Development and Validation of Indigenous Deliberate Self-Harm Scale

Afifa Gull
PhD. Scholar, Institute of Applied Psychology, University of the Punjab, Lahore, Pakistan. Email: afaf.gul@gmail.com

Najma Najam
Professor Emeritus, Institute of Applied Psychology, University of the Punjab, Lahore, Pakistan.

Abstract   *Deliberate Self Harm (DSH) is a pervasive issue in Pakistan. The limited research on this phenomenon conducted in Pakistan is restricted by the non-availability of an empirical assessment measure of self-harm in the Urdu language, and hence relies mostly on the interviews of cases reported to the emergency departments of which those translated does not necessarily carry the same connotation. An indigenous deliberate self-harm scale was developed to cater to this issue. Factors of DSH were identified using Nock's integrated theoretical model and literature review. Sixty-five items were generated. A Content Validity Index (CVI) was calculated. The scale was administered on a sample of 200 self-harm cases. EFA revealed a three-factor structure (i.e intrapersonal, interpersonal and situational) supported by Parallel Analysis. RASCH analysis supported the item fit. This scale can be a helpful tool for the researchers and clinicians to explore DSH in the native population.*

Introduction

Deliberate Self-Harm (DSH) has recently gained the attention of mental health professionals because of a noticeable increase in the number of cases reported across the globe. Deliberate Self-Harm is intentional harm to one's body without suicidal intent. Different researchers have used varying terms [like Non-Suicidal Self Injury (NSSI), Deliberate Self-Harm (DSH), Self-Inflicted Violence, Self-Destruction, and Parasuicide] to identify this behavior leading to a lack of a consistent definition for DSH. Sutton (2007, 22-23.) argues that the act of self-harm is generally carried out to regain a sense of emotional balance and cope with unbearable psychological distress. According to him, there is no suicidal, sexual or decorative intent involved. Similarly, Hawton et. al. (2002) stated that self-harm is a non-fatal act where a self-harming behavior is initiated to cause harm to self, or take an overdose of either a prescribed medicine or recreational drugs, or ingest a non-ingestible substance (e.g. batteries, razor blades). Considering the fact that the inflicted injury is intentional, all other behaviors where the motivation to self-harm is something other than injury are excluded, such as extreme dieting with a motivation to lose weight, tattooing which is done mostly for ornamental purposes, etc. Similarly, other researchers (Klonsky, 2007; Muehlenkamp; 2005; Gratz, 2001; Winchel, 1991; Favazza, 1998; Feldman, 1988) have also outlined it as intentional self-induced damage to the bodily tissues. However, presence and absence of suicidal intention is a major distinction that most clinicians and researchers (e.g. Conner, 2010; Linehan, Comtois, Brown, Heard, Wagner, 2006; Klonsky et al, 2003; Ross & Health 2000 see *Manghall et al 2008,176.*; Pattison, & Kahan, 1983) draw while defining the DSH. The possibility that DSH can coexist with suicidal intention (Cooper, Kapur, Webb, Lawlore, Gauthrie, Mackway-Jones, 2005; Sansone & Wiederman, 1998) makes it even more confusing by excluding cases where individuals engage in self-harm with no intention to kill themselves (Linehan, 1986), but on the other hand, DSH cannot be regarded as a subset of suicidality because apparently both serve related but different psychological functions (Walsh, 2006). The recognition that DSH is increasingly prevalent, highlighted the need for detailed assessment in indigenous context so that a better understanding of DSH could be developed in the native population. Globally, various instruments have been developed and most of these instruments vary in different aspects depending on the content (rationale of DSH behavior, frequency, methods, etc.), response options (Likert scale, dichotomous yes or no, open-ended questions) target audience (developmentally disabled, psychiatric inpatients

or personality disorders e.g. borderline personality) and time required to complete the assessment. Some of these scales are discussed here.

The Chronic Self-Destructiveness Scale (CSDC Kelley et al., 1985) consists of 73 items and is one of those earlier scales developed to assess self-destructive tendency including health-related issues and risk-taking behaviors. It has gender-specific scoring and norms of the scale were developed on undergraduate students (females=238 and males= 164).

