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Review article

Risk factors and correlates of deliberate self-harm behavior: A systematic review

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Abstract

Objective: Deliberate self-harm behavior—without suicidal intent—is a serious health problem and may be studied as a clinical phenomenon in its own right. Empirical studies of sociodemographic and psychological correlates and risk factors are systematically reviewed. **Methods:** We searched Medline, PsycINFO, PSYNDEX (German psychological literature), and reference lists. We targeted self-induced bodily harm without conscious suicidal intent. Studies on suicidal behavior or self-poisoning were only included if they also assessed nonsuicidal self-harm. **Results:** Fifty-nine original studies met the criteria. Deliberate self-harm may occur at all ages, yet adolescents and young adults are at a higher risk. Evidence on gender is complex. Only 5 studies realize a prospective design (6 months to 10 years) and test predictors. The majority use cross-sectional and retrospective methods. No longitudinal study (separately) examines new incidence. Evidence of correlates encompasses distal/proximal, person/environment, and state/trait factors. Many studies report associations between current self-harm behavior and a history of childhood sexual abuse. Adolescent and adult self-harmers experience more frequent and more negative emotions, such as anxiety, depression, and aggressiveness, than persons who do not self-harm. Two studies yield specific interactions between childhood trauma and current traits and states such as low emotional expressivity, low self-esteem, and dissociation with respect to a vulnerability to self-harm. **Conclusion:** Evidence of distal, biographical stressors is fairly strong. Proximal stressors have rarely been investigated; protective factors, hardly at all. Despite many findings of correlates, the data do not yet justify terming them *risk factors*. Longitudinal studies are needed.
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Keywords: Deliberate self-harm; Self-injurious behavior; Risk factors; Correlates; Systematic literature review

Introduction

Deliberate self-harm behavior is a significant health problem that is increasingly being studied as a clinical phenomenon in its own right [1–3]. It is detrimental to the body and may impede social relations, medical treatment, and psychotherapy [4–9]. Some reports characterize aggressive acts against one's own body as indicative of especially severe psychopathological problems [6,10].

Definition of self-harm

The most accepted term for auto-destructive acts in the literature is *self-harm* [3] or, more specifically, *deliberate self-harm behavior* [11]. It is defined as the intentional self-induced harming of one's own body resulting in relevant tissue damage [5,6,11,12]. The term encompasses self-injurious behaviors and more indirect forms of bodily harm [13]. It is largely agreed upon to exclude the following from the definition: (a) phenomena that are explicit symptoms or classificatory criteria of other disorders, such as eating disorders or substance abuse; (b) everyday behaviors, such as unhealthy eating habits or lack of exercise; and (c) psychological self-harm, such as deliberately engaging in an abasing partnership. The latter is occasionally studied in the context of borderline personality disorder [14]. However, there is little consensus

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as to how to classify different levels of frequency, severity (e.g., delicate self-cutting vs. auto-mutilation), or specific forms of deliberate self-harm, such as self-poisoning. Another complex issue is how to distinguish between deliberate self-harm and suicidal behavior.

Prominent definitions of *deliberate self-harm behavior* exclude suicidal intention [5,12,15]. This understanding prevails in U.S. publications, whereas the term *self-harm* generally includes behaviors irrespective of a suicidal intention in the UK, thus encompassing self-harm behaviors with and without suicidal intention. This discrepancy limits cross-national study comparability. There is some comorbidity between suicidal and nonsuicidal self-harm, and deliberate self-harm is prognostic for suicide attempts [14,16–21]. However, there appear to be some important differences between self-harm with the intent to die and self-harm with no intent to die [22]. Studies have revealed a distinction between the psychological functions of suicidal and nonsuicidal self-harm behavior [13]. This distinction is based on the criterion of intention, which is difficult to operationalize. Suicidal intentions may be ambivalent, dissimulated, or concealed. Thus, intention is more difficult to measure reliably than observable behavior [16]. Skegg [3] proposes assessing self-harm behavior descriptively and many authors have adopted the approach of assessing deliberate self-harm as an act of intentional self-injury or self-poisoning "irrespective of the apparent purpose of the act" [23]. However, if we want to expand our knowledge on differences between suicidal and nonsuicidal self-harm, further efforts to develop reliable assessments of intent are required. Some advances have recently been made in this area [24].

Diagnostic classification

Deliberate self-harm behavior may occur in clinical as well as in nonclinical samples [9,10,25–27]. *DSM-IV* and ICD-10 F list self-harm behavior as a diagnostic criterion of borderline personality disorder. However, individuals who self-harm are diagnostically heterogeneous and may suffer from a spectrum of other psychological disorders [28,29]. Frequently reported co-occurring diagnoses—other than borderline personality disorder—are alcohol and substance abuse [29,30]; eating disorders [31–34]; dissociative, somatoform, or body dysmorphic disorders [35–37]; depression and anxiety disorders [26,38,39]; posttraumatic stress disorder [30,40]; and several personality disorders and schizophrenia [2,29]. In *DSM-IV*, self-harm behavior may also be classified as a disorder of impulse control not otherwise specified and ICD-10 has an additional Z code for a personal history of self-harm. Concealed self-harm carried out with the aim of adopting the sick role is classified as factitious disorder [13]. Within factitious disorders, indirect forms of self-harm prevail [41]. Studies indicate certain overlaps between factitious disorder and open (or admitted) self-harm behaviors, making the diagnostic categories not absolutely distinct empirically [6,42–44].

