

The Association between Life Events and Suicide Intent in Self-Poisoners with and without a History of Deliberate Self-Harm: A Preliminary Study

CATHERINE CRANE, D PHIL, J. MARK. G. WILLIAMS, DSc, KEITH HAWTON, DSc, ELLA ARENSMAN, PhD, HEIDI HJELMELAND, DR POLIT, UNNI BILLE-BRAHE, MA, PAUL CORCORAN, MSc, DIEGO DE LEO, MD, PhD, FRANZCZP, SANDOR FEKETE, MD, PhD, ONJA GRAD, PhD, CHRISTIAN HARING, PhD, AD J.F.M. KERKHOF, PhD, JOUKO LONNQVIST, MD, PhD, KONRAD MICHEL, MD, ELLINOR SALANDER RENBERG, PhD, ARMIN SCHMIDTKE, MD, PhD, CORNELIUS VAN HEERINGEN, MD, PhD, AND DANUTA WASSERMAN, MD, PhD

The associations between life events in the 12 months preceding an episode of self-poisoning resulting in hospital attendance (the index episode), and the suicide intent of this episode were compared in individuals for whom the index episode was their first, episode and in individuals in whom it was a recurrence of DSH. Results indicated a significant interaction between *independent* life events, repetition status, and gender in the prediction of suicide intent, the association between life events and intent being moderated by repetition status in women only. The results provide preliminary evidence to suggest the presence of a sui-

CATHERINE CRANE, D PHIL, J. MARK. G. WILLIAMS, DSc, AND KEITH HAWTON, DSc, are with the Centre for Suicide Research, University of Oxford Department of Psychiatry; ELLA ARENSMAN, PhD, is with the National Suicide Research Foundation, Cork, Ireland; HEIDI HJELMELAND, DR POLIT, is with the Department of Social Work and Health Science, Norwegian University of Science and Technology, Trondheim, and Division of Mental Health, Norwegian Institute of Public Health, Oslo, Norway; UNNI BILLE-BRAHE, MA, was with Centre for Suicidological Research, Odense, Denmark; PAUL CORCORAN, MSc, is with the National Suicide Research Foundation, Cork, Ireland; DIEGO DE LEO, MD, PhD, FRANZCZP, is with the University of Padua, Italy (now at Australian Institute for Suicide Research and Prevention, Griffith University, Australia); SANDOR FEKETE, MD, PhD, is with the Department of Psychiatry, University of Pecs, Hungary; ONJA GRAD, PhD, is with the University Psychiatric Hospital, Ljubljana, Slovenia; CHRISTIAN HARING, PhD, is with the Psychiatric State Hospital Hall in Tirol, Austria; AD J.F.M. KERKHOF, PhD, is with the Department of Clinical Psychology, Vrije Universiteit, The Netherlands; JOUKO LONNQVIST, MD, PhD, is with National Public Health Institute, Department of Mental Health and Alcohol Research and Department of Psychiatry, University of Helsinki, Finland; KONRAD MICHEL, MD, is with the University Psychiatric Services, University of Bern, Switzerland; ELLINOR SALANDER RENBERG, PhD, is with the Department of Clinical Sciences, Division of Psychiatry, Umea University, Sweden; ARMIN SCHMIDTKE, MD, PhD, is with Department of Clinical Psychology, Clinic for Psychiatry and Psychotherapy, University of Wurzburg, Germany; CORNELIUS VAN HEERINGEN, MD, PhD, is with the Unit for Suicide Research, Department of Psychiatry, Ghent University, Belgium; and DANUTA WASSERMAN, MD, PhD, is with Centre for Suicide Research and Prevention, Karolinska Institute, Sweden.

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Address correspondence to Catherine Crane, Department of Psychiatry, Warneford Hospital, Warneford Lane, Oxford, OX3 7JX, UK. E-mail: Catherine.crane@psych.ox.ac.uk

cidal process in women, in which the impact of negative life events on suicide intent diminishes across episodes.

Approximately half of all individuals presenting to hospital following an episode of deliberate self-harm (DSH; self-poisoning or self-injury) have a history of previous self-harm (Sakinofsky, 2000), with 16% of patients engaging in a further episode within the next 12 months, rising to approximately 23% after four years or more (Owens, Horrocks, & House, 2002). Rates of repetition are higher in individuals with a previous history of DSH at index than in those without (e.g., Wilkinson & Smeeton, 1987). Despite this fact, relatively few studies have focused specifically on changes in the nature of DSH across episodes. For example, although stressful life events and social problems are prominent in the recent histories of suicidal individuals, and although there have been several controlled trials of problem-solving therapies for deliberate self-harm patients (see Townsend et al., 2001), it is not clear whether the impact or significance of negative life events and problems changes over consecutive episodes of self-harming behavior¹ (e.g., Arensman, McAuliffe, Corcoran, & Perry, 2004).

