suicide related questions (Figure 1). Children were made aware before the suicide interview that if any serious concerns for their own or other people's health emerged they would be discussed by the research team and possibly with the parents/legal guardian. Three hundred and eighty children did not answer the suicide related questions (Figure 1). This study is, therefore, based on 6, 043 preadolescents (age range: 10.4 to 13.6 years; mean age: 11.7 years), who answered questions about any suicidal thoughts or behaviors they had experienced in the past two years.

To assess whether dropout had been random or selective, those who answered the questions were compared to those lost to follow up (Table 1). The frequencies of socio-demographic, family and parenting factors, abuse, psychiatric diagnoses, negative emotionality and peer victimization for participants with and without suicide data are shown in Table 1. Those lost to follow up were more often boys, had higher internalizing and externalizing scores, of ethnic minority, with low birth weight, born to single mothers, with lower educational level and living in rental properties, with parents engaged in manual jobs. Those exposed to 1 or more family adversities were less likely to have suicide data, as were those exposed to domestic violence. Those exposed to physical or sexual abuse were more

likely to have attended the interview. Generally, participants who dropped out were exposed to more deprivation than remaining participants.

Measures

Two suicide outcomes were considered.[17, 31] *Suicide ideation* was assessed using the question: "Have you thought about killing yourself?" *Suicidal/self-injurious behavior* was assessed using two questions: "Have you hurt yourself on purpose" and "Have you actually tried to kill yourself?" Suicidal /self-injurious behavior was considered present if the child responded yes to one or both of the questions. The interviewer then sensitively explored to clarify that suicide ideation/behavior was not part of a game, an accident or experimentation. If present, exact circumstances and frequency in the last two years were explored. Furthermore, it was ascertained whether an adult was aware of the suicide-related behavior and whether there was present risk.

Bullying variables were constructed from 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.* [32] They were asked five questions (for giving *and* receiving) pertaining to experience of *overt* bullying: 1) personal belongings taken; 2) threatened or blackmailed; 3) hit or beaten up; 4) tricked in a nasty way; 5) called bad/nasty names; and four (for giving *and* receiving) pertaining to *relational* bullying: 1) exclusion to upset the child; 2) pressure to do things s/he didn't want to do; 3) lies or nasty things said about others; 4) games spoilt. Overt victimization was coded as present if the child confirmed that at least one of the five behaviors occurred repeatedly (4 or more times in the past six months) or very frequently (at least once per week in the past six months). Similarly relational victimization was coded as present if the child confirmed that at least one of the four behaviors occurred *repeatedly* or *very frequently*.

A *bullying status* variable was constructed by summing any victimization (overt and/ or relational) and any bullying (overt and/or relational). The following categories were derived: 1) Not involved in bullying; 2) bully/victim (any reported victimization and any reported bullying) status; 3) pure victim (relational and/or overt victimization) status; 4) pure bully (relational and/or overt bullying) status. Finally, a *chronic victimization* variable was constructed, by considering child reported victimization at 8 and 10 years. The following categories were derived: no victimization; unstable (overt or relational victimization at 8 *or* 10 years) and stable (overt or relational victimization at both 8 *and* 10 years).

Mother reported victim status was constructed from a single question: *"child is picked on or bullied by other children"* asked repeatedly at 4, 7 and 9 years. Bully status was constructed from the question*: "In the past year the child has bullied or threatened someone"* asked at 4, 7 and 9 years. Victim and bully status were coded as present if the mother replied "applies somewhat" or "certainly applies" at any time point. The following mother reported bullying variable was constructed: 1) not involved in bullying; 2) bully/victim status; 3) pure victim status; 4) pure bully status. Teachers responded to the same items when the children were 7 and 10 years of age; and the same bullying variable (as described for mother report above) was constructed. Additionally, mother (no victimization; unstable = 1 time point; stable = 2 or 3 time points) and teacher (no victimization; unstable = 1 time point; stable = 2 time points) chronicity variables were constructed.

The overall agreement rates between the different informants were as follows: mothers and teachers 66% ($_{Kappa}$= 0.17; $p < 0.001$); mothers and children, 59.9% ($_{K}$ = 0.18; $p < 0.001$); and teachers and children, 57.5% ($_{K}$=0.10; $p<0.001$); [33] which are consistent with previously reported figures. [34]

[Insert Table 1]

Sociodemographic and birth variables for the dropout analysis included: Birth weight obtained from birth records; ethnic background (ethnic minority vs. white), mothers' marital status (married vs. single), home ownership (mortgaged vs. rented), parental social class (using the 1991 OPCS classification[35] and dichotomized into manual and non-manual), and maternal education (O-level or more vs. less than O level, where O levels were the standard school-leaving qualifications, taken around age 16 years, until recently in the United Kingdom); all obtained from mother reported questionnaires during the antenatal period. Multiple family risk factors during pregnancy were assessed with the Family Adversity Index (FAI). [36] The FAI consists of 18 items (e.g. Financial difficulties, maternal affective disorder) taken from questionnaires administered throughout pregnancy (8 weeks gestation, 12 weeks gestation, 18 weeks gestation and 32 weeks gestation). If adversity was present in an item this was rated as 1. The 18 items were then summed and dichotomized into: No adversity verses adversity (1 or more items).