Epidemiology

In school and college student samples, lifetime prevalence of nonsuicidal self-harm behavior ranges from 13% to 35% [11,45–48]. Several population-based samples from the United States and Canada yield a prevalence of 4% pertaining to the past 6 months and lifetime prevalence figures ranging from 2.2% to 6% [49–51]. Deliberate self-harm behavior is particularly prevalent in patients in psychosomatic medicine and psychiatric settings, including consultation–liaison patients [29,52–54].

Risk factors and protective factors

Generally, the relation between a factor and an illness is probabilistic, not deterministic. Therefore, the term *risk factors* is more often preferred over the term *causal factors*. Kraemer et al. [55] define *risk factor* as a measurable variable that must precede the outcome and be associated with a higher risk of developing the outcome. They distinguish between risk factors of first onset and those of a relapse and—inversely—factors raising the probability of a remission. Knowledge of these factors is relevant for the aims of primary, secondary, and tertiary prevention and for therapy. According to Kraemer et al. [55], a factor that has a correlation with an outcome, with both variables being assessed at the same time, should merely be termed a *correlate*. Kraemer argues that although a given factor may indeed be a risk factor, it might also be an accompanying condition or a consequence of the illness. To term a variable *risk factor*, it must be assessed before the outcome occurs.

Distal and proximal factors are distinguished depending on the proximity between factors and outcome. This is often operationalized along a time axis [56], with distal factors arising earlier in the biography and proximal factors nearer to illness onset. The terms *distal* and *proximal* are merely descriptive. Another aspect concerns the paths of effect. In a cause-and-effect chain, distal factors are supposed to have more indirect effects and proximal factors more direct effects on the outcome [57]. More specifically, diathesis-stress models define distal as predisposing factors, which are those that make the individual vulnerable to stress, such as parental problems or childhood traumata. Thus, in predisposed individuals, proximal factors may trigger the onset of mental or behavioral problems. Proximal factors are composed of daily hassles, conflicts, acute stress, life events, or traumata closely prior to illness onset.

Transactional models emphasize that risk factors can transact with each other as well as with the behavior itself [58]. While some risk factors are largely considered static, like a history of childhood trauma or personality traits, others are more often considered dynamic, like changing mood states or the current course of events. More recent approaches underscore the variability of risk factors over time, rather than assume that the risk factors remain valid indefinitely [58].

Risk factors may be inherent in the person or in the environment. Accordingly, protective factors can be personal resources (resilience) or social resources [59].

Protective factors

According to the salutogenic approach, when a person faces stress, protective factors diminish the risk of deve; loping a disease [60]. Identifying protective factors is relevant, provided they can be modified and enhanced by interventions.

Interaction between risk factors and protective factors

Well-known models of the interaction between risk and protective factors are the *compensation model*, which claims that a protective factor simply has an additive positive effect on health and thereby compensates the negative effect of risk factors [59], and the *protective factors model*, which claims that a protective factor must moderate the association between risk factor and outcome [61,62].

Literature review

Although there are some excellent reviews on deliberate self-harm behavior [1–3], we believe that we have added to this knowledge in several ways. In contrast to earlier reviews that give a comprehensive overview [3] or focus on the functions of self-harm [1,2], our review elucidates on the possible factors in the etiology of deliberate self-harm that have been empirically investigated. Since Gratz's 2003 review on risk factors and functions of deliberate self-harm [1], a considerable number of self-harm studies have been published, thus making an updated review expedient. Moreover, other than Gratz's 2003 review, which focused on childhood traumatic experiences and emotion regulation as possible factors [1], our review focuses on a broader range of empirically investigated sociodemographic and psychological factors. Additionally, we evaluate each risk factor or correlate in terms of the methodological strength of the available evidence and infer open research issues that need to be addressed.

Our review focuses on sociodemographic and psychological factors. Although several studies also yield associations between deliberate self-harm and alcohol or other substance abuse, binge eating, or restricted eating, we will not include this information. One reason for this is that substance abuse and disturbed eating may indicate co-occurring disorders. As a result, the question of correlates or risk factors would be strongly linked with the question of diagnostic comorbidity proper. A second reason is that substance abuse and disturbed eating are in themselves behavior with a strong inherent element of self-harm. This makes it a much more complex issue than just treating substance abuse and disturbed eating as correlates or risk factors. In our view, the relation between deliberate self-harm with alcohol or substance abuse and disturbed eating behaviors, in particular, deserves investigating in more detail than this review would allow.

Methods

Research strategies

We searched Medline, PsycINFO, and PSYNDEX (German psychological literature) for the keywords ["self-harm" OR "self-injur∗" OR "self-cut∗" OR "self-destruct∗" OR "auto-mutilat∗" OR "auto-destruct∗"] combined with ["risk facto∗" OR "correlate∗" OR "precurs∗" OR "predict∗" OR "causal facto∗"]. We also searched reference lists. We included studies that adopt the definition of deliberate self-harm as self-induced bodily harm without conscious suicidal intent [1]. Studies on suicidal behavior or self-poisoning alone were generally excluded. However, in order not to omit relevant evidence, we included a small number of studies on suicidal behavior, provided that they also assessed non-suicidal self-harm. We considered original papers that report at least one correlate, risk factor, or protective factor. Case studies and studies without any group comparisons were not included.

