Suicidal Ideation and Behavior Assessment Tool (SIBAT): Psychometric Characterization of Patient-reported Modules

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ABSTRACT

Methodological Question Being Addressed: We examined psychometric characteristics of selected patient-reported outcomes gathered with the Suicidal Ideation and Behavior Assessment Tool (SIBAT). SIBAT modules My Risk/Protective Factors (Module 2) and My Current Thinking (Module 3) were assessed using Exploratory Factor Analysis (EFA). The objective of this analysis was to inform the dimensionality of Modules 2 and 3 of SIBAT based on their underlying psychometric structures.

Introduction (Aims): The SIBAT allows for structured collection of information from patients and clinicians, relevant to assessment of suicidal ideation and behavior (SIB) and is designed to measure rapid SIB changes in clinical trial settings. The SIBAT is comprised of 5 patient-reported modules (1-5) and 3 clinician-rated modules (6-8). My Risk/Protective Factors (Module 2) consists of 21 items with a six-point Likert scale ranging from 'never' to 'all of the time'. My Current Thinking (Module 3) consists of 48 items; each item has a six-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

Methods: Participants (n=130) with varying degrees of SIB were identified from 4 clinical sites. All consented to SIB evaluation with the SIBAT. These participants completed the 5 patient-reported SIBAT modules: 1) About Me, 2) My Risk/Protective Factors, 3) My Current Thinking, 4) My Actions, and 5) My Risk. Thereafter, a trained clinician completed 1) a semi-structured interview, 2) the 4-item Clinical Global Impressions module, and 3) a treatment-management module. An EFA was conducted to separately examine the factor structure underlying each item of patient-reported Modules 2 (My Risk/Protective Factors) and 3 (My Current Thinking). The number of factors within each module was determined by examining the scree test, eigen values, simple structure, and clinical interpretability of the resulting factors. Item loading and correlations among the factors were also evaluated.

Results: Suicidal severity of the participants (mean age [SD], 38.3 [17.77] years; range, 12-81 years, women 57.7%) varied- not suicidal (15.4%), questionably suicidal (15.4%), mildly suicidal (20.8%), moderately suicidal (16.9%), markedly suicidal (5.4%), severely suicidal (19.2%) and extremely suicidal (6.9%) [Clinical Global Impression of Severity of Suicidality Revised score, mean (SD)= 2.7 (1.9)]. Among the participants, 71/130 (54.6%) were regarded as clinically depressed. Results of the EFA from this initial study suggest that a 3-factor model and a 4-factor model provided the best fits to Modules 2 and 3, respectively. Moderate inter-factor correlations (>0.40) were observed.

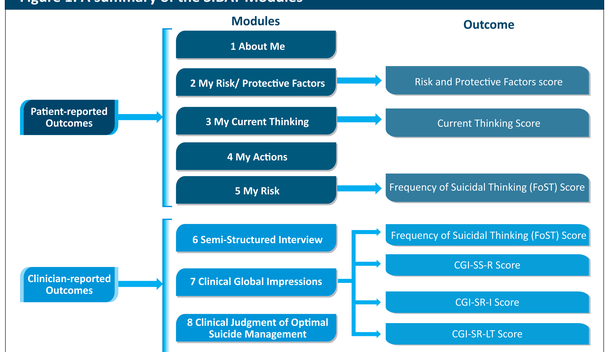
Conclusions: These preliminary analyses from a broad range of suicidal participants provide information on the factor structure of the SIBAT patient-reported modules and may offer insight into the interpretation of patient-reported elements of the SIBAT when it is used in research and clinical settings. Further evaluation of these factors in a larger sample is needed.

BACKGROUND

- The Suicidal Ideation and Behavior Assessment Tool (SIBAT) provides a structured approach for assessment of patients' suicidality and assesses rapid changes in suicidal ideation to inform clinician's judgement of suicidal risk. It is a computerized assessment tool comprising 8 modules: 5 patient self-reported modules and 3 clinician-rated modules.
- The SIBAT
  - o Builds on existing tools (e.g., International Suicide Prevention Trial [InterSePT] Scale for Suicidal Thinking (ISST), Clinical Global Impression of Severity of Suicidality [CGI-SS], ISST-Plus[1-3])
  - o Provides a structured approach for assessment of patients' SIB
  - o Identifies patients at high risk and assesses rapid changes in suicidal ideation
  - o Documents clinician's assessment of SIB along with the plan for its management
- Since there was no *a priori* hypothesis about factors or patterns of response, an exploratory factor analysis (EFA) of select patient-reported modules was carried out as part of the psychometric validation of the SIBAT. This preliminary analysis was done to identify the number of factors in each module.

