



The psychometric properties and clinical utility of the Norwegian versions of the deliberate self-harm inventory and the inventory of statements about self-injury

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Accepted: 11 November 2020 / Published online: 16 November 2020
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Abstract

Deliberate self-harm (DSH) is a widespread transdiagnostic health problem with increasing prevalence among adolescences, and young adults. It is therefore essential to effectively chart the epidemiology of DSH, as well as to assess the efficacy of interventions designed to modify this behavior. The aim was to translate and analyze the psychometric properties of the Norwegian versions of two instruments designed to assess DSH: the Deliberate Self-harm Inventory (DSHI) and the Inventory of Statements About Self-Injury (ISAS), as well as to assess the prevalence of DSH within a nonclinical Norwegian adult population. Of the 402 participants who completed a questionnaire packet comprising the DSHI, ISAS, general questions about DSH, and other related measures, 30.6% reported some form of DSH. Those with a history of DSH reported greater difficulties with emotion regulation than those without. Participants with and without a history of DSH did not differ in unrelated constructs, including social desirability. The frequency of specific DSH behaviors was in accordance with previous research, with cutting being the most frequent. The factor structure of DSH functions in the Norwegian ISAS was generally comparable to the factor structure of the English version. Overall, results indicate that: a) the Norwegian versions of the DSHI and ISAS behave as expected and in accordance with prior research in other languages and other populations, and b) both the DSHI and ISAS have high internal consistency and adequate construct, convergent, and discriminant validity, and may be applied to evaluate DSH in adult Norwegian populations.

Keywords Deliberate self-harm · Self-injury · Psychometric · Translation · Cross-cultural · Assessment

Introduction

Deliberate self-harm (DSH), also referred to as non-suicidal self-injury, is defined as direct self-destruction or alteration of body tissue without conscious suicidal intent, but resulting in injuries severe enough for tissue damage to occur (American Psychiatric Association, 2013; Favazza, 1998). DSH is a major public health problem with increasing prevalence in adolescent and young adult populations (Madge et al., 2011; Tørmoen, Myhre, Walby, Grøholt, & Rossow, 2020).

This behavior often remains undetected in clinical and school settings unless directly assessed. Indeed, lifetime rates of DSH range from 13 to 41.5% within community adolescent samples (most of which involved middle or high school students; Bjärehed & Lundh, 2008; Lundh, Karim, & Quilisch, 2007; Madge et al., 2011; Ougrin, Tranah, Stahl, Moran, & Asarnow, 2015), and 17–41% within nonclinical young adult samples (mostly university students; Gratz, 2001, 2006; Ougrin & Yue, 2016). Moreover, DSH is a behavior implemented by a heterogeneous transdiagnostic, clinical, and nonclinical population, mostly related to negative emotionality, self-derogation, difficulties in emotion regulation, childhood trauma, posttraumatic symptoms, and dissociative features, such as depersonalization and derealization (Gratz, 2003; Klonsky, 2007; Nobakht & Dale, 2017). DSH is a symptom criteria for Borderline Personality Disorder (BPD) (prevalence ranging from 17 to 80% across clinical samples; Zanarini et al., 2008), but can also be present in disorders such as depression and anxiety (Klonsky, 2007).

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The most common forms of DSH include skin cutting, carving, severe scratching, burning, needle sticking, and interfering with wound healing (American Psychiatric Association, 2013; Favazza, 1998; Zanarini et al., 2008). Given both the serious consequences of DSH and the evidence that this behavior is increasing in prevalence among adolescents (Madge et al., 2011; Tørmøen et al., 2020), there is a pressing need for empirically validated measures assessing the presence, features, and functions of DSH across countries and languages. Such measures would be useful in both clinical and nonclinical settings in order to screen for the presence of DSH, track the prevalence of this behavior in various populations, and assess the utility of interventions aimed at reducing DSH.

As many as 49 different instruments have been used in published research on DSH (Borschmann, Hogg, Phillips, & Moran, 2012), many of which lack empirical support. Systematic reviews of instruments assessing DSH have identified 6–7 self-report measures that have adequate psychometric properties. These include the Self-Harm Behavior Questionnaire (SHBQ) (Croyle & Waltz, 2007), the Deliberate Self-harm Inventory (DSHI) (Gratz, 2001), the Self-Injury Questionnaire (SIQ) (Sansone, Songer, & Sellbom, 2006), the Self-Injury Questionnaire Treatment Related (SIQTR) (Madge et al., 2008), the Inventory of Statements About Self-Injury (ISAS) (Glenn & Klonsky, 2011), the Self-Harm Information Form (SHIF) (Croyle & Waltz, 2007), and the Self-Harm Inventory (SHI) (Borschmann et al., 2012; Latimer, Meade, & Tennant, 2013; Sansone et al., 2006).