Self-Harm Behavior Survey by Favazza (1986) comprises 174 items encompassing a wide array of self-harming behaviors and factors. For demographic information, it covers variables like religious background, personal and family of mental illness and hospitalization along with methods and functions of self-harm.

The Self-Injury Questionnaire (SIQ) is a self-reported, Likert style scale with 57 items developed by Vanderlinden & Vandereycken (1997). It has multiple response options and asks questions regarding cutting, burning, scratching, wound opening, etc. Another instrument with an identical name, the Self Injury Questionnaire (SIQ; Alexander, 1999), was developed to assess the frequency and functions of self-harm behaviors and their link to trauma among college students. Later Gratz (2001) developed Deliberate Self Harm Inventory (DSHI) consisting of 17 self-report items about the frequency, severity, and duration of direct tissue damage.

Other scales have tried to measure DSH in association with other risk-taking/impulsive behaviors, like the Impulsive and Self Harm Questionnaire which was developed by Rossotto (1997) to measure different impulsive and self-harming behaviors e.g. accident proneness, injury, etc. Similarly, the Adolescents Risk Inventory (2007) assesses high-risk behaviors. It consists of 33 items, with yes/no options and out of thirty-three items, and it asks questions pertaining to risk behaviors and attitudes (high-risk sexual behaviors). Among the scales developed to be used specifically with the population having developmental disabilities, the Self-Injurious Behavior Questionnaire (SIB-Q; 1997) is a Likert type scale with 25 items and targets physical aggression, tantrums, destruction of property or objects. Similarly, the Timed Self-Injurious Behavior Scale (1997; Lescano et. al., 2007); is a 16 item scale which also examines self-harming behavior at 6 consecutive time intervals (Brasic, et. al. 1997).

Aim & Scope

In Pakistan, no scale has been developed to cater to the phenomena of DSH in an indigenous context. Some native researchers (Haqqani, 2017; Khan, Laeeq & Firdous, 2017; Siddiqui & Hassan, 2018) have translated the scales developed in the West for use with Pakistani adolescents; however, due to differences in cultural and contextual factors it is likely that the translated version may not tap this behavior in a local cultural context. Therefore, we aimed at developing a deliberate self-harm scale based on Nock's integrated theoretical model of development and maintenance of DSH that can help clinicians and researchers to explore DSH in culturally apt terminology that is understood by a greater percentage of the native population.

Method

The process of developing an indigenous scale was carried out in two phases; item generation and try out.

Phase I: Item Generation

After the literature review of previous scales and studies conducted on self-harm, Nock's integrated theoretical model of the development and maintenance of non-suicidal self-harm (2009) was used for factors related to self-harm, including intrapersonal, interpersonal, and specific factors, and these were referred to as main factors. The main factors were further divided into sub-factors followed by identification of indicators for each subfactor. Five mental health experts rated the relevance of each factor to its subfactor and subfactor to its indicator. A Content Validity Index (CVI) was calculated using the formula put forth by Lawshe (1975). Only subfactors and indicators with a minimum CVI value of .80 were retained. The indicators were then converted into statements to be rated on a four-point Likert type rating scale with response categories of Strongly Agree, Agree, Disagree and Strongly Disagree. To cover each indicator comprehensively, a large pool of items (67 items) was generated which was subjected to expert opinion. Five mental health professionals evaluated each statement in terms of its clarity and relevance. The initial draft was then administered to 30 individuals indulging in DSH. (15 Non-Hospital Cases of DSH and 15 Cases reported to the Emergency Departments of Hospital). Statements identified as problematic by the pilot study participants were revised and/or removed accordingly leading to a 65 item scale.

