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Title	Psychological characteristics, stressful life events and deliberate self-harm: findings from the Child & Adolescent Self-harm in Europe (CASE) Study
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Publication date	2011-08
Original citation	Madge N, Hawton K, McMahon EM, Corcoran P, De Leo D, de Wilde EJ, Fekete S, van Heeringen K, Ystgaard M, Arensman E. (2011) 'Psychological characteristics, stressful life events and deliberate self-harm: findings from the Child & Adolescent Self-harm in Europe (CASE) Study'. European Child & Adolescent Psychiatry, 20(10), 499-508.
Type of publication	Article (peer-reviewed)
Link to publisher's version	http://link.springer.com/article/10.1007/s00787-011-0210-4 http://dx.doi.org/10.1007/s00787-011-0210-4 Access to the full text of the published version may require a subscription.
Rights	© 2011, Springer-Verlag. The final publication is available at www.springerlink.com
Item downloaded from	http://hdl.handle.net/10468/926

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Chapter 4

Psychological characteristics, stressful life events and deliberate self-harm: findings from the Child & Adolescent Self-harm in Europe (CASE) Study

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As published in *European Child and Adolescent Psychiatry*, 2011; 20 (10):499-508

ABSTRACT

Background: There is evidence to suggest that both psychological characteristics and stressful life events are contributory factors in deliberate self-harm among young people. These links, and the possibility of a dose-response relationship between self-harm and both psychological health and life events, were investigated in the context of a seven-country school-based study.

Methods: Over 30,000 mainly 15 and 16 year-olds completed anonymous questionnaires at secondary schools in Belgium, England, Hungary, Ireland, the Netherlands, Norway and Australia. Pupils were asked to report on thoughts and episodes of self-harm, complete scales on depression and anxiety symptoms, impulsivity, and self-esteem, and indicate stressful events in their lives according to ten defined life event categories. Level and frequency of self-harm was judged according to whether they had thought about harming themselves or reported single or multiple self-harm episodes. Multinomial logistic regression assessed the extent to which psychological characteristics and stressful life events distinguished between adolescents with different self-harm histories. **Results:** Increased severity of self-harm history was associated with greater depression, anxiety and impulsivity and lower self esteem and an increased prevalence of all ten life event categories. Female gender, higher impulsivity and experiencing the suicide or self-harm of others, physical or sexual abuse, and worries about sexual orientation independently differentiated single-episode self-harmers from adolescents with self-harm thoughts only. Female gender, higher depression, lower self esteem, experiencing the suicide or self-harm of others, and trouble with the police independently distinguished multiple- from single-episode self-harmers. **Conclusions:** The findings reiterate the importance of psychological characteristics and stressful life events in adolescent self-harm but nonetheless suggest that some factors are more likely than others to be implicated.

Psychological characteristics, stressful life events and deliberate self-harm: findings from the Child & Adolescent Self-harm in Europe (CASE) Study.

BACKGROUND

Deliberate self-harm is a significant problem among the young. Although hard to predict, and often appearing 'out of the blue', there is evidence to suggest that mental health problems, impulsivity, self-esteem, and stress in young people's lives are contributory factors. We examined associations between self-harm and these factors among a large sample of (mainly) 15 and 16 year-olds participating in the Child & Adolescent Self-harm in Europe (CASE) Study, and build on earlier findings from this international research (Madge et al., 2008, Rossow et al., 2007, Ystgaard et al., 2009).

Considerable evidence links psychological characteristics with self-harm thoughts and behaviour in adolescents (Evans et al., 2004). These problems may be state-dependent (e.g. depression or anxiety) or trait-dependent (e.g. impulsivity and self-esteem). Associations with depression are particularly widely reported (Andrews and Lewinsohn, 1992, Kerfoot et al., 1996, Olfson et al., 2005), including longitudinal studies (Fergusson et al., 2005, Steinhausen et al., 2006). Anxiety symptoms also increase risk of self-harm, particularly when associated with depression (Evans et al., 2004, Foley et al., 2006, Ross and Heath, 2003).

Impulsivity has been linked with both self-harm episodes and suicidal ideation (Conner et al., 2004, Hawton et al., 1992, Hull-Blanks, 2004, Kerfoot et al., 1996). Brent and Mann implicate aggressive impulsivity in the interpretation of patterns of suicidal behaviour across generations (Brent and Mann, 2006). Self-esteem (in relation to peers, school, family, sports/athletics, body image and global self-worth) has also been related to suicidal thoughts and attempts (Hull-Blanks, 2004, Wild et al., 2004).

Self-harm shows strong links with stress factors (Hawton and Harriss, 2008), including difficulties in familial relationships (Byrne et al., 2008, Hawton et al., 2003, McDonald et al., 2007), poor relationships with friends and partners (Dimmock et al., 2008, Hawton et al., 2003) and perceptions of poor academic performance (Martin et al., 2005).

In addition, knowing someone who has self-harmed, or made a suicide attempt, contributes to risk (Brent and Mann, 2006, Bridge et al., 2006, Evans et al., 2004, Lieb et al., 2005, Melhem et al., 2004). Gay, lesbian and bisexual young people appear at elevated risk (Bearman and Moodly, 2004, Remafedi et al., 1998), especially when facing family difficulties (Eisenberg and Resnick, 2006). Child abuse, especially sexual abuse, has repeatedly been associated with self-harming and suicidal behaviour (Bensley et al., 1999, Harrington et al., 2006, Ystgaard et al., 2004), and the link appears direct even though self-esteem (Evans et al., 2005) or continued adversity over the life-cycle (Harrington et al., 2006) may play a mediating role. Both being bullied (Coggan et al., 2003) and fear of bullying (Baldry and Winkel, 2003) have been linked to an increase in self-harm.