Potential confounders included: 1) child *Abuse* (constructed from two items answered by the mother: "he/she was sexually abused and he/she was physically hurt by someone" at 1.5, 2.5, 3.5, 4.8, 6.8 and 8.6 years of age); coded as present if sexual and/or physical abuse were reported at any time point. 2) Maladaptive parenting (from 0 to 3.5 years) constructed from two items: maternal hitting (daily or every week at 2 and/or 3.5 years) and maternal hostility (4 items at 1.8 or 4 years. e.g. "mum feels whining makes her want to hit child"); which were found to load on a distinct factor of parenting. [37] The maladaptive parenting composite was constructed as: none (no exposure); mild (exposure to hitting or hostility) and severe (exposure to hitting and hostility). 3) Domestic violence was considered present if there was emotional (partner emotionally cruel at 0.7, 1.8, 2.8, 4 years) and/or physical domestic violence (partner physically cruel at 0.7, 1.8, 2.8, 4 years or partner broken or thrown things at 1.8, 2.8 years) [36] reported at any time point by the mother. 4) Externalizing

and internalizing symptoms were assessed using the Strengths and Difficulties Questionnaire (SDQ) [38, 39] at 4, 6.8, 8 and 9.6 years. Externalizing symptoms were assessed using the conduct problems subscale, comprising the following 5 items: *child has temper tantrums; child is obedient (reverse scored); child often fights with or bullies others; child often cheats/lies; child steals from home*. The "child bullies" item was removed to prevent confounding with the mother reported bullying variable. These 4 items were summed and averaged across the 4 time points for all children with measures from at least 3 of the 4 time points. Internalizing symptoms were assessed using the negative emotionality subscale, comprising the following 5 items: *child complains of aches; child has many worries; child is often unhappy; child is nervous in new situations; child has many fears.* Similarly, these items were summed and averaged for all children across measurement points.

Ethical approval for the study was obtained from the ALSPAC Law and Ethics committee and the local research ethics committees.

Statistical analyses

All analyses were carried out using SPSS version 18. Logistic regression models were used to estimate odds ratios (OR) with 95% confidence intervals (CI). Gender differences for the suicide ideation and suicidal/self-injurious behaviors and peer victimization variables were computed (Table 2). Crude associations between peer victimization measures and suicide ideation and suicidal/self-injurious behaviors were computed (see supplementary Table S1, available online). Analyses were then carried out controlling for potential confounders (Table 3 & Table 4). Model A is based on the full data set controlling for age and gender. Model B incorporated (with age and gender) environmental confounders including abuse, maladaptive parenting and exposure to domestic violence. Model C included the preceding controls and, additionally, internalizing and externalizing problems.

RESULTS

Frequency and gender differences of suicide ideation and suicidal/self-injurious behavior and peer victimization

4.8% of children reported engaging in suicidal ideation, and 4.6%, in suicidal or self-injurious behavior. While there were no gender differences regarding suicide ideation, more boys (6.4%) than girls (2.9%) reported suicidal or self-injurious behavior. More males than females were classified as bully/victims according to child (at both 8 and 10 years), mother and teacher report. Males were more often victimized than females according to mother and teacher report; and were more often classified as bullies according to all three informants. Males were more likely to be overtly bullied, while females were more likely to be relationally bullied.

[Insert Table 2]

Crude associations between bullying behavior and suicide ideation and suicidal/self-injurious behavior

Bully/victim and victim status were consistently predictive of suicide ideation and suicidal/self-injurious behavior, according to all respondents (see supplementary Table S1, available online). Pure bully status, according to child report at 8 years and teacher report, was also predictive of suicide ideation; and suicidal self-injurious behavior according to child (8 years), mother and teacher report. According to child report, overt and relational victimization were predictive of suicide ideation and suicidal/self-injurious behavior. Chronic victimization was strongly predictive of suicide ideation and suicidal/self-injurious behavior, according to child, mother and teacher report.

Associations between bullying behavior and suicidal ideation controlling for confounding factors

Associations between bullying behavior and suicide ideation and suicidal/self-injurious behavior were computed accounting for potential confounders, including: age and gender (Model A); additionally abuse by an adult, exposure to domestic violence and maladaptive parenting (Model B), and additionally, child internalizing and externalizing disorders (Model C) (Table 3 and 4).

Pure victim status remained predictive of suicide ideation according to child, mother and teacher report (Table 3). Pure bullies were at increased risk of suicide ideation according to child report at 8 years: 3.60 (1.46 to 8.84). Both relational and overt victimization remained predictive of suicide ideation. Bully/victim status remained predictive of suicidal ideation for child (8 and 10 years), mother and teacher report, after adjusting for confounders.

Chronicity of victimization remained strongly predictive of suicide ideation, according to child, mother, and teacher report. According to child report, those exposed to overt or relational bullying at 8 or 10 years were 1.47 (1.03 to 2.09) times more likely to report suicide ideation; while those exposed to bullying at both time points were 3.26 (2.24 to 4.75) times more likely to report suicide ideation. According to mother report, those exposed to bullying at 1 or 2-3 time points were more likely to report suicide ideation. According to teacher report, those exposed to bullying at 1 time point were 1.93 (1.30 to 2.86), and those exposed to bullying at 2 time points were 5.99 (2.79 to 12.88), times more likely to report suicide ideation.

