A Psychometric Study of the Suicide Ideation Scale

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A Psychometric Study of the Suicide Ideation Scale

David D. Luxton, M. David Rudd, Mark A. Reger, and Gregory A. Gahm

An exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted on the Suicide Ideation Scale (SIS) with a large military clinical sample (total $N = 3,072$). The EFA identified a two-factor solution with the first factor (Resolved Plans/Preparation) accounting for 17.3% of the variance and the second (Suicidal Desire) accounting 15.1% of the variance. This 2-factor solution demonstrated a good fit to the data in the CFA. SIS construct validity and internal reliability data are also reported. The results of this study provide additional psychometric data for the SIS that support use of the measure in clinical work and research. Implications for theories related to suicide assessment and clinical practice are discussed.

Keywords: assessment, military, psychometrics, suicidal ideation, suicide attempts

The majority of instruments used in the assessment of suicidal ideation were developed for use with clinical samples, both inpatient and outpatient (c.f. Beck, Kovacs, & Weissman, 1979; Miller, Norman, Bishop et al., 1986). The Suicide Ideation Scale (SIS; Rudd, 1989), originally developed for and validated with non-clinical samples of young adults more than 2 decades ago, was designed to be a brief measure of ideation for use in both clinical and non-clinical populations. The ten SIS items were conceptualized as representing a “continuum of suicidal ideation ranging from covert suicidal thoughts to more overt or intense ideation and, ultimately, actual suicide attempts” (Rudd, 1989, p. 175). Covert items were defined as those in which suicide is implicitly understood by respondents but not explicitly stated whereas overt items were defined as those that represent consciously recognized suicidal thoughts that are explicitly stated. Some of these items address basic death wishes and suicidal desire, while others address preparation and planning related to suicide. The delineation of preparatory thoughts and behaviors from suicidal desire was intended to help clinicians estimate the seriousness of suicide risk. Despite fairly broad use of the scale, however, the factor structure and psychometric properties of the SIS have not been established with a clinical sample.

An important question is whether or not there is consistency in the general structure of suicidal ideation when measured in clinical and non-clinical samples. Several investigators have addressed this question as part of broader psychometric studies. Beck, Kovacs, and Weissman (1979) found that the Beck Scale for Suicide Ideation (BSS) had three identifiable factors in clinical samples: active suicidal desire; passive suicidal desire; and suicidal behavior. Steer, Rissmiller, Ranieri et al. (1993) found a somewhat different factor structure for the BSS among a sample of psychiatric inpatients that consisted of desire for death, active
suicidal desire, and preparation for suicide. Despite the overlap in the factor labels, there were noticeable differences in the items loading on each factor across the two studies, suggesting some differences across different clinical populations (e.g., inpatient versus outpatient, major depression versus anxiety disorder diagnostic groupings).

Using a modified version of the BSS, the Modified Scale for Suicidal Ideation (MSSI), Clum and Yang (1995) identified three MSSI factors among a sample of college students who were seeking treatment for suicidality: suicidal desire, preparation for an attempt, and perceived capability to make an attempt. With a large clinical sample of individuals with suicide ideation and attempts, Joiner, Rudd, and Rajab (1997) identified two MSSI factors: suicidal desire (ongoing thoughts or desires) and resolved plans and preparation (intense thoughts, plans, courage, and capability to die by suicide). Factor analyses using other suicidal ideation scales have found comparable underlying structures. Using the Adult Suicidal Ideation Questionnaire (ASIQ) in community, college student, and clinical samples, Reynolds (1991) suggested the following factor structure for suicidal ideation: “cognitions related to specific plans and intentions related to suicide, relatively mild suicidal ideation characterized by wishes one were dead, thoughts specific to others, and thoughts of one’s self-worth” (p. 47).

There does appear to be overlap across not only the content of items used to assess suicidal thinking, but also the identified factor structures for various scales. The parsimonious two-factor structure offered by Joiner, Rudd, and Rajab (1997) might well have some potential in answering the question about whether or not there is consistency in the structure of suicidal thinking across clinical and non-clinical samples, regardless of the assessment instrument used. The constellation of items around two distinctive elements (suicidal desire and resolved plans/preparation) that are distinguishable by intent to die offers a clinically meaningful and potentially unifying solution. It is arguable that every single approach to differentiate or categorize suicide risk relies on intent as one of the most critical determinants (Rudd, Joiner, & Rajab, 2004) and there is little debate about the critical role intent plays in differentiating suicidal versus non-suicidal behaviors (see Silverman, Berman, Sanddal et al., 2007). It is possible that the SIS will have a similar two-factor structure proposed by Joiner, Rudd, and Rajab (1997), although this has never been tested.

