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Research report

Early predictors of deliberate self-harm among adolescents. A prospective follow-up study from age 3 to age 15

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Abstract

Background: To study predictors at age 3 and at age 12 for ideations and acts of deliberate self-harm at age 15 in a representative birth cohort.
Method: Information about ideations and acts of deliberate self-harm at age 12 and at age 15 was obtained from parents and children. Information about the child's problems was obtained at age 3 using the Child Behavior Checklist 2/3 (CBCL 2/3), and at age 12 with the CBCL and Youth Self-report (YSR). Furthermore, when the child was 12, mothers and fathers gave information about their own health, well-being and mental distress, and about family functioning measured with the Family Assessment Device (FAD).
Results: There was a significant increase in self-reported deliberate self-harm (ideations or acts) from age 12 to age 15, especially among girls (from 3% to 13%). Parent–child agreement on acts and ideations of deliberate self-harm was very low at both time-points (proportion of agreement 0.0–0.2). Self-reports of deliberate self-harm at age 12 independently predicted both acts and ideations of deliberate self-harm at age 15. Female gender, self-reports of internalizing problems and somatic complaints, parent reports of child's externalizing problems and aggressivity, mother's reports of her health problems, and living in nonintact family at age 12 independently predicted self-reported acts of deliberate self-harm 3 years later. Parent reports of child's learning difficulties, and self-reports of being bullied independently predicted ideations of deliberate self-harm at age 15. Parent reports of child's psychopathology at age 3 assessed with the CBCL 2/3 had no predictive association with ideation or acts of deliberate self-harm at age 15.
Conclusions: Acts of deliberate self-harm in mid-adolescence are due to an accumulation of earlier family and parental distress, and child's externalizing and internalizing problems. Information about deliberate self-harm at age 12 is an important warning sign of deliberate self-harm in mid-adolescence.

Keywords: Adolescents; Suicidality; Self-harm; Psychopathology; Risk factors

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1. Introduction

For preventive, clinical and research purposes, population-based information about early antecedents of adolescent deliberate self-harm is important. A major limitation to research on deliberate self-harm in clinical samples is that it does not include the vast majority of adolescents with ideations or acts in the community. Of all adolescent suicidal attempters, only a minority have used any mental health services (Appleby et al., 1996; Garrison et al., 1993; Sourander et al., 2001). Previous studies have also shown that health professionals show rather poor recognition of adolescents' suicidal behavior. A number of different terms have been put forward to describe suicidal behavior, which has caused some confusion. The term suicidal behavior encompasses any form of intentional or deliberate self-injurious behavior (suicide, attempted suicide, deliberate self-harm). In the present article, deliberate self-harm is referring to self-injurious behavior with non-fatal outcome.

The continuum from deliberate self-harm thoughts to attempts and to completed suicide is not linear; the factors associated with ideations differ from those associated with acts. The present longitudinal study investigates predictors for adolescent ideations and acts of deliberate self-harm at two developmental stages, in very early childhood at age 3, and at age 12, reflecting the turning point from childhood to the adolescent stage. The follow-up period from age 12 to 15 is interesting because of the many changes related to adolescent development. Self-harm attempts reach a peak between 15 and 18 years of age after which there is a marked decline in frequency as adolescents enter early adulthood. Information about early childhood predictors for adolescent deliberate self-harm has relevance for the early detection of children at risk of suicidal attempts. There is a lack of population-based studies examining the continuity of deliberate self-harm from preadolescence to mid-adolescence, as well as studies examining possible very early childhood psychopathology predictors for deliberate self-harm in mid-adolescence.

Significant suicide risks include difficulties at school (Gould et al., 1996), sociodemographic disadvantage (Beautrais et al., 1996), living in broken families (Brent et al., 1993), parental psychopathology (Brent et al., 1988; Fergusson and Lynskey, 1995), difficulties in relationships with parents and stressful and traumatic life events (Beautrais et al., 1996; Lewinsohn et al., 1994). In particular, a combination of depressive symptoms and antisocial behavior has been shown to form the most common antecedent of teenage suicide (Shaffer and Fisher, 1981). Despite the overlap between self-harm attempts and ideations, and the significant prediction of future attempts from ideations, the diagnostic profiles of attempters and ideatiors are somewhat different (Haavisto et al., 2003). Apter et al. (1995) distinguished two types of suicidal behavior in adolescent inpatients: the first was characterized by a wish to die and common in depressive disorders, the second was characterized by impulse control problems and associated with externalizing problems.