[Insert Table 3]

Associations between bullying behavior and suicidal/self-injurious behavior controlling for confounding factors

Pure victim status remained predictive of suicidal/self-injurious behavior according to child report at 8 and 10 years, mother and teacher report (Table 4). Pure bullies, according to child report at 8 years, and teacher report, were at increased risk of suicidal/self-injurious behavior. Both relational 1.77 (1.31 to 2.41) and overt 2.56 (1.91 to 3.44) victimization remained predictive of suicidal/self-injurious behavior. Bully/victim status remained predictive of suicidal/self-injurious behavior for child (8 and 10 years), mother and teacher report, after adjusting for confounders. Chronicity of exposure remained strongly predictive of suicidal/self-injurious behavior according to child, mother and teacher report (Table 4).

[Insert Table 4]

DISCUSSION

We found that children identified as victims or bully/victims, across different informants, were more likely to engage in suicide ideation and behavior (suicidal/self-injurious behavior), even after controlling for potential confounders. Both overt and relational victimization were associated with future suicide ideation and suicidal self-injurious behavior; supporting that indirect, more subtle, forms of victimization also lead to considerable psychological harm, including suicidal behavior. [40, 41] Indirect victimization may lead to feelings of social exclusion, and suicidal behavior may reflect an attempt to escape from the self and world, due to internalized feelings of inadequacy, and subsequent negative affect. [41]

An association between peer victimization and suicide ideation [9, 12-14] and behavior [9, 15, 16] has been found in several studies; however, most were cross-sectional. Considering the

few prospective studies pertaining to adolescents, our results are largely concordant in revealing that victims and bully-victims, especially, are at increased risk for suicide ideation [17] and behavior, [20] compared to non-victims. In contrast, the only prospective study regarding preadolescent children, did not report an association between bully-victimization and subsequent suicide ideation. [11] Therefore, our findings extend the current literature by revealing that victims, and particularly bully-victims, are at increased risk of suicide ideation and behavior during preadolescence.

Previous studies suggest that bully/victims are especially at risk for suicide ideation and behavior due to increased mental health problems. [17, 19] The observed increased risk for bully/victims may be attributable to the unique profile of these children. Bully/victims tend to experience heightened emotional arousal compared to other bully subgroups; [7] are characterized by poor impulse control, breaking rules in games and generally annoying other children. [5, 42] They are the least popular and most rejected children, as rated by peers. [43, 44] These features may indicate early personality problems, [45] and suicidal ideation and behavior, may represent an attempt at reducing intolerable emotional states, [46] or the ultimate approach to overcoming high rejection from peers.

We also found that chronic victims, according to child and teacher report, were at heightened risk for suicide ideation and suicidal/self-injurious behavior during late childhood. Repeated exposure to bullying may have physiological repercussions, exacerbating an already vulnerable stress response, [47] leading to further affective dysregulation and impulsivity. Thus, engaging in suicide ideation [48] or self-injurious/ suicidal behaviors [49] may reflect maladaptive coping strategies, in response to increases in dysregulation.

Pure bullies, according to child (8 years) and teacher report, were more likely to engage in suicidal/self-injurious behavior, in particular. Previous cross-sectional studies have reported an association between bullying behavior and suicide ideation or behavior. [10, 12, 13, 31]

Bullies are often exposed to family adversity and inconsistent parenting, [12] and are at increased risk for psychiatric morbidity in childhood, generally. One prospective study [18] reported that bullying perpetration at age 8 was not associated with suicide ideation 10 years later, after controlling for childhood depression and conduct problems. Our study found that controlling for pre-existing emotional and conduct problems, abuse, domestic violence and hostile parenting attenuated relationships; but pure bullies remained at increased risk for suicidal or self-injurious behavior according to child and teacher report.

Currently, there are limited longitudinal studies regarding pure bullies in comparison to bully-victims and victims. [50] Subsequently, further prospective research is required to confirm that pure bullies experience comparable risk to victims or bully-victims for suicidality, after controlling for pre-existing psychiatric problems.

Our study has a number of strengths. We utilized data from a large prospective cohort. Bullying behavior was assessed using multiple informants, thus providing evidence of converging links to suicide ideation and suicidal/self-injurious behavior, supporting the validity of the observed associations. Further, we controlled for a wide range of known confounders associated with suicide-related behavior. To our knowledge, this is the first study to prospectively assess the predictive relationship between bullying and suicide ideation *and* behavior in preadolescents; revealing that preadolescents exposed to bullying may not only think about, but engage in, suicidal behavior.

There was considerable attrition in this longitudinal study, especially when all confounders were included. Those growing up in adverse social circumstances were more likely to have been lost to follow-up. Furthermore, 380 children did not answer questions about suicide ideation or suicidal/self-injurious behavior. Thus, this study is likely to underestimate the prevalence of suicide ideation and suicidal/self-injurious behavior, during preadolescence, in the community.