1. There is considerable debate about the most appropriate way to categorize and refer to self-harming and suicidal behaviors. For the purposes of the current study the focus is on episodes of self-poisoning which fall within the definition of *parasuicide* adopted by the World Health Organization (1986). This defines parasuicide as: "an act with non-fatal outcome in which an individual deliberately initiates a non-habitual behaviour that, without intervention from others, will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognized therapeutic dosage, and which is aimed at realizing changes which the subject desired, via the actual or expected physical consequences." This definition, while excluding habitual self-damaging behaviors, acknowledges the inherent difficulties in making assumptions about the often mixed motivations and intent of any given act of self-harm. Because the term *deliberate self-harm* has superseded *parasuicide* as the preferred term in the liter-

One possibility is that episodes of self-harm bring about neurobiological, emotional, cognitive, or interpersonal changes that directly increase risk of recurrence, a phenomenon referred to as kindling, or 'episode sensitization' (Post, 1992; Segal, Williams, Teasdale, & Gemar, 1996). In recent years a large number of studies have examined episode sensitization processes in major depressive disorder (MDD: e.g., Post, 1992; Segal et al., 1996; Kendler, Karkowski, & Prescott, 1999; Kendler, Thornton, & Gardner, 2000, 2001; Kendler, Thornton, & Prescott, 2001). These studies have indicated that previous episodes of MDD contribute directly to an individual's risk of recurrence (Kessing, Andersen, & Andersen, 2000), with stressful life events appearing to be more important in triggering first depressive episodes than those occurring later in the course of the disorder (e.g., Mitchell, Parker, Gladstone, Wilhelm, & Austin, 2003; Lewinsohn, Allen, Seeley, & Gotlib, 1999). The majority of DSH patients are suffering from an affective disorder at the time of presentation to hospital (e.g., Haw, Hawton, Houston, & Townsend, 2001; Suominen et al., 1991) and it is possible that a similar process of episode sensitization may take place across episodes of DSH. Indeed, Joiner (2002) has made this point, suggesting that while enduring predispositions (e.g., genetic or temperamental factors) contribute to ongoing risk of suicidal behavior, episodes of deliberate self-harm may themselves increase risk of repetition, in part as a result of cognitive sensitization (the increased activity and accessibility of suicide-related cognitive structures across consecutive episodes).

Drawing on this work it is hypothesized that with each suicidal crisis the associations will be strengthened between low

 ature this is adopted, where appropriate, throughout the paper.

mood, feelings of hopelessness, and the desire to engage in self-harming behavior. As a consequence, although early episodes of DSH may occur in response to the external stress of major negative life events and problems, later episodes may be more easily triggered, with relatively minor hassles and/or endogenous cognitive and affective changes gaining the capacity to reactive suicidal ideation and deliberate self-harm (see Joiner & Rudd, 2000; Williams, Barnhofer, Crane, & Beck, 2005). Such a process would result in a diminishing association between *major* life events and deliberate self-harm across episodes, the association being less pronounced in those with prior episodes than in those engaging in DSH for the first time.

There have been relatively few empirical studies examining episode sensitization in deliberate self-harm and the findings of those that have been conducted are mixed. An early study (Clark, Gibbons, Fawcett, & Scheftner, 1989) concluded that a heterogeneity model, which is based on the assumption that individuals differ in their propensity towards suicidal behavior as the result of stable predispositions, was sufficient to explain data on repetition of suicide attempts in a mixed psychiatric sample, arguing against the presence of episode sensitization. However, no account was taken of the number of episodes participants had engaged in prior to their entry into the study, a factor which may critically influence the likelihood of observing episode sensitization (see Kendler et al., 2000, for discussion in the case of MDD).

Two more recent studies have provided more support for the episode sensitization hypothesis. The first (Joiner & Rudd, 2000) indicated that multiple attempters showed a weaker association between life event stress and suicidal ideation than those who had harmed themselves for the first time or who had experienced suicidal ideation only. The second, a 12 month prospective study, examined the occurrence of death ideation, death wishes, suicide contemplation, and deliberate self-harm in a large general population sample (Neeleman, Graaf, & Vol-

leberg, 2004). Negative life events were more closely associated with the occurrence of suicidality in individuals without a prior history of suicidal ideation or behavior, whereas mental illness was more closely associated with suicidality in individuals with a prior history. Both these studies broadly support the idea of a suicidal process in which suicidal ideation and self-harming behavior become more autonomous of external negative life events over time. However, the first study grouped together suicide ideators and individuals who had made a single suicide attempt, reporting that findings were more pronounced if comparison was restricted to the distinction between ideators and multiple attempters (Joiner & Rudd, 2000). Therefore, it is not clear whether single attempters and multiple attempters actually differ significantly in the association between life events and suicide intent. Secondly, the sample on which this study was based (predominantly young, male, military personnel) is unusual and it is not clear whether a similar effect of prior history of deliberate self-harm on the association between life events and the severity of suicidality would be observed in other populations.