Up to the end of 2007, a total of 59 original papers that met inclusion criteria emerged (Table 1). Table 1 gives an overview of included studies, sample characteristics, and assessment methods of deliberate self-harm. Assessment methods are described briefly and are then assigned to one of the following eight categories: (a) there is no information on how deliberate self-harm was assessed; (b) deliberate self-harm was established by an (unspecified) diagnostic case ascertainment at hospital admission or by inspecting medical records, chart reviews, or other; (c) deliberate self-harm was assessed by a standardized clinician rating based on clinical interview and medical documentation; (d) deliberate self-harm was established on the basis of interviews that were constructed ad hoc for the study; (e) deliberate self-harm was established on the basis of interviews for which validation data are available; (f) deliberate self-harm was assessed by single self-report (or interview) items; (g) deliberate self-harm was assessed by a self-report questionnaire constructed ad hoc for the study; (h) deliberate self-harm was assessed by a self-report questionnaire for which psychometrical validation data are available.

Taxonomy of correlates and risk factors

We included sociodemographic factors, distal and proximal correlates, and risk factors. We distinguished correlates and risk factors from protective factors. A factor such as "self-esteem" may be reported as a protective factor or—inversely, as low self-esteem—as a risk factor. We presented factors according to the way they were treated in the studies.

Empirical evidence is summarized and presented in Table 2. For each factor, we listed all relevant studies by authors and indicated whether the study design was cross-sectional (CS), including retrospective assessment, or longitudinal (LT). We rated the strength of the evidence for each

Table 1
Samples and self-harm assessment of the 59 studies

Study		Sample				Deliberate self-harm assessment		
Authors (year of publication)	Reference	Kind/Setting	N	n/n	Age	Assessment instruments	Category	Psychometric validation data
Akyuz et al. (2005)	[63]	Population-based random sample of the city of Sivas, Central Turkey; females	628	14 with DSH 614 without DSH	18–65 (34.5±11.5)	Ad hoc self-report questionnaire (frequency, duration, types)	7	None reported
Boudewyn and Liem (1995a, 1995b)	[64,65]	College psychology students	438	46 with DSH 392 without DSH	16–65 (mean=24.9)	Questions about acts of deliberate self-harm, not described	(6)	None reported
Briere and Gil (1998)	[49]	Population-based sample, clinical sample (inpatients, outpatients), and self-harmers via advertisement	1410	927 population based 390 clinical 93 self-harmers	18–90 (46±17) 18–58 (36±10) ./. (35±9)	Single item from Trauma Symptom Inventory [66] ["Intentionally hurting yourself (e.g., by scratching, cutting, or burning) even though you weren't trying to commit suicide"]	6	None reported
Brown et al. (2007)	[67]	College psychology students	223	23 with recent DSH 39 with past DSH 161 without DSH	19.4±2.1	Standardized self-report questionnaire: DSHI [11] (type, frequency, severity, duration)	8	Available
Brunner et al. (2007)	[45]	Students, 9th grade	5759	630 with occasional DSH 229 with repetitive DSH 4900 without DSH	14.9±0.73	Single item from Schedule for Affective Disorders	6	None reported
Carroll et al. (1980)	[68]	Psychiatric patients, subgroup of patients with DSH and age-/sex-matched sample without DSH	28	14 patients with DSH 14 controls	21–41 (mean=28.1)	Interview, not specified	(4)	None reported
Colman et al. (2004)	[69]	Patients presenting to 1 of 5 emergency departments of Edmonton, Alberta, Canada, for "parasuicide"	369	92 with recurrence within 1–2 years	16–55	Case ascertainment at hospital admission; risk factors by European Parasuicide Study Interview Schedule, Suicide Intent Scale	2 8	None reported for the diagnostic code; available for interview and intent scale
Crowell et al. (2005)	[70]	"Parasuicidal" adolescents and age-matched controls; females	46	23 with DSH 23 without DSH	14–18 (15.3±1.1)	Semistructured/ structured interview; Lifetime Parasuicide Count Interview [71] self-/parent report, DSH group only	(5)	None reported
Darche (1990)	[72]	Adolescent psychiatric inpatients and age-/sex-matched controls	96	48 patients 48 controls	13–17 (mean=15.4)	Review of medical records	2	None reported

De Leo and Heller (2004)	[73]	Students from 14 high schools on the Gold Coast, Queensland, Australia	3757	233 with DSH 3524 without DSH	10–11	Single-item from the Lifestyle and Coping Questionnaire ["Have you ever deliberately taken an overdose (...) or tried to harm yourself in some other way (such as cut yourself)?"] and further questions on most recent episode	6	None reported
Demitrack et al. (1990)	[74]	Inpatients of an eating disorder unit and age-matched controls; females	60	30 patients 30 controls	16–39 (23.3±4.4)	Initial clinical interview at hospital admission	2	None reported
Dubo et al. (1997)	[75]	Psychiatric inpatient with borderline or other personality disorder	59	33 with DSH 26 without DSH	18–60 (mean=31.7)	Ad hoc self-report questionnaire (duration, number of episodes, severity)	7	None reported
Dulit et al. (1994)	[76]	Psychiatric inpatients with borderline personality disorder, with or without DSH	124	62 without DSH 23 with infrequent DSH 39 with frequent DSH	32.8±9.2	Ad hoc self-report questionnaire (frequency); Suicide Intent Scale [77]	7 8	None reported for DSH items; available for intent scale
Evren and Evren (2005)	[78]	Substance dependents after inpatient detoxification; males	136	47 with DSH 89 without DSH	Mean=36.4	Single-item from the Childhood Abuse and Neglect Questionnaire	6	None reported
Fliege et al. (2003)	[79]	Psychosomatic inpatients, consultation–liaison patients and outpatients	354	32 with DSH 322 without DSH	18–65 (30.1±10.1)	Standardized clinician-administered rating form, based on clinical interview and medical records	3	Available
Fliege et al. (2004)	[80]	Psychosomatic medicine consultation–liaison patients and outpatients, general hospital	854	63 with DSH 63 matched controls out of 791 without DSH	17–65 (32.5±11.6)	Standardized clinician-administered rating form, based on clinical interview and medical records	3	Available
Fliege et al. (2006)	[52]	Psychosomatic inpatients	361	109 with DSH 252 without DSH	17–77 (41.9±14.9)	Standardized self-report questionnaires: DSHI [11]; Self-Harm Behavior Questionnaire DSHQ [46]	8	Available
Gladstone et al. (1999)	[81]	Inpatients and outpatients with depressive disorder	269	26 with current DSH 29 with history of DSH	18–77	Ad hoc semistructured/ structured interview containing questions on self-harm	4	None reported
Gladstone et al. (2004)	[82]	Outpatients with depressive disorder; females	125	33 with current DSH 34 with history of DSH	17–68 (37.8±12.1)	Ad hoc semistructured/ structured interview containing unspecified questions of self-harm	4	None reported