To date, the only published Norwegian version of a self-report measure of self-harm is the self-harm section of the Lifestyle and Coping Questionnaire, which was used in the Child and Adolescent Self-Harm in Europe (CASE) Study (Madge et al., 2008; Madge et al., 2011). A relatively broad definition of self-harm was used in the CASE study that failed to distinguish between suicidal and non-suicidal behaviors and included a wide range of self-destructive behaviors that may or may not cause immediate tissue damage, including the overuse of medications and drug use. Furthermore, this measure was not behaviorally-specific, as participants were asked to list what they considered self-harming behaviors (Madge et al., 2008).

Thus, Norwegian versions of measures assessing the key characteristics of DSH in particular (rather than self-destructive behaviors more broadly) are sorely needed in order to facilitate the accurate assessment of this behavior in a Norwegian context. In particular, behaviorally-specific measures assessing the presence, frequency, duration, and functions of DSH are needed. To this end, the DSHI and ISAS were chosen for this study, as both are behavior-specific instruments designed to assess the frequency, severity, duration, and type of specific DSH behaviors that fit the definition of

DSH used in this study (American Psychiatric Association, 2013; Favazza, 1998). Furthermore, the ISAS assesses both intrapersonal and interpersonal functions of DSH (Klonsky & Glenn, 2009), consistent with theory and research on DSH functions (Bildik, Somer, Basay, Basay, & Özbaran, 2013; Klonsky & Glenn, 2009; Klonsky, Glenn, Styer, Olino, & Washburn, 2015).

Psychometric Properties of the DSHI and ISAS

The English version of the DSHI, originally tested among young adults in the United States, demonstrates good internal consistency and test-retest reliability, as well as adequate construct, convergent, and discriminant validity (Gratz, 2001). The DSHI has been translated into various languages, including Italian (Somma, Sharp, Borroni, & Fossati, 2017), Swedish (Lundh et al., 2007), German (Fliege et al., 2006), Dutch (Kool, van Meijel, van der Bijl, Koekkoek, & Kerkhof, 2015), and Iranian (Nobakht & Dale, 2017). Although there are differences across studies in terms of the stringency of translation and validation procedures, preliminary data suggest acceptable psychometric properties of the DSHI across translations and versions of this scale (Fliege et al., 2006; Kool et al., 2015; Latimer et al., 2013; Lundh et al., 2007; Nobakht & Dale, 2017; Somma et al., 2017).

The DSHI assesses various aspects of DSH, including the frequency, severity, duration, and type of DSH behavior (Gratz, 2001). The specific acts of DSH listed in the questionnaire were based on clinical observations, testimonies from individuals who engage in DSH, and behaviors commonly reported in the literature.

The ISAS consists of two sections assessing: 1) lifetime frequency of DSH, as well as descriptive and contextual factors; and 2) the functions of DSH. The ISAS has been found to have sound psychometric properties, with good internal consistency, test-retest reliability, and convergent and divergent validity (Glenn & Klonsky, 2011). Likewise, the DSH functions section of the ISAS possesses a robust two-factor structure (Klonsky et al., 2015; Kortge, Meade, & Tennant, 2013) that is consistent with prior research on the functions of DSH, thus supporting the construct validity of the ISAS functions (Klonsky & Glenn, 2009).

The ISAS has been translated into and used in multiple languages, including Swedish (Lindholm, Bjärehed, & Lundh, 2011) and Turkish (Bildik et al., 2013). Although the evaluation of psychometric properties varies across these translations, preliminary data suggest acceptable psychometric properties of the different versions of the ISAS (Bildik et al., 2013; Lindholm et al., 2011).

Given that translated versions of an instrument cannot be assumed to have the same psychometric properties as the original, it is essential to empirically determine the psychometric properties of any translation (Gudmundsson, 2009). Thus, this

study sought to assess the frequency and functions of DSH in a Norwegian adult population of college students and faculty members, as well as to investigate the validity of the Norwegian versions of the DSHI and ISAS within this sample. To this end, we examined: 1) the rates of DSH within this sample, both overall and across specific DSH behaviors; 2) the extent to which responses in the DSHI and ISAS converge with one another, as well as with other more general measures of DSH; 3) the factor structure of the Norwegian version of the ISAS function scales; and 4) the convergent and divergent validity of the DSHI and ISAS in relation to other measures of related (e.g., borderline personality pathology, emotion regulation difficulties) and unrelated (social desirability) constructs.

Study Design and Methods

Translation

The two questionnaires were translated in accordance with guidelines issued by the World Health Organization (2017, February). Hence, both the DSHI and the ISAS were: a) translated by two psychologists with experience in the field of DSH and instrument translation; b) evaluated by an expert panel consisting of clinical psychologists and psychiatrists with experience in DSH, research, and instrument translations; and c) back translated by an independent translator with extensive experience with the English language, the translation of instruments, and research in psychology. The Norwegian versions were then pilot tested on a patient group consisting of 10 patients known for their severe DSH behavior. The final versions of the instruments were then evaluated and approved by the authors of the original instruments in English.