The current paper utilizes data on recent life events and the suicide intent of an episode of DSH resulting in presentation to hospital. The data was collected as part of a large multi-center study of psychological and socio-demographic factors associated with repetition of deliberate self-harm (the European Parasuicide Study Interview Schedule, EPSIS). As part of this interview participants completed the Beck Suicide Intent Scale (Beck, Schuyler, & Herman, 1974), which assesses the severity of an episode of DSH, in terms of the objective circumstances and the subjective wish to die. Episode sensitization can be operationalized as a diminishing association across episodes between the severity of the DSH episode (level of suicide intent) and the burden of negative life events present at the time, or alternatively as a difference in the strength of such an association between first ever DSH patients and repeaters. In or-

der to examine the hypothesis that DSH is subject to episode sensitization processes it is necessary to focus analyses on individuals in whom there is likely to be a relatively strong association between life events and degree of suicide intent at the outset (to allow for potential diminution of the association across episodes). Post (1992) and Kendler, Thornton, and Gardner (2001) suggest that some people will be *prekindled* showing lower levels of association between negative life events and suicide intent from the outset. In patients with major depression this pre-kindling is observed in those with a past history of trauma (e.g., Hammen, Henry, & Daley, 2000; Beatson & Taryan, 2003), where first onsets of depression are less closely associated with major life events. Deliberate self-harm patients with high rates of past trauma (e.g., borderline patients) show a similar pattern (e.g., Stanley, Brodsky, Groves, & Mann, 2004). Alcohol and substance misuse, which increase impulsivity of self-harm episodes (e.g., Suominen, Isometsa, Ostamo, & Lonnqvist, 1997; Borges, Walters, & Kessler, 2000), are also likely to increase the importance of immediate contextual factors and limit the contribution of major negative life events. As a result, we examined patients *without* a history of sexual trauma or co-morbid alcohol/substance misuse at the time of self-poisoning, in order to ensure that analyses are focused on those in whom episode sensitization (as operationalized in this study) is most likely to be observed.^{2,3}

2. Sexual abuse/assault was defined as a report of one of the following experiences in childhood or later life (>12 months prior to index): forced sexual intercourse by parents, forced sexual intercourse by siblings, rape by another person, being forced to endure other sexual activity by parents, and being forced to endure other sexual activity by siblings, forced sexual intercourse by a partner, other forced sexual activity by a partner, having to prostitute oneself, and being forced into prostitution by a partner.

3. To check the validity of this assumption we also examined the data on *all* self-poisoners, including those with current alcohol or substance abuse and a history of sexual trauma. In this broader sample there was no significant associa-

Data on the occurrence of a large number of life events and difficulties were collected from study participants. Some life events and difficulties may arise as a *consequence* of ongoing distress and mental illness (e.g., loneliness, problems in intimate relationships, unemployment), as a consequence of temperamental factors (e.g., impulsivity, aggression, neuroticism) which overlap with predispositions to psychiatric disorder (see Kendler et al., 1999 for a discussion), or as a consequence of factors related directly to an individual's own risk of recurrent deliberate self-harm (for example, the psychiatric illness of family members, e.g., Brent, Bridge, Johnson, & Connolly 1996; Johnson, Brent, Bridge, & Connolly, 1998). Such events potentially confound an individual's history and risk of repeating deliberate self-harm, with the way that self-harm manifests itself (for example, the lethality or impulsivity of an episode). Therefore, we conducted analyses examining relations between suicide intent and the experience of life events that can be considered to occur relatively *independently* of an individual's mental state or risk of self-harm: deaths and physical illnesses in the close social network.⁴

METHOD

Participants

All participants were interviewed as part of the WHO/EURO Multicentre Study on Parasuicide, initiated by the World Health Organization (Platt et al., 1992). Data was collected from 16 of the centers which participated in the repetition-prediction part of

tion between suicide intent and number of life events (total, independent) in either first episode patients or in repeaters.

4. We also explored the association between suicide intent and a total life events score. However, no significant associations between this variable and suicide intent in either first ever DSH patients or repeaters were identified, so for clarity these analyses are omitted.

the study (EPSIS Study) (Bern, Switzerland; Cork, Ireland; Emilia-Romagna, Italy; Ghent, Belgium; Hall, Austria; Helsinki, Finland; Leiden, Netherlands; Ljubljana, Slovenia; Odense, Denmark; Oxford, England; Padova, Italy; Pecs, Hungary; Sør-Trøndelag, Norway; Stockholm, Sweden and Umea, Sweden; Wuerzburg, Germany). Studies have confirmed the similarities between centers in psychological characteristics such as intentions involved in the parasuicide (DSH) (e.g., Hjelmeland et al., 2002), supporting the validity of combining data across centers. Further details of the participating centers can be found in a report on the WHO/EURO Multicentre Study published by the World Health Organization (1999) and a summary of recent research findings in De Leo, Bille-Brahe, Kerkhof, and Schmidtke (2004). Readers should note that, given the large scale of this study, a number of publications have arisen from the data collected. However, no previous studies have examined episode sensitization processes or the association between life events and suicide intent as a function of history of deliberate self-harm. General data on the occurrence of life events and their association to measures of mood and self-esteem can be found in Arensman and Kerkhof (2004).

Individuals were suitable for inclusion in the EPSIS study if they presented to hospital having engaged in an act fulfilling the WHO/EURO definition of parasuicide (the Index episode). Individuals fulfilling these criteria took part in interviews, usually within one week of their act. In some centers all eligible individuals were approached. In others a random sample of potential eligible patients were identified and invited to participate. Further information concerning the methods of the EPSIS study can be found in Bille-Brahe et al., (1996) and Bille-Brahe, Schmidtke, Kerkhof, and De Leo (2004).

Measures

Participants completed a structured interview schedule, the European Parasuicide Interview Schedule (EPSIS), detailed in Ker-

khof and colleagues (1993), which incorporated several self-report questionnaires. Only the aspects of the interview schedule relevant to the current analyses are discussed below.