Table 1 (continued)

Study			Sample				Deliberate self-harm assessment		
Authors (year of publication)	Reference		Kind/Setting	N	n/n	Age	Assessment instruments	Category	Psychometric validation data
Gratz (2001)	[11]		Undergraduate students of psychology	150	53 with DSH 97 without DSH	18–64 (23.2±7.1)	Standardized self-report questionnaire: DSHI [11]	8	Available
Gratz (2006)	[83]		Undergraduate students of psychology; females	249	91 with DSH 158 without DSH	18–55 (23.3±6.0)	Standardized self-report questionnaire: DSHI [11]	8	Available
Gratz et al. (2002)	[84]		Undergraduate students of psychology	133	51 with DSH 82 without DSH	18–49 (22.7±6.2)	Standardized self-report questionnaire: DSHI [11]	8	Available
Haavisto et al. (2005)	[85]		Representative birth cohort sample at age 8 and again at age 18, males	2307	51 with DSH (at age 18) 2256 without DSH	8/18	Ad hoc single item ("I deliberately tried to hurt or kill myself")	6	None reported
Haines and Williams (1997)	[86]		Prison inmates and students of psychology; males	50	19 prisoners with DSH 13 prisoners and 18 students without DSH	(22.3±6.17)	Not reported	1	None reported
Hawton et al. (2002)	[87]		Pupils from England, survey	6020	398 with DSH 5622 without DSH	15–16	Ad hoc self-report questionnaire (type, consequences, functions, intent); a posteriori classification of open response categories	7	None reported
Herpertz et al. (1997)	[88]		Inpatients with any personality disorder and nonclinical controls	165	54 patients with DSH 66 patients without DSH 45 nonclinical controls	Mean=24 Mean=24.3	Ad hoc structured interview questions, in addition to the SCID Interview for DSM-III-R	4	None reported
Howat and Davidson (2002)	[89]		Elderly psychiatric patients treated for "parasuicidal" behavior or depression, and controls	77	34 parasuicidal patients 21 depressive patients 22 controls	>65	Ad hoc structured interview questions on self-harm, method and intent	4	None reported
Johnston et al. (2006)	[90]		Patients from an emergency department and psychiatric inpatients, treated for self-injury	4743	516 with history of recurrent DSH	>16	Medical records on occurrence (Manchester self-harm monitoring system MASH)	2	None reported
Joyce et al. (2006)	[91]		Psychiatric patients in a long-term treatment program for depression	195	46 with DSH 149 without DSH	>18	Ad hoc structured interview questions, in addition to the SCID Interview for DSM-IV	4	None reported
Kapur et al. (2006)	[23]		Patients presenting to an emergency department with episodes of self-harm including self-injury	7723	1054 with recurrence within 12 months	15–98 (median=30)	Medical records on occurrence (Manchester and Salford self-harm project MASSH)	2	None reported
Kirkcaldy et al. (2006)	[92]		Patients from a hospital for child and adolescent psychiatry and psychosomatic medicine	3649	2153 with DSH 1496 without DSH	3–24 (13.4±3.3)	Ad hoc self-report questionnaire	7	None reported

Klonsky et al. (2003)	[26]	Military recruits, U.S. Air Force	1986	79 with DSH 1907 without DSH	20±5	Two items from Schedule of Nonadaptive and Adaptive Personality ("When I get very tense, hurting myself physically somehow calms me down"; "I have hurt myself on purpose several times") (exclusion when item "I have tried to commit suicide" endorsed)	6	Available for the total questionnaire
Lipschitz et al. (1999)	[93]	Adolescent psychiatric inpatients	71	28 with DSH 43 without DSH	12–18 (14.8±1.6)	Ad hoc self-report questionnaire (type, frequency, age at onset, precipitants)	7	None reported
Low et al. (2000)	[35]	Mentally disordered patients in high-security detention; females	50	37 with DSH (15 infrequent, 22 frequent) 13 without DSH		Medical examination records on occurrence and frequency	2	None reported
Lundh et al. (2007)	[94]	Age-group cohort from three schools in Southern Sweden	123	84 with DSH 44 without DSH	15	Standardized self-report questionnaire: DSHI [11], modifiedàsuicidal intent was asked for each endorsed self-harm behavior	8	Available for original version
Marchetto (2006)	[27]	Patients presenting to an emergency department with five or more episodes of self-cutting	516		16–60 (28.8±8.74)	Medical examination records on occurrence and frequency	2	None reported
Matsumoto et al. (2004)	[95]	Adolescent inmates of a juvenile detention center	201	33 with DSH 168 without DSH	14–19 (16.8±1.6)	Ad hoc self-report questionnaire ["Have you cut your wrist and/or your arm more than once?"; "Have you ever attempted suicide with any ways (including self-cutting)?"] (plus items on burning, frequency, precipitants, functions)	7	None reported
McAuliffe et al. (2005)	[96]	Patients treated for "parasuicide", several treatment centers (WHO multicenter study in 12 European regions)	836		Mean=36	Self-harm assessment not described; semistructured/ structured interview, European Parasuicide Study Interview Schedule	1 4	None reported