In this paper we explore links between psychological characteristics, life events and self-harm history among young people within a large international dataset. In particular, we examine the dose-response hypothesis that increasing adversity, in terms of psychological characteristics and life events, is associated with increasing level and frequency of self-harm. Such a relationship between depression and self-harming behaviour has already been suggested for both frequency (Esposito et al., 2003, Harrington et al., 2006, Hawton et al., 1999) and severity (Olfson et al., 2005) of episodes.

METHOD

The CASE Study

This paper draws on data from the CASE Study, an internationally collaborative investigation of self-harm among young people in seven self-selected countries. These comprised six European countries – Belgium, England, Hungary, Ireland, The Netherlands and Norway – and Australia. The study methodology was similar in each participating country and is described in detail elsewhere (Madge et al., 2008). School-based surveys were conducted with a total of 30,477 14-17 year-old adolescents, the majority being 15 or 16 years, who consented to provide anonymous self-report data on self-harm behaviour (e.g. timing, frequency of episodes, methods used, motives, help-seeking before and after the episode, hospitalisation, serious thoughts about self-harm), negative life events, lifestyle and psychological characteristics including symptoms of anxiety, depression, self-esteem and impulsivity. Schools were selected to be as locally and nationally representative as possible, and response rates ranged from 81 to 96 per cent in individual countries.

Measures

Self-harm

To ensure international comparability, strict criteria were adopted to assess self-harm taking account of whether young people said they had harmed themselves as well as descriptions of the last episode. The criterion for self-harm depended on a report of at least one of the following acts deliberately undertaken with non-fatal outcome:

- Initiated behaviour (e.g. self-cutting, jumping from a height), which they intended to cause self-harm;
- Ingested a substance in excess of the prescribed or generally recognised therapeutic dose;

- Ingested a recreational or illicit drug that was an act that the person regarded as self-harm;
- Ingested a non-ingestible substance or object.

Judgements of self-harm were in no way dependent on motives other than that the act in question appeared deliberate. It was not possible to draw a clear distinction between suicidal and non-suicidal self-harm from the survey data. Further information on the assessment of self-harm is provided elsewhere (Madge et al., 2008).

Study participants were divided into four groups: 'no self-harm' comprising all those who reported neither self-harm behaviour meeting the study criteria, nor thoughts of self-harm, in the past year; 'self-harm thoughts only' with self-harm thoughts but no episode of self-harm in the past year; 'single self-harm episode' with one episode in the previous year; and 'multiple self-harm episodes' with an episode in the previous year as well as at least one other earlier episode. Throughout this chapter, when referring to 'severity of self-harm history', we are referring to these four groups, with the assumption that as we move from the group with no thoughts or acts of self-harm through to those with self-harm thoughts, and then to those with single and multiple acts of self-harm, we are moving through increasing levels of severity of self-harm history.

Psychological characteristics

Four psychological scales were included. Anxiety and depression symptoms were measured by the HADS scale (Zigmond and Snaith, 1983), which includes two 7-item subscales for anxiety and depression, each scored between 0 and 21, where higher scores indicated higher levels of anxiety and depression. Self-esteem was measured using an eight-item abbreviated version of the Robson self-concept scale (Robson, 1989), with possible scores between 8 and 32, and higher scores indicating more positive self-esteem. A six-item impulsivity scale (Plutchik and

van Praag, 1986) led to scores between 6 and 24 with higher scores indicating greater impulsivity. Raw scores on these measures are used in the analysis.

Life events

The questionnaire included 20 questions relating to negative life events in the past 12 months and/or more than a year ago. For the purposes of analysis, these were reduced to ten categories of lifetime experience. These were: '*Difficulties with friends and peers*'; '*Problems with or between parents*'; '*Serious illness of family or friend*'; '*Physical or sexual abuse*'; '*Suicide or self-harm of family or friend*'; '*Death of someone close*'; '*Worries about sexual orientation*'; '*Trouble with police*'; '*Bullied*'; and '*Problems with schoolwork*'.

Data analysis

All analyses were undertaken for the sample as a whole and some analyses were carried out by gender and by country. Chi-square tests were used to assess the statistical significance of associations between pairs of categorical variables such as self-harm history and gender. The strength of these associations was measured by the Phi statistic. In line with previous recommendations (Cohen 1988), associations were considered very weak if $\Phi < 0.10$, weak if < 0.30 , moderate if < 0.50 and strong if $0.50+$.

Cronbach's alpha was used to assess the internal consistency of the scales employed to measure the psychological characteristics. These measures (depression, anxiety, impulsivity, self esteem) and the total number of stressful life event categories experienced followed a normal distribution and were summarised by the mean and standard deviation. Pearson's correlation coefficient, r , was used to assess the strength of the linear association between the psychological measures and the coefficient of determination, r^2 , was used to measure the information in one measure that could be explained statistically by another.

Between-group comparisons of the psychological measures and the number of reported stressful life event categories were carried out using analysis of variance. The effect size was measured using partial η^2 and, following established guidelines (Cohen, 1988), the effect size was considered very small if partial $\eta^2 < 0.01$, small if < 0.06 , medium if < 0.14 and large if $0.14+$. Post hoc pairwise comparisons were based on Tukey's honestly significant difference.

Multinomial logistic regression was used to assess the associations between gender, age, country, psychological characteristics and reported stressful life event categories and self-harm history in the past year with a view to identifying which factors distinguished between adolescents reporting no self-harm, self-harm thoughts only, a single self-harm episode and multiple self-harm episodes. The dependent variable comparison group was those with no self-harm in the past year. Gender, age and country were entered into the regression model as the first block of independent variables. A forward stepwise approach was adopted for the second block of independent variables which contained each reported stressful life event category, the total number of reported life event categories and the psychological characteristics.