Demographic Information. Participants provided information on their age, sex, marital status, level of education, and number of children.

History of Deliberate Self-Harm. Participants provided information on the number of previous episodes of DSH they had engaged in, based on their self-report. Only episodes falling within the WHO definition of parasuicide were counted. Because recollection of the total number and timing of previous episodes of DSH may be subject to bias, it was considered more likely that individuals would be accurate in their recall of whether or not *any* episodes of DSH had occurred. For this reason most analyses use a dichotomized variable to identify those with and those without a previous episode of DSH.

Life Events. Individuals completed an inventory to indicate (by ticking a box to say *yes* or *no* to each item) whether or not they had experienced each of a large number of negative life events (related to parents, siblings, children, partners, other close social ties, and events and difficulties relating only to the individual themselves) in the 12 months preceding the episode of DSH that resulted in their presentation to hospital and inclusion in the study, the Index episode (see Kerkhof et al., 1993, for further details). A score was calculated which corresponded to the number of *independent* life events experienced, of a possible eleven.⁵ These events, deaths, and illnesses in the social network, as well as being independent, are likely to be experienced as severe and distressing to most people.

Suicide Intent. Suicide Intent was

5. The independent life events were: death of mother, death of father, parental chronic illness, death of a sibling, sibling's chronic illness, death of a partner, partner's chronic illness, death of participant's child, child's chronic illness, death of another close person, participant's own physical illness.

measured using the Beck Suicide Intent Scale (Beck, Schuyler, & Herman, 1974). The items refer both to objective features of the suicide attempt (e.g., whether or not the individual communicated their wish to die to others, whether precautions were taken against discovery) and level of subjective intent (e.g., whether the individual believed that the actions they took were likely to result in death, whether the individual considered that they had made a serious attempt to end their life). The internal reliability in the current sample was good ($\alpha = .86$).

Hopelessness. Participants' levels of hopelessness were assessed with the Beck Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974). Internal reliability in the current sample was good ($\alpha = .83$).

Depression. The Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbauch, 1961) was used to assess the level of depression over the previous two weeks. Internal reliability in the current sample was good ($\alpha = .80$).

Statistical Analysis

The primary research question, the nature of the association between suicide intent and life events in first-ever DSH patients and repeaters, was explored using hierarchical linear regression. Because some of the variables of interest (e.g., life events) departed from normality, both parametric (Pearson's) and nonparametric (Spearman's) correlations were computed to confirm that the findings were the same in each case. All analyses were conducted using SPSS version 13.

RESULTS

Participant Characteristics

Data was collected from 609 individuals (243 males, 366 females) who presented to hospital following an episode of self-poisoning and did not (a) self-report current problems with alcohol, (b) report use of her-

oin or cocaine in the preceding week, and (c) report a history of sexual victimization. The mean age of participants was 36.0 years ($SD = 15.4$). For a total of 285 individuals (47%, 111 males, 174 females) the index DSH episode was their first (first-ers), with 323 individuals (53%; 132 males, 191 females) reporting a prior history of DSH (repeaters). One individual had missing data concerning number of previous episodes of DSH. The proportions of females was the same amongst first-ers and repeaters, $\chi^2 (1) = .23, p > .60$. Amongst repeaters, 153 individuals (47%; 61 males, 92 females) reported one previous episode, 100 individuals (31%; 43 males, 57 females) two to four previous episodes, and 70 individuals (21%; 28 males, 42 females) five or more previous episodes. First-ers and repeaters did not differ in number of children, $\chi^2 (4) = 7.18, p > .10$, marital status, $\chi^2 (4) = 7.37, p > .10$, or educational level $\chi^2 (2) = 1.89, p > .30$.

Initial Analyses

Level of Suicide Intent. The mean suicide intent scale score was $M = 14.0$ ($SD = 7.0$, range 0–30), which represents a relatively high level of intent which may reflect the focus on self-poisoners, since some other forms of self-harm, e.g., self-cutting, appear to be associated with lower levels of suicide intent (Hawton, Harriss, Simkin, Bale, & Bond, 2004). Univariate analysis of variance (ANOVA) indicated a main effect of repetition status, $F (1, 601) = 8.23, p < .01$, with first-ers ($M = 13.1, SD = 6.9$) having lower mean suicide intent scores than repeaters ($M = 14.8, SD = 7.0$). There was also a main effect of gender, $F (1, 601) = 5.73, p < .05$, with males having higher mean suicide intent scores ($M = 14.9, SD = 7.1$) than females ($M = 13.5, SD = 6.9$), although the absolute difference in scores was small. There was no interaction between gender and repetition status.

Level of Depression. The mean BDI score was 21.8 ($SD = 11.5$, range 0–54), representing depressive symptoms of moderate severity. A univariate ANOVA indicated a

significant main effect of repetition status, $F(1, 584) = 15.13$, $p < .001$, resulting from higher levels of depression in repeaters ($M = 23.4$, $SD = 11.2$) than in first-ers ($M = 19.9$, $SD = 11.6$). There was no significant main effect of gender and no interaction between gender and repetition status.