Table 1 (*continued*)

Study			Sample				Deliberate self-harm assessment		
Authors (year of publication)	Reference		Kind/Setting	N	n/n	Age	Assessment instruments	Category	Psychometric validation data
McKay et al. (2004)	[97]		Psychiatric inpatients with borderline personality disorder with or without DSH	48	30 with DSH 18 without DSH	30.0±9.3 (with DSH) 29.11±6.4 (without DSH)	Semistructured/ structured interview: Self-Injury Interview (methods, location, pain perception, precipitants, urge, relief)	4	Available
Milnes et al. (2002)	[98]		Patients admitted to hospital following self-harm	150		>15	Ad hoc clinical interview with questions on self-harm (occurrence, type, frequency); Beck interview scale for suicidal intent	4	None reported
Newman and Bland (2007)	[99]		Patients with "parasuicidal" behavior and age-/sex-matched controls treated at an emergency department	707	507 with DSH 200 without DSH	16 to over 45	Medical examination records on occurrence, frequency, method	2	None reported
Nijman et al. (1999)	[100]		Psychiatric inpatients with or without DSH	54	24 with DSH 30 without DSH	37.5±12.4	Ad hoc interview on self-harm (type, frequency, age of onset, severity)	4	None reported
Paivio and McCulloch (2004)	[101]		Undergraduate students of psychology; females	100	41 with DSH 59 without DSH	21±1.7	Ad hoc self-report questionnaire (type, frequency)	7	None reported
Portzky et al. (2007)	[102]		Students from Belgium and the Netherlands	4431 and 4643	Belgium: 460 with DSH, 3969 without DSH The Netherlands: 183 with DSH, 4460 without DSH	15–16	Ad hoc self-report questionnaire ["Have you ever deliberately taken an overdose (…) or other medication or tried to harm yourself in some other way (such as cut yourself)?"], with open description and a posteriori classification	7	None reported
Rodriguez-Srednicki (2001)	[103]		College students; females	441	18 with DSH 423 without DSH	18–23 (20.6±1.2)	Ad hoc self-report questionnaire items (occurrence, frequency)	6	None reported
Romans et al. (1995)	[104]		Random community sample; females	477	23 with DSH 454 without DSH	18–65	Ad hoc interview, self-harm section not described	4	None reported
Schaffer et al. (1982)	[105]		Psychiatric inpatients and outpatients with DSH, patients without DSH matched for age, sex, and setting	28	14 with DSH 14 without DSH	21–41 (28.1)	Ad hoc interview on self-harm; Diagnostic Interview for Borderline Patients [106]	4 5	None reported for self-harm interview, available for borderline interview

Schmidtke et al. (1996)	[107]	Multicenter-study on "parasuicide" at 16 treatment centers in 13 European regions; self-harm included self-cutting behavior	3.968.125	6.310 with DSH 3.961.815 without DSH	15 to over 55	Medical examination records on occurrence	2	None reported
Simeon et al. (1992)	[108]	Patients with any personality disorder with or without DSH, age-matched groups	52	26 with DSH 26 without DSH	31.0±9. 31.4±9.4	Semistructured/ structured interview: Schedule for Interviewing Borderlines (occurrence, frequency)	5	Available
Sourander et al. (2006)	[109]	Representative birth cohort assessed at age 12 and again at age 15	839	52 with DSH (at age 15) 787 without DSH	12/15	Ad hoc single item ("I deliberately try to hurt or kill myself" response categories: not true, sometimes/somewhat, often/very true)	6	None reported
Tuisku et al. (2006)	[110]	Adolescent psychiatric outpatients treated for depression	218	29 with DSH 189 without DSH	13–19	Ad hoc structured interview questions on suicide attempts and deliberate self-harm without intent to die (none, occasional, frequent)	4	None reported
Tulloch et al. (1997)	[111]	Adolescent patients presenting to an emergency department with self-harm and nonpsychiatric hospital controls, matched for age, sex and socioeconomic status	104	52 with DSH 52 matched controls	14–19 (16.4±1.4)	Medical examination records on self-harm occurrence and severity and ad hoc interview questions on suicide history	2 4	None reported
van der Kolk et al. (1991)	[112]	Patients with any personality disorder and/ or bipolar disorder, psychiatric hospital	74	28 with DSH/not suicide attempt	18–39	Ad hoc self-report questionnaire (occurrence, type)	7	None reported
Wright et al. (2004)	[113]	Adolescents with history of sexual abuse, pediatric hospital patients and students; students without sexual abuse	664	399 with wall-hitting as most frequent DSH	13–17 (15±1.2)	Standardized self-report questionnaire: Self-Destructive Behaviors Inventory (unpublished manuscript) with 9 items on self-harm	7	Cronbach alpha reported
Young et al. (2006)	[114]	Male offenders receiving psychiatric treatment in prison	242	43 with DSH 199 without DSH	Not reported	Semistructured/ structured ad hoc interview, not described; review of medical records	4 2	None reported

Table 1 (*continued*)