In sum, the SIS was developed to provide a brief screening and assessment of ideation for use in both clinical and non-clinical populations. A number of psychometric examinations of other popular suicide scales show differences in the factor structure of suicidal ideation across clinical and non-clinical samples. The factor structure of the SIS in a clinical sample, however, has never been tested. In addition, there is a need to establish the psychometric properties of the SIS in military populations. The SIS is currently used in clinics at some of the largest military installations in the United States. However, to our knowledge, no psychometric studies of the SIS have been conducted in this population. The purpose of this study is to test the psychometric properties of the SIS with a large military clinical sample. Our specific goals are to: 1) provide factorial validity data for the SIS; 2) provide additional evidence of construct validity for the SIS; and 3) examine internal consistency of the SIS.

**METHODS**

**Case Selection**

Cases were retrospectively analyzed from outpatient behavioral health clinic (BHC) records at a large military installation. Cases included Regular and activated
Reserve and National Guard service members on a large military installation. Cases presented in the clinic with a variety of concerns and were referred by several sources (e.g., self, medical, or psychology professional). We excluded cases that were referred for training school or chapter (disciplinary) evaluations; these evaluations are not “clinical” in the sense that the individual does not generally have an identifiable “personal complaint.” A total of 3072 cases from BHC visits in 2007 ($n = 1272$) and 2008 ($n = 1800$) met this criteria and were included in the analysis. There were not any missing data for the variables that we analyzed.

All participants completed the BHC’s computerized intake screening questionnaire, the Automated Behavioral Health Clinic (ABHC), as part of the standard clinical screening and intake process. The ABHC includes a variety of standardized measures for mental health screening to include depression, PTSD, alcohol and substance abuse, and suicide risk. Data from the SIS and the Behavior and Symptom Identification Scale-24 (BASIS-24) were utilized for the purposes of this study.

**Suicide Ideation Scale (SIS).** The 10-item Suicidal Ideation Scale (SIS; Rudd, 1989) is a screening and assessment tool that provides critical information about the presence or absence of suicidal thinking, the intensity of those thoughts, and the presence or absence of prior suicide attempts. The SIS is scored on a Likert-type scale with anchors at 1 (“never or none of the time”) to 5 (“always or a great many times”) based on how the respondent has felt or behaved over the past year (Rudd, 1989). The computerized screening tool version of the SIS used by the BHC asks respondents to read each item and then to select the response that best describes the way they felt over the past week (including the present day) on a five point scale ($1 = “Never,” 2 = “Infrequently,” 3 = “Sometimes,” 4 = “Frequently,” and 5 = “Always”). The total score ranges from 10 to 50. Based on results from the initial SIS validation study (Rudd, 1989), Rudd recommended scores greater than one standard deviation above the mean (SIS total score of 15 or greater) to be considered serious suicidal ideation. The SIS has high internal consistency (Cronbach alpha = .86) as well as adequate item-total correlations ($r$ = .45 to .74; Rudd, 1989).

**Behavior and Symptom Identification Scale-24 (BASIS-24).** The BASIS-24® (Eisen, Normand, Belanger et al., 2004) is a brief 24-item measure that assesses self-reported difficulty and/or distress in six major areas: depression/functioning, relationships, self-harm, emotional lability, psychosis, and substance abuse. The Self-Harm subscale consists of two items: “During the PAST WEEK, how much of the time did you think about ending your life?” and “During the PAST WEEK, how often did you think about hurting yourself?” The BASIS-24® was administered with a computer as a part of the ABHC at the same clinical visit the SIS data was collected. Strong support for the factor structure, validity, and reliability of the BASIS-24® have been reported (Eisen, Gerena, Ranganathan et al., 2006; Eisen, Normand, Belanger et al., 2004).

### Statistical Analysis

We first examined the normality of the total SIS and the individual SIS items and found that both skewness and kurtosis were within acceptable ranges of +1.5 to −1.5 (Kline, 2005). We then conducted an exploratory factor analysis (EFA) on the SIS and then followed this with a confirmatory factor analysis (CFA). For the EFA, we used maximum likelihood estimation with Harris-Kaiser (oblique) rotation in order to test the factor structure of the SIS and the contribution of individual items.
Factors with eigenvalues greater than one were selected.