Level of Hopelessness. The mean level of hopelessness was 12.0 ($SD = 4.6$, range 3–21), which is relatively high and somewhat higher than the level reported for samples of suicide ideators and attempters (Beck & Steer, 1993). This may reflect the exclusion of substance misusers since Beck and Steer report that levels of hopelessness are much lower in these groups. Univariate ANOVA again indicated a main effect of repetition status, $F(1, 572) = 13.74$, $p < .001$, resulting from lower levels of hopelessness in first-ers ($M = 11.3$, $SD = 4.5$) than repeaters ($M = 12.7$, $SD = 4.7$). There was no main effect of gender and no interaction between gender and repetition status.

Number of Independent Life Events. The mean number of independent life events (deaths/illness) reported by participants was relatively low ($M = 0.8$, $SD = 0.9$, range = 0 to 5), reflecting the relative rarity of these serious events. Univariate ANOVA identified no significant main effects or interactions, indicating that the occurrence of these life events was similar in individuals with and without prior episodes of deliberate self-harm, as would be expected if such events occur independently of an individual's mental state.

Correlations

Correlations were calculated between the above variables and are shown in Table 1. Across the sample as a whole there was no significant association between the measures of independent negative life events and suicide intent. The sample was then divided into individuals presenting with their first episode of self-poisoning and individuals who had a prior history of deliberate self-harm at index. A significant (if small) association between independent life events and suicide intent

was observed in first-ers, $r(283) = .15$, $p = .01$; $r_s(283) = .16$, $p < .01$, but not in repeaters, $r(320) = -.07$, $p = ns$; $r_s(320) = -.04$, $p = ns$. A comparison of the strengths of the correlation coefficients between independent life events and suicide intent in the two groups yielded a significant difference, $Z = 2.68$, $p < .004$, which was investigated further using hierarchical regression.

Regression Analysis

To examine whether repetition status moderated the association between independent life events and suicide intent, a hierarchical multiple regression analysis was conducted with suicide intent entered as the dependent variable. Number of life events and repetition status were entered at Step 1. Gender and hopelessness were also entered at Step 1 due to their significant relationships with level of suicide intent.⁶ At Step 2, the two-way interaction, Life Events \times Repetition Status was added. At Step 3, the three-way interaction Life Events \times Gender \times Repetition Status was added (see Table 2 for a summary of the regression model). The results indicated that at Step 1, the overall regression model was significant, $R^2 = .05$, $F(4, 567) = 6.94$, $p < .001$, with repetition status, gender, and hopelessness, but not life events entering as significant predictors of suicide intent. At Step 2, following the inclusion of the two-way interaction, Life Events \times Repetition status there was a significant improvement in the model, $\Delta R^2 = .01$, $\Delta F(1) = 6.82$, $p < .01$, with repetition status, hopelessness, gender, life events, and the two-way interaction all significantly contributing to the prediction of suicide intent. At Step 3, there was a further significant improvement in variance explained, $\Delta R^2 = .013$, $\Delta F(1) = 7.92$, $p = .005$. The three-way interaction between Life Events \times Gender \times Repetition Status entered

6. Due to the high degree of association between BHS and BDI scores only one of these measures were entered into the regression analysis. Since BHS score showed the stronger correlation with suicide intent this variable was selected.

TABLE 1
Intercorrelations Between Life Events, Suicide Intent, Depression, and Hopelessness

	Spearman's <i>r</i>				Pearson's <i>r</i>			
	1	2	3	4	1	2	3	54
1. Independent events	—	.04	.13**	.07	.05	.13***	.10**	
2. Suicide Intent		—	.13**	.17***		.13**	.18***	
3. BDI				.59***			.59***	
4. BHS								

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

as a significant predictor of suicide intent, overriding the contribution of the two-way interaction, which was no longer significant. Hopelessness, gender, and life events remained as significant predictors of suicide intent. Overall, the model accounted for approximately 7% of the variance in suicide intent and was highly significant, $F(6, 565) = 7.20, p < .001$.

*Correlations Clarifying
Three-Way Interaction*

To clarify the nature of the three-way interaction between repetition status, gender, and life events in the prediction of suicide intent, the correlations between number of life events and suicide intent were computed separately for men and women presenting with

TABLE 2
Summary of Hierarchical Regression Analysis for Prediction of Suicide Intent

	Variable	<i>B</i>	<i>SE B</i>	β
Step 1	Hopelessness	.22	.06	.15***
	Life Events (L)	.29	.31	.04
	Repetition Status (S)	1.38	.58	.10*
	Gender (G)	-1.28	.58	-.09*
Step 2	Hopelessness	.21	.06	.14**
	Life Events	1.15	.45	.16**
	Repetition Status	1.39	.57	.10*
	Gender	-1.41	.58	-.10*
	L \times S	-1.59	.61	-.16**
Step 3	Hopelessness	.20	.06	.13***
	Life Events	1.15	.45	.16**
	Repetition Status	1.38	.57	.10*
	Gender	-1.35	.58	-.10*
	L \times S	-.28	.77	-.03
	L \times S \times G	-2.34	.83	-.17**

Note. Step 1, $\Delta R^2 = .047, \Delta F(4, 567) = 6.94, p < .001$; Step 2, $\Delta R^2 = .011, \Delta F(2, 566) = 6.82, p = .009$; Step 3, $\Delta R^2 = .013, \Delta F(1, 564) = 7.92, p = .005$.