Associations were reported as odds ratios with 95% confidence intervals. Nagelkerke's r^2 was used as the estimate of the proportion of variance explained by the derived regression model. Wald tests were carried out to identify the factors distinguishing adolescents with a single self-harm episode from those with self-harm thoughts only and factors distinguishing between multiple and single episode self-harmers.

Further multinomial logistic regression models were estimated in which interaction terms (by country, by gender and between the psychological measures) were considered as a third block of factors for entry into the multi-variate regression model described above. Change in Nagelkerke's r^2 was used to quantify the extent to which interaction terms further distinguished between the four self-harm history groups.

RESULTS

Self-harm history in past year

Overall, 79.6% of the young people said they had not experienced thoughts of self-harm in the past year, 14.6% said they had thought about harming themselves but had not done so, 2.6% reported single self-harm episodes in the past year meeting the study criteria, and a further 3.2% reported multiple episodes. Females were at least twice as likely as males to report having thoughts of self-harm, and both single and multiple episodes of self-harm (Table 1). While statistically significant at $p < 0.001$, the strength of the association between self-harm history and gender was weak ($\Phi = 0.22$).

Table 1. Psychological characteristics, reported stressful life events and self-harm history in past year by gender

		All		Male		Female		p-value	Partial
		mean	(SD)	mean	(SD)	mean	(SD)		Eta ²
Psychological characteristics	Depression	4.4	(3.3)	4.4	(3.3)	4.3	(3.3)	Not sig.	<0.01
	Anxiety	6.9	(4.0)	6.1	(3.8)	7.8	(4.1)	<0.001	0.04
	Impulsivity	13.9	(2.9)	13.8	(2.9)	14.1	(2.9)	<0.001	<0.01
	Self esteem	22.4	(3.9)	23.1	(3.8)	21.7	(4.0)	<0.001	0.03
Life event category	Number of life event categories	3.6	(2.1)	3.3	(2.0)	3.9	(2.1)	<0.001	0.02
		n	(%)	n	(%)	n	(%)	p-value	Phi
	Death of someone close	18203	(59.7%)	8776	(56.3%)	9427	(63.4%)	<0.001	0.07
	Problems with or between parents	16895	(55.4%)	7844	(50.2%)	9051	(60.8%)	<0.001	0.11
	Serious illness of family or friend	16753	(55.0%)	8232	(52.8%)	8521	(57.3%)	<0.001	0.05
	Difficulties with friends and peers	16284	(53.3%)	6999	(44.8%)	9285	(62.3%)	<0.001	0.18
	Problems with schoolwork	14414	(47.5%)	6943	(44.7%)	7471	(50.4%)	<0.001	0.06
	Suicide/self-harm of others	9279	(30.4%)	3369	(21.6%)	5910	(39.7%)	<0.001	0.20
	Bullied	6339	(20.9%)	2955	(19.0%)	3384	(22.9%)	<0.001	0.05
	Trouble with the police	5318	(17.5%)	3751	(24.2%)	1567	(10.6%)	<0.001	0.18
	Physical or sexual abuse	3164	(10.4%)	1258	(8.0%)	1906	(12.8%)	<0.001	0.08
	Worries about sexual orientation	1737	(5.7%)	746	(4.8%)	991	(6.7%)	<0.001	0.04
Self-harm history	No self-harm	23038	(79.6%)	13020	(88.1%)	10018	(70.7%)	<0.001	0.22
	Self-harm thoughts only	4237	(14.6%)	1365	(9.2%)	2872	(20.3%)		
	Single self-harm episode	752	(2.6%)	179	(1.2%)	573	(4.0%)		
	Multiple self-harm episodes	912	(3.2%)	212	(1.4%)	700	(4.9%)		

Effect size measured by partial Eta² was very small if <0.01, small if <0.06, medium if <0.14 or large if 0.14+

Association measured by Phi was very weak if < 0.10, weak if < 0.30, moderate if < 0.50 and strong if 0.50+

Some differences emerged between countries (see also Madge et al., 2008). The Netherlands, in particular, stood out as having low rates of both thoughts and episodes of self-harm among both males and females. Hungary also showed an interesting pattern in that, compared with other countries, both males and females were less likely to report no thoughts or episodes of self-harm in the previous year, but more likely to report self-harm thoughts only.

Psychological characteristics

The psychological measures had satisfactory levels of internal consistency (Cronbach's alpha: 0.69 for depression, 0.84 for anxiety, 0.75 for impulsivity and 0.90 for self esteem). All inter-correlations between depression, anxiety, impulsivity and self esteem were statistically significant at $p < 0.001$. There was only one strong correlation, that between depression and anxiety (Pearson's correlation coefficient, $r = 0.52$; $r^2 = 0.27$). Depression and anxiety were equally negatively correlated with self-esteem ($r = -0.45$; $r^2 = 0.20$). Other correlations were weak, ranging in magnitude from 0.13 to 0.24 ($r^2 = 0.02$ to 0.06). Therefore, there was limited overlap between the psychological measures.

There was no gender difference in relation to depression (Table 1). Female scores were generally higher than male scores on anxiety and impulsivity and lower on self esteem. However, the effect size was small for anxiety and self esteem and very small for impulsivity.

Depression, anxiety, impulsivity and self-esteem differed by country ($p < 0.001$ in each case) with partial η^2 ranging from 0.03 to 0.04 indicating a small effect of country on psychological measures. Mean scores ranged from 3.6 in Ireland to 5.7 in Hungary for depression, between 6.0 in Norway and 8.0 in England for anxiety, between 13.2 in Belgium and 14.8 in Hungary for impulsivity, and between 21.3 in Hungary and 23.3 in Norway for self-esteem. Overall Hungarian adolescents stood out as displaying the highest levels of psychological difficulties while Norwegian adolescents showed the lowest levels.