Participants and Procedures

Seven hundred and fifty questionnaire packets were distributed to a convenience sample consisting of full-time students taking health and social science programs (450 out of a total of 650 students), and all academic and administrative faculty members at the campuses of university colleges in the Norwegian cities of Molde and Volda (200). Enclosed with the questionnaire packet was a written explanation of the project, including that participation was voluntary and the data were anonymous.

Completion took approximately 10–30 min. Participants at the university college in Molde returned completed questionnaires to a locked mailbox on campus. Those at the university college in Volda sent the completed questionnaires by mail in a prepaid envelope.

Four hundred and sixteen individuals, from the total of 750 who had received it (response rate of approx. 55.5%) returned completed questionnaires, although 14 were excluded from

the analyses due to extensive missing data. The majority of participants were women (78.9%; $n = 317$). In terms of age, 48.4% ($n = 193$) were under 25 years of age, 21.1% ($n = 85$) were in the age group 26–35, 12.7% ($n = 51$) were 36–45, 8.7% ($n = 35$) were 46–55, and 8.7% ($n = 35$) were over 55.

Measures

Demographics Questionnaire This questionnaire elicited basic demographic information from the participants relating to their age and gender.

The Deliberate Self-Harm Inventory (DSHI) The DSHI is a 17-item behaviorally-specific, self-report instrument designed to assess various aspects of DSH, including its frequency, severity, duration, and type of self-harming behavior (Gratz, 2001). In order to collect psychometric data on the Norwegian version of the DSHI, two variables were derived from information obtained from the measure: 1) a continuous variable representing the frequency of DSH, calculated by adding up participants' scores on the frequency items for each behavior; and 2) a dichotomous variable reflecting the presence versus absence of lifetime DSH, with "0" indicating the absence of the behavior and "1" indicating at least one episode of the behavior.

Inventory of Statements about Self-Injury (ISAS) The ISAS is a measure of the frequency and functions of DSH and consists of two sections. The first assesses the lifetime frequency of 12 DSH behaviors performed "intentionally (i.e., on purpose) and without suicidal intent". This section also contains five additional questions assessing descriptive and contextual factors of DSH, including age of onset, the experience of pain during DSH, whether DSH is performed alone or around others, time between the urge to self-injure and the act of DSH, and whether the individual wants to stop self-injuring (Klonsky & Glenn, 2009).

Participants endorsing one or more DSH behaviors are instructed to complete the second section of the ISAS, which assesses 13 potential functions of DSH (i.e., affect regulation, anti-dissociation, anti-suicide, autonomy, interpersonal boundaries, interpersonal influence, marking distress, peer bonding, self-care, self-punishment, revenge, sensation seeking, and toughness) through 39 items. Items assessing the functions of DSH are rated on a 3-point scale ranging from 0 (not relevant) to 2 (very relevant). As such, scores for each of the 13 ISAS functions can range from 0 to 6 (Klonsky & Glenn, 2009). The functions of DSH in the ISAS have been found to demonstrate a robust 2-factor structure, with the first representing interpersonal functions (e.g., interpersonal influence, peer-bonding) and the second capturing intrapersonal functions (e.g., affect-regulation, self-punishment).

General Self-Harm Questionnaire This brief questionnaire consists of seven questions recommended in Norway for assessing DSH and suicidality among patients seeking medical help or attention (Mehlum & Holseth, 2009). These questions include: 1) Have you ever intentionally hurt yourself?; 2) What did you do to hurt yourself?; 3) What did you want to accomplish by hurting yourself?; 4) Did you wish to die because of harming yourself?; 5) Did you want something to change because of harming yourself?; 6) When did you first harm yourself?; and 7) Before this, how many times have you intentionally hurt yourself? (Mehlum & Holseth, 2009). Dichotomous DSH variables were created for items 1 and 4, with participants who answered yes receiving a score of “1” for the respective variable, and participants who answered no receiving a score of “0”. Items 1, 2, 6, and 7 were used to assess the convergent validity of the DSHI and ISAS. Convergent validity was measured by comparing the answers on item 1 to responses in the DSHI and ISAS, and comparing the methods listed in item 2 to the methods marked in the DSHI and ISAS. Items 6 and 7 were examined as continuous variables, and convergent validity was assessed by examining the correlations between these items and the corresponding information from the DSHI and ISAS.

The Norwegian Short-Form of the Marlowe-Crowne Social Desirability Scale (NSF-MCSDS) The NSF-MCSDS is a 10-item measure of social desirability (Rudmin, 1999). The items are derived from the 33 items of the original version of the Marlowe-Crowne Social Desirability Scale, one of the most widely used measures of social desirability (Crowne & Marlowe, 1960). The NSF-MCSDS has been found to be strongly correlated with the original 33-item version ($r=0.83$, $n=224$, $p < 0.001$), indicating that the short-form is a reliable equivalent to the original (Rudmin, 1999). Ratings are summed across all items, and higher scores indicate a greater propensity to answer in socially-desirable ways. The NSF-MCSDS was included to assess the discriminant validity of the DSHI and ISAS.