THE SIBAT INSTRUMENT

Figure 1: A summary of the SIBAT Modules



CGI-SS-R= Clinical Global Impression of Severity of Suicidality Revised; CGI-SR-I= CGI of Imminent Suicide Risk; CGI-SR-LT= CGI of Long Term Suicide Risk

- Patient-reported outcomes include modules 1 to 5. Module 2 (21 items) informed the clinician-rater about the risk and protective factors experienced by the patient in the past 7 days and module 3 (48 items) provided information on current patient suicidal thinking.

OBJECTIVES

- To conduct a preliminary analysis to examine the factor structure underlying the patient-reported modules 2 (My Risk/Protective Factors) and 3 (My Current Thinking) items separately.

METHODS

Study design and statistical methods

- Eligible participants (N=130) with varying levels of suicidality were administered the SIBAT, including the SIBAT patient-reported modules 1-5, in a single study visit.
- A minimum sample size of 120 participants was estimated to be sufficient for performing factor analysis at item levels to evaluate item performance and redundancy for SIBAT modules 2 and 3. The data obtained from these modules were analyzed using an EFA.
- Iterative principal factor analysis method was utilized to derive the minimum number of factors and explain the maximum portion of variance in the original variable.
- The number of factors within each module were determined separately by examining the eigenvalues and scree test. The Kaiser criterion (eigenvalues ≥1.0) was applied, and factors were extracted.
- Oblique rotations were used to interpret the factor matrixes. They allow for factors to correlate and produced estimates of correlations among factors thus offering an advantage of creating solutions with better simple structure.
- These results obtained from the EFA could be used to refine and reduce the items in each module.

Study Participants:

Inclusion criteria for participants:

- Age 12-85 years (inclusive) with varying level of suicidality, read and write English sufficiently well as per investigator's judgement, and provided informed consent for study participation

Exclusion criteria for participants:

- Any clinically relevant physical or mental conditions that could interfere with the ability to complete the study interviews.

RESULTS

Table 1: Demographics of study participants

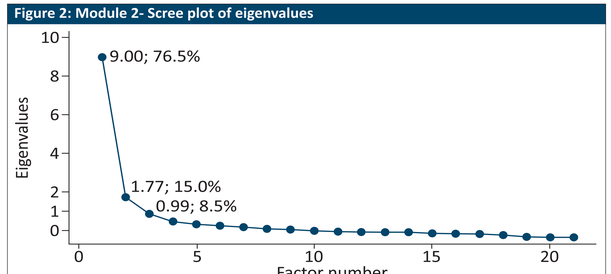
Characteristic	Full sample N=130
Age (years), mean (SD)	38.3 (17.77)
Adolescents, age 12-17 (inclusive), n (%)	13 (10.0)
Adults, age ≥18, n (%)	117 (90.0)
Geriatric, age ≥65, n (%)	16 (12.3)
Gender, n (%)	
Female	75 (57.7)
Race, n (%)	
White	91 (70.0)
Black or African American	23 (17.7)
Others	16 (12.3)
Education, n (%)	
≤High school (10-12 years)	63 (48.5)
College (13-16 years)	61 (46.9)
Postgraduate or professional (>16 years)	6 (4.6)
Suicidal severity (CGI-SS-R) from SIBAT Module 7, n (%)	
Normal, not at all suicidal	20 (15.4)
Questionably suicidal	20 (15.4)
Mildly suicidal	27 (20.8)
Moderately suicidal	22 (16.9)
Markedly suicidal	7 (5.4)
Severely suicidal	25 (19.2)
Extremely suicidal	9 (6.9)
CGI-SS-R score, mean (SD)	2.7 (1.9)
Clinically depressed, n (%)	71 (54.6)

CGI-SS-R= Clinical Global Impression of Severity of Suicidality-Revised; SD= standard deviation; SIBAT= Suicidal Ideation and Behavior Assessment Tool

- Suicidality of the participants ranged from not suicidal to extremely suicidal. Most participants were women and had completed college education. Among the participants, 54.6% were regarded as clinically depressed.