The aims of the present study are: we studied 1. the prevalence of parent and self-reports of child's deliberate self-harm behavior at age 12 and at age 15; 2. the level of agreement between parents and children on deliberate self-harm behavior; 3. to which extent the child's psychopathology and competence at age 3 and at age 12 and the mother's and father's self-reports of their well-being and mental distress predict the child's reports of acts and ideations of deliberate self-harm at age 15.

2. Subjects and methods

2.1. Subjects

The present study is part of the Finnish Family Competence Study (FCC) launched in 1985 in the Province of Turku and Pori in South-Western Finland. The source population was an unselected sample from Central Hospital region of the Province of Turku and Pori in South-Western Finland with a total population of 713,000. Subject collection was based on stratified randomised cluster sampling. For stratification, the study area was divided into two parts, the southern area (Turku University Hospital Region) and the northern area (Satakunta Central Hospital Region). Each cluster consisted of the municipalities in the sample health authority areas which did not differ significantly from all municipalities in the province (Rautava and Sillanpää, 1989). Randomisation was carried out by selecting by lot 11 of the total of 35 health authority areas weighted according to each stratum. All the 67 maternity health care clinics and 72 well-baby clinics of these 11 health authority areas participated in the study.

The study population consisted of young families expecting their first baby and paying their first visit to a maternity health care clinic in 1986. Virtually all Finnish mothers use the services of a maternity health care clinic. Maternity health care nurses offered 1582 women the possibility to participate, and 1443 of them gave their informed consent for participation. The occupational distribution of those who refused was similar to that of the participants (Rautava and Sillanpää, 1989).

There were 1294 deliveries of which three were stillbirths, eight children died in infancy and five children moved abroad. The number of original potential study families was thus 1278. Seven women delivered twins and one triplets, so the number of potential study children was 1287.

The information has been collected from early pregnancy to the children's age of fifteen: at first through questionnaires given by a nurse to the parents on their routine visits to the maternity health care clinic during the pregnancy and in the well-baby clinics after the birth of the child. At school-age, the questionnaires were mailed home. The parents and children themselves (at the ages of 12 and 15) returned the filled-in questionnaires to the authors in sealed envelopes. At the child's age of 12, altogether 1125 (87%) children and their families were still traceable, of them, 907 (80%) parents and 900 (80%) children returned the questionnaires acceptably filled in. At the age of 15, information about children's deliberate self-harm was obtained from 839 (75%) children and 738 (66%) parents.

When the dropouts in the participation to the study at age 15 was analysed, there were no significant differences in the mean CBCL scores both at ages of 3 and 12 years between participants and dropouts.

2.2. Methods

2.2.1. Psychopathology at 3 years

At the 3-year visit to the well-baby clinic, the parents completed the Child Behavior Checklist (CBCL; Achenbach et al., 1987). The version designed for 2- to 3-year-old children consists of a 99-item checklist and used previously, e.g. in Finnish studies (Sourander, 2001). For detailed information, the items are scored on six syndrome scales: withdrawn, somatic complaints, depressed, sleep problems, aggressive behavior and destructive behavior; and on two broad-band groupings of syndromes, internalizing and externalizing. The subjects were categorized as deviant when the sex-specified CBCL scores (total problem, externalizing, internalizing and syndrome scores) were equal to or above the 90th percentile of the distribution.