Difficulties in Emotion Regulation Scale (DERS) The DERS is a self-report instrument consisting of 36 items assessing trait-level difficulties in emotion regulation (Gratz & Roemer, 2004). The items on the scale are categorized into six subscales reflecting difficulties in emotion regulation across six domains: non-acceptance of negative emotions; inability to engage in goal-directed behaviors when experiencing negative emotions; difficulties controlling impulsive behaviors when experiencing negative emotions; lack of access to effective emotion regulation strategies; lack of emotional awareness; and lack of emotional clarity. Participants rate each item on a 5-point Likert-type scale (1 = “almost never” [0–10%], 2 = “sometimes” [11–35%], 3 = “about half the time” [36–65%], 4 = “most of the time” [66–90%], and 5 = “almost always” [91–100%]). Higher scores indicate greater difficulties

in emotion regulation (Gratz & Roemer, 2004). Scores on the DERS were used to assess the construct validity of the DSHI and ISAS.

Self-Report Version of the Borderline Personality Disorder (BPD) Module of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-II BPD) The BPD module of the SCID-II is a structured diagnostic interview used to assess the presence of BPD (First, Benjamin, Gibbon, Spitzer, & Williams, 1997). This study used a self-report version of this interview to assess BPD, with participants being asked to rate the symptoms of BPD on a yes–no scale. Ratings are summarized across all answers and higher scores indicate more symptoms of BPD. Scores on this measure were used to assess the convergent validity of the DSHI and ISAS.

Statistical Analysis

Statistical analyses were performed using SPSS 25.0. The internal reliability of each instrument was measured with Cronbach’s alpha. The frequency of DSH among college students and faculty members was also calculated. Next, the factor structure of the ISAS function scales was examined by performing an exploratory factor analysis (principal axis factoring in SPSS) with Promax rotation. Due to the small sample size, we opted for a factor analysis of the 13 categories of DSH functions, each consisting of 3 items, instead of a factor analysis at the item level. Finally, the convergent and divergent validity of both the DSHI and ISAS were examined by comparing the correlations of these instruments with measures of both related constructs (including general questions about DSH, difficulties in emotion regulation, and symptoms of BPD) and unrelated constructs (i.e., social desirability). Convergent validity was also assessed by comparing the reported frequency and methods of DSH across the different measures of DSH.

Results

Prevalence of Self-Harm

Thirty one percent of the sample ($n = 123$) reported a history of DSH in at least one of the instruments. Of those who reported a history of DSH, 94.3% ($n = 116$) reported this in the ISAS and 82.9% ($n = 102$) reported this in the DSHI. In comparison, 53.7% ($n = 66$) of those who reported some form of DSH did so when asked about DSH in general (i.e., “Have you ever intentionally hurt yourself?”). The rates of each form of DSH assessed in the DSHI and ISAS are reported in Table 1. The most common form of DSH across both measures was cutting, followed by interfering with wound healing and severe scratching in the DSHI, and interfering with wound healing and pinching in the ISAS. Of those who reported DSH in the DSHI ($N = 102$) and

Table 1 Frequency of participants endorsing different DSH behaviors in the DSHI and ISAS

DSHI Method			ISAS Method		
DSH behavior	Frequency	Percent	DSH behavior	Frequency	Percent
Cutting	55	44.7	Cutting	56	45.5
Burning w/cigarette	7	5.7	Biting	28	22.8
Burning w/lighter or match	12	9.8	Burning	18	14.6
Carving words	24	19.5	Carving	36	29.3
Carving pictures	7	5.7	Pinching	43	35.0
Severe scratching	30	24.4	Pulling hair	15	12.3
Biting	11	8.9	Severe scratching	29	23.6
Rubbing sandpaper	2	1.6	Banging or hitting self	44	35.8
Dripping acid	1	0.8	Interfering w/wound healing	51	41.5
Scraping skin with bleach	1	0.8	Rubbing skin against rough surface	8	6.5
Sticking pins and needles	20	16.3	Sticking self w/needles	18	14.6
Rubbing glass on skin	11	8.9	Swallowing dangerous substances	10	8.1
Breaking bones	2	1.6	Other	4	3.3
Banging the head	18	14.8			
Punching oneself	21	17.1			
Interfering w/wound healing	31	25.2			
Other methods	10	8.1			

ISAS ($N = 116$), the vast majority (DSHI: 85%, ISAS: 86%) reported harming themselves more than once, with 58% and 68% reporting more than 10 episodes, and 25% and 35% reporting more than 100 episodes, respectively. More than half of those who endorsed DSH in the DSHI or ISAS reported using more than one method of DSH (DSHI: 57%, ISAS: 57%), with 29% using four or more different methods. According to reports in the DSHI, 20% ($N = 34$) of those with a history of DSH were actively self-harming at the time of the study. The mean time from their last DSH episode was 65.5 months ($SD = 96,414$ -months, range 0–624 months), as reported in the ISAS.

