An Investigation of the Validity of the SPSI and SPSI-R in Differentiating High-Suicidal from Depressed, Low-Suicidal College Students

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The present study examined the validity of the Social Problem-Solving Inventory (SPSI) and SPSI—Revised in differentiating 65 high-suicidal from 63 depressed, low-suicidal college students. Results from multivariate analyses indicated overall differences in problem-solving between these two groups as measured by the SPSI but not by the SPSI-R. Further examination of these differences revealed the high-suicidal group was different in problem-solving orientation, rather than problem-solving skills, compared to the depressed, low-suicidal group. However, when depression was statistically controlled in hierarchical regression analyses, none of the problem-solving measures predicted group membership. The superiority of the SPSI to the SPSI-R in differentiating these two groups appears to be accounted for by the elimination of 28 items in the revised version, many of which measure orientation to problem-solving. Also explored was the possibility that objective measures of problem-solving provide a better prediction of adjustment than do self-report measures.

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INTRODUCTION

Problem-solving skills have been found to be important in moderating the effects of stress on adjustment (Nezu, Kalmar, Ronan, & Clavijo, 1986; Priester & Clum, 1993a, b) and in predicting depression (Nezu & D'Zurilla, 1989; Marx, Williams, & Claridge, 1992; Priester & Clum, 1993b) and suicidality (Bonner & Rich, 1987, 1988; Clum & Febbraro, 1994; Clum, Patsiokas, & Luscomb, 1979; Dixon, Heppner, & Anderson, 1991; Linehan, Camper, Chiles, Strosahl, & Shearin, 1987; Priester & Clum, 1993b; Sadowski & Kelley, 1993; Schotte & Clum, 1982, 1987). The problem-solving process has been shown to be comprised of problem-solving orientation and problem-solving skills proper (D'Zurilla & Nezu, 1990). However, until recently these constructs have had to be measured by separate instruments. Thus, problem-solving orientation has been measured by the Problem Solving Inventory (PSI; Heppner & Petersen, 1982) and problem-solving skills have been measured by instruments such as the Means–End Problem Solving Procedure (MEPS; Platt & Spivack, 1975), the Modified MEPS (Schotte & Clum, 1987), and the Personal Problem-Solving Evaluation (Clum, Canfield, Van Arsdel, & Yang, 1996). With the construction of the Social Problem-Solving Inventory (SPSI; D'Zurilla & Nezu, 1990), both aspects of the problem-solving process have been incorporated into one measure. With the exception of Sadowski and Kelley (1993), little information is available on the validity of the SPSI for measuring aspects of the problem-solving process shown to be germane to predicting adjustment. The present study sought to rectify the situation by examining the concurrent validity of the SPSI with regard to suicidality. Suicidality was chosen as the criterion because it has been consistently shown to be predictable from problem-solving deficits.

The SPSI, a 70-item, Likert-type measure, is based upon the social problem-solving model by D'Zurilla and associates (D'Zurilla, 1986; D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982, 1990). In the social problem-solving model, solutions result from the processes of problem orientation and problem-solving proper. Problem orientation, which is primarily a motivational process, involves the operation of relatively stable cognitive schemas that reflect an individual's confidence in problem-solving abilities and tendency to look at stressors as problems to be solved. What D'Zurilla and associates refer to as problem-solving proper, on the other hand, involves the utilization of specific problem-solving skills or techniques which are designed to enhance the probability of finding the most adaptive solution for a specific problem. D'Zurilla and Nezu (1982, 1990) identified the following four major problem-solving skills: (1) problem definition and formulation, (2) generation of alternative solutions, (3) decision making, and (4) solution implementation and verification. Problem-solving deficits,

in terms of both problem orientation (e.g., Clum & Febbraro, 1994; Dixon et al., 1991; Sadowski & Kelley, 1993) and problem-solving skills (e.g., Sadowski & Kelley, 1993; Schotte & Clum, 1982, 1987), have been found to be related to suicidality. The SPSI measures both the problem orientation and the problem-solving skills aspects of the problem-solving process and, as such, is a potentially comprehensive instrument for predicting suicidality. In the first test of this possibility, Sadowski and Kelley (1993) found that, compared with psychiatric and normal controls, adolescent suicide attempters exhibited poorer social problem-solving. When examining the problem orientation and problem-solving skills scales separately, differences between groups emerged. Individuals who had made a suicide attempt exhibited poorer problem orientation than psychiatric and normal controls, with no differences emerging between the latter groups. In addition, when examining components of problem orientation, suicide attempters exhibited greater maladaptive cognitive–emotional–behavioral response sets to problem situations than did psychiatric and normal controls. When problem-solving skills were examined (e.g., generation of alternatives, decision making, and solution implementation), no differences emerged between suicide attempters and psychiatric controls, though both of these groups had greater skills deficits compared with normal controls.