2.2.2. Psychopathology and competence at 12 years

At the child's age of twelve, the CBCL 113-item version for 4–18-year-olds (Achenbach, 1991a) was included in the parents' questionnaire. This version includes two subscales, Externalizing and Internalizing, and eight syndrome scales: withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior and aggressive behavior. The CBCL also includes a competence scale reflecting the child's social and school functioning. The child's questionnaire includes the Youth Self-Report (YSR), a matching instrument used in the age group 11–18 years, scored identically to the CBCL (Achenbach, 1991b). Deviant group categorization was performed as mentioned above. The CBCL and the YSR are widely used instruments for assessing emotional and behavioral problems in children for the purposes of clinical screening and epidemiological research, both internationally (Crijnen et al., 1999) and in Finland (Helstelä and Sourander, 2001; Helstelä et al., 2001). Parent questionnaire included question about child's learning difficulties at school and special school attendance. Self-report questionnaire included a question about being bullied at school (scored 1–5, 1 = never, 2 = less than once a month; 3 = less than once a week; 4 = every week; 5 = daily, analysed as 1–3 vs. 4–5).

2.2.3. Sociodemographic, parent and family related factors at age 12

Sociodemographic factors included gender, both parents' age, occupation and basic education on a 7-point scale, 7 being the highest score.

Both mothers and fathers filled in a questionnaire assessing their perceived health, well-being and mental distress. Parent-related factors included mother's and father's health (scored 1 to 5, 1 = good, 5 = poor, analysed 1 + 2 vs. 4 + 5); well-being (scored 1 to 5, 1 = energetic, 5 = exhausted, analysed 1 + 2 vs. 4 + 5); mother's and father's stress, depressive mood and nervousness (scored 1–4, 1 = weekly, 2 = monthly, 3 = seldom, 4 = hardly ever, analysed as 1 vs. 2 + 3 + 4).

Family functioning was screened using the 12-item General Functioning Scale part of McMaster's Family Assessment Device (FAD) (Byles et al., 1988). A total score above the 90th percentile was categorized as poor functioning. Other family-related factors included family composition (child living with both biological parents/single parent/other); separation from either parent (yes/no); and a new adult in the family (yes/no).

2.2.4. Ideations and acts of deliberate self-harm at age 12 and 15

Self-reports of ideations of deliberate self-harm during the previous 6 months was determined by the question: "I think about killing myself" and acts of deliberate self-harm by the question: " I deliberately try to hurt or kill myself" (alternatives 0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true, alternatives 1 and 2 were pooled together). Similar

Table 1
Descriptive data on self-reports of ideations and acts of deliberate self-harm at ages 12 and 15

Parent report at age 12	Self-report at age 12				Parent report at age 15	Self-report at age 15			
	Missing data *n* (%)	No self-harm *n* (%)	Only ideation *n* (%)	Acts *n* (%)		Missing data *n* (%)	No self-harm *n* (%)	Only ideation *n* (%)	Acts *n* (%)
Missing data					Missing data				
Girls	0 (0)	0 (0)	0 (0)	0 (0)	Girls	0 (0)	58 (12.8)	1 (0.2)	8 (1.8)
Boys	0 (0)	1 (0.2)	0 (0)	0 (0)	Boys	0 (0)	62 (14.9)	1 (0.2)	2 (0.5)
No self-harm					No self-harm				
Girls	5 (1.0)	451 (94.2)	2 (0.4)	10 (2.1)	Girls	10 (2.2)	324 (71.2)	11 (2.4)	28 (6.2)
Boys	5 (1.2)	400 (93.0)	7 (1.6)	4 (0.9)	Boys	18 (4.3)	309 (74.3)	7 (1.7)	5 (1.2)
Only ideation					Only ideation				
Girls	0 (0)	10 (2.1)	1 (0.2)	0 (0)	Girls	1 (0.2)	2 (0.4)	1 (0.2)	2 (0.4)
Boys	0 (0)	9 (2.1)	1 (0.2)	1 (0.2)	Boys	0 (0)	5 (1.2)	1 (0.2)	1 (0.2)
Acts					Acts				
Girls	0 (0)	0 (0)	0 (0)	0 (0)	Girls	1 (0.2)	2 (0.4)	0 (0)	6 (1.3)
Boys	0 (0)	2 (0.5)	0 (0)	0 (0)	Boys	1 (0.2)	1 (0.2)	0 (0)	2 (0.5)

questions were asked in parent questionnaires. The wording of the questions and alternatives were identical at age 12 and 15.