Module 2- My Risk/Protective Factors

Figure 2: Module 2- Scree plot of eigenvalues



Eigenvalues; proportion values stated for the factors that were retained

- Preliminary analysis based on the eigenvalues and scree plot using the Kaiser criterion indicated that the first 3 factors- representing affective states (empty, hopeless, worthless) and motivations (thoughts, urges and desires) [Factor 1]; physical, psychological, and social distress [Factor 2]; and anger or potential risk to others [Factor 3]- could be separately extracted. Factor 1 explains 76.6% of the total variance per the proportion values.

Table 2: Module 2- Correlation matrix

	Factor 1	Factor 2	Factor 3
Factor 1	1		
Factor 2	0.5502	1	
Factor 3	0.5073	0.4404	1

- The correlation matrix demonstrated low to moderate correlations between the factors (>0.40).

Table 3: Module 2- Items and factor loading

Item No.	Description	Factor 1	Factor 2	Factor 3	Uniqueness
1	Felt hopeful (reverse)		0.72		0.37
2	Felt agitated			0.74	0.36
3	Felt happy (reverse)		0.87		0.33
4	Felt empty	0.57	0.34		0.38
5	Felt valued (reverse)		0.82		0.46
6	Emotionally stable (reverse)		0.55		0.50
7	Wanted to take own life	0.95			0.17
8	Felt hopeless	0.65			0.26
9	Felt calm (reverse)		0.64		0.47
10	Felt depressed	0.41	0.42		0.37
11	Felt fulfilled (reverse)		0.69		0.56
12	Felt worthless	0.69			0.18
13	Anger easily			0.61	0.56
14	Well rested (reverse)		0.62		0.51
15	Urges to take own life	0.82			0.36
16	Felt anxious			0.46	0.49
17	Good relationships (reverse)		0.51		0.64
18	Felt isolated	0.37	0.35		0.52
19	Thought of killing one's self	0.96			0.17
20	Wanted to hurt others			0.48	0.80
21	Voice to kill yourself	0.34			0.77

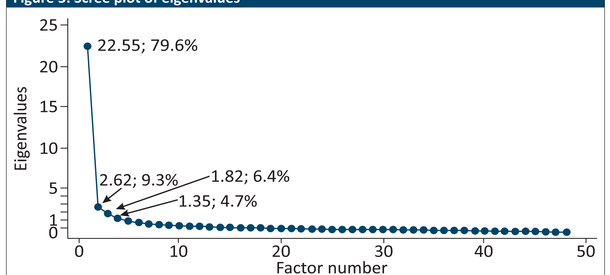
Blanks represent factor loading <0.4

Item loading on: Factor 1 | Factor 2 | Factor 3 | Cross-loading | High unique variance

- Uniqueness is the variance that is 'unique' to the variable (e.g. Item 1 uniqueness= 37% i.e. not shared with other variables in the model). Also greater 'uniqueness' was associated with lower relevance of the variable in the overall factor model.
- A majority of the items in module 2 loaded strongly on one of the factors (≥0.40). Item 10 cross-loaded on factors 1 and 2. Items 18 and 21 did not load adequately on any of the factors.
- Factor 2 was comprised entirely of the positively-stated items that were reverse-scored (i.e., a low score indicated more pathology), suggesting that this factor may be an artifact of the response scale rather than a separate factor.

Module 3- My Current Thinking

Figure 3: Scree plot of eigenvalues



Eigenvalues; proportion values stated for the factors that were retained

- Based on the Kaiser criterion, the first 4 factors with eigenvalues ≥1 were retained initally. Factor 1 explains 79.3% of the total variance.
- However, the correlation matrix demonstrated meaningful correlations only between factors 1-3, representing cognitive attributions and preparations (deciding to die, planning death, death as a solution to current problems, lack of reasons to live, and preparation to die) [Factor 1]; psychosocial distress [Factor 2]; and resilience or preventive behaviors (e.g., personal goals, talents and valued purposes) [Factor 3]. Factor 4 had strong cross-loading with factor 3 and hence the model was respecified using a 3-factor solution (factors 3 and 4 were combined).

Table 4: Module 3- Correlation matrix

	Factor 1	Factor 2	Factor 3
Factor 1	1		
Factor 2	0.611	1	
Factor 3	0.4967	0.3635	1

- Strong inter-correlations between factors 1 and 2 (>0.60) and moderate correlations between the other factors were observed.