* $p < .05$; ** $p \leq .01$, *** $p \leq .001$

a first episode and presenting with a repetition. As shown in Table 3, the association between suicide intent and number of life events in men was similar for first episodes and for repetitions, being positive but non-significant in both cases. In contrast, in women, number of life events was associated with higher levels of suicide intent in those presenting with a first episode of DSH and lower levels of suicide intent in those presenting with a repetition. As shown in Table 3 there appears to be a change in the strength and direction of the correlation between life events and suicide intent from those women in whom the index episode was their first, to those with five or more episodes (see Table 4).

DISCUSSION

There has been increasing interest in the possibility that episode sensitization processes are a feature of repeated deliberate self-harm (e.g., Joiner, 2002). It is suggested that across episodes minor stressors and endogenous factors (such as spontaneous fluctuations in sad mood) become capable of triggering suicidal ideation and self-harming behavior (e.g., Williams et al., 2005). If this occurs it would be expected that the association between major life events and level of suicide intent would diminish across epi-

TABLE 3
Intercorrelations Between Suicide Intent and Life Events in Men and Women with and without a Prior History of Deliberate Self-Harm

	Men		Women	
	First ever	Repeater	First ever	Repeater
r	.14	.14	.19*	-.22**
r_s	.14	.17	.20**	-.20**

* $p < .05$; ** $p < .01$

TABLE 4
Intercorrelations Between Suicide Intent and Life Events Score in Women According to Number of Prior Episodes of Deliberate Self-Harm

Coefficient	Number of prior episodes of DSH			
	0	1	2-4	5+
r	.19*	-.20	-.21	-.36*
r_s	.20**	-.18	-.21	-.30*

* $p \leq .05$ ** $p \leq .01$

sodes. A first step in investigating this issue is to establish whether there are in fact significant differences between first-ever episodes and repeat episodes in this regard. The current study identified limited evidence in favor of the episode sensitization hypothesis. A significant three-way interaction was identified between independent life events, repetition status, and gender in the prediction of suicide intent, with the association between independent life events and suicide intent being moderated by participants' repetition status (first-ever, repeater), but only in women. Women presenting with a first episode of deliberate self-harm showed a significant positive correlation between life events and suicide intent, while female repeaters showed a significant negative correlation. When female repeaters with one repeat, two to four repeats and five or more repeats were examined separately, the relationship between number of independent negative life events and suicide intent was negative in all cases but significant only for those with five or more prior episodes.

The levels of association between the variables of interest in this study were low and so the results should be interpreted with caution. However, if taken at face value, the findings have at least two possible interpretations. They may indicate the presence of a suicidal process in women in which the impact of negative life events on suicide intent diminishes across episodes, or suggest that

there are stable differences between women engaging in single episodes of DSH and women engaging in repeated episodes in the association between independent negative life events and the severity of a suicidal episode.

A number of issues should be borne in mind when considering the results of this study. First, as discussed above, although statistically significant and similar to levels observed in other comparable studies (e.g., Joiner & Rudd, 2000), the results of this study are likely to have limited clinical significance. Although the relationship between suicide intent and independent life events may differ in women as a function of history of DSH, a large number of other factors must also contribute to the severity of individual episodes since the majority of the variance in suicide intent remained unexplained. Thus, although the results indicate that the relationship between life events and suicide intent may alter subtly across episodes at a population level, they do not provide strong evidence to suggest a suicidal process observable at the level of the individual patient.

Second, we excluded from the study individuals with current alcohol problems/drug use or a history of past sexual trauma. These individuals constitute a significant proportion of the deliberate self-harm patients presenting to hospital, but were excluded on theoretical grounds, since it is likely that major negative life events are less important as determinants of suicide intent from the outset. As a consequence, the generalizability of the findings is limited to a sub-group of self-poisoners without these characteristics.

Third, information on Axis I and Axis II diagnoses was not available, preventing the inclusion of diagnostic variables as potential moderators of the life events-suicide intent association. It is likely that different diagnostic sub-groups within the DSH population would show differing patterns of change in association between life events and suicide intent across episodes. For example, a diminishing contribution of major life events to

suicide intent might be most relevant to those whose DSH occurs in the context of uncomplicated major depression, where episode sensitization processes have most frequently been observed, rather than to DSH patients as a whole.

Finally, a number of correlation analyses were conducted to explore the nature of the interaction between gender, life events, and repetition status in the prediction of suicide intent and it should be noted that if a Bonferroni correction was applied conservatively, to reduce the family-wise error rate to below $\alpha = .05$ across all analyses conducted, that association would no longer be statistically significant. Therefore, the results should be interpreted cautiously.

Despite these limitations, the current study also has strengths. It reports data on a large sample drawn from across Europe, and represents the first study to examine the extent to which the association between life events and the severity of a verified episode of DSH varies with number of prior DSH episodes. The fact that the study provides only limited evidence of sensitization is itself important, since there has been increasing speculation that sensitization processes may contribute to DSH (e.g., Joiner, 2002; Joiner & Rudd, 2000; Williams et al., 2005). However, it is likely to be premature to rule out the contribution of episode sensitization processes in DSH without further studies. In particular, future research might consider not only the occurrence of life events or problems and their relationship to episodes of DSH, but also the extent to which problem-solving skills protect against further episodes of DSH in first episode patients and repeaters. Such studies would have the potential to shed light not only onto the nature of the suicidal process, but would also have important implications for treatment, indicating for whom problem-solving interventions (focused on resolution of external problems) are likely to be most efficacious and in whom treatment might be better focused on the ability to tolerate aversive internal states.