A child was defined as belonging to the deliberate self-harm group if he reported ideations or acts of deliberate self-harm during the previous 6 months. The first group included those who reported acts of deliberate self-harm and/or suicide attempt. The second group included those who reported only ideations of deliberate self-harm but not acts of deliberate self-harm or suicide attempt. If the child had answered positively to both questions, he was assigned to the first group.

2.3. Statistical methods

The effect of sex and age on self-reports and parent reports of child's deliberate self-harm at ages 12 and 15 was calculated with repeated measures of analysis. The level of agreement on deliberate self-harm between parents and children was analysed with the proportional agreement test. The statistical significance of the univariate associations was analysed with cross tabulation and tested with Pearson's chi square test. These associations were quantified by calculating odds ratios (OR) with 95% confidence intervals (95% CI) using multinomial logistic regression analysis, and adjusted with the effect of sex. Odds ratios and confidence intervals were calculated separately for the group of 15-year-old children who reported acts of deliberate self-harm (including those who reported both acts and ideations) vs. the children with no self-reported deliberate self-harm: and for the group with only ideations of deliberate self-harm according to self-reports vs. the children with no self-reported deliberate self-harm. 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 (Hosmer and Lemeshow, 2000). The multivariate analyses of the associations were carried out by applying multivariate multinomial stepwise logistic regression analysis. *p*-values less than 0.05 were considered statistically significant. Statistical computations were performed using the SAS system for Windows, release 8.2/2000.

3. Results

3.1. Prevalence of ideations and acts of deliberate self-harm at ages 12 and 15

Table 1 shows the prevalences of children at ages 12 and age 15 having only ideations of deliberate self-harm, and having acts of deliberate self-harm (including those who reported both ideations and acts) separately in parent and self-reports. In self-reports at age 12, 2.7% of girls and 3.1% of boys while at age 15, 12.6% of girls and 4.6% of boys reported deliberate self-harm (ideations or acts). However, according to parent reports, at age 12, 2.3% of girls and 3.1% of boys, and at age 15, 3.3% of girls and 2.7% of boys had deliberate self-harm.

3.2. The effect of sex and age

In analysis of repeated measures in self-reports the association of age was significant for acts of deliberate self-harm (OR 3.1, 95% CI 1.8–5.4, $p<0.001$) indicating an increase in acts from age 12 to age 15. Furthermore, in self-reports, the association of sex was significant for acts (OR 3.4, 95% CI 1.7–6.8, $p<0.001$) indicating that girls have significantly more acts than

Table 2
Significant predictors at age 12 for ideations and acts of deliberate self-harm at age 15 when controlled with the effect of gender