LISREL 8.71 (Joreskog & Sorbom, 2004) was used to conduct the CFA on the EFA solution, and maximum likelihood (ML) method of estimation was used to analyze variance/covariance matrices. We used the chi-square statistic to assess the overall fit of the model; however, it is sensitive to the sample size and may be unreliable given large sample sizes (Smyth & MacLachlan, 2005). Thus, in addition to chi-square, the decisions regarding the adequacy of model fit were based on Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Non-Normed Fit Index (NNFI), respectively. In order for the model fit to be considered as adequate, a minimum of two of these three indices had to have met the following standards: RMSEA < .05, CFI > .90, and NNFI > .90. For the EFA, we used cases that presented to the clinic during 2007. For the CFA, we analyzed data from a second cohort of service members that completed the ABHC screening during 2008.

We tested the construct validity of the SIS by examining the association between the total SIS score and each of the BASIS-24© subscales, with a particular focus on the association between the SIS and the self-harm subscale. To accomplish this, we conducted a Pearson correlation analysis on the pooled 2007 and 2008 ABHC data. To further evaluate construct validity, we also examined whether scores on the SIS would differ among service members with and without a history of previous suicide attempts.

RESULTS

Exploratory Factor Analysis

The sample for the EFA consisted of 1272 service members (221 women, 1051 men) who completed BHC visits in 2007. Ages ranged from 18 to 58 years (M = 28.6, SD = 7.6). The race and ethnicity breakdown of participants was as follows: 64.8% White Non-Hispanic, 13.2% African American, 3.8% Asian/Pacific Islander, 8.8% Latino, and 8.6% Other/Not Provided. The highest level of education was broadly dispersed with one-third (33.6%) of the sample completing high school or high school equivalency (GED), 43.5% completing some college, and 22.9% completing an Associate’s degree or higher. The primary branch of military service was Army (99.2%), with an average time in service of 6.7 years (SD = 6.2). Most were Active Duty (86.7%), while 5.6% were in the Reserves, and 7.5% were in the National Guard. Nearly all of the service members were Enlisted with 55.0% Junior Enlisted (E1 to E4) and 36.3% Senior Enlisted (E5 to E9). There were 5.6% Warrant and Commissioned Officers (W1 to W5 and O1 to O10).

The EFA found a two-factor structure (eigenvalues of 16.02 and 1.73 with remaining eigenvalues all less than 0.50). The first factor accounted for 17.3% of the variance and the second accounted for 15.1% of the variance. Consistent with the two-factor solution identified by Joiner, Rudd, and Rajab (1997), the first factor addresses suicidal desire (“ongoing thoughts or desires”) and the second factor addresses resolved plans and preparation (“intense thoughts, plans, courage, and capability to commit suicide”). Table 1 presents the rotated factor loadings (standardized regression coefficients) for the items.

Internal Consistency

We also tested the internal consistency of the SIS on this same sample. Reliability analysis resulted in a Chronbach’s Alpha of .91 for the overall SIS. Items to scale correlations ranged from .57 to .89 and all were statistically significant at the .05 level. Split half reliability with the first five items
Confirmatory Factor Analysis

Confirmatory factor analyses were conducted on the two factor SIS solution. For this analysis, cases consisted of service members that completed first time ABHC screening during 2008. This sample consisted of 1800 service members (375 women, 1425 men) and ages ranged from 17 to 61 years ($M = 28.1$, $SD = 7.21$). The race and ethnicity breakdown of participants was similar to the EFA sample, and was as follows: 67% White Non-Hispanic, 13.2% African American, 3.8% Asian/Pacific Islander, 8.8% Latino, and 7% Other/Not provided.

The results of the two factor CFA showed a good fit to the data, $\chi^2(34, n = 1800) = 856.03$, $p < .001$, RMSEA = .113, NNFI = .960, CFI = .970. Although the RMSEA was greater than .05, the overall fit was deemed acceptable because there is not a single fit index that is a definitive marker of optimum model fit (Byrne, 2000; Hu & Bentler, 1999). The first factor accounted for 18.2% of the variance and the second factor accounted for 16.3% of the variance. The correlation between the two factors was .84. The CFA factor loadings and squared multiple correlations are displayed in Table 2. Overall, the results of the CFAs support the two factor model of the SIS.