Although participants were more likely to endorse DSH in the DSHI and ISAS than when asked about DSH in general, a chi-square test of independence revealed significant associations in the rates of DSH captured by the three different instruments measuring DSH: ISAS-DSHI $\chi^2(1,394) = 260.141$, $p < 0.001$, ISAS-General $\chi^2(1,394) = 171.495$, $p < 0.001$, and DSHI-General $\chi^2(1,400) = 202.874$, $p < 0.001$. Moreover, participants reported similar rates of DSH behaviors in the DSHI and ISAS (see Table 2).

Impact of Gender and Age

Consistent with prior research on DSH (Gratz, 2001; Pattison & Kahan, 1983), the rates of DSH among men and women (35.1% and 29%, respectively) did not differ significantly ($F(4,392) = 0.751$, $p = .473$). However, there was a significant difference present in the rate of DSH across the various age groups ($F(4,394) = 8.482$, $p < .0001$), with the highest rate of DSH in

the youngest age group (i.e., < 25 years: 40.5%; 26–35 years: 34.1%; 36–45-years: 21.6%), compared to the two oldest age groups (i.e., 46–55 and > 55: 5.7% each). There were no significant differences across age groups in the number of DSH methods (DSHI: $F(4,116) = 0.857$, $p = .492$; ISAS: $F(4,116) = 2.929$, $p = .024$) or its frequency (DSHI: $F(4,112) = 0.559$, $p = .693$; ISAS: $F(4,116) = 0.732$, $p = .572$).

Reliability of the DSHI and the ISAS

Regarding the internal consistency of the 17 DSHI behavior items and the 13 ISAS behavior items, the results revealed adequate internal consistency for both sets of items (see Table 3). Item correlations for the 17 DSHI items ranged from $r_b = .64$ and $r_b = .55$ for severe scratching and cutting, respectively, to $r_b = .139$ for dripping acid on the skin, and using bleach or oven cleaner. Ten of the items had item-total correlations above $r_b = .31$ (see Table 3 for item-total correlations for the DSHI and ISAS items). Item-total correlations for the ISAS behavior items ranged from $r_b = .88$ and $r_b = .84$ for severe scratching, and interfering with wound healing, respectively, to $r_b = .12$ for other types of DSH (see Table 3).

ISAS DSH Functions

Of those who reported a history of DSH, 47.7% ($N = 82$) endorsed one or more of the functions included in the ISAS DSH Functions section. Of those who did not endorse any of the functions included in this measure, 45.5% ($N = 41$) wrote

Table 2 Chi-square test and rate of convergence between different DSH behaviors reported in the ISAS, DSHI, and General DSH Questionnaire

DSH Behavior	ISAS vs. DSHI			ISAS vs. General			DSHI vs. General		
	Convergent (%)	Non-convergent (%)	<i>p</i> value	Convergent (%)	Non-convergent (%)	<i>p</i> value	Convergent (%)	Non-convergent (%)	<i>p</i> value
Cutting	96.8	3.2	<i>p</i> < .001	96.8	3.2	<i>p</i> < .001	97.3	2.7	<i>p</i> < .001
Biting	94.8	5.2	<i>p</i> < .001	93.8	6.2	<i>p</i> < .001	97.5	2.5	<i>p</i> < .001
Burning	98.5	1.5	<i>p</i> < .001	96.8	3.2	<i>p</i> < .001	96.0	4.0	<i>p</i> < .001
Carving	91.5	8.5	<i>p</i> < .001	91.0	9.0	<i>p</i> = .006	96.5	3.5	<i>p</i> = .130
Pinching				90.0	10.0	<i>p</i> < .001			
Severe scratching	96.8	3.2	<i>p</i> < .001	93.5	6.5	<i>p</i> < .001	92.8	7.2	<i>p</i> = .003
Banging or hitting	85.8	14.2	<i>p</i> = .007	91.5	8.5	<i>p</i> < .001	91.2	8.8	<i>p</i> = .010
Wound healing	93.3	6.7	<i>p</i> < .001	87.5	12.5	<i>p</i> < .001	93.3	6.7	<i>p</i> < .001
Rubbing skin	97.8	2.2	<i>p</i> = .059						
Sticking self	98.5	1.5	<i>p</i> < .001	96.5	3.5	<i>p</i> < .001	96.0	4.0	<i>p</i> < .001
Swallowing				97.5	2.5	<i>p</i> = .003			

Note. For comparing different DSH behaviors, the variables in the DSHI for burning with cigarettes, and burning with matches or lighter were combined into the variable *burning*, and carving words, and carving pictures and patterns were combined into the variable of *carving*