Stressful life event categories

The reported stressful life event categories varied widely in prevalence from 59.7% for the death of someone close down to 5.7% for worries about sexual orientation. On average, 3.6 categories were reported with female students reporting a higher number than male students. The prevalence of each life event category differed by gender at $p < 0.001$. For all but one stressful life event category (trouble with the police), the prevalence was higher among female students. However, the strength of the association between prevalence of stressful life events and gender was weak or very weak (range of Phi statistic=0.04-0.20). The prevalence of each stressful life event category varied by country (all at $p < 0.001$) but the strength of all associations was weak or very weak.

Psychological characteristics and self-harm history in past year

There were highly statistically significant ($p < 0.001$) differences between the self-harm history groups with regard to each of the psychological characteristics (Table 2). The effect size was small in relation to impulsivity and medium in relation to depression, anxiety and self esteem. There was evidence of a dose-response or graded relationship whereby the more severe the self-harm history, the higher the levels of depression, anxiety and impulsivity and the lower the level of self esteem. All pairwise comparisons among the four self-harm history groups differed significantly at $p < 0.001$ with three exceptions. The self-harm thoughts only group and the single self-harm episode group did not differ significantly in relation to depression ($p = 0.131$) and self esteem ($p = 0.477$) and only differed marginally in relation to anxiety ($p = 0.012$).

Table 2. Psychological characteristics by self-harm history in past year

	No self-harm		Self-harm thoughts only		Single self-harm episode		Multiple self-harm episodes		p-value	Partial Eta ²
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Depression	3.9	(3.0)	5.6	(3.3)	5.9	(3.6)	7.4	(4.2)	<0.001	0.08
Anxiety	6.1	(3.7)	9.5	(3.8)	9.9	(4.1)	11.4	(4.2)	<0.001	0.11
Impulsivity	13.6	(2.8)	14.8	(3.0)	15.3	(3.1)	15.9	(3.2)	<0.001	0.04
Self esteem	23.1	(3.7)	20.3	(3.7)	20.1	(4.0)	18.4	(4.2)	<0.001	0.09

Effect size measured by partial Eta² was very small if <0.01, small if <0.06, medium if <0.14 or large if 0.14+

All pairwise comparisons among the four self-harm history groups differed significantly at $p < 0.001$ with the exception of the comparison between the self-harm thoughts only group and the single self-harm episode group in relation to depression ($p=0.131$), anxiety ($p=0.012$) and self esteem ($p=0.477$)

Figure 1 illustrates the consistency of the dose-response association between the four psychological characteristics and self-harm history when examined for each of the seven countries. The stepped increase in depression, anxiety and impulsivity and decrease in self esteem was evident with increasing self-harm history. However, in most countries there was limited or no difference in level of depression, anxiety and self esteem between the adolescents who only thought of self-harming but did not act and those who engaged in a single self-harm episode. There was no evidence of gender modifying the association between the psychological measures and self-harm history.

Figure 1. Mean depression, anxiety, impulsivity and self esteem scores and mean number of stressful life event categories by self-harm history in past year for each country

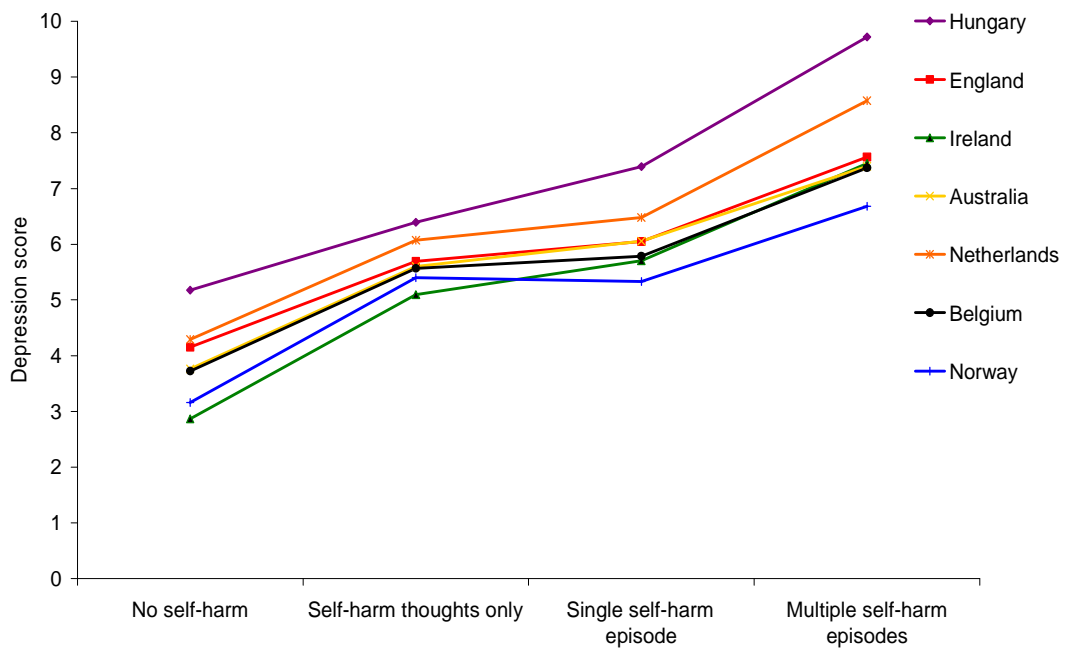


Figure 1(a) Mean depression score by self-harm history in past year for each country