TABLE 1. SIS Factor Loadings and Communalities Based on Maximum Likelihood Estimation with Harris-Kaiser (Oblique) Rotation ($n = 1272$)

<table>
<thead>
<tr>
<th>SIS item</th>
<th>Suicidal desire</th>
<th>Resolved plans/preparation</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. I just wish my life would end.</td>
<td>0.93</td>
<td>-0.03</td>
<td>0.82</td>
</tr>
<tr>
<td>5. I feel life just isn’t worth living.</td>
<td>0.92</td>
<td>-0.12</td>
<td>0.71</td>
</tr>
<tr>
<td>6. Life is so bad I feel like giving up.</td>
<td>0.91</td>
<td>-0.22</td>
<td>0.59</td>
</tr>
<tr>
<td>8. It would be better for everyone involved if I were to die.</td>
<td>0.67</td>
<td>0.15</td>
<td>0.62</td>
</tr>
<tr>
<td>10. I have come close to taking my own life.</td>
<td>-0.15</td>
<td>0.95</td>
<td>0.72</td>
</tr>
<tr>
<td>4. I have made attempts to kill myself.</td>
<td>-0.22</td>
<td>0.87</td>
<td>0.52</td>
</tr>
<tr>
<td>1. I have been thinking of ways to kill myself</td>
<td>0.37</td>
<td>0.53</td>
<td>0.72</td>
</tr>
<tr>
<td>3. I believe my life will end in suicide.</td>
<td>0.36</td>
<td>0.51</td>
<td>0.67</td>
</tr>
<tr>
<td>9. I feel there is no solution to my problems other than taking my own life.</td>
<td>0.34</td>
<td>0.50</td>
<td>0.63</td>
</tr>
<tr>
<td>2. I have told someone I want to kill myself.</td>
<td>0.25</td>
<td>0.48</td>
<td>0.47</td>
</tr>
</tbody>
</table>
We also examined whether scores on the SIS would differ among participants with and without a history of suicide attempts. To accomplish this, we pooled 2007 and 2008 data and classified participants that responded “never” to the SIS item “I have made attempts to kill myself” into a “no attempt” group (n = 2951) and assigned participants that responded “infrequently” to “frequently” to a “with attempt” group (n = 121). We then calculated total scale scores and the two factor scores for the two attempt groups with the “I have made attempts to kill myself” item removed from the analysis. A MANOVA was conducted with history status as the factor and SIS full scales and scores on each of the two factors as the dependent variables. The “with attempt” group had a significantly higher total SIS score (M = 23.19, SD = 9.10) compared to the “no attempt” group (M = 11.45, SD = 3.44), F(1, 3070) = 1097.55, p < .001. Further, the “with attempt” group had higher scores on the plans factor (M = 10.54, SD = .41) compared to the “no attempt” group (M = 5.35, SD = .03), F(1, 3070) = 11698.31, p < .001. The “with attempt” group also had higher levels on the desire factor (M = 10.26, SD = .42) compared to the “no attempt” groups (M = 5.09, SD = .04), F(1, 3070) = 495.90, p < .001. These results are consistent with data that indicates that history of prior suicide attempts is an indicator of suicide risk and suggests that this risk is associated with higher mean levels on the SIS.

### DISCUSSION

Results provide support for the presence of a two-factor solution for the SIS, and provide additional support for the reliability and construct validity of the SIS. One factor can be described as suicidal desire, characterized by wishing life would end, feeling like giving up, and burdensomeness. The second factor can be described as resolved plans and preparation, characterized by a history of suicide attempts (or nearly attempting suicide), a belief that life will end in suicide, a belief that there are no solutions to problems, and planning, or communicating intent, to die by suicide. This factor structure was generally consistent with the factor structure previously identified for the BSS in a large clinical sample by Joiner, Rudd, and Rajab (1997). In both studies, the factors are differentiated at least to some degree by suicide intent. Other research with the BSS also

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**TABLE 2. SIS CFA Factor Loadings and Squared Multiple Correlations (n = 1800)**

<table>
<thead>
<tr>
<th>SIS item</th>
<th>Suicidal desire</th>
<th>Resolved plans/preparation</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. I just wish my life would end.</td>
<td>0.92</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>5. I feel life just isn’t worth living.</td>
<td>0.85</td>
<td></td>
<td>0.72</td>
</tr>
<tr>
<td>6. Life is so bad I feel like giving up.</td>
<td>0.78</td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>8. It would be better for everyone involved if I were to die.</td>
<td>0.82</td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td>10. I have come close to taking my own life.</td>
<td></td>
<td>0.69</td>
<td>0.47</td>
</tr>
<tr>
<td>4. I have made attempts to kill myself.</td>
<td></td>
<td>0.61</td>
<td>0.37</td>
</tr>
<tr>
<td>1. I have been thinking of ways to kill myself.</td>
<td></td>
<td>0.86</td>
<td>0.75</td>
</tr>
<tr>
<td>3. I believe my life will end in suicide.</td>
<td></td>
<td>0.83</td>
<td>0.69</td>
</tr>
<tr>
<td>9. I feel there is no solution to my problems other than taking my own life.</td>
<td></td>
<td>0.86</td>
<td>0.75</td>
</tr>
<tr>
<td>2. I have told someone I want to kill myself.</td>
<td>0.73</td>
<td></td>
<td>0.53</td>
</tr>
</tbody>
</table>