Study		Sample				Deliberate self-harm assessment		
Authors (year of publication)	Reference	Kind/Setting	N	n/n	Age	Assessment instruments	Category	Psychometric validation data
Zlotnick et al. (1996)	[115]	Psychiatric inpatients; females	148	103 with DSH 45 without DSH	33±9.2	Ad hoc self-report questionnaire (type, frequency, duration), including items on bingeing, reckless driving, etc.	7	None reported
Zlotnick et al. (1999)	[54]	Psychiatric outpatients	256	85 with DSH 171 without DSH	40.6±14.0	Ad hoc self-report questionnaire (type, frequency); semistructured/ structured interview for *DSM-IV* personality	7 5	Cronbach alpha reported
Zoroglu et al. (2003)	[116]	High-school students	839	175 with DSH 664 without DSH	14–17 (15.9±1.8)	Ad hoc self-report questionnaire (types)	7	None reported
Zweig-Frank et al. (1994)	[117]	Patients with borderline or other personality disorder	150	48 with DSH 152 without DSH	18–48 BPD: 28.3±6.3 Non-BPD: 29.7±7.2	Single item from Revised Diagnostic Interview for Borderlines [118] ["During the last two years, have you ever hurt yourself deliberately without intending to commit suicide (e.g., cutting your skin, burns, hitting yourself, breaking windows with your fists hitting walls, hitting your head)?"]	6	None reported

DSH, deliberate self-harm; BPD, borderline personality disorder; single item's texts are included if reported in the paper or available. Assessment categories: 1=no information; 2=case ascertainment/medical records; 3=standardized clinician-administered rating; 4=ad hoc interviews; 5=validated interviews; 6=single items, self-report/interview; 7=ad hoc questionnaire; 8=validated questionnaire (assignment to assessment category is given in parentheses if information is insufficient to judge).

Table 2
Overview of empirical evidence of correlates or risk factors of self-harm behavior

Variable	Studies	Design	Strength of evidence	Annotation
Sociodemographic factors				
Age	[49,107]	CS	++	Highest rates in adolescents and young adults (15–24 years)
	[23]	LT (12 months)	+++	Highest recurrence of DSH for age group 25–54 years
Sex	[11,26,27,49,52,67]	CS	00/(++)	6 studies found no sex differences in adults
	[107]			1 study found more females among medical patients treated for self-harm
	[45,87,92,93,102,109,110]			6 studies on adolescents found a higher prevalence in females (2:1 to 4:1); 1 study on adolescents found no sex differences
	[69]	LT (1–2 years)	000	Not predictive of DSH recurrence
	[23]	LT (12 months)		
Unemployment	[78,99]	CS	+++	
	[90]	LT (6 months)		Predictive of DSH recurrence
	[23]	LT (12 months)		
No partnership	[78]	CS	+++	
	[90]	LT (6 months)		Predictive of DSH recurrence (except when widowed)
	[23]	LT (12 months)		
Distal factor				
Parental separation	[87]	CS	+++	
	[109]	LT (age 12/15)		
	[85]	LT (age 8/18)		
Psychological problems of a parent	[109]	LT (age 12/15)	+++	Significant aspects: mother's nervousness and low well-being
Health problems in the family	[45]	CS	+++	
	[109]	LT (age 12/15)		
	[85]	LT (age 8/18)		
Experience of separation in childhood	[68,84,95,99,112]	CS	++	
	[23]	LT (12 months)	+++	Not predictive of DSH recurrence
Childhood physical abuse	[35,63,68,83,84,87,95, 100,101,110,112,113]	CS	++	
Childhood psychological abuse	[63,84,100,110]	CS	++	
Childhood emotional neglect	[63,75,84,92,93,100,112]	CS	++	
Childhood sexual abuse	[35,49,63,65,72,75,81,82, 84,87,91,93,100,103,104, 110,112,113,115–117]	CS	++	Except: no association found by Rodriguez-Srednicki [103]
	[23]	LT (12 months)	+++	Predictive of DSH recurrence
Proximal factors				
Somatic complaints/ health problems	[45,72,85]	CS	+++/–––	
	[69]	LT (6 months)		Predictive of DSH recurrence
	[23]	LT (12 months)		
	[109]	LT (age 12/15)		
Negative affect intensity/reactivity	[83]	CS	+	
Anxiety	[26,35,67,72,87,102,108]	CS	+++	
	[109]	LT (age 12/15)		
Depression	[26,45,52,64,67,70,72,76,87, 99,102,105,108,111,113]	CS	+++	Except: no difference found by Schaffer et al. [105]
	[109]	LT (age 12/15)		Predictive of DSH recurrence (2 studies) and incidence (1 study)
	[85]	LT (age 8/18)		
	[23]	LT (12 months)		
Impulsivity	[35,87,88,102,105,108]	CS	++	Except: Portzky et al. [102] yielded significance in univariate analyses but not in multiple regression

Table 2 (continued)

Variable	Studies	Design	Strength of evidence	Annotation
Aggressiveness/ hostility	[45,67,108]	CS	+++	
	[109]	LT (age 12/15)		
	[85]	LT (age 8/18)		
Psychopathy	[114]	CS		
Derealization/ Dissociation	[35,49,54,74,79,84, 95,100,112,115–117]	CS	++	
Alexithymia/Lack of emotional expressivity	[83,97,101,115]	CS	++	
Low self-esteem	[35,64,79,87,94,102]	CS	++	
Self-blame/ Self-derogation	[26,73,88]	CS	++	
Critical life events in previous year	[102]	CS	+	
Perceived stress	[52]	CS	+	
Low self-efficacy	[80]	CS	+	
Hopelessness	[98,108]	CS	++	
	[23]	LT (12 months)	+++	Predictive of DSH recurrence
Lack of coping skills, lack of problem-solving abilities, maladaptive coping	[67,86,89,96,98]	CS	++	
Protective factors				
Self-esteem	[96]	CS	+	Self-esteem buffers association between passive-avoidant coping and self-harm
Adaptive coping	[67]	CS	0	No differences found

CS, cross-sectional design/test correlates; LT, longitudinal design/test predictors; +, positive evidence; −, negative evidence; 0, no association.

factor. "+" indicates positive evidence from only one cross-sectional study. "++" indicates positive evidence from at least two cross-sectional studies. "+++" indicates positive evidence from at least one prospective study. A zero means no association was found.