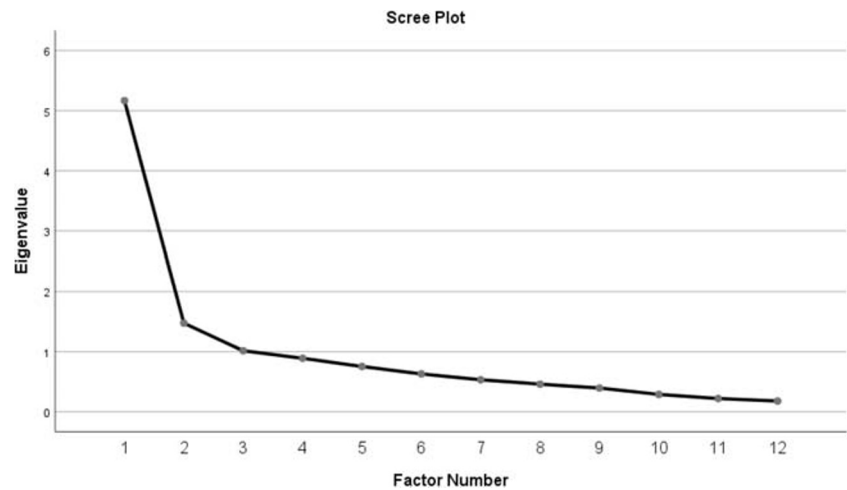
another function, e.g., “As a dare when in school”, “Out of curiosity”, or “lost a football game”. The mean score across all DSH function items in the ISAS for those who endorsed one or more of the listed DSH functions was 5.78 (*SD* = 8.93). Intrapersonal functions were more frequently endorsed (mean = 3.73, *SD* = 5.94) than interpersonal ones (mean = 1.95, *SD* = 3.87), with affect regulation being the most common (*M* = 2.68, *SD* = 2.02).

An exploratory factor analysis (EFA) using principle axis factoring (PAF) was conducted on the DSH function items of the ISAS for 12 of the 13 represented functions; items pertaining to the peer-bonding function scale were excluded from the factor analysis due to endorsement rates below 5%. Each of the represented functions was comprised of three items. Consistent with Klonsky and Glenn (2009), items included in the EFA were

Table 3 Corrected item-total correlations and Cronbach’s Alpha if item deleted, for DSHI and ISAS

DSHI scale item	DSHI		ISAS 1 scale item	ISAS 1	
	Corrected item-total correlation	Cronbach’s Alpha if item deleted		Corrected item-total correlation	Cronbach’s Alpha if item deleted
Cutting	.55	.75	Cutting	.75	.75
Burning w/cigarette	.28	.77	Biting	.56	.79
Burning w/lighter or match	.28	.77	Burning	.35	.80
Carving words	.28	.78	Carving	.88	.72
Carving pictures	.23	.78	Pinching	.37	.79
Severe scratching	.64	.74	Pulling hair	.27	.80
Biting	.49	.76	Severe scratching	.46	.79
Rubbing sandpaper	.31	.77	Banging or hitting self	.53	.79
Dripping acid	.14	.78	Interfering w/wound healing	.84	.73
Scraping skin with bleach	.14	.78	Rubbing skin against rough surface	.20	.80
Sticking pins and needles	.52	.75	Sticking self w/needles	.82	.73
Rubbing glass on skin	.43	.76	Swallowing dangerous substances	.28	.80
Breaking bones	.17	.78	Other	.12	.80
Banging the head	.50	.76			
Punching oneself	.51	.75			
Interfering w/wound healing	.34	.77			
Other methods	.37	.77			

Fig. 1 Scree Plot for the factor analysis of the ISAS functions



subjected to a two-factor solution (interpersonal and intrapersonal). Due to correlation ($r = .665$) between the two factors, we opted for an oblique solution using Promax 3 rotation. An inspection of the correlation matrix revealed that most coefficients were above 0.25. The Kaiser-Meyer-Olkin value was 0.862, exceeding the recommended value of 0.5, and the Bartlett's Test of Sphericity was statistically significant ($< .001$), thus supporting the factorability of the correlation matrix (Fig. 1).

In the initial solution, 55% of the variance was explained, with the interpersonal factor explaining 43% of the variance and the intrapersonal factor explaining 12%. Although results generally supported the original factor structure of the ISAS function items, some differences were identified (see Table 4). Specifically, although almost all intrapersonal items loaded on the intrapersonal factor as expected, items comprising the “marking distress” function loaded on both factors, albeit with higher loadings on the

interpersonal factor. Likewise, one of the functions that loaded on the interpersonal factor in the original ISAS study (i.e., self-care) loaded on the intrapersonal factor in this study. Although not expected, past research has shown that the ISAS self-care items often load on both factors (Klonsky & Glenn, 2009) or the intrapersonal factor alone (Kortge et al., 2013). When items are divided in accordance with the loading on the two-factor solution, with “marking distress” placed in the Intrapersonal subscale, internal consistency is high for both subscales, i.e., Intrapersonal ($\alpha = .923$) and Interpersonal ($\alpha = .783$).