Prevalence figures from longitudinal studies should be interpreted with caution; however, analysis revealed that peer victimization was not related to selective drop out. Under these circumstances estimates of exposure (bullying) - outcome (suicide ideation/behavior) associations are unlikely to be substantially altered by selective dropout processes. [51] "True" relationships between an exposure (i.e. role in bullying) and outcome (suicidal ideation or suicidal/self-injurious behavior) should be found irrespective of whether they are investigated in more, or less, advantaged sections of the population. This has, indeed, been shown in several empirical studies and theoretical simulations. [51-53] Thus, selective dropout mainly affects statistical power (i.e. due to reduced sample size and outcome numbers) regarding the exposure-outcome relationship, rather than the nature of the association; however, this possibility cannot be ruled out entirely.[51]

Data regarding suicide ideation/behavior was via self-report rather than clinical examination. However, the interview was carefully conducted by trained psychologists to clarify the relevance of reported thoughts and actions.

In conclusion, this study suggests that suicide related behavior is a serious problem for preadolescent youth: 4.8% of this community population reported suicide ideation and 4.6% suicidal/self-injurious behavior. Further, a significant association between exposure to bullying and suicide ideation and behavior in late childhood was revealed. Health practitioners should be aware of the relationship between bullying and suicide and recognize the very real risks, which may be evident earlier in development than commonly thought. Intervention strategies should target both overt and relational bullying; as failing to consider more subtle, indirect aggression could ultimately lead to a large number of at risk children being ignored. [54] Further, targeting intervention schemes from primary school onwards is paramount; [55] and could help prevent, especially harmful, chronic exposure to bullying.

The addition of emotional arousal assessments (physiological in addition to self-report), [7] and consideration of peer rejection and personality factors may be promising for research, while clinicians should routinely ask children about their peer relationships in consultations.[56]

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Table 1. Dropout analyses with regard to availability of suicide behavior interview

		Suicide questions interview status		Associations
		Interview not available	Interview available	available vs. not available
				OR (95% C.I) [A]
Gender	Male	4332 (59.6)	2934 (40.4)	**[reference]**
	Female	3672 (54.2)	3109 (45.8)	**1.25 (1.17 to 1.34)**
Ethnicity	White	5973 (93.8)	5535 (96.3)	**[reference]**
	Black	397 (6.2)	214 (3.7)	**0.58 (0.49 to 0.69)**
Birth weight	> 2499 grams	7376 (93.4)	5701 (95.4)	**[reference]**
	< 2500 grams	518 (6.6)	272 (4.6)	**0.68 (0.58 to 0.79)**
Marital Status	Single	2206 (30.5)	1095 (18.5)	**[reference]**
	Married	5037 (69.5)	4815 (81.5)	**1.93 (1.77 to 2.09)**
Home Ownership	Mortgaged	4704 (65)	4898 (83.7)	**[reference]**
	Rent	2535 (35)	955 (16.3)	**0.36 (0.33 to 0.39)**
Educational level mother	Below O level	2478 (37.4)	1260 (21.6)	**[reference]**
	O Level or above	4148 (62.6)	4571 (78.4)	**2.17 (2.00 to 2.35)**
Social Class	Non-manual	2733 (46)	3148 (56.5)	**[reference]**
	Manual	3212 (54)	2428 (43.5)	**0.66 (0.61 to 0.71)**
FAI [B]	None	2572 (35.4)	2784 (46.8)	**[reference]**
	1 or more adversities	4702 (64.6)	3171 (53.2)	**0.62 (0.58 to 0.67)**
Peer victimisation (child report) [C]	No	1189 (54.5)	3114 (53.8)	**[reference]**
	Yes	991 (45.5)	2671 (46.2)	1.03 (0.93 to 1.14)
Abuse (sexual or physical)	No	5441 (88.6)	5096 (85.9)	**[reference]**
	Yes	697 (11.4)	835 (14.1)	**1.28 (1.15 to 1.42)**
Domestic violence	No	4773 (76.1)	4646 (78.9)	**[reference]**
	Yes	1497 (23.9)	1240 (21.1)	**0.85 (0.78 to 0.93)**
Maladaptive preschool parenting	No	2609 (52.4)	2889 (51.5)	**[reference]**
	1	1950 (39.1)	2189 (39)	1.01 (0.94 to 1.10)
	2	424 (8.5)	528 (9.4)	1.13 (0.98 to 1.29)
SDQ [D] **Emotionality M (SD)**		1.55 (1.35)	1.50 (1.29)	**0.97 (0.94 to 1.01)**
SDQ Conduct Problems M (SD)		1.50 (1.02)	1.40 (0.99)	**0.91 (0.87 to 0.96)**

OR: Odds Ratio; C.I: Confidence Intervals; [A] Bold font indicates significant associations, i.e. the 95% confidence intervals do not cross one; [B] FAI: Family Adversity Index; [C] Overt or Relational victimization at 8 or 10 years; [D] Strengths and Difficulties Questionnaire

Table 2. Suicide ideation, suicidal/self-injurious behavior and peer bullying role by gender