Results

Study design

Only 5 of the 59 original studies test predictors of deliberate self-harm in a longitudinal design [23,69,85,90,109]. They each include two time points of measurement, with intervals ranging from 6 months to 10 years. Three of the longitudinal studies [23,69,90] investigated patients who were medically treated for deliberate self-harm at t_1. The predicted criterion at t_2 was not new onset but recurrence of deliberate self-harm. In a Finnish epidemiological study [109], a representative birth cohort sample of adolescents was assessed at the age of 12 (t_1) and again at the age 15 years (t_2). Occurrence of deliberate self-harm at t_2 was predicted. Among those who exhibited self-harm at t_2, there were new cases of self-harm and repeaters. Self-harm rates at age 12 were 2.7% for girls and 3.1% for boys. At age 15, rates had risen to 12.6% for girls and 4.6% for boys. Thus, at age 15, the majority were new cases. However, no separate analyses for new cases and repeaters were reported. Another sample of the aforementioned Finnish epidemiological study [85]

included only male participants, assessed at age 8 (t_1) and again at age 18 years (t_2). Here, prevalence of deliberate self-harm at age 18 pertaining to the past 6 months was 2.2%. There was, however, no information offered concerning whether any or how many of these self-harmers had also exhibited self-harm behavior at the age of 8 years. It may well be assumed that, at age 18, the rate of new cases in the self-harm group was high but, again, no separate analyses were reported.

Consequently, we conclude that—with the possible exception of the latter study [85]—no study yielded evidence for risk factors of new incidences of deliberate self-harm behavior [55].

Sociodemographic correlates and risk factors

Deliberate self-harm behaviors may occur at all ages. Yet, notably high rates have been found in adolescents and young adults [49,107]. Patients who utilized medical treatment for self-harm were more often female [23,107]. In adolescents, six studies found higher self-harm rates for females [45,87,92,93,102,109]. Only one study found no such difference [110]. In three studies involving young adults [11,26,67] and in three studies involving adult samples of a large age range [27,43,49], there was no gender difference found. One study yielded no gender effect on recurrence of deliberate self-harm [23].

There were no studies on socioeconomic status or level of education and self-harm in adults. In adolescents, self-harm rates were associated with a lower level of education [45].

Prospective data yield that unemployment and having no partnership are predictive of the recurrence of self-harm within 12 months [23,90].

Distal correlates and risk factors

A large number of studies on deliberate self-harm investigate stressful traumatic experiences in childhood. Virtually all studies find associations with self-harm behavior. The following are significant factors: psychological problems on the part of a parent, parental separation, and early or prolonged separation from a parent. Most frequently found were associations between childhood experiences of emotional neglect, psychological or physical abuse, especially sexual abuse, and adolescent or adult self-harm behavior. We identified 21 studies reporting associations between deliberate self-harm behavior and sexual abuse. Only one study did not report this particular association [103], a fact that its authors attribute to the small statistical power of the study.

However, with the exception of only one study, all responses were given retrospectively. Although the time sequence of early biographical events and self-harm in adolescence or adulthood is plausible in itself, retrospection is prone to various recall biases, which may lead to the overreporting or underreporting of biographical events.

In one longitudinal study [109], deliberate self-harm was measured at the age of 15, where parental separation and the psychological problems of a parent—as biographical factors—had been assessed at age 12. Here, too, responses were given retrospectively, at least in part. Not living in a family with two biological parents, mother's health problems, somatic complaints, aggressiveness, and externalizing and internalizing problems at age 12 independently predicted deliberate self-harm 3 years later. In another, only male sample from the same longitudinal study, self-harm behavior at age 18 was more likely when, at age 8, the child's school performances had been poorer and when parents had lower educational levels [85].

Proximal correlates and risk factors

Individual factors

There is good correlative and prognostic evidence for the relevance of general psychopathology, in the way of anxiety, depression, and aggressiveness, in deliberate self-harm behavior. Self-harmers experience more frequent and more negative emotions in their daily lives than persons who do not self-harm. This heightened experience of negative emotion may be a principal reason for deliberate self-harm, as self-harm may acutely alleviate emotional distress. There is also an association between perceived health problems and deliberate self-harm. The evidence for those psychopathological factors deemed to be more specific to self-harm, such as derealization/dissociation and alexithymia/lack of emotional expressivity, is good but correlative only. Self-harmers have more difficulties in identifying or understanding their emotions and in expressing their emotions than individuals who do not self-harm [83,97,101,115].

Stress and maladaptive coping

One study showed a correlation between a higher level of perceived stress in the last 4 weeks and deliberate self-harm behavior [52]; however, the time sequence was not assessed. A study in adolescents found an association between the number of critical life events and self-harm behavior, where both variables were measured retrospectively for the preceding year [102]. Again, no time sequence was assessed. Some cross-sectional results indicate associations between lower personal coping resources and deliberate self-harm. In several studies, deliberate self-harm was associated with low self-esteem and low problem-solving abilities. Self-harmers showed a lower belief in self-efficacy [80] and had a higher tendency towards a self-blaming coping style [73] and to self-derogation [26,88] than non-self-harmers.