Several sample characteristics may have influenced Sadowski and Kelley's (1993) findings. First, since individuals hospitalized after a suicide attempt were used as the criterion group, they may have been under greater acute stress, a factor that impacted their problem-solving skills compared to the nonhospitalized control group. The very act of being hospitalized is itself a major stressor that can be disorienting, a fact that may compromise one's perception of available problem-solving skills. The comparison of hospitalized to nonhospitalized controls confounds the interpretation of the above differences. This interpretative difficulty also obtains for the comparison of the nonhospitalized control group to the hospitalized psychiatric control group. Since problem-solving deficits characterize depressed (Nezu & D'Zurilla, 1989; Marx et al., 1992; Priester & Clum, 1993b) as well as suicidal individuals, a more rigorous test of the predictive validity of the SPSI with regard to suicidality is to compare a nonhospitalized group of suicidal individuals to a nonhospitalized group of depressed but nonsuicidal individuals. This comparison would also avoid the interpretative confound produced by comparing hospitalized to nonhospitalized individuals. We sought, therefore, to test the validity of the SPSI by comparing a sample of depressed, high-suicidal individuals (DHS) to a group of depressed, low-suicidal individuals (DLS).

Recently, the SPSI has been revised by D'Zurilla, Nezu, and Maydeu-Olivares (1994) essentially by eliminating 18 of the original 70 items, resulting in a 52-item instrument with a different factor structure. The

SPSI-R has a five factor solution: Positive Problem Orientation, Negative Problem Orientation, Rational Problem-Solving, Impulsivity/Carelessness Style, and Avoidance Style. To date, the SPSI-R has not been used to differentiate suicidal from nonsuicidal individuals. Therefore, an additional goal of the present study was to compare the SPSI and SPSI-R in terms of their ability to differentiate the DHS and DLS groups.

To summarize, (1) problem-solving skills have been found to be an important predictor of response to negative life stress, especially when adjustment is reflected by suicidality; and (2) the SPSI is a promising instrument for examining problem-solving skills. An important determination yet to be made, however, is whether problem-solving deficits are uniquely characteristic of suicidal individuals. Hence, the present study sought (1) to examine the utility of the SPSI in differentiating depressed, high-suicidal from depressed, low-suicidal college students and (2) to examine whether the factor solution offered by the SPSI or SPSI-R is more effective in making this differentiation.

METHOD

Participants

Two groups of participants were recruited for this study: a group of depressed high-suicide ideating (DHS) individuals ($n = 66$) and a group of depressed, low-suicide ideating (DLS) individuals ($n = 63$). All participants were from 18 to 24 years of age.

Of the 66 participants in the DHS group, 52 were recruited from the university community as potential participants in a suicide treatment study for chronic suicide ideators, while 14 were recruited as part of the depressed sample as described below. Individuals in the DHS group were required to receive a minimum score of 11 on the Scale for Suicide Ideation (SSI; Beck, Kovacs, & Weissman, 1979) to be included in the study. They were also administered the Modified Scale for Suicide Ideation (MSSI; Miller, Norman, Bishop, & Dow, 1986), which has been shown to correlate highly with the SSI (Clum & Yang, 1995). The average score of the MSSI in the DHS group was 18.11 ($SD = 8.46$). Individuals in the DHS group also completed the Zung Self-Rating Depression Scale (ZDS; Zung, 1965), on which they obtained an average score of 50.67 ($SD = 7.99$).

Participants in the DLS group consisted of 63 individuals who responded to advertisements to participate in a study of depression. These participants scored 6 or below on the MSSI and 40 or above on the Zung Self-Rating Depression Scale (ZDS; Zung, 1965) which were the inclusion

criteria for the DLS group. Fourteen participants scored 11 or higher on the MSSI and were included in the DHS group. A question arises as to whether these "recruited" participants were comparable to individuals self-presenting or referred to a clinical facility. In addition to the severity of scores on the SSI, MSSI and the ZDS, a recent study of this issue by Krupnick, Shea, and Elken (1986) indicated that solicited patients are equal in severity to clinical patients provided there is an adequate screening.