Phase II: Try out Phase
Sample

A sample of 200 participants was drawn (using G-power) based on the following inclusion/exclusion criteria; i) no history of psychiatric illness ii) DSH not a result of developmental disorder iii) participant's acknowledgment of current episode as DSH episode and not a suicide attempt and iv) willingness to participate. The sample was divided into two groups i.e. n=103 (Men= 48, Women= 55) the DSH cases reported to the emergency departments of three major hospitals of Rawalpindi city and n=100 (Men=42, Women=58) the DSH cases in the general population that are not reported to the hospitals. The mean age for the Hospital cases was 19.73 (SD=3.4) and 19.31(SD=3.7) for the Non-hospital cases.

Procedure

After seeking permissions for data collection, DSH cases reported to the three major hospitals of Rawalpindi (Benazir Bhutto Hospital, Poly Clinic Hospital, and District Head Quarters Hospital) were approached and briefed about the nature of research and content of the indigenous scale. The same procedure of informed consent was followed for the deliberate self-harm cases from the general population. The data collected was then subjected to Principal Component Analysis (PCA) using Promax rotation to draw a meaningful factor structure. Items were deleted in two steps. Firstly, items with factor loading <.4 were dropped followed by the deletion of items with communalities <.3. This resulted in 24 out of 65 items that were retained in the final scale. Three factors that emerged were named after that themes that emerged after clustering them together i.e. intrapersonal factors (10 items), interpersonal factors (7 items) and environmental factors (7 items).

Results

Before conducting the PCA, data were screened for outliers and missing values. Four values, identified as out of range due to data entry error were corrected, while two missing values were replaced with means. Moreover, the assumption for the minimum number of data (Kiaser, 1970) for exploratory factor analysis was satisfied by taking a ratio of at least 3 cases per item (N=203).

Inspection of the correlation matrix revealed several coefficients values equal to greater than .3. The Kaiser-Meyer-Oklin (KMO) value for sampling adequacy was .730, which exceeds the suggested minimum acceptable value of .06 (as 0.00-0.49=unacceptable, 0.50-0.59= miserable, 0.60- 0.69= mediocre, 0.70-0.79 middling, 0.80-0.89 meritorious, 0.90-1.00 marvelous; Kaiser, 1970, 1974). The Bartlett test of sphericity (Bartlett, 1954) also reached statistical significance [χ^2 (1525) = 276, p<.000], supporting the factorability of the correlation matrix. Principal Component Analysis was used because the basic purpose was to identify the underlying factors of deliberate self-harm in the native population and compute composite scores for each identified factor. PCA extracted six components/factors with Kasier's (1970) eigen values greater than 1, explaining 18.18%, 14.19%, 9.83%, 5.99%, 4.82% and 4.76% of variance respectively. A Catell's (1966) scree plot, however, revealed the first point of inflection after the third factor.

To further validate the selection of a three-factor solution, Parallel Analysis (PA; Horn, 1965) was carried out using O'Connor's (2000) SPSS syntax for parallel analysis. The results of the parallel analysis also confirm that only three factors exceeded the corresponding criterion values for a randomly generated data matrix. The three-factor solution was also preferred over the six-factor solution because i) it has the previous theoretical ground and specifically the current scale was developed based on Nock's integrated theoretical framework for deliberate self-harm which identifies three factors for development and maintenance of DSH ii) the values on scree plot nearly leveled off after the third factor and iii) difficulty in interpreting the fourth and subsequent factors due to low or insufficient factor loadings on them.

Table 1. Comparison of Eigen Values from PCA and Criterion Values from PA

Factor Number	Actual Eigen Value from PCA	Criterion Value from Parallel Analysis	Decision
1	4.363	1.797	Accepted
2	3.407	1.649	Accepted
3	2.360	1.546	Accepted
4	1.439	1.469	Rejected
5	1.157	1.396	Rejected
6	1.144	1.333	Rejected

The rotated solution depicted the presence of a simple factor structure with most items loading substantially on each factor. Factor loadings and commonalities of each item in the respective factor are presented in the table below.