Construct Validity of the DSHI and ISAS

The results of the correlation analyses revealed significant positive correlations between DSH outcomes (both the presence and frequency of DSH) across the three measures (i.e.,

Table 4 Factor loadings, endorsement rates and mean of the 13 categories of function of DSH in the Inventory of Statements About Self-Injury, Function (ISAS 2)

ISAS item	ISAS subscale	Original factor	Endorsement	Mean	Factor	
					Intrapersonal (Factor 1)	Interpersonal factor (Factor 2)
1	Affect-regulation	Intrapersonal	36%	.41	.919	
2	Interpersonal boundaries	Social	11%	.06		.499
3	Self-punishment	Intrapersonal	24%	.23	.709	
4	Self-care	Social	23%	.13	.845	
5	Anti-dissociation	Intrapersonal	25%	.24	.871	
6	Anti-suicide	Intrapersonal	17%	.16	.662	
7	Sensation-seeking	Social	14%	.08		.520
8	Interpersonal influence	Social	15%	.10	.247	.582
9	Toughness	Social	15%	.09		.491
10	Marking distress	Intrapersonal	23%	.51	.519	.412
11	Revenge	Social	8%	.05		.475
12	Autonomy	Social	7%	.03		.593

Table 5 Correlations between DSH measured with the General DSH Questionnaire, DSHI, and ISAS and Difficulties in Emotion Regulation (DERS), BPD symptoms (SCID-BPD), and Social Desirability (MCSDS) ($N = 402$)

	General Dichotomous	General Frequency	DSHI Dichotomous	DSHI Frequency	ISAS Dichotomous	ISAS Frequency	ISAS Intrapersonal	ISAS Interpersonal
General Frequency	.349**							
DSHI Dichotomous	.705**	.246**						
DSHI Frequency	.211**	.881**	.174*					
ISAS Dichotomous	.654**	.212**	.813**	.146				
ISAS Frequency	.292**	.872**	.262**	.955**	.244**			
DERS	.393**	.279**	.318**	.219**	.337**	.266**	.515**	.299**
SCID-BPD	.416**	.230**	.430**	.184*	.418**	.228**	.357**	.263**
MCSDS	-.064	-.029	-.073	-.028	-.099	-.025	-.028	-.019

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

DSHI, ISAS, and general DSH questions). Likewise, both the presence and frequency of DSH in the DSHI and ISAS were significantly positively associated with emotion regulation difficulties and BPD symptoms. Finally, although both intrapersonal and interpersonal functions of DSH in the ISAS evidenced significant positive associations with emotion regulation difficulties and BPD symptoms, these associations were stronger for the intrapersonal functions vs. the interpersonal functions. None of the measures of DSH were significantly associated with the measure of social desirability (Table 5).

Discussion

This study examined rates of DSH within a Norwegian adult sample and explored the psychometric properties of the Norwegian versions of two empirically supported measures of DSH: the DSHI and ISAS. Approximately one third of the Norwegian adult students and faculty members in this study reported a history of some form of DSH. Rates of DSH varied to some degree across age groups, with reported rates of DSH being significantly higher in the two youngest age groups (25 and younger, and 26–35), relative to the older age groups. This finding is consistent with previous research suggesting a rising trend in DSH behavior among young people (Boudewyn & Liem, 1995; Klonsky, 2007; Tørmoen et al., 2020). The vast majority of participants with a history of DSH reported having engaged in DSH more than once, with 58%–68% reporting more than 10 lifetime episodes of DSH. Consistent with previous research on adolescents and adults (Gratz, 2001; Nobakht & Dale, 2017; Pattison & Kahan, 1983), the results revealed no gender differences in the rates of DSH within this sample.

Notably, and highlighting the importance of assessing specific DSH behaviors (vs. asking about DSH more generally), only 48.9% of the participants who reported a history of DSH endorsed this behavior when asked about it more generally,

i.e., “Have you ever intentionally hurt yourself?”. This finding is consistent with previous research suggesting that the use of behaviorally-specific items is necessary to provide the most accurate data on rates of DSH (Gratz, 2001), and underscores the importance of having such measures available to screen for DSH in clinical and research settings.

The rates of specific DSH behaviors in this sample were consistent with previous research in other countries (see Table 1), with cutting being the most frequently used method, followed by interfering with wound healing (Zanarini et al., 2008). Apart from a higher frequency of severe scratching, the three methods with the highest frequency in the DSHI within this sample (i.e., cutting, interfering with wound healing, severe scratching), and the three methods with the lowest frequency (i.e., dripping acid, using bleach or oven cleaner to scrub skin, and breaking bones) were consistent with the relative frequency of the methods reported in the original study on the DSHI in a young adult community sample in the United States (Gratz, 2001). Likewise, the four methods most frequently reported in the ISAS in this sample (cutting, wound healing, burning and hitting, and pinching) were consistent with the four most frequently used methods reported in the original study of this measure in the United States (Glenn & Klonsky, 2011), as well as in a study using the Swedish version of the ISAS (Lindholm et al., 2011). Finally, although some forms of DSH were endorsed by very few participants, the internal consistency of both the DSHI and ISAS in this sample was adequate, suggesting that the measures can be administered in their entirety in the Norwegian context.