The demographic information for these two groups, including age, sex, ethnicity, and years of education, is shown in Table I. Chi-square analyses indicated that participants from these two groups did not differ on marital status or on ethnic background. However, there was a relationship between group membership and gender ($X = 4.53$, $p < .05$). The t tests further indicated that participants in the DHS group were older (19.76 vs. 18.78; $t = 3.75$, $p < .001$) and had more years of education (13.93 vs. 12.95; $t = 3.14$, $p < .01$) than participants in the DLS group.

Measures

Social Problem-Solving Inventory (SPSI) (D'Zurilla & Nezu, 1990). This is a 70-item measure of social problem-solving that assesses problem orientation and problem-solving skills. The Problem-Solving Orientation (POS) factor is comprised of three subscales: Cognition (CS), Emotion

Table I. Demographic Comparisons of the DHS and DLS Groups

	Mean (*SD*) or % (frequency)	
	Depressed/high suicidal (*n* = 66)	Depressed/low suicidal (*n* = 63)
Age (yr)	19.76 (1.76)	18.78 (1.11)
Education (yr)	13.93 (2.93)	12.95 (0.85)
Marital status		
Single	64 (97)	63 (100)
Other	2 (3)	0
Sex		
Male	32 (48.5)	19 (30.2)
Female	34 (51.5)	44 (69.8)
Race		
Caucasian	52 (78.8)	45 (71.4)
Black	4 (6.1)	7 (11.1)
Hispanic	0	3 (4.8)
Asian	10 (15.2)	6 (9.5)
Other	0	2 (3.2)

(ES), and Behavior (BS). The Problem-Solving Skills (PSSS) factor is comprised of four subscales: Problem Definition and Formulation (DFS), Generation of Alternative Solutions (GASS), Decision Making (DMS), and Solution Implementation and Verification (SIVS). Each subscale has 10 items. The items are rated on a 5-point scale ranging from "not at all true of me" (0) to "extremely true of me" (4) by the respondent. According to D'Zurilla and Nezu (1990), the internal consistency coefficients (Cronbach's alpha) for the total SPSI, the Problem Orientation Scale, and the Problem-Solving Skills Scale are .94, .94, and .92, respectively. In addition, the test–retest coefficients with a 3-week interval for the same measures are .87, .83, and .88, respectively. Concurrent validity was measured via correlations with two other problem-solving measures: the PSI (Hepnner & Peterson, 1982) and the MEPS (Platt & Spivack, 1975). The correlations between the PSI and the total SPSI, the Problem Orientation Scale, and the Problem-Solving Skills Scale are -.71, -.67, and -.60, respectively (the negative signs are due to the fact that lower scores on the PSI reflect a more positive orientation to one's problem-solving skills, while for the SPSI higher scores reflect a more positive orientation to one's problem-solving skills). The correlations between the MEPS and the total SPSI, the Problem Orientation Scale, and the Problem-Solving Skills Scale are .73, .61, and .65, respectively.

Social Problem-Solving Inventory—Revised (SPSI-R) (D'Zurilla et al., 1994). This 52-item revised measure of social problem-solving contains identical items from the original SPSI with the exclusion of 18 items. The revised measure assesses five problem-solving factors: (a) Positive Problem Orientation (PPO; 5 items), (b) Negative Problem Orientation (NPO; 10 items), (c) Rational Problem-Solving (RPS; 20 items), (d) Impulsivity/Carelessness Style (ICS; 10 items), and (e) Avoidance Style (AS; 7 items). The Rational Problem-Solving factor (RPS) is further divided into four subscales (five items each): (1) Problem Definition and Formulation (PDF), (2) Generation of Alternative Solutions (GAS), (3) Decision Making (DM), and (4) Solution Implementation and Verification (SIV). Similar to the original SPSI, the items on the SPSI-R are rated on a 5-point scale ranging from "not at all true of me" (0) to "extremely true of me" (4) by the respondent. No information is available about reliability and validity of the SPSI-R to date.

Modified Scale for Suicide Ideation (MSSI) (Miller et al., 1986). This 18-item instrument was modified from the Beck *et al.* (1979) inventory (SSI) for use as a self-report instrument to assess the extent of suicidal ideation and intent. It has 13 items from the original SSI and 5 new items. Responses on this scale are scored from 0 to 3. The total score ranges from 0 to 54. Based on Miller and co-workers' (1986) report, the items on the

MSSI showed a high level of internal consistency (KR-20 = .94). Item–total correlations ranged from .41 to .83. Regarding validity, the MSSI total scores correlated significantly with the suicide item from the BDI (r = .60). Also, the correlation between the MSSI and the BDI total scores (r = .34) is similar to that reported by Beck et al. (1979) for the original SSI scale (r = .39) (Miller et al., 1986).