Item 7 loaded significantly on factors 1 and 2, having factor loadings of .41 and .49 respectively. Therefore, the decision to retain these items in either factor was made on the basis of its relevance to that particular factor. Content of item 7 was found to be more relevant to factor 1 so it was retained in this factor despite the fact that it loaded a little bit higher in factor 2 (table 2)

Table 2. Factor loadings and Communalities Based on PCA with Promax rotation for 24 Items of DSH Scale (N = 203)

S.No.	Items	Factor 1	Factor 2	Factor 3	Communalities
1	S3Q1		.632		.472
2	S3Q2		.718		.509
3	S3Q3		.567		.454
4	S3Q5	.623			.487
5	S3Q6	.660			.480
6	S3Q7	.412	.491		.455
7	S3Q8		.627		.453
8	S3Q11	.687			.500
9	S3Q12	.706			.516
10	S3Q14		.579		.348
11	S3Q17	.605			.396
12	S3Q18	.516			.501
13	S3Q22		.662		.415
14	S3Q29			.482	.364
15	S3Q31	.508			.383
16	S3Q32	.542			.383
17	S3Q34			.509	.304
18	S3Q41	.456			.342
19	S3Q43			.500	.344
20	S3Q45		.573		.393
21	S3Q60			.543	.374
22	S3Q61			.661	.468
23	S3Q65			.578	.361
Eigen Value		4.36	3.40	2.36	
% of Variance		18.18	14.19	9.83	
Cumulative % of variance		18.18	32.37	42.21	
Chronbach's α		.79	.75	.60	

Table 3. Correlation between Subscale and Total Scale for Total Sample (N=203)

Variable	1	2	3	4
Intrapersonal (Factor1)	-	.141*	.002	.711**
Interpersonal (Factor 2)		-	.157*	.639**
Environmental (Factor 3)			-	.158**
Total DSH				-

Note. $*p < .05$, $**p < .01$

Correlation matrices indicated low but significant $(*p < .05)$ correlation in Intrapersonal and Interpersonal subscales, also in Interpersonal and Environmental subscales, however, the correlation between Intrapersonal and Environmental subscale was not significant. All three subscales had significant $(**p < .01)$ correlation with the total

scale. Results of subscale inter and total correlation (table 3) provided support for using the oblique (Promax) rotation for extracting factors.

Total scale subscale correlation was followed by calculation of correlation for Nonhospital and hospital cases separately (table 4).

Table 4. Correlation between Subscale and Total scale of Deliberate Self-harm for Non-Hospital (n = 100) and Hospital cases (n= 103)

Subscales	1	2	3	Total DSH
Intrapersonal (Factor1)	-	.099	.123	.711**
Interpersonal (Factor 2)	.397**	-	.128	.651**
Environmental (Factor 3)	.067	.081	-	.524**
Total DSH	.794**	.678**	.532**	-

Composite scores were calculated for each of the three subscales and for the total sample (N=203, table 5). Median and means of each subscale were compared which indicated that all the mean scores were closer to the respective median value, with both groups scoring slightly above the respective median for interpersonal subscale.

Table 5. Descriptive Statistics of Deliberate Self-Harm scale for Total Sample (N = 203)

Scale and Subscale	k	M(SD)	Median	Scoring Range
Intrapersonal (Factor 1)	10	24.54(5.06)	25.00	9-35
Interpersonal (Factor 2)	7	17.82(3.90)	18.00	7-27
Situational (Factor 3)	7	16.63(3.56)	17.00	8-25
Total DSH	24	61.66(8.42)	62.00	31-39

Results of Independent sample t-test indicated that both groups differed significantly on all the three factors (subscales) as indicated in table 5. Differences in both groups (Non hospital cases, M=22.87, SD=4.39 and Hospital cases (M=26.12, SD=5.15) with respect to intrapersonal factors were significant at ***$p< .001$ with an effect size of .74 [t (197.69) = -4.90] which is considered a large effect size and mean difference of -3.29 (95% CI: -4.61 to -1.970). Similarly, both groups differed significantly (***$p< .001)$ on interpersonal factors with non-hospital cases having a slightly higher mean (M=18.93, SD=3.87) as compared to the hospital cases (M=16.74, SD=3.63) and a mean difference of 2.18 and medium effect size of .58 (95% CI: 1.14 to 3.22). On the third factor, significant differences were found in scores of Non Hospital (M=17.49, SD=2.70) and Hospital cases (M=15.80, SD=4.08); t(177.51)= 3.47, p= .001. The magnitude of difference (95% CI: .72 to 2.64) in the means was small (Cohen's d = .48).