Variable		Total *n*	Only ideation (%) (*n*=22)	Acts (%) (*n*=54)	Only ideation		Acts	
					OR	95% CI	OR	95% CI
Gender	Boys	396	2.3	2.5				
	Girls	443	2.9	9.9	1.4	0.6–3.3	4.3	2.1–8.7
Parent reports								
CBCL total scores	<90 percentile	709	2.4	5.4				
	≥90 percentile	76	5.3	14.5	2.6	0.8–7.9	3.3	1.6–6.9
CBCL subscores								
Externalizing	<90 percentile	712	2.7	5.3				
	≥90 percentile	73	2.7	15.1	1.2	0.3–5.1	3.3	1.6–7.0
Internalizing	<90 percentile	692	2.6	5.8				
	≥90 percentile	85	3.5	9.4	1.4	0.4–5.0	1.7	0.8–3.9
CBCL syndrome scales								
Aggressivity	<90 percentile	708	2.7	5.2				
	≥90 percentile	77	2.6	15.6	1.1	0.3–4.9	3.7	1.8–7.6
Social problems	<90 percentile	695	2.2	6.0				
	≥90 percentile	90	6.7	7.8	3.3	1.2–8.7	1.2	0.5–2.8
Somatic complaints	<90 percentile	711	2.7	5.3				
	≥90 percentile	69	2.9	14.5	1.2	0.3–5.3	2.9	1.4–6.2
Act or ideations of	No	762	2.5	5.8				
deliberate self-harm	Yes	22	9.1	22.7	5.0	1.1–23.7	6.0	2.0–18.1
Special school	No	702	2.3	6.1				
	Yes	82	6.1	7.3	2.8	0.98–7.8	1.1	0.5–2.8
Learning difficulties	No	616	1.8	6.7				
	Yes	164	6.1	4.9	3.6	1.5–8.6	0.8	0.4–1.8
Self-reports								
YSR total scores	<90 percentile	701	2.4	5.6				
	≥90 percentile	79	5.1	11.4	2.3	0.8–7.1	2.4	1.1–5.2
YSR subscores								
Internalizing	<90 percentile	692	2.5	5.2				
	≥90 percentile	73	4.1	16.4	1.9	0.6–6.8	3.7	1.8–7.5
YSR syndrome scales								
Anxious–depressed	<90 percentile	698	2.3	5.4				
	≥90 percentile	78	6.4	12.8	3.2	1.1–9.1	2.8	1.3–5.9
Attention	<90 percentile	721	2.6	5.6				
	≥90 percentile	56	3.6	14.3	1.6	0.4–6.9	3.2	1.4–7.4
Delinquency	<90 percentile	690	2.5	5.1				
	≥90 percentile	88	4.6	14.8	2.1	0.7–6.4	3.1	1.5–6.1
Social problems	<90 percentile	702	2.6	6.0				
	≥90 percentile	77	3.9	7.8	1.6	0.5–5.7	1.6	0.7–4.0
Somatic complaints	<90 percentile	681	2.4	5.0				
	≥90 percentile	88	4.6	15.9	2.3	0.8–7.1	4.0	2.0–8.0
Withdrawal	<90 percentile	721	2.5	5.4				
	≥90 percentile	59	5.1	15.3	2.4	0.7–8.3	3.3	1.5–7.4
Ideations or acts of	No	747	2.3	5.5				
deliberate self-harm	Yes	24	16.7	25.0	12.0	3.6–40.7	8.3	2.9–23.8
School competence	Good/average	688	2.2	6.3				
	Poor	82	7.3	6.1	3.6	1.4–9.6	1.1	0.4–2.9
Bullied at school	No	707	2.0	6.4				
	Yes	76	9.2	5.3	5.1	2.0–13.1	0.96	0.3–2.8
Family variables								
Divorce	No	638	2.0	5.5				
	Yes	142	5.6	9.9	3.0	1.2–7.4	1.8	0.9–3.4
New parent	No	680	2.1	5.6				
	Yes	94	6.4	11.7	3.5	1.3–9.3	2.3	1.1–4.7
Family structure	Two biologicalparents	620	2.1	5.2				
	Other	165	4.9	10.3	2.5	1.01–6.1	2.0	1.1–3.7

(continued on next page)

Table 2 (*continued*)

Variable		Total *n*	Only ideation (%) (*n*=22)	Acts (%) (*n*=54)	Only ideation		Acts	
					OR	95% CI	OR	95% CI
Mother's health								
Problems in perceived health	No	747	2.5	5.4				
	Yes	29	6.9	27.6	3.9	0.8–17.8	7.7	3.1–19.4
Problems in well-being	No	626	2.9	4.8				
	Yes	147	2.0	12.2	0.8	0.2–2.6	2.7	1.4–5.0
Nervousness	No	700	2.9	5.4				
	Yes	72	1.4	13.9	0.5	0.1–3.9	2.6	1.2–5.5
Father's health								
Problems in well-being	No	573	2.6	5.4				
	Yes	103	2.9	12.6	1.2	0.3–4.3	2.5	1.3–5.1

Results of univariate multinomial logistic regression analysis.
OR, odds ratio; CI, confidence interval. In the calculation of odds ratios "no deliberate self-harm" group is the reference category.

boys. The association of neither sex nor age was significant for having only ideations of deliberate self-harm. No significant associations of age and sex interaction on self-reported ideations or acts of deliberate self-harm was found.

The association of age, sex or age and sex interaction was not significant in parent reports of child's ideations or acts of deliberate self-harm.