	Total	Males	Females	Males vs. Females
	No (%)	No (%)	No (%)	**OR (95% C.I) [D]**
Suicide ideation[A]				
No	5754 (95.2)	2782 (94.8)	2972 (95.6)	**[reference]**
Yes	289 (4.8)	152 (5.2)	137 (4.4)	1.19 (0.94 to 1.50)
Sucidal/self-injurious behavior [B]				
No	5773 (95.4)	2752 (93.6)	3021 (97.1)	**[reference]**
Yes	278 (4.6)	188 (6.4)	90 (2.9)	**2.29 (1.77 to 2.96)**
Child report:				
Bully victim status at 8				
None	3016 (59.7)	1381 (56.7)	1635 (62.4)	**[reference]**
Bully/victim	344 (6.8)	227 (9.3)	117 (4.5)	**2.30 (1.82 to 2.90)**
Victim	1639 (32.4)	791 (32.5)	848 (32.4)	1.10 (0.98 to 1.25)
Bully	55 (1.1)	36 (1.5)	19 (0.7)	**2.24 (1.28 to 3.93)**
Bully victim status at 10				
None	4168 (75.0)	1919 (71.5)	2249 (78.3)	**[reference]**
Bully/victim	302 (5.4)	221 (8.2)	81 (2.8)	**3.20 (2.45 to 4.14)**
Victim	1035 (18.6)	505 (18.8)	530 (18.4)	1.12 (0.97 to 1.28)
Bully	52 (0.9)	39 (1.5)	13 (0.5)	**3.43 (1.82 to 6.46)**
Overt victim[C]				
No	3438 (59.4)	1503 (53.7)	1935 (64.8)	**[reference]**
Yes	2346 (40.6)	1297 (46.3)	1049 (35.2)	**1.59 (1.43 to 1.77)**
Relational victim[C]				
No	4636 (80.4)	2296 (82.1)	2340 (78.8)	**[reference]**
Yes	1131 (19.6)	500 (17.9)	631 (21.2)	**0.81 (0.71 to 0.92)**
Mother report:				
Bully victim status				
None	2785 (58.3)	1491 (53.5)	1856 (62.8)	**[reference]**
Bully/victim	591 (10.3)	353 (12.7)	238 (8.1)	**1.85 (1.55 to 2.21)**
Victim	1180 (20.6)	594 (21.3)	586 (19.8)	**1.26 (1.11 to 1.44)**
Bully	623 (10.9)	347 (12.5)	276 (9.3)	**1.57 (1.32 to 1.86)**
Teacher report:				
Bully victim status				
None	3487 (78.6)	1527 (71.1)	1960 (85.6)	**[reference]**
Bully/victim	207 (4.7)	150 (7.0)	57 (2.5)	**3.32 (2.43 to 4.53)**
Victim	419 (9.4)	247 (11.5)	172 (7.5)	**1.84 (1.50 to 2.26)**
Bully	326 (7.3)	225 (10.5)	101 (4.4)	**2.89 (2.26 to 3.69)**

OR: Odds Ratio; C.I: Confidence Intervals; [A] Suicide ideation: thought about killing self; [B] Suicidal self/injurious behavior: hurt self on purpose and/or actually tried to kill self; [C] At 8 and or 10 years; [D] Bold font indicates significant associations , i.e. the 95% confidence intervals do not cross one

Table 3. Associations between bullying behavior and suicide ideation controlling for potentially confounding factors

	Model [A]	Model B [B]	Model C [C]
Peer victimization status	**OR (95% C.I)**	**OR (95% C.I)**	**OR (95% C.I) [D]**
Child report at 8 years	(N=5047) [E]	(N=4775) [E]	(N= 4404) [E]
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**3.50 (2.34 to 5.25)**	**3.41 (2.24 to 5.18)**	**2.84 (1.81 to 4.45)**
Victim only	**1.70 (1.26 to 2.29)**	**1.70 (1.25 to 2.31)**	**1.57 (1.15 to 2.16)**
Bully only	**3.74 (1.56 to 8.97)**	**3.74 (1.55 to 9.07)**	**3.60 (1.46 to 8.84)**
Child report at 10 years	(N=5550)	(N=5207)	(N=4719)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**4.23 (2.88 to 6.20)**	**3.84 (2.57 to 5.74)**	**3.20 (2.07 to 4.95)**
Victim only	**2.40 (1.80 to 3.19)**	**2.20 (1.64 to 2.96)**	**1.95 (1.42 to 2.66)**
Bully only	1.16 (0.28 to 4.83)	1.13 (0.27 to 4.75)	0.56 (0.08 to 4.13)
Overt victim	(N= 5778)	(N=5403)	(N=4879)
No	**[reference]**	**[reference]**	**[reference]**
Yes	**2.30 (1.79 to 2.96)**	**2.19 (1.69 to 2.84)**	**1.88 (1.43 to 2.47)**
Relational victim	(N=5760)	(N=5389)	(N=4868)
No	**[reference]**	**[reference]**	**[reference]**
Yes	**1.76 (1.34 to 2.32)**	**1.74 (1.31 to 2.30)**	**1.60 (1.18 to 2.16)**
Chronicity (child report)	(N=4829)	(N= 4589)	(N = 4251)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**1.66 (1.19 to 2.32)**	**1.59 (1.13 to 2.23)**	**1.47 (1.03 to 2.09)**
Stable	**4.03 (2.84 to 5.72)**	**3.68 (2.57 to 5.28)**	**3.26 (2.24 to 4.75)**
Chronicity (mother report)	(N=4273)	(N=4252)	(N=4249)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**2.62 (1.88 to 3.65)**	**2.43 (1.74 to 3.40)**	**2.25 (1.60 to 3.17)**
Stable	**3.64 (2.51 to 5.26)**	**3.03 (2.06 to 4.46)**	**2.49 (1.64 to 3.79)**
Chronicity (teacher report)	(N=4435)	(N= 4118)	(N=3691)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**2.01 (1.41 to 2.87)**	**1.81 (1.25 to 2.64)**	**1.93 (1.30 to 2.86)**
Stable	**5.66 (2.93 to 10.93)**	**5.18 (2.57 to 10.43)**	**5.99 (2.79 to 12.88)**
Mother report	(N=5741)	(N= 5502)	(N= 4990)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**4.01 (2.91 to 5.55)**	**3.22 (2.27 to 4.58)**	**2.71 (1.81 to 4.05)**
Victim only	**2.20 (1.62 to 2.97)**	**2.03 (1.48 to 2.77)**	**1.99 (1.42 to 2.80)**
Bully only	1.42 (0.92 to 2.19)	1.34 (0.87 to 2.09)	1.25 (0.77 to 2.02)
Teacher report	(N=4434)	(N=4117)	(N= 3690)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**3.45 (2.18 to 5.48)**	**2.85 (1.74 to 4.68)**	**2.79 (1.62 to 4.81)**
Victim only	**2.00 (1.32 to 3.02)**	**1.89 (1.23 to 2.92)**	**1.99 (1.27 to 3.12)**
Bully only	1.58 (0.96 to 2.61)	1.50 (0.89 to 2.52)	1.08 (0.57 to 2.00)