Table 6. Independent Sample t-test Analysis for Deliberate Self-Harm (N = 203)

Variables	Cases				t	p	95%CI		Cohen's d
	Non-Hospital (n=100)		Hospital (n=103)						
	M	SD	M	SD			LL	UL	
Intrapersonal factor1	22.87	4.39	26.16	5.15	-4.90	.000	-4.61	-1.97	0.74
Interpersonal factor2	18.93	3.87	16.74	3.63	4.13	.000	1.14	3.22	0.58
Situational factor 3	17.49	2.70	15.80	4.08	3.47	.001	.72	2.64	0.48

*$p< .05$, ***$p< .001$

Reliability Analysis

Cronbach's alpha was used to measure the reliability of complete-scale, which was found to be .74 meaning that the scale yielded adequate internal consistency. To further investigate the reliability estimate of indigenous scale an RASCH analysis for each subscale was also conducted along with Cronbach's alpha. A RASCH analysis was carried out using Ministep which accepts 75 cases only, and, therefore, 75 cases from each group (Non-Hospital and Hospital) were selected separately using the random selection in SPSS. RASCH yielded the following reliability (person reliability, separation, and item fit) for each group. For Non-Hospital cases, *Reliability* estimates for the three subscales are reported in Table 7. These reliability estimates are closer to the Cronbach alpha for each subscale

respectively. As indicated by Root Mean Standard Error (RMSE) values (compared to the criterion value of 1), the error variance attached with each factor (subscale) is low.

Table 7. Cronbach *a* and Rasch Person Reliability for three Subscales of DSH

Subscale	Non Hospital Cases			Hospital Cases			Total Sample		
	Cronbach's *a*	RASCH Person Reliability	RASCH Person Separation	Cronbach's *a*	RASCH Person Reliability	RASCH Person Separation	Cronbach's *a*	RASCH Person Reliability	RASCH Person Separation
Intrapersonal	.68	.65 RMSE (.46)	1.36	.83	.81 RMSE (.54)	2.07	.83	.65 RMSE (.46)	1.36
Interpersonal	.73	.70 RMSE (.61)	1.53	.73	.70 RMSE (.65)	1.52	.73	.70 RMSE (.61)	1.53
Environmental/Sit	.53	.33 RMSE (.59)	.70	.71	.72 RMSE (.62)	1.61	.71	.33 RMSE (.59)	.70

Item Fit statistics indicate the extent to which the data fits expectations of the model. Values of INFIT and OUTFIT provides information on if an item is producing calibrations that are not desirable for productive measurement i.e. if it is noisy or not (Hart et al., 2013). Table 8 presents the INFIT OUTFIT mean square statistics of each item on the three subscales of deliberate self-harm for both Non-Hospital and Hospital Cases as well for the total sample. According to Wright and Linacre (1994) criteria for the desired values of INFIT and OUTFIT values ranging from 0.6 to 1.4 are considered desirable for a rating scale. All items except Item 1, 11, and 31 fall in the acceptable range and considered fit. However, 3 items (1, 11, 31) were slightly noisy for hospital cases with INFIT OUTFIT value slightly above the acceptable range, however, their overall INFIT OUFIT indices were within the acceptable range (total scale) therefore they were retained in the final scale.