3.3. Parents' and adolescents' agreement on ideations and acts of deliberate self-harm

At age 12, out of the 13 girls having only ideations of deliberate self-harm, the parents and children agreed only in one case (proportion of agreement 0.08, 95% CI 0.07–0.22). Similarly, the parental conceptions of their son's ideations were in line with only one of 18 12-year-old boys (proportion of agreement 0.06, 95% CI 0.01–0.16). Ten girls and seven boys had acts of deliberate self-harm but in not one single case did parents and children agree on acts. However, the agreement between parents and children on the child having no ideations or acts of deliberate self-harm was high among both girls and boys (proportion of agreement 0.95, 95% CI 0.93–0.97; and 0.93, 95% CI 0.93–0.97, respectively).

At age 15, out of the 16 girls with only ideations of deliberate self-harm, parents and children agreed in only one case (proportion of agreement 0.06, 95% CI 0.06–0.18). Similarly, among boys, out of the 14 cases with only ideations both informants agreed in only one case (proportion of agreement 0.07, 95% CI 0.06–0.21). Among the 38 girls with acts of deliberate self-harm, the both informants agreed in 6 cases (proportion of agreement 0.16,95% CI 0.04–0.27), and among the 9 boys with acts the both informants agreed in 2 cases (proportion of agreement 0.22, 95% CI 0.05–0–49). The agreement on not having ideations or acts of deliberate self-harm was high between parents and adolescents among both girls and boys (proportion of agreement 0.88, 95% CI 0.85–0.92; 0.94, 95% CI 0.92–0.97, respectively).

3.4. Predictors of self-reported ideations and acts of deliberate self-harm at age 15

3.4.1. Demographic and family variables at age 12

As shown in Table 2, in analysis adjusted for the effect of sex, living in other than a two biological parent family, and having a new parent figure predicted self-reported acts and ideations of deliberate self-harm at age 15. Parental divorce was associated with having only ideations. Female gender, mother's health problems, poor well-being, and nervousness, and father's poor well-being, at age 12, had a predictive association with self-reported acts at age 15. Family functioning measured with the FAD when the child was 12 had no predictive association with outcome at age 15.

3.4.2. Parental ratings of psychopathology and competence at age 3 and age 12

When the child's psychopathology was assessed by parents using the CBCL 2–3 at age 3, no significant associations were found between CBCL total problems, subscores or syndrome domains and self-reported acts or ideations of deliberate self-harm at age 15.

At age 12, in analysis adjusted for the effect of sex, CBCL total problems, externalizing subscores, somatic complaints, and aggressivity predicted self-reported acts of deliberate self-harm at age 15. Furthermore, CBCL social problems and parental evaluation of learning difficulties at age 12 predicted ideations at age 15. Parental evaluation of preadolescents' deliberate self-

Table 3
Predictors of self-reported ideations and acts of deliberate self-harm at age 15

Variables	Overall *p*-value	Only ideations		Acts	
		OR	95% CI	OR	95% CI
Model 1 (n=756) (including CBCL/YSR total scores)					
Female sex	<0.001	1.6	0.6–4.1	4.5	2.0–9.8
Mother's health problems	<0.001	2.0	0.3–11.0	7.4	2.8–19.7
Self-reports of deliberate self-harm	<0.001	8.1	2.2–29.7	7.1	2.3–21.4
Nonintact family structure	0.017	1.8	0.7–4.8	2.5	1.3–4.9
CBCL total scores	0.018	1.1	0.3–3.8	3.7	1.6–8.8
Learning difficulties	0.017	2.7	1.04–7.2	0.5	0.2–1.2
Bullied	0.024	3.4	1.2–9.6	0.5	0.1–1.7
Model 2 (n=745) (including CBCL/YSR sub scores)					
Female sex	<0.001	1.8	0.7–4.8	4.8	2.1–10.8
Mother's health problems	<0.001	2.0	0.3–12.2	9.0	3.4–24.3
Self-reports of deliberate self-harm	0.001	10.7	2.6–45.0	4.7	1.4–15.9
CBCL externalizing	0.015	0.7	0.2–3.4	3.5	1.5–8.2
Nonintact family structure	0.012	1.9	0.7–5.3	2.6	1.3–5.2
Learning difficulties	0.005	3.2	1.2–9.0	0.5	0.2–1.2
YSR internalizing	0.036	0.7	0.2–3.1	3.0	1.3–7.1
Bullied	0.013	3.8	1.3–10.8	0.5	0.1–1.9
Model 3 (n=746) (including CBCL/YSR syndrome scales)					
Female sex	<0.001	1.9	0.7–5.1	5.1	2.3–11.5
Mother's health problems	<0.001	2.2	0.4–13.2	8.9	3.3–24.1
CBCL aggressivity	0.002	0.7	0.1–3.1	4.2	1.9–9.7
Self-reports of deliberate self-harm	0.001	8.0	2.1–30.9	5.2	1.6–17.0
Nonintact family structure	0.014	1.9	0.7–5.2	2.6	1.3–5.2
YSR somatic complaints	0.014	1.7	0.5–5.7	3.2	1.4–7.1
Learning difficulties	0.008	2.9	1.1–7.7	0.5	0.2–1.2
Bullied	0.010	4.0	1.4–11.4	0.6	0.2–2.2