REFERENCES

- ARENSMAN, E., & KERKHOF, A. (2004). Negative life events and non-fatal suicidal behaviour. In De Leo, D., Bille-Brahe, U., Kerkhof, A., & Schmidtke, A. (Eds.). *Suicidal behaviour: Theories and research findings*. Gottingen, Germany: Hogrefe & Huber.
- ARENSMAN, E., McAULIFFE, C., CORCORAN, P., & PERRY, I. (2004). Comment on Tyrer et al., 2003. *Psychological Medicine*, *34*, 1143–1144.
- BEATSON, J., & TARYAN, S. (2003). Predisposition to depression: The role of attachment. *Australian and New Zealand Journal of Psychiatry*, *37*, 219–225.
- BECK, A. T., SCHUYLER, D., & HERMAN, J. (1974). Development of suicide intent scales. In A. T. Beck, H.L.P. Resnik, & D. J. Lettieri (Eds.). *The prediction of suicide*. Bowie, Maryland: Charles Press.
- BECK, A. T., & STEER, R. A. (1993). *Manual for the Beck Hopelessness Scale*. San Antonio: The Psychological Corporation.
- BECK, A. T., WARD, C. H., MENDELSON, M., MOCK, J., & ERBAUCH, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561–571.
- BECK, A. T., WEISSMAN, A., LESTER, D., & TREXLER, L. (1974). The measurement of pessimism: The Hopelessness Scale. *Journal of Consulting and Clinical Psychology*, *6*, 861–865.
- BILLE-BRAHE, U., KERKHOF, A., DE LEO, D., SCHMIDKE, A., CREPET, P., LONNQVIST, J., ET AL. (1996). A repetition-prediction study on European parasuicide populations. *Crisis*, *17*, 22–31.
- BILLE-BRAHE, U., SCHMIDTKE, A., KERKHOF, A., & DE LEO, D. (2004). The WHO/Euro multi-centre study on suicidal behaviour: Its background, history, aims and design. In De Leo, D., Bille-Brahe, U., Kerkhof, A.J.F.M., & Schmidtke, A. Eds. *Suicidal behaviour: Theories and research findings*. Gottingen, Germany: Hogrefe & Huber Publishers.
- BORGES, G., WALTERS, E. E., & KESSLER, R. C. (2000). Associations of substance use, abuse, and dependence with subsequent suicidal behaviour. *American Journal of Epidemiology*, *151*, 781.
- BRENT, D. A., BRIDGE, J., JOHNSON, B. A., & CONNOLLY, J. (1996). Suicidal behaviour runs in families. *Archives of General Psychiatry*, *53*, 1145–1152.
- CLARK, D. C., GIBBONS, R. D., FAWCETT, J., & SCHEFTNER, W. A. (1989). What is the mechanism by which suicide attempts predispose to later suicide attempts? A mathematical model. *Journal of Abnormal Psychology*, *98*, 42–49.
- DE LEO, D., BILLE-BRAHE, U., KERKHOF, A., & SCHMIDTKE, A. (Eds.). (2004). *Suicidal behaviour: Theories and research findings*. Gottingen, Germany: Hogrefe & Huber.
- HAMMEN, C., HENRY, R., & DALEY, S. E. (2000). Depression and sensitization to stressors among young women as a function of childhood adversity. *Journal of Consulting and Clinical Psychology*, *68*, 782–787.
- HAW, C., HAWTON, K., HOUSTON, K., & TOWNSEND, E. (2001). Psychiatric and personality disorders in deliberate self-harm patients. *British Journal of Psychiatry*, *178*, 97–104.
- HAWTON, K., HARRISS, L., SIMKIN, S., BALE, E., & BOND, A. (2004). Self-cutting: Patient characteristics compared to self-poisoners. *Suicide and Life-Threatening Behavior*, *34*, 199–207.
- HJELMELAND, H., HAWTON, K., NORDVIK, A. H., BILLE-BRAHE, U., DE LEO, D., FEKETE, S., ET AL. (2002). Why people engage in parasuicide: A cross-cultural study of intentions. *Suicide and Life-Threatening Behavior*, *32*, 380–393.
- JOHNSON, B. A., BRENT, D. A., BRIDGE, J., & CONNOLLY, J. (1998). The familial aggregation of adolescent suicide attempts. *Acta Psychiatrica Scandinavica*, *97*, 18–24.
- JOINER, T. E. (2002). The trajectory of suicidal behaviour over time. *Suicide and Life-Threatening Behavior*, *32*, 33–41.
- JOINER, T. E., & RUDD, M. D. (2000). Intensity and duration of suicidal crises vary as a function of previous suicide attempts and negative life events. *Journal of Consulting and Clinical Psychology*, *68*, 909–916.
- KENDLER, K. S., KARKOWSKI, L. M., & PRESCOTT, C. A. (1999). Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry*, *156*, 837–841.
- KENDLER, K. S., THORNTON, L. M., & GARDNER, C. O. (2000). Stressful life events and previous episodes in the etiology of major depression in women: An evaluation of the kindling hypothesis. *American Journal of Psychiatry*, *157*, 1243–1251.
- KENDLER, K. S., THORNTON, L. M., & GARDNER, C. O. (2001). Genetic risk, number of previous depressive episodes and stressful life events in predicting onset of major depression. *American Journal of Psychiatry*, *158*, 582–586.
- KENDLER, K. S., THORNTON, L. M., & PRESCOTT, C. A. (2001). Gender differences in the rates of exposure to stressful life events and sensitivity to their depressogenic effects. *American Journal of Psychiatry*, *158*, 587–593.
- KERKHOF, A.J.F.M., BERNASCO, W., BILLE-BRAHE, U., PLATT, S., & SCHMIDTKE, A. (1993). In