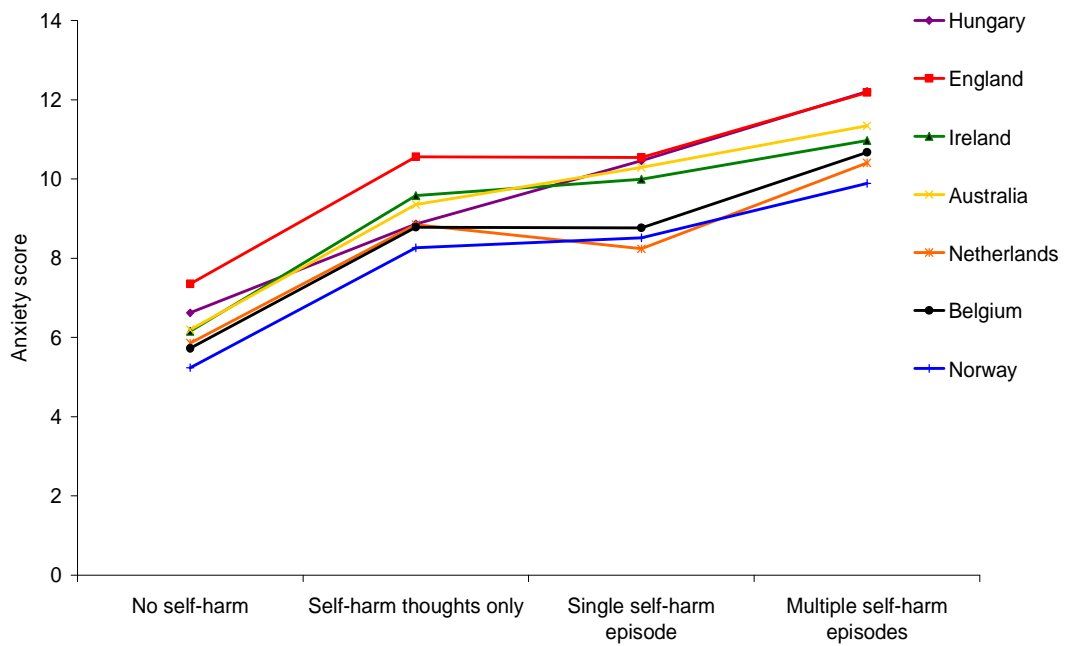


Figure 1(b) Mean anxiety score by self-harm history in past year for each country

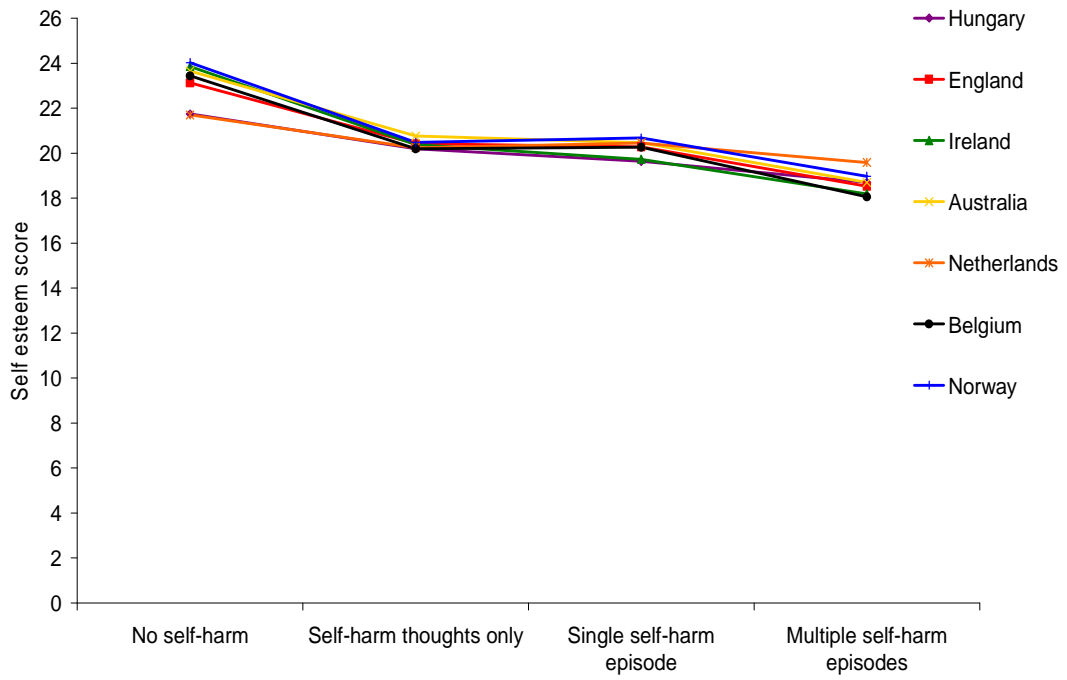


Figure 1(c) Mean self esteem score by self-harm history in past year for each country