Table 8. Item Fit of the DHS Subscales

Subscale	Non Hospital Cases		Hospital Cases		Total Sample	
	INFIT MSNQ	OUTFIT MSNQ	INFIT MNSQ	OUTFIT MNSQ	INFIT MNSQ	OUTFIT MNSQ
Intrapersonal						
Item 5	.86	.87	1.09	1.16	.86	.87
Item 6	.76	.76	.77	.79	.76	.76
Item 7	1.20	1.18	.84	.87	1.20	1.18
Item 11	1.00	1.00	1.52	1.75	1.00	1.00
Item 12	1.04	1.03	.91	.83	1.04	1.03
Item 17	.92	.91	.50	.51	.92	.91
Item 18	1.01	1.00	.96	1.06	1.01	1.00
Item 31	.96	.97	1.52	1.42	.96	.97
Item 32	1.01	1.02	1.18	1.08	1.01	1.01
Item 41	1.12	1.12	.70	.68	1.19	1.21

Interpersonal						
Item 1	.97	.89	1.67	1.44	.96	.89
Item 2	.67	.66	.83	.70	.67	.66
Item 3	.71	.75	.89	.83	.71	.74
Item 8	1.13	1.11	.78	.84	1.13	1.11
Item 14	1.23	1.27	1.12	1.04	1.23	1.27
Item 22	1.40	1.30	.55	.46	1.40	1.36
Item 45	.93	.94	1.14	1.05	.93	.94

Subscales	Non Hospital Cases		Hospital Cases		Total Sample	
	INTFIT MSNQ	OUTFIT MNSQ	INFIT MNSQ	OUTFIT MNSQ	INFIT MNSQ	OUTFIT MSNQ
Environmental						
Item 29	.99	.99	1.17	1.18	.99	.99
Item 34	1.25	1.25	1.10	1.00	1.25	1.25
Item 43	1.00	.99	1.18	1.09	1.00	.99
Item 60	.75	.75	1.02	.93	.75	.75
Item 61	1.10	1.09	.78	.72	1.10	1.09
Item 65	.97	.97	.95	1.21	.97	.97

Discussion

Deliberate Self Harm has been studied by the researchers across the globe and in Pakistan. However, there is a dearth of in-depth information on this phenomenon although some research conducted in hospital settings has created an initial picture of the prevalence and intensity of such behaviors reported in the emergency departments. The indigenous Deliberate Self Harm Scale was developed keeping in view the non-availability of an assessment measure that can cater to the native population.

The indigenous scale consists of three parts; part I is a checklist of risk factors in yes/no response format, and Part II is comprised of questions related to suicidal ideation, methods of DSH, age of onset, frequency of DSH in 1 year, pain experienced during DSH episode. The third part is related to the factors leading to DSH. These factors were identified based on Nock's integrated theoretical model of the maintenance of self-harm.

The three-factor structure that emerged in the exploratory factor analysis is composed of intrapersonal, interpersonal and situational/environmental factors. Several types of research have explored the two factors (Intrapersonal and Interpersonal for example Inventory of Statements About Self-Injury), three-factor model (Intrapersonal, interpersonal and situational factors; for example, Egbe, Petersen, & Weitz, 2016).

Reliability analysis indicated an adequate Cronbach alpha for the total sample i.e. $a=.79$. Since the sample was drawn from two populations (cases of DSH in general public and DSH cases reported to the emergency departments of hospitals), therefore, Cronbach alpha was calculated for both groups separately on each subscale (Table 6). Person Reliability using RASCH which is considered conceptually equal to Cronbach alpha (Linacre, 1999) yielded values closer to or less than the a value. RASCH was carried out using the ministep which runs analysis on only 75 persons. Two groups of 75 persons were drawn randomly from Non-Hospital cases (n=100) and Hospital cases (n=103) for this purpose.

Pakistan is a third world country where the rate of DSH has been increasing over the several years, yet not much research has focused on the assessment of DSH with reference to the local context. Use of scales in the English language limits the amount of information derived because of the language barrier: translation of westernized scales in the Urdu language may not necessarily represent the same connotation. Moreover, due to the penalization of suicide act according to the national constitution, people feel reluctant in reporting self-harm to the hospitals which results in very limited information. Therefore, there is a dire need of an empirical scale in the Urdu language that can be helpful in obtaining the related information from the DSH individuals without raising negative connotation attached to DSH. This indigenous scale of DSH may help researchers and clinicians to obtain important information of the respondents' self-harm behavior and draw conclusions that can help to identify the future research directions in the Pakistani context.

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