- Bille-Brahe, U., Bjerke, T., Crepet, P., De Leo, D., Haring, C., Hawton, K., et al. (Eds.). *WHO/EURO Multicentre Study on Parasuicide. Facts and Figures* (pp. 53–118). Copenhagen: World Health Organisation Regional Office for Europe.
- KESSING, L. V., ANDERSEN, E. W., & ANDERSEN, P. K. (2000). Predictors of recurrence in affective disorder—analyses accounting for individual heterogeneity. *Journal of Affective Disorders*, *73*, 139–145.
- LEWINSOHN, P. M., ALLEN, N. B., SEELEY, J. R., & GOTLIB, I. A. (1999). First onset versus recurrence in depression: Differential processes of psychosocial risk. *Journal of Abnormal Psychology*, *108*, 483–489.
- MITCHELL, P. B., PARKER, G. B., GLADSTONE, G. L., WILHELM, K., & AUSTIN, M. V. (2003). Severity of stressful life events in first and subsequent episodes of depression: Relevance of depressive sub-type. *Journal of Affective Disorders*, *73*, 245–252.
- NEELEMAN, J., DE GRAAF, R., & VOLLEBERG, W. (2004). The suicidal process: Prospective comparison between early and later stages. *Journal of Affective Disorders*, *82*, 43–52.
- OWENS, D., HORROCKS, J., & HOUSE, A. (2002). Fatal and nonfatal repetition of self-harm. *British Journal of Psychiatry*, *181*, 193–199.
- PLATT, S., BILLE-BRAHE, U., KERKHOF, A., SCHMIDTKE, A., BJERKE, T., CREPET, P., ET AL. (1992). Parasuicide in Europe. The WHO EURO Multicentre on Parasuicide 1. Introduction and preliminary analysis for 1989. *Acta Psychiatrica Scandinavica*, *85*, 97–104.
- POST, R. M. (1992). Transduction of psychosocial stress into the neurobiology of recurrent affective disorder. *American Journal of Psychiatry*, *149*, 999–1009.
- SAKINOFSKY, I. (2000). Repetition of suicidal behaviour. In K. Hawton & K. van Heeringen (Eds.), *The International Handbook of Suicide and Attempted Suicide* (pp. 385–404), Chichester, England: John Wiley & Sons, Ltd.
- SEGAL, Z. V., WILLIAMS, J.M.G., TEASDALE, J. D., & GEMAR, M. (1996). A cognitive science perspective on kindling and sensitization in recurrent affective disorder. *Psychological Medicine*, *26*, 371–380.
- STANLEY, B., BRODSKY, B., GROVES, S., & MANN, J. J. (2004, August). *Distinguishing suicidal behaviour and precipitants in borderline personality disorder*. Paper presented at the 10th European Symposium on Suicide and Suicidal Behaviour, Copenhagen, Denmark.
- SUOMINEN, K., HENRIKSSON, M., SUOKAS, J., ISOMETSA, E., OSTAMO, A., & LONNQVIST, J. (1991). Mental disorders and co-morbidity in attempted suicide. *Acta Psychiatrica Scandinavica*, *94*, 234–240.
- SUOMINEN, K., ISOMETSA, E., OSTAMO, A., & LONNQVIST, J. (1997). Hopelessness, impulsiveness, and intent among suicide attempters with major depression, alcohol dependence, or both. *Acta Psychiatrica Scandinavica*, *96*, 142–149.
- TOWNSEND, E., HAWTON, K., ALTMAN, D. G., ARENSMAN, E., GUNNEL, D., HAZELL, P., ET AL. (2001). The efficacy of problem-solving treatments after deliberate self-harm: Meta-analysis of randomized controlled trials with respect to depression, hopelessness, and improvement in problems. *Psychological Medicine*, *31*, 979–988.
- WILKINSON, G., & SMEETON, N. (1987). The repetition of parasuicide in Edinburgh 1980–1981. *Social Psychiatry*, *22*, 14–19.
- WILLIAMS, J.M.G., BARNHOFER, T., CRANE, C., & BECK, A. T. (2005). Problem solving deteriorates following mood challenge in formerly depressed patients with a history of suicidal ideation. *Journal of Abnormal Psychology*, *114*, 421–431.
- WORLD HEALTH ORGANIZATION. (1999). *WHO/EURO Multicentre Study on Parasuicide. Facts and Figures*. (2nd ed.). Copenhagen: World Health Organization Regional Office for Europe.
- WORLD HEALTH ORGANIZATION. (1986). *Summary report, Working group in prevention practices in suicide and attempted suicide*. Copenhagen: WHO Regional Office for Europe.

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