Table 5: Module 3- Items and factor loading

Item No.	Description	Factor 1	Factor 2	Factor 3	Uniqueness
1	Glad to be alive (reverse)	0.61		0.36	0.27
2	Feel worthless	0.51	0.44		0.25
3	Difficult to control urges	0.83			0.26
4	Powerless to improve situation	0.45	0.41		0.39
5	Prevent me from suicide (reverse)			0.57	0.68
6	Wish to die in sleep	0.78			0.28
7	Concern for others prevents (reverse)			0.47	0.81
8	Life threatening illness (reverse)	0.54			0.61
9	Nothing gives me pleasure		0.44		0.46
10	Shamed and should die	0.64			0.34
11	Depressed better off dead	0.79			0.25
12	Take life within a year	0.91			0.28
13	Feel lonely		0.59		0.40
14	Severe emotional distress	0.78			0.19
15	So stressed, better dead	0.68	0.31		0.16
16	People want me dead		0.38		0.67
17	Feel guilty for past actions		0.52	−0.30	0.74
18	Others would be better off	0.40	0.40		0.44
19	No future for me	0.44	0.35		0.27
20	No one to help me		0.63		0.54
21	Fantasize about ending life	0.70			0.31
22	Life goals are important to me			0.56	0.47
23	Wishes were dead	0.85			0.13
24	Trapped in current situation	0.37	0.53		0.27
25	I'm a good person (reverse)		0.34	0.60	0.58
26	Ending life is only way out	0.86			0.17
27	Greater purpose in life (reverse)			0.63	0.43
28	Thoughts are mixed up		0.67		0.45
29	Want to make life better (reverse)			0.66	0.56
30	Feel neglected		0.60		0.42
31	Death is only solution	0.89			0.22
32	People bring happiness (reverse)			0.40	0.60
33	Fully prepared to end life	1.02			0.19
34	Helping other gives purpose (reverse)			0.51	0.69
35	Nobody will care if I die	0.36	0.38		0.46
36	Want to stay alive (reverse)	0.73			0.24
37	Severe physical pain	0.59			0.58
38	Severe emotional pain	0.73			0.23
39	Want more time alone	0.32			0.78
40	Often feel anxious		0.60		0.50
41	Often feel agitated		0.67		0.47
42	Often feel frightened		0.59		0.61
43	Talented and skilled (reverse)	−0.30	0.35	0.58	0.60
44	In control of life (reverse)		0.35		0.62
45	A burden to others		0.52		0.47
46	Scared of dying		0.37		0.88
47	Troubling uncontrollable thoughts	0.45	0.45		0.42
48	Having a crisis in life	0.37	0.42		0.49

Blanks represent factor loading <0.4

Item loading on: Factor 1 | Factor 2 | Factor 3 | Cross-loading | High unique variance

- A majority of the items in module 3 loaded strongly on one of the factors (≥0.40). Items 2, 4, 18 and 47 cross-loaded on factors 1 and 2. Items 16, 35, 39, 44 and 46 did not load adequately on any of the factors. The factors identified for module 3 were difficult to interpret.
- Multiple items cross-loading and strong factor inter-correlation between factors 1 and 2 indicate that these factors may be combined or may be part of a multi-factor model. Also, like module 2, the majority of items loading strongly on Factor 3 were reverse-scored, positively stated items, suggesting that this too may be an artifact of the response scale in which item format was driving factor loading rather than item content.

CONCLUSIONS

- This preliminary analysis provides initial information on the factor structure of the SIBAT patient-reported modules 2 and 3. Such analyses may provide deeper insight into drivers of SIB.
- Further examination of the items in a larger sample would be required to refine and potentially reduce the items within module 2 and to identify meaningful unidimensional domains in module 3.

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Author contributions:

Drs. Alphs L, Canuso C, Turkoz I and Fu DJ contributed to the study design. Drs. Alphs L, Canuso C, Turkoz I, Revicki D and Fu DJ contributed to data collection, data analysis, interpretation, and review of the poster. All authors had full access to all the data in the study, take responsibility for the integrity of data and the accuracy of data analysis, provided direction and comments on the poster, and made the final decision about where to present the data. All authors met the ICMJE criteria and all those who fulfilled those criteria are listed as authors.

Disclosures:

Alphs L was an employee of Janssen Scientific Affairs, LLC. Fu DJ, Canuso C, and Turkoz I are employees of Janssen Research and Development LLC. They hold stocks/stock options in Johnson and Johnson. Revicki D received research funding support from Janssen Research and Development LLC. Janssen Scientific Affairs, LLC, provided support for this study.

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