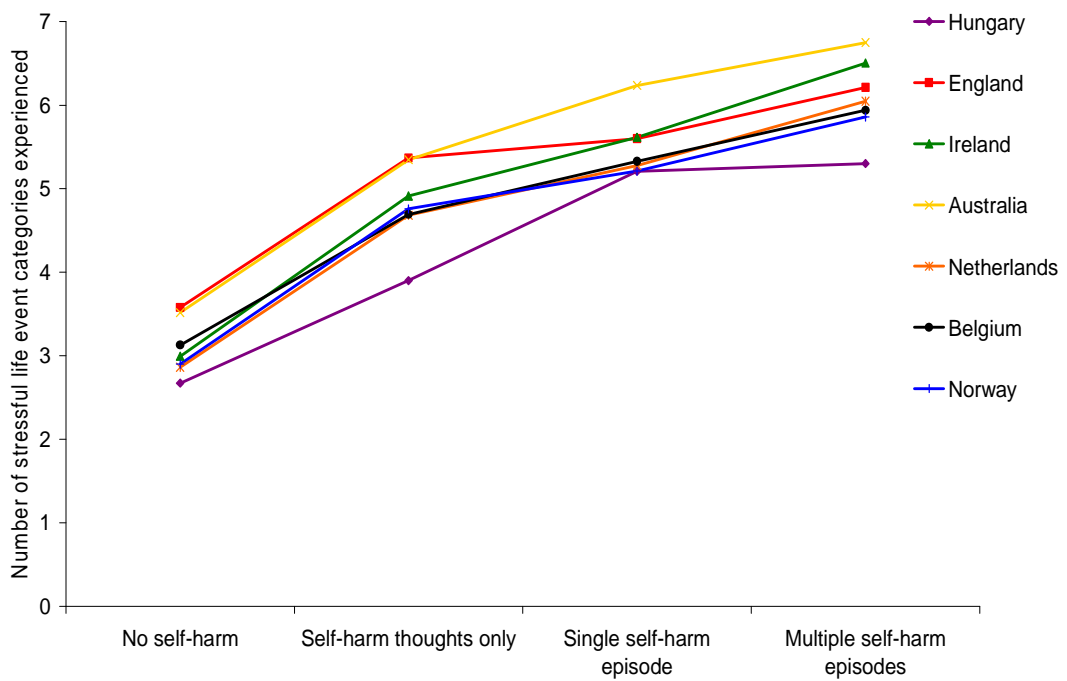


Figure 1(d) Mean number of life events reported by self-harm history in past year for each country

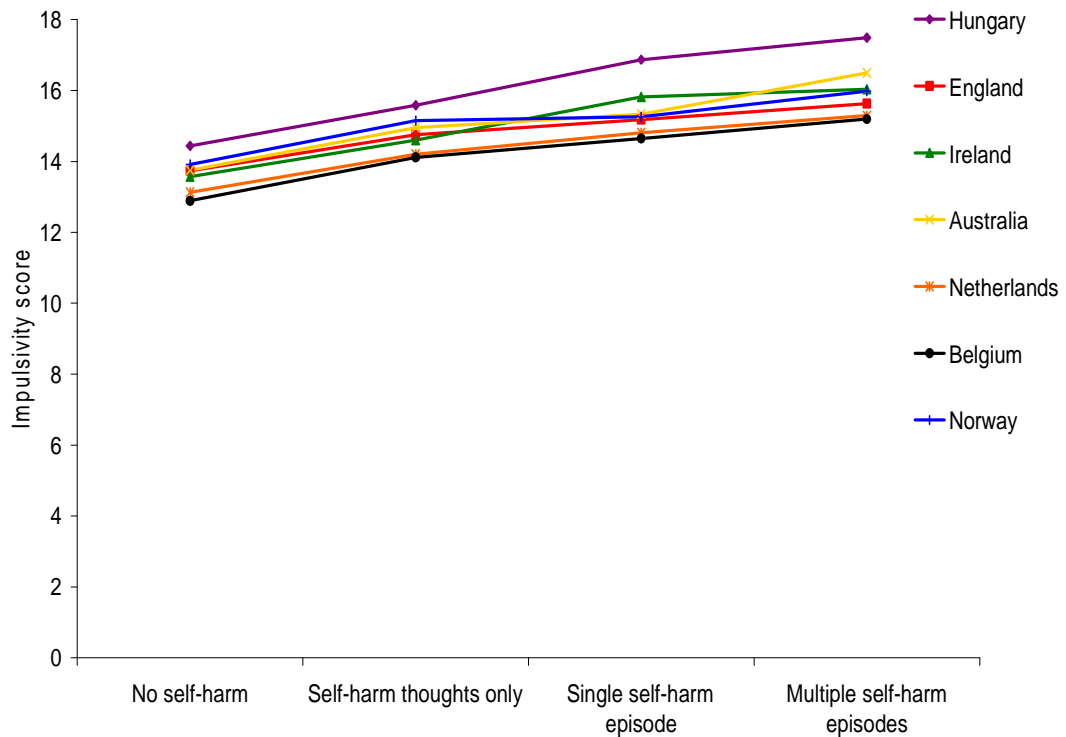


Figure 1(e) Mean impulsivity score by self-harm history in past year for each country

Stressful life event categories and self-harm history in past year

There were highly statistically significant ($p < 0.001$) associations between the reporting of each life event category and self-harm history in the past year (Table 3). In every case, the prevalence increased across the groups with increasing self-harm history. The life event category most strongly related to self-harm history was experiencing the suicide or self-harm of others followed by physical or sexual abuse, difficulties with friends or peers and problems with or between parents. There was also evidence of a strong dose-response relationship as the average number of event categories reported varied from 3.1 for adolescents with no self-harm in the past year to 4.8 for those with self-harm thoughts only to 5.5 for those with a single self-harm episode and 6.2 for multiple self-harmers.

Gender modified the association between three of the life event categories (death of someone close ($p=0.001$), bullied ($p=0.013$) and worries about sexual orientation ($p<0.001$)) and self-

harm history and country modified the association between six of the life event categories (difficulties with friends and peers ($p=0.002$), problems with schoolwork ($p=0.025$), suicide/self-harm of others ($p<0.001$), bullied ($p<0.001$), physical or sexual abuse ($p<0.001$) and worries about sexual orientation ($p<0.001$)) and self-harm history. However, none of these interaction effects explained more than an additional 0.2% of the variation in self-harm history.