Zung Self-Rating Depression Scale (ZDS). This 20-item scale developed by Zung (1965) incorporates the affective, somatic, psychological, and physiological symptoms that are typical of depression. Each item is presented in a four-choice, anchored format, and half of the items are reverse seored. Based on the American college student norm, raw scores between 40 and 47 are in the "mild depression range," scores between 48 and 55 are in the "moderate depression range," and scores above 55 are in the "severe depression range." This scale possesses a good discriminant validity, is sensitive to changes in level of depression as a result of treatment (Zung, 1965), and has been used extensively in the study of depression.

Scale for Suicide Ideation (SSI) (Beck et al., 1979). This 19-item scale was designed for assessing and quantifying the degree of suicide intent for suicide ideators. The scale is presented in an interview-rated format. Scores range from 0 to 38; higher scores indicate increasing levels of suicide intent. This scale has a high internal consistency (KR-20 = .89) and interrater reliability (.83) as well as satisfactory levels of concurrent, discriminant, and construct validity (Beck et al., 1979). It is also sensitive to changes in suicidal intent with treatment (Beck et al., 1979).

Procedure

Fifty-two of the 66 participants in the DHS group were self-referred in response to a series of advertisements inviting suicidal individuals to participate in a treatment study for chronic suicide ideators. Individuals were initially screened by phone to determine if they were 18 to 24 years of age and were currently or recently suicidal. Individuals who met these criteria were scheduled for an initial interview, where they were given the SSI and the MSSI. Individuals who scored 11 or higher on the SSI were invited for a second interview, where they were again administered the MSSI, ZDS, and SPSI. Participants who had suicide ideation and who did not meet the inclusion criteria were referred to the University Counseling Center. Initial counseling sessions were scheduled for all these individuals.

Fourteen of the 66 participants in the DHS group and all subjects in the DLS group were self-referred individuals responding to an advertisement announcing an assessment study of depression. Testing was conducted

in two sessions, an initial group screening session (5–15 participants per group) and a second individual session for those who scored a minimum of 40 on the ZDS and 6 or less on the MSSI. Participants who met these criteria were invited for a second testing, where they were again administered the MSSI, ZDS, and SPSI. Participants who scored 11 or above on the MSSI were referred for free treatment in the ongoing suicide study or referred to the University Counseling Center. All other participants were also provided referral information and encouraged to seek treatment.

Therefore, the SPSI, as well as the MSSI and ZDS, was administered to all participants in the present study. Because the 52 items on the SPSI-R are identical to 52 of 70 items of the original SPSI, total scores and factor scores of the SPSI-R were computed based on those 52 items on the SPSI.

RESULTS

Correlation coefficients among SPSI predictor variables and criterion variables are listed in Table II. As shown in Table II, correlations among the problem-solving orientation and among problem-solving skills subscales are high, whereas correlations between these two problem-solving domains are low to moderate.

To evaluate the overall effect of all seven subscales of the SPSI on group membership, multivariate analysis of variance (MANOVA) was employed. The Wilks' lambda for group effect was $F(7,121) = 4.24$ ($p < .001$), which indicated that overall differences in problem solving existed between the two groups. MANOVA was employed to examine the overall group effect across the five problem-solving factors on the SPSI-R. The Wilks' lambda for group effect was $F(5,123) = 0.58$ ($p > .05$), which indicated no overall differences in problem-solving between the two groups. When using all the subscales on the SPSI-R (eight subscales after dividing the RPS into four subscales), similar results were obtained: according to the Wilks' lambda for group effect, $F(8,120) = 0.84$ ($p > .05$).

Because the MANOVA for the SPSI-R was not significant, subsequent analyses involving specific factors were limited to the SPSI; t tests were used to evaluate differences between the DHS and the DLS groups on the seven subscales on the original SPSI. As shown in Table III, significant group differences were found on Problem-Solving Orientation factors, the SPSI total score, and the Cognition and Behavior subscales of the Problem-Solving Orientation factor.