Results of the final multivariate multinomial stepwise regression analyses.
OR, odds ratio; CI, confidence interval. In the calculation of odds ratios "no deliberate self-harm" group is the reference category.

harm (acts or ideations) at age 12 strongly predicted both self-reported acts and ideations at age 15.

3.4.3. Self-reported psychopathology and competence at age 12

As shown in Table 2, in analysis controlled for the effect of sex YSR total problems, internalizing subscores, withdrawal, somatic complaints, attention problems, and delinquency at age 12 had a predictive association with self-reported acts of deliberate self-harm at age 15. Poor school competence and being bullied at school at age 12 predicted self-reported ideations at age 15. YSR anxious–depressive symptoms and self-reported deliberate self-harm (acts or ideations) at age 12 predicted both acts and ideations at age 15.

3.4.4. Final multivariate analysis

The variables independently associated with outcome first analysed in different subgroups (demographic and family variables; parent reports of psychopathology and competence; self-reported psychopathology and competence) were entered in the final multivariate analysis. Because of the hierarchical relationship between CBCL/YSR total problems, subscores, and syndrome scales the analyses were performed in three models (Table 3).

As shown in Table 3, female sex, not living in a family with two biological parents, mother's health problems, CBCL total problems, CBCL externalizing problems, CBCL aggressivity, YSR internalizing problems, and YSR somatic complaints at age 12 independently predicted acts of deliberate self-harm at age 15. Self-reported deliberate self-harm (ideations or acts) at age 12 independently predicted both self-reported ideations and acts at age 15. Learning difficulties and being bullied at age 12 specifically predicted future ideations of deliberate self-harm.

4. Discussion

4.1. Prevalence and cross-informant agreement

The prevalence rate of self-reported deliberate self-harm increased dramatically from age 12 to age 15

among girls, but not in boys. Accordingly, the gender differences also increased during the 3-year follow-up period. The agreement between parents and children on ideations and acts of deliberate self-harm was very low, indicating that, in the majority of cases, parents are not aware of their children's deliberate self-harm. Previous studies have shown that suicidal acts are more common among females (Gould et al., 1998; Lewinsohn et al., 1994). One rather evident explanation for the elevated rates of suicidal behavior among girls in mid-adolescence is their elevated rate of depression.

4.2. Stability of deliberate self-harm from age 12 to age 15

There was a rather high stability of deliberate self-harm from age 12 to 15. Both parent and self-reports of deliberate self-harm when the child was 12 years old had a predictive association with having only ideations, and having suicidal acts 3 years later. To illustrate this, 42% of those with self-reported deliberate self-harm and 32% of those with parent-reported deliberate self-harm at age 12 had self-reported ideations or acts at age 15. The findings of the present study give additional support to previous findings that suicidal ideation and acts are important indicators of future suicidal behavior in adolescence.

4.3. Predictors of self-reported ideations and acts of deliberate self-harm at age 15

Living in a broken family at age 12 independently predicted future acts of deliberate self-harm in agreement with prior studies (Gould et al., 1996). Brent et al. (1994) and Gould et al. (1998) showed that the relationship between divorce and suicidal behavior in adolescence is mediated by the increased rate of psychopathology in parents whose marriages end in divorce.