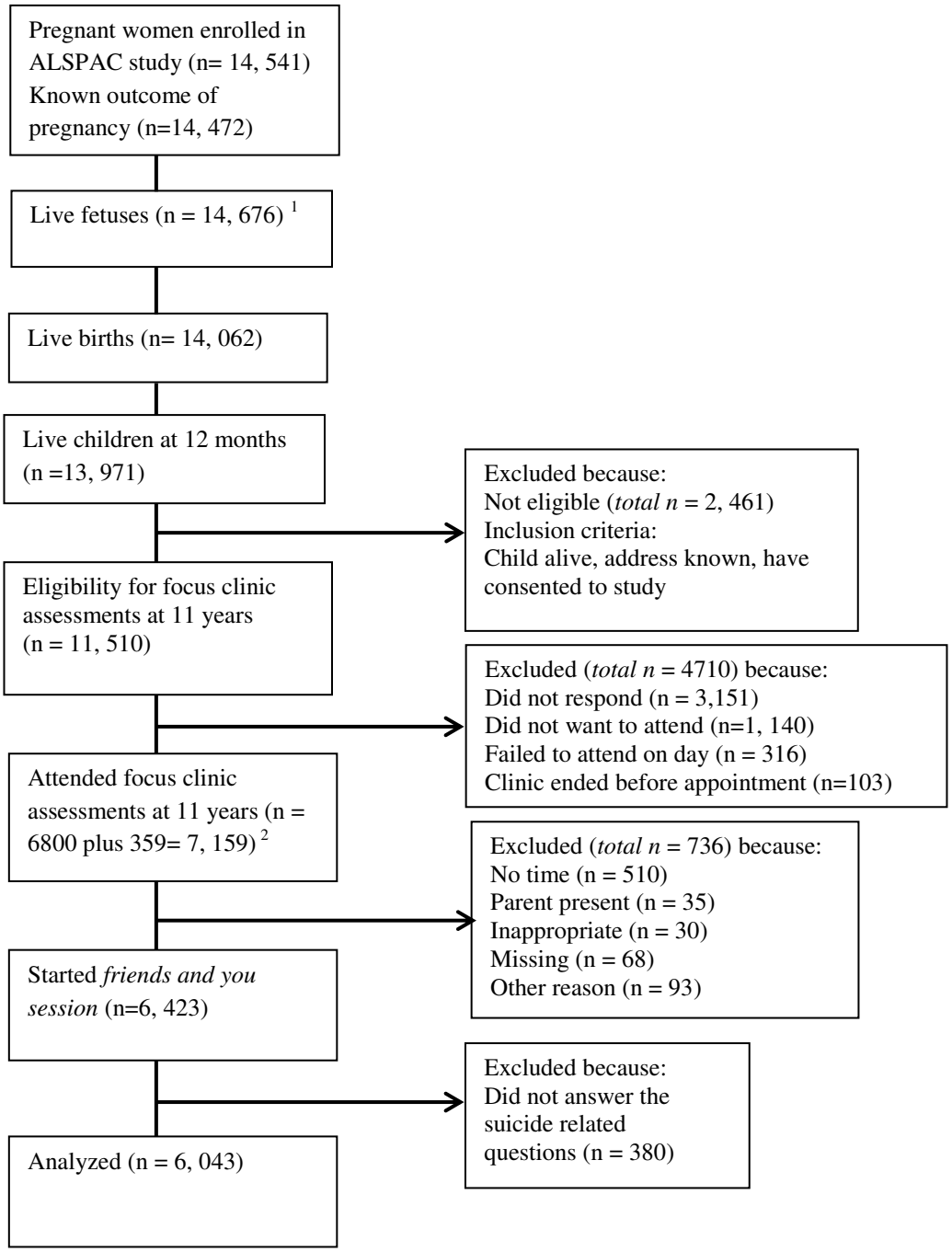
OR: Odds Ratio; C.I: Confidence Intervals; [A] Controlling for age and gender; [B] Controlling for age, gender and additionally abuse, domestic violence and maladaptive parenting; [C] Controlling for negative emotionality and conduct disorder in addition to age, gender, abuse, domestic violence and maladaptive parenting; [D] Bold font indicates significant associations, i.e. the 95% confidence intervals do not cross one; [E] Number of participants in analysis