Table 3. Prevalence of stressful life event categories by self-harm history in past year

	No self-harm		Self-harm thoughts only		Single self-harm episode		Multiple self-harm episodes		Phi ^a
	n	(%)	n	(%)	n	(%)	n	(%)	
Death of someone close	13249	(57.5%)	2778	(65.6%)	519	(69.7%)	677	(74.2%)	0.09
Problems with or between parents	11263	(49.0%)	3179	(75.2%)	623	(83.2%)	792	(87.3%)	0.24
Serious illness of family or friend	11716	(51.0%)	2838	(67.1%)	520	(69.8%)	685	(75.5%)	0.15
Difficulties with friends and peers	10739	(46.7%)	3180	(75.1%)	599	(79.7%)	776	(85.2%)	0.25
Problems with schoolwork	9573	(41.8%)	2716	(64.7%)	531	(71.5%)	694	(76.5%)	0.21
Suicide/self-harm of others	5281	(22.9%)	2108	(49.8%)	525	(69.9%)	722	(79.3%)	0.32
Bullied	4059	(17.8%)	1267	(30.2%)	263	(35.3%)	394	(43.9%)	0.16
Trouble with the police	3546	(15.5%)	831	(19.7%)	191	(25.7%)	314	(34.6%)	0.10
Physical or sexual abuse	1474	(6.4%)	808	(19.1%)	233	(31.0%)	352	(38.7%)	0.26
Worries about sexual orientation	882	(3.8%)	428	(10.2%)	120	(16.0%)	182	(20.2%)	0.17
Number of life event categories^b	3.1	(1.9)	4.8	(1.9)	5.5	(1.9)	6.2	(1.8)	0.16

All associations statistically significant at $p < 0.001$

^a Association measured by Phi was very weak if < 0.10 , weak if < 0.30 , moderate if < 0.50 and strong if $0.50+$

^b Mean (standard deviation) reported with partial η^2 as the effect size measure. Effect size measured by partial η^2 was very small if < 0.01 , small if < 0.06 , medium if < 0.14 or large if $0.14+$. All post hoc pairwise comparisons among the four self-harm history groups were statistically significant at $p < 0.001$.

Independent associations between gender, psychological characteristics and stressful life event categories and self-harm history in past year

Table 4 details the results of the multi-variate multinomial logistic regression analysis carried out to identify the factors independently distinguishing between adolescents in the four self-harm history groups. The derived regression model explained 37.7% of the variation in self-harm history. Some interactions between the psychological measures with gender and with

country reached statistical significance but they contributed very little (0.2-0.8%) to explaining variation in self-harm history.

Female gender strongly distinguished self-harm ideators and single and multiple self-harmers from those with no self-harm history. Female gender also distinguished adolescents with a single self-harm episode from those with self-harm thoughts only ($p < 0.001$) but did not distinguish between single and multiple self-harmers ($p = 0.523$).

Each of the four psychological characteristics independently contributed to distinguishing between the self-harm groups. Only impulsivity distinguished single episode self-harmers from self-harm ideators ($p = 0.005$) whereas self esteem ($p < 0.001$) and depression ($p = 0.002$) differentiated multiple self-harmers from those with a single episode.

All but one (death of someone close) of the ten stressful life event categories was independently associated with self-harm history (Table 4). Experience of the suicide/self-harm of others strongly distinguished adolescents with a single self-harm episode from those with self-harm thoughts only ($p < 0.001$) and also distinguished multiple from single episode self-harmers ($p = 0.015$). Physical or sexual abuse ($p < 0.001$) and to a lesser extent worries about sexual orientation ($p = 0.017$) differentiated between adolescents with a single self-harm episode from those with self-harm thoughts only, while trouble with the police was associated with multiple self-harmers more than it was with single-episode self-harmers ($p = 0.019$).

Table 4. Multinomial logistic regression analysis of the independent associations between gender, psychological characteristics and reported stressful life event categories and self-harm history in past year

		Self-harm thoughts only		Single self-harm episode		Multiple self-harm episodes ^a		Group differences ^d
		OR ^b	(95% CI)	OR ^b	(95% CI)	OR ^b	(95% CI)	
Gender	Female (ref. group: Male)	1.94	(1.78-2.11)	2.76	(2.28-3.35)	3.00	(2.48-3.64)	A<B<C=D
Psychological characteristics ^c	Depression	1.02**	(1.01-1.04)	1.04**	(1.01-1.07)	1.10	(1.07-1.13)	A<B=C<D
	Anxiety	1.11	(1.09-1.12)	1.10	(1.07-1.13)	1.13	(1.11-1.16)	A<B=C=D
	Impulsivity	1.06	(1.05-1.08)	1.10	(1.07-1.13)	1.13	(1.10-1.16)	A<B<C=D
	Self esteem	0.89	(0.88-0.90)	0.90	(0.87-0.92)	0.84	(0.82-0.86)	A>B=C>D
Life event category (ref. group: those not reporting an event in the life event category)	Problems with or between parents	1.64	(1.50-1.79)	1.95	(1.58-2.41)	2.12	(1.69-2.65)	A<B=C=D
	Serious illness of family or friend	1.20	(1.10-1.30)	1.11 ^{ns}	(0.93-1.32)	1.19 ^{ns}	(0.99-1.42)	A<B
	Difficulties with friends and peers	1.67	(1.53-1.82)	1.54	(1.26-1.88)	1.71	(1.38-2.12)	A<B=C=D
	Problems with schoolwork	1.41	(1.30-1.54)	1.54	(1.29-1.85)	1.45	(1.21-1.74)	A<B=C=D
	Suicide/self-harm of others	1.89	(1.74-2.04)	3.69	(3.09-4.40)	5.00	(4.15-6.02)	A<B<C<D
	Bullied	1.19	(1.08-1.30)	1.25*	(1.05-1.48)	1.41	(1.19-1.66)	A<B=C=D
	Trouble with the police	1.15**	(1.03-1.27)	1.39	(1.15-1.70)	1.86	(1.55-2.23)	A<B=C<D
	Physical or sexual abuse	1.49	(1.33-1.67)	2.30	(1.90-2.78)	2.29	(1.91-2.74)	A<B<C=D
Worries about sexual orientation	1.40	(1.21-1.62)	1.86	(1.47-2.36)	1.83	(1.46-2.29)	A<B<C=D	