The mother's mental distress, and health problems, and the mother's and father's unsatisfactory well-being when the child was 12 years old predicted acts of deliberate self-harm at age 15 in univariate analysis. These findings are in accordance with previous studies showing high rates of parental mental distress and psychopathology to be associated with completed suicide in adolescence, as well as suicidal attempts (Fergusson and Lynskey, 1995; Gould et al., 1996). This association may be due to either a genetic or an environmental transmission of risk. Brent et al. (1994) concluded that familial psychopathology adds to suicide risk through mechanisms other than merely increasing the liability for similar psychopathology in an adolescent.

Child's psychopathology at age 12 when assessed with the CBCL and YSR had a higher predictive association with future acts than with having only ideations of deliberate self-harm. In the case of parental information, especially externalizing problems and paricularly the child's aggressivity at age 12 predicted acts at age 15. However, self-reports of externalizing problems did not predict later acts of deliberate self-harm. While the child's reports of internalizing problems, particularly somatic complaints at age 12, predicted acts of deliberate self-harm at age 15, parent reports of child's internalizing problems did not predict self-reported acts. Accordingly, previous studies have shown a low level of parent/adolescent agreement especially on internalizing symptoms. When detecting preadolescent children at risk of later acts of deliberate self-harm, particular attention should be focused on parent reports of the child's aggressivity, and the child's self-reports of internalizing problems.

Learning difficulties, poor competence at school, and being bullied at age 12 predicted having only ideations of deliberate self-harm at age 15. Poor achievement at school may be associated with poor self-esteem, which may contribute to increased ideations of deliberate self-harm. When controlled with other explanatory variables, learning difficulties and being bullied were independently associated with ideations. Previous studies have shown an association between suicide attempts and difficulties at school (Beautrais et al., 1996). Furthermore, another cross-sectional population-based Finnish study showed an increased prevalence of depression and severe suicidal ideation among both those who were bullied and those who were bullies among adolescents aged 14–16 (Kaltiala-Heino et al., 1999).

No significant predictive associations were found between parent reports of the child's psychopathology at age 3 assessed with the CBCL 2/3 and acts or ideations of deliberate self-harm at age 15. Although previous studies have shown a low or moderate predictive association of behavioral ratings of psychopathology, especially externalizing problems from early childhood to adolescence, the present study indicates that adolescent deliberate self-harm cannot be predicted from very early parent-reported childhood psychopathology.

4.4. Limitations

The present prospective follow-up study is based on an unselected cohort highly representative of the source population with a reasonably good participation rate. When interpreting the results it is important to note that the item "deliberately try to hurt or kill myself"

encompasses both attempted suicides and other forms of deliberate self-harm, such as self-mutilation. In clinical situations, these simple questions would inevitably be followed by more detailed questions. Unfortunately, information about the subjective and objective severity of deliberate self-harm was not collected. The fraction of suicide attempts which were of sufficient severity to require medical treatment is unknown, but likely small. Furthermore, information about psychopathology was based solely on self-reports because no clinical interviews were done. Finally, when interpreting the results an important limitation is that for some explanatory variables there was a small frequency in either of the outcome variables. Because of low frequency of subjects the associations particularly with suicidal ideations were often not statistically significant.

4.5. Clinical implications

The present study shows that deliberate self-harm in adolescence is often a consequence of an accumulation of numerous additional factors and events over and above the presence of psychopathology in the child. Data on deliberate self-harm from preadolescents themselves and their parents are important warning signs of future acts and ideations in mid-adolescence. Child psychopathology, parental well-being, and living in a broken family in preadolescence predict acts of deliberate self-harm in mid-adolescence. School and peer problems in preadolescence are especially associated with having only ideations of deliberate self-harm in mid-adolescence. Self-reported screening questionnaires used, e.g. in connection with routine physical examinations in school, may help to identify children at risk. However, as Gould et al. (2003) have suggested, the screening approach requires second stage evaluations and efforts to assist adolescents and families to obtain help if needed.

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