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supports a two factor solution (Beck, Brown, & Steer, 1997), even when diverse populations such as older adults are examined (Witte, Joiner, Brown et al., 2006). Although results from Beck’s Suicide Intent Scale have sometimes revealed three or four factors, most studies have identified a planning factor that separated the construct from other suicidal thoughts (Beck, Weissman, Lester et al., 1976; Kingsbury, 1993; Spirito, Sterling, Donaldson et al., 1996). Thus, the results of the current study add weight to the theory that suicidal thinking can be differentiated along this dimension (Rudd, Joiner, & Rajab, 2004).

The findings also suggest that the brief SIS is measuring two somewhat distinct factors that may be useful in future research and clinical work. Factor scores for the SIS could be calculated to examine the constructs separately. Researchers may benefit from studying the factors scores to test theories related to suicidal thinking, while clinicians may find the factor scores helpful for organizing their clinical interview. It is important to note, however, that the SIS is not intended to provide an exhaustive assessment of suicidal thinking. Rather, it is intended as a simple and flexible screening and assessment tool that provides critical information about the presence or absence of suicidal thinking, the general intensity of those thoughts, and the presence or absence of prior suicide attempts. Clearly, if the presence of suicidal thinking is reported, additional assessment should be conducted. This should always include a clinical interview. More thorough and detailed assessment instruments such as the BSS can be used after initial screening with the SIS. As a screening and brief assessment tool, the SIS allows the clinician or researcher to identify the presence or absence of ideation and attempts, along with a general marker of the intensity of suicidal thoughts. It does not provide the detailed information essential to clinical management of suicidal patients.

The current study also provides additional data to support the reliability and construct validity of the SIS as a useful screening and brief assessment tool. The SIS was highly correlated with the BASIS-24® self-harm subscale. Cases with a history of a suicide attempt (a cohort known to be at higher risk for a future suicide and suicide attempt) demonstrated higher SIS total and factor scores than those who did not report a history of self-harm.

There are several limitations of the current study that should be noted. The version of the SIS used in the ABHC, which is intended for assessment of symptoms during an intake screening process, has a modified response format. Some items do not conform intuitively to the anchor points used in this version of the SIS (e.g., “I have [Never, Always] made attempts to kill myself”). Also, because this version of the SIS asks about the past week, the comparisons of SIS scores between the groups with and without a history of suicide did not account for persons who might have experienced an attempt greater than 1 week prior. Nonetheless, the present analyses provide important and much needed data on the version of the SIS that is used by clinics at some of the largest U.S. military installations. Future research might want to examine efforts to further refine the response format of the SIS. Also, although the use of a large military sample is a strength, it raises questions about the generalizability of the results. The military population is disproportionately male in composition, and this was reflected in our sample. In addition, while suicidal ideation is not highly prevalent, the mean SIS scores in our samples were quite similar to those observed in a non-clinical sample (Rudd, 1989). We speculate that this may be due to the fact that our clinical sample was drawn from a military population that underwent health screening procedures upon entrance to the military, and was fully employed at the time of the clinic visit; thus our military clinical
sample may differ from other clinical samples. Alternatively, clinic patients may have underreported suicidal ideation due to concerns related to the impact of such reports in the military behavioral health system (e.g., fear of Command notification). Furthermore, diagnostic information was not available, thus limiting clinical information for the sample. Accordingly, some of the questions raised earlier about varying factor structures across diagnostic groupings remain unanswered. Similarly, we did not have detailed information about individual suicidal histories. As a result, important questions about differences across individuals with suicidal ideation, single attempts, and multiple attempts could not be addressed. Furthermore, the percentage of variance explained by the two factors was lower than expected. Additional research is needed to determine what other factors may explain the variance in scores.

The results of this study provide additional psychometric support for the SIS. Future research that examines response patterns to individual items as well as the specificity and sensitivity of the measure would be helpful. The benefits of the SIS include its simplicity of administration and its ability to be used with both clinical and non-clinical populations. The results of this study provide further support for the use of the SIS in both clinical and research applications.

**AUTHOR NOTE**

The opinions or assertions contained herein are the private views of the author(s) and are not to be construed as official or as reflecting the views of the Department of the Army or Department of Defense.

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