Interaction between factors

Distal and proximal factors may have more complex than just additive effects. States and traits may also interact in the triggering of deliberate self-harm. Anxiety, depression, aggressiveness, and low emotional expressivity have stronger trait aspects, whereas derealization and dissociation have stronger state aspects. We found two cross-sectional studies that tested the paths of various factors. One study showed that it was not low emotional expressivity alone but childhood abuse and negative affect together with low emotional expressivity that made the individual prone to deliberate self-harm [83]. The other study found both a direct path from childhood abuse to current self-harm and indirect paths via low self-esteem and via dissociation [35].

Protective factors

Some studies yielded associations between low self-esteem and low coping resources, on the one hand, and deliberate self-harm, on the other. However, these studies adopted a pathogenic framework. In a study that did test within the salutogenic framework [96], high self-esteem buffered the negative effect of passive-avoidant coping on self-harm. Although the overall study was longitudinal, the fact that the said variables were assessed at the same measurement time needs to be mentioned. In one study [67], maladaptive and adaptive coping strategies were tested. Although self-harmers relative to non-self-harmers showed more maladaptive coping, like behavioral disengagement and substance abuse, there were no group differences for adaptive coping, like active coping, acceptance, planning, or humor. Neither were there any differences for seeking instrumental or emotional support.

Discussion

We reviewed empirical studies on correlates and potential risk factors of nonsuicidal, deliberate, self-harm behavior. We included studies that were in accordance with an accepted definition of deliberate self-harm behavior [1]. However, we considered some studies on suicidal behavior if they also included nonsuicidal self-harm behavior.

Sociodemographic and many other distal and proximal correlates of deliberate self-harm could be identified. There were few longitudinal studies, but such studies did not always test the associations that we are focusing on prospectively. Nevertheless, most of the correlates are at least suitable for inclusion in future prospective studies on risk factors.

Evidence of biographical stress and trauma in childhood was most frequent. Yet, the multitude of studies on childhood factors does not alter the fact that their validity is necessarily limited by their retrospective design.

With regard to proximal personal factors, evidence is strongest for anxiety, aggression, and depression, as indicators of general psychopathology, as well as for physical health problems.

Virtually all variables were investigated in a cross-sectional design. Thus, following Kraemer et al. [55], they can only be considered "correlates". Even though the temporal distance of biographical factors to the occurrence of deliberate self-harm suggests that they are indeed risk factors, there are methodological limits to this conclusion. Precision of retrospective assessment is limited by various factors, such as recall biases, which may result in the overreporting or underreporting of events.

With the exception of the person's sex, all variables were modifiable variables [55]. This is a prerequisite for considering them in interventions.

The pathogenic approach dominates the literature on correlates and risk factors of deliberate self-harm. Studies report many potential risk factors, most frequently distal or biographical factors, such as emotional neglect, maltreatment, and abuse in childhood. More proximal factors that are relevant in stress-coping models were investigated in few instances. Although one study measured stress in the past 4 weeks, it is not clear whether this was a precursor, an accompanying condition, or even a consequence of self-harm. With respect to possible proximal factors, the self-harm literature is particularly incomplete. This state of knowledge is unsatisfactory, especially when we compare it with other areas, such as depression, where there are comprehensive studies that successfully integrate distal and proximal factors [56]. To our knowledge, there was only one study that tested interaction effects between different risk factors for the onset of deliberate self-harm [83].

Despite these analyses, the evidence on protective factors against deliberate self-harm is incomplete. While some studies investigated the lack of a resource as a correlate or precursor of deliberate self-harm, buffering or moderating effects were neglected for the most part.

Although our review could identify a number of correlates and several probable risk factors of deliberate self-harm, a résumé of the evidence is limited by some methodological issues. Most importantly, the definition of deliberate self-harm varies across studies. Although we put the focus on studies of self-harm without conscious suicidal intent, a clear-cut distinction could not be made throughout. Even if deliberate self-harm acts were defined by the studies' investigators as having been carried out "without the intent to die", some overlaps between nonsuicidal and suicidal behaviors may still have occurred. As a rule, suicidal intent was not assessed more closely; thus, it is virtually impossible to determine the extent to which the registered behaviors encompassed nonsuicidal or suicidal intent. Therefore, we recommend that future studies should include psychometric assessments of self-harm and intent in order to distinguish nonsuicidal self-harm as precisely as possible.

Other limitations result from the variability in the measurements. More specifically, deliberate self-harm is assessed by diverse methods. Although some advances in the development and psychometric validation of instruments [11,46,52] have been made, the assessments performed in many of the reviewed studies were constructed ad hoc for the study. Only 15 studies used validated instruments or reported any information on the psychometric properties of their assessments of self-harm. Properly validated instruments, like Gratz' Deliberate Self-Harm Inventory (DSHI) [11], were rarely used. In some instances, the assessments were not even described at all. Finally, small and unequal group sizes limit comparability.

Conclusions for research

Knowledge on correlates and risk factors is important in order to better predict, understand, and treat deliberate self-harm behavior. Future research should include (a) longitudinal studies; (b) a psychometrically sound assessment of deliberate self-harm; (c) proximal stress factors (life events, stress, daily hassles, or situational triggers) that occur prior to the onset of deliberate self-harm; (d) the coping with stress dimension; (e) the potential role of social resources; (f) models that test interactions or transactional relations between risk factors, including mediating and moderating effects, as well as interactions between dynamic risk factors and target behavior, including unidirectional and bidirectional effects; and finally (g) models that test moderating effects of protective factors.

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