^a No self-harm was the comparison category of the dependent variable

^b The odds ratios were adjusted for age and country as well as the factors detailed in the table. All associations tabulated were statistically significant at $p < 0.001$ except where indicated (ns=not significant; * $p < 0.05$; ** $p < 0.01$)

^c These odds ratios represent the effect of a one-point increase in the score of the scale measuring the psychological characteristic

^d Group differences indicate the extent to which the independent variables distinguish between the self-harm groups (A= no self-harm; B=self-harm thoughts only; C=single episode self-harm; D= multiple episodes of self-harm)

DISCUSSION

An earlier paper from the CASE Study (Madge et al., 2008) addressed socio-demographic and self-harm characteristics for the same school-based sample of adolescents. Here we focus on more in-depth psychological characteristics and stressful life events and, in particular, report evidence for a dose-response relationship whereby increased severity of self-harm history was, in general, associated with higher levels of depression, anxiety and impulsivity and lower levels of self-esteem, as well as stressful life events in more areas of young people's lives. These patterns were consistent across both gender and country.

A particularly interesting finding is that thoughts of self-harm are not always distinguishable from a single self-harm episode in terms of links with psychological characteristics and stressful life events. It emerged, however, that impulsivity and experiencing the suicide or self-harm of others, physical or sexual abuse and worries about sexual orientation were the only factors that independently differentiated single-episode self-harmers from adolescents with self-harm thoughts only. That few factors distinguished between ideators and self-harmers is important for future research and for prevention. The findings are also in line with a recently presented model of suicidal behaviour which maps the relationship between background factors and trigger events, and the development of suicidal ideation/intent through to suicidal behaviour (O'Connor, 2011).

The strong associations between psychological characteristics and self-harm on the one hand, and stressful life events and self-harm on the other, raise the question of the associations between psychological health, stressful life events and self-harm, and whether either set of factors is more significant than the other. Multi-variate models were constructed to investigate this study objective. Despite some specific differences, the effects of psychological characteristics and stressful life events remained significant within the population overall, and continued to remain significant when gender and country were considered separately. Our findings of independent associations between four psychological characteristics and nine life

event categories with self-harm history supports the conclusion of a recent systematic review showing that a wide range of factors is linked with self-harm behaviour (Evans et al., 2004). It also confirms the heterogeneity of young self-harmers among community samples, with differing frequencies of self-harm and varying levels of associated difficulties (Stanford and Jones, 2009).

In any event, it would seem unlikely that a single chain of events links life events, psychological health and deliberate self-harm. On the one hand it is clear that stress can precede mental health difficulties (Pelkonen et al., 2008, Reinherz et al., 2006). On the other, however, it is apparent that depression can trigger psychosocial difficulties through poor interpersonal functioning and impaired relationships (Rossow et al., 2007), and that self-harm or suicidal behaviour may follow life stress in the absence of depression and hopelessness (Baldry and Winkel, 2003, Martin et al., 2004). Furthermore, self-harm itself may act as a trigger for depression (Flisher, 1999).

Some differences between countries were found. There was, for instance, some variation in levels of self-harm behaviour as well as differences in psychological characteristics: in this latter respect Hungarian young people reported the highest rates of difficulty while Norwegians reported the lowest. Despite these differences, however, the dose-response relationships between psychological characteristics, stressful life events and a history of self-harm were maintained in all countries. This suggests the universality of the finding.

These findings underline the complexity involved in specifying the precursors of self-harm among the young. Although both psychological characteristics and negative life events are associated with increased levels of self-harm within the population of young people as a whole, varying constellations of interrelated factors contribute to individual risk. Recent research on identifying sub-groups of young self-harmers (Stanford and Jones, 2009) appears promising, and it is suggested that knowledge on the aetiology of deliberate self-harm may develop best in

the context of further large-scale longitudinal research that can look at distinct groups of young self-harmers over time.

The strengths of this study are its large representative school-based sample, the clear definition of self-harm, and the standardised methodology used across seven countries. Whilst we relied on retrospective self-reported information, and thus were unable to look conclusively at temporal associations, most of our findings have relied on episodes of self-harm reported for the previous year, rather than over the lifetime, to increase accuracy. The cross-sectional nature of the study, nonetheless, implies that the nature of the relationships between self-harm, psychological characteristics, and life events that we have identified cannot necessarily be assumed to be causal. Additionally, there may have been other potentially relevant factors, such as substance or alcohol abuse, that we do not consider. A further limitation of the study is that we cannot guarantee the representative nature of all national samples despite attempts to ensure this was the case. Treatment of life events presents another possible methodological difficulty in that categories of stressful events cannot be equated or added. Nonetheless, the fact that all but one stressful life event category showed statistically significant associations with a history of self-harm increases our confidence in the validity of these measures. Further research exploring the impact of different life events, and taking account of severity, occurrence and timing, could throw more light on this issue.

In clinical terms, the evidence for a dose-response relationship linking both psychological characteristics and negative life events with the frequency of self-harm underlines the need for positive mental health promotion and early identification of adolescents at risk of self-harm (Horowitz and Ballard, 2009, Naylor et al., 2009). Similarities found between adolescents who have merely thought about harming themselves, and those reporting a single episode, suggest the salience of taking intentions as well as behaviour into account.

CONCLUSION

There is no single pattern of self-harm among young people, but both psychological characteristics and stressful life events substantially increase risk. Those developing prevention and intervention programmes must remain 'open minded' to patient characteristics and not neglect either those who have only thought of harming themselves or, despite current practice (Storey et al., 2005), those who do not have evident signs of depression or mental illness.

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