Table 4. Associations between bullying and suicidal/self-injurious behavior controlling for potentially confounding factors

Peer victimization status	**Model [A]**	**Model B[B]**	**Model C[C]**
	OR (95% C.I)	**OR (95% C.I)**	**OR (95% C.I) [D]**
Child report at 8 years	(N=5053) [E]	(N=4780) [E]	(N=4408) [E]
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**2.92 (1.88 to 4.53)**	**2.60 (1.64 to 4.13)**	**2.67 (1.66 to 4.29)**
Victim only	**2.36 (1.75 to 3.18)**	**2.28 (1.67 to 3.09)**	**2.05 (1.48 to 2.83)**
Bully only	**3.90 (1.61 to 9.42)**	**2.93 (1.12 to 7.69)**	**3.02 (1.14 to 8.02)**
Child report at 10 years	(N=5558)	(N=5214)	(N=4724)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**3.87 (2.63 to 5.69)**	**4.07 (2.74 to 6.03)**	**3.34 (2.17 to 5.15)**
Victim only	**2.53 (1.89 to 3.38)**	**2.45 (1.81 to 3.32)**	**2.25 (1.63 to 3.09)**
Bully only	1.57 (0.48 to 5.13)	1.61 (0.49 to 5.29)	1.12 (0.26 to 4.74)
Overt victim	(N=5786)	(N=5410)	(N=4884)
No	**[reference]**	**[reference]**	**[reference]**
Yes	**2.90 (2.22 to 3.79)**	**2.87 (2.17 to 3.79)**	**2.56 (1.91 to 3.44)**
Relational victim	(N=5768)	(N=5396)	(N=4873)
No	**[reference]**	**[reference]**	**[reference]**
Yes	**1.92 (1.46 to 2.53)**	**1.88 (1.41 to 2.50)**	**1.77 (1.31 to 2.41)**
Chronicity (child report)	(N=4835)	(N=4594)	(N= 4255)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**2.05 (1.45 to 2.89)**	**1.96 (1.38 to 2.81)**	**1.91 (1.32 to 2.76)**
Stable	**4.78 (3.33 to 6.86)**	**4.67 (3.21 to 6.78)**	**4.10 (2.76 to 6.08)**
Chronicity (mother report)	(N=4278)	(N=4257)	(N=4254)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**2.04 (1.45 to 2.87)**	**1.97 (1.39 to 2.78)**	**1.82 (1.28 to 2.60)**
Stable	**2.53 (1.70 to 3.76)**	**2.28 (1.51 to 3.44)**	**1.91 (1.22 to 2.99)**
Chronicity (teacher report)	(N = 4441)	(N=4123)	(N=3695)
None	**[reference]**	**[reference]**	**[reference]**
Unstable	**1.71 (1.19 to 2.47)**	**1.61 (1.10 to 2.37)**	**1.65 (1.09 to 2.49)**
Stable	**3.88 (1.92 to 7.85)**	**3.92 (1.91 to 8.03)**	**3.26 (1.38 to 7.68)**
Mother report	(N=5747)	(N=5508)	(N=4995)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**2.80 (1.99 to 3.93)**	**2.59 (1.79 to 3.74)**	**2.09 (1.36 to 3.20)**
Victim only	**1.76 (1.29 to 2.41)**	**1.65 (1.20 to 2.29)**	**1.74 (1.22 to 2.46)**
Bully only	**1.51 (1.00 to 2.26)**	1.41 (0.92 to 2.16)	1.32 (0.83 to 2.10)
Teacher report	(N=4440)	(N=4122)	(N=3694)
None	**[reference]**	**[reference]**	**[reference]**
Bully/victim	**3.08 (1.92 to 4.93)**	**2.85(1.74 to 4.69)**	**2.44 (1.39 to 4.30)**
Victim only	**1.70 (1.09 to 2.63)**	**1.67 (1.05 to 2.64)**	**1.74 (1.07 to 2.84)**
Bully only	**2.16 (1.39 to 3.35)**	**2.14 (1.35 to 3.40)**	**1.84 (1.09 to 3.10)**

OR: Odds Ratio; C.I: Confidence Intervals; [A] Controlling for age and gender; [B] Controlling for age, gender and additionally abuse, domestic violence and maladaptive parenting; [C] Controlling for negative emotionality and conduct disorder in addition to age, gender, abuse, domestic violence and maladaptive parenting; [D] Bold font indicates significant associations, i.e. the 95% confidence intervals do not cross one; [E] Number of participants in analysis

Figure 1. Flow of participants from pregnancy to 11 year assessment in the ALSPAC cohort study



[1] Includes multiple births (195 twins, 3 triplets, 1 quadruplet); [2] An additional 359 children were invited who were previously missed pregnancies, born and residing in the Avon area.