With regard to the section of the ISAS that assesses DSH functions, the results generally provided support for the theorized two-factor structure representing the intrapersonal and interpersonal functions of DSH, respectively. In particular, all functions considered intrapersonal functions loaded on the intrapersonal factor, although the “marking distress” function also loaded on the interpersonal factor. Likewise, the self-care function loaded on the intrapersonal (vs. interpersonal) factor,

and although this is not consistent with the original factor structure of the ISAS, it is consistent with other research examining the factor structure of this measure (Klonsky et al., 2015; Klonsky & Glenn, 2009; Kortge et al., 2013), as well as the content of the self-care items. Notably, although the results generally provide support for the factor structure of the Norwegian version of the ISAS functions section, potential difficulties relating to this particular section of the ISAS warrant mention and may have influenced the results. Specifically, of the participants reporting a history of DSH, approximately half did not endorse any of the 39 reasons for DSH provided in the ISAS. Further, items relating to the function of peer bonding had to be excluded from the analyses due to the particularly low rates of endorsement (as only two participants endorsed these). Future research should explore the potential factors contributing to the relatively low levels of endorsement of the ISAS DSH functions, including societal and contextual differences, or language or translation barriers.

The results also provided support for the validity and utility of the Norwegian versions of the DSHI and ISAS. In addition to evidencing strong correlations with their respective variables derived from the other DSH measures, measures of the presence and frequency of DSH in the DSHI and ISAS evidenced significant associations with the related constructs of emotion regulation difficulties and BPD symptoms, and non-significant associations with the unrelated construct of socially desirable responses. Indeed, although most participants were not actively self-harming at the time of the study, individuals with a history of DSH still reported greater difficulties with emotion regulation and BPD symptoms than those who had never engaged in DSH. These findings are consistent with previous research linking DSH to both emotion regulation difficulties and BPD (Chapman, Gratz, & Brown, 2006; Klonsky, 2007). Likewise, and providing support for the construct validity of the ISAS DSH function scales, the endorsement of intrapersonal (including affect regulation) functions of DSH in the ISAS was more strongly associated with emotion regulation difficulties than the endorsement of interpersonal functions of DSH. Moreover, the mean scores of the intrapersonal and interpersonal functions scales are also consistent with prior research, and provide further support for the relative salience and relevance of intrapersonal (vs. interpersonal) reasons for DSH (Chapman et al., 2006; Klonsky, 2007; Klonsky et al., 2015; Kortge et al., 2013).

This study has several strengths and limitations that warrant mention. Using multiple translated instruments to assess DSH, including measures that assess different types of DSH behaviors, facilitates the simultaneous evaluation of these measures, and strengthens the assessment of their construct validity. The use of these different measures also allowed us to speak to the relative utility of measures of DSH that assess specific behaviors, versus relying on participants' own definitions of DSH. Given that both the DSHI and ISAS are behaviorally-based measures that delineate a variety of specific DSH behaviors, there is very

little doubt as to the construct being assessed. The availability of Norwegian translations of these measures will increase the accuracy and quality of research on DSH in Norway, as well as facilitate more accurate assessments of the treatment effects of interventions targeting DSH in this country.

Nonetheless, the absence of Norwegian versions of empirically supported measures of DSH with which to compare the Norwegian translations of the DSHI and ISAS is a limitation of this study. Furthermore, the exclusive focus on university students and faculty members limits the external validity and generalizability of the results. The risk of a self-selection bias present among those who completed the survey, should also be taken into account, the relatively high response rate (approx. 55.5%) notwithstanding.

Future research is called for to examine the validity of the Norwegian translations of the DSHI and ISAS in other relevant community samples (e.g., adolescents), as well as in clinical populations. Only by examining the validity and reliability of these measures in relevant clinical populations will their clinical utility be supported. Finally, given the relatively low rates of endorsement of the ISAS DSH functions by participants in this sample, future research is needed to examine the DSH functions of the ISAS in larger community and clinical samples.

In conclusion, the Norwegian translations of both the DSHI and ISAS demonstrated high internal consistency and adequate construct, convergent, and discriminant validity. As such, the results suggest that these measures can be used to evaluate DSH behaviors in adult populations in Norway.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12144-020-01189-y>.

Availability of Data End Material The data can be made available on request.

Author's Contributions All authors contributed to the study conception and design. Johanna Vigfusdottir, Reidun Høidal and Karl Yngvar Dale performed material preparation, data collection and analysis. Johanna Vigfusdottir wrote the first draft of the manuscript and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding This study was funded by the Department of Psychiatry, Møre og Romsdal Hospital Trust.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

The study was approved by the Administrative Council at the University College of Molde, Department of Health and Social Sciences.

The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Code Availability Non applicable

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