Supplementary Table S1. Crude associations between bullying behavior and suicide ideation and suicidal self-injurious behaviour

Any victim by informant		Suicide Ideation	Suicidal/self-injurious behavior
	Total number	Odds Ratio (95% C.I)	Odds Ratio (95% C.I) [F]
Child report at 8 years			
None	3011	**[reference]**	**[reference]**
Bully/victim	344	**3.55 (2.38 to 5.30)**	**3.44 (2.23 to 5.31)**
Victim only	1637	**1.70 (1.27 to 2.29)**	**2.40 (1.78 to 3.24)**
Bully	55	**3.72 (1.56 to 8.90)**	**4.43 (1.85 to 10.64)**
Child report at 10 years			
None	4162	**[reference]**	**[reference]**
Bully/victim	301	**4.34 (2.98 to 6.33)**	**4.68 (3.20 to 6.84)**
Victim only	1036	**2.41 (1.81 to 3.20)**	**2.57 (1.92 to 3.43)**
Bully	51	1.19 (0.29 to 4.94)	1.93 (0.59 to 6.28)
Overt victimization [A]			
None	3435	**[reference]**	
Victimisation	2343	**2.32 (1.81 to 2.97)**	**3.02 (1.28 to 7.11)**
Relational victimization [A]			
None	4631	**[reference]**	
Victimisation	1129	**1.74 (1.33 to 2.29)**	**1.82 (1.38 to 2.40)**
Chronicity (child report)			
None	2454	**[reference]**	**[reference]**
Unstable [B]	1714	**1.67 (1.20 to 2.34)**	**2.14 (1.52 to 3.01)**
Stable [C]	661	**4.09 (2.88 to 5.79)**	**5.13 (3.59 to 7.35)**
Chronicity (mother report)			
None	2880	**[reference]**	**[reference]**
Unstable [D]	912	**2.64 (1.90 to 3.67)**	**2.12 (1.50 to 2.98)**
Stable [E]	481	**3.69 (2.55 to 5.34)**	**2.71(1.83 to 4.02)**
Chronicity (teacher report)			
None	3808	**[reference]**	**[reference]**
Unstable [D]	565	**2.08 (1.46 to 2.96)**	**1.91 (1.33 to 2.75)**
Stable [E]	62	**6.06 (3.16 to 11.63)**	**4.83 (2.41 to 9.70)**
Mother report			
None	3424	**[reference]**	
Bully/victim	404	**4.30 (2.92 to 5.55)**	**3.08 (2.19 to 4.31)**
Victim only	1340	**2.20 (1.62 to 2.98)**	**1.83 (1.34 to 2.50)**
Bully	458	1.43 (0.93 to 2.20)	**1.62 (1.08 to 2.43)**
Teacher report			
None	3482	**[reference]**	
Bully/victim	208	**3.64 (2.31 to 5.73)**	**3.69 (2.32 to 5.86)**
Victim only	419	**2.05 (1.36 to 3.10)**	**1.87 (1.21 to 2.90)**
Bully	325	**1.65 (1.01 to 2.72)**	**2.53 (1.64 to 3.90)**

OR: Odds Ratio; C.I: Confidence Intervals; Suicide ideation: thought about killing self; Suicidal/self-injurious behavior: hurt self on purpose or actually tried to kill self [A] At 8 or 10 years; [B] At 8 or 10 years; [C] At 8 and 10 years; [D] 1 time; [E] 2 or 3 times; [F] Bold font indicates significant associations, i.e. the 95% confidence intervals do not cross one

Supplementary Table S2. Association of Socio-demographic factors with Maladaptive Parenting

Socio-demographic factors	Potential Confounders	
	Parenting mild [1]	Parenting severe [1]
	Odds Ratio (CIs)	Odds Ratio (CIs)
Social class (non-manual vs. manual)	**1.23 (1.14 to 1.35)**	1.08 (0.94 to 1.25)
Ethnic background (white vs. ethnic minority)	0.94 (0.76 to 1.16)	1.33 (0.97 to 1.83)
Home ownership (own vs. rent)	**1.19 (1.07 to 1.31)**	**1.24 (1.05 to 1.47)**
Maternal education (lower vs. higher)	0.91 (0.83 to 1.00)	0.94 (0.80 to 1.10)
Family adversity Index (0 vs. adversity)	**1.17 (1.08 to 1.27)**	**1.63 (1.41 to 1.89)**
Marital status (single vs. married)	**0.87 (0.79 to 0.97)**	**0.77 (0.65 to 0.91)**

[1] Logistic regressions with confidence intervals in brackets; significant values at $p < 0.05$ in bold