To test whether the DHS and DLS groups were comparable on level of depression, a correlation was computed between ZDS score and group membership. The correlation between the ZDS and group membership was

Table II. Correlation Coefficients and Means and Standard Deviations of SPSI Predictor Variables and Dependent Variables

	Group	POS	CS	ES	BS	PSSS	DFS	GASS	DMS	SIVS	SPSI
MSSI	.80***										
ZDS	.30***										
POS	−.21*										
CS	−.28**	.88***									
ES	−.10	.91***	.75***								
BS	−.20*	.84***	.58***	.62***							
PSSS	−.11	.38***	.42***	.24**	.34***						
DFS	−.15	.24**	.35***	.08	.23**	.89***					
GAS	.00	.41***	.47***	.30***	.32***	.90***	.73***				
DMS	−.10	.29***	.27**	.16	.33***	.89***	.69***	.75***			
SIVS	−.13	.41***	.43***	.31***	.35***	.90***	.73***	.75***	.75***		
SPSI	−.19*	.80***	.76***	.66***	.69***	.87***	.71***	.82***	.75***	.82***	
Mean		56.2	20.7	16.7	18.8	79.7	19.9	18.5	21.5	19.8	135.9
SD		21.6	7.2	9.0	8.4	26.0	7.6	7.3	7.3	6.9	39.7

Note. The DLS group was coded 1 and the DHS group was coded 2 in the "Group" variable. POS, Problem-Solving Orientation factor; CS, Cognition subscale; ES, Emotion subscale; BS, Behavior subscale; PSSS, Problem-Solving Skills factor; DFS, Problem Definition and Formulation subscale; GASS, Generation of Alternative Solutions subscale; DMS, Decision Making subscale; SIVS, Solution Implementation and Verification subscale.

*p < .05.
**p < .01.
***p < .001.

Table III. t Test Comparing the DHS and DLS Groups on Problem-Solving Orientation and Skills

	X (SD)		
Variable	DHS group	DLS group	t
Orientation (POS)	51.7 (22.6)	60.8 (19.6)	2.45*
Cognition (CS)	18.7 (7.9)	22.7 (5.9)	3.30**
Emotion (ES)	15.9 (9.5)	17.6 (8.5)	1.09
Behavior (BS)	17.1 (8.4)	20.5 (8.2)	2.30*
Skills (PSSS)	76.9 (26.1)	82.6 (25.8)	1.24
Definition & Formulation (DFS)	18.8 (6.9)	21.1 (8.1)	1.75
Generation of Alternatives (GASS)	18.5 (7.2)	18.5 (7.4)	0.01
Decision Making (DM)	20.8 (7.5)	22.3 (7.1)	1.16
Implementation & Verification (SIV)	18.9 (7.0)	20.7 (6.8)	1.53
SPSI total	128.6 (43.4)	143.4 (34.2)	2.15*

*$p < .05$
**$p < .01$

.30 ($p < .05$) with individuals in the DHS group having higher depression scores. Therefore, the decision was made to statistically control for depression by conducting hierarchical regression analyses where depression was forced in as the first predictor variable in predicting the criterion of group membership. For this purpose, the DHS and DLS groups were dummy coded, with DHS = 2 and DLS = 1. In these analyses, none of the problem-solving measures predicted group membership after controlling for level of depression.

DISCUSSION

This study examined the concurrent validity of the SPSI and SPSI-R with regard to suicidality. Within the SPSI, correlational differences appear to support the notion of differentiating problem-solving orientation and problem-solving skills, as evidenced by the fact that correlations among the problem-solving orientation and among problem-solving skills subscales are high, whereas correlations between these two problem-solving domains are low to moderate. MANOVAs were performed to examine the overall group effect of the seven SPSI subscales and the five SPSI-R problem-solving factors. Using the subscales of the SPSI, differences in problem-solving emerged between the DHS and the DLS groups. When this same procedure was employed with the SPSI-R, however, differences between groups did not emerge. When using t tests to evaluate differences between the DHS and the DLS groups on the seven subscales of the original SPSI, the DHS group exhibited greater overall social problem-solving deficits than

the DLS group. These overall differences between the DHS and the DLS groups appear to be accounted for by differences in problem-solving orientation rather than problem-solving skills. These findings are consistent with Sadowski and Kelley (1993), who found that, overall, suicide attempters exhibited poorer problem-solving orientation but not poorer problem-solving skills than psychiatric and normal controls. The question arises, however, of whether the differences between the DHS and the DLS groups are attributable to the suicide behavior of the DHS group or the higher level of depression in this group. To answer this question, hierarchical regression analyses controlling for level of depression were conducted. In this analysis, the problem-solving variables were not found to predict group membership. This finding underscores the difficulty in differentiating suicide behavior from depression using problem-solving measures. One possible explanation is that problem-solving deficits are not directly linked to suicide behavior but, rather, affect suicide behavior via their effects on depression. Indeed, prior research has demonstrated a link between problem-solving skills/deficits and depression (Nezu & D'Zurilla, 1989; Marx et al., 1992; Priester & Clum, 1993b). It is possible, therefore, that some of the previous studies' linking problem-solving deficits to suicidal behavior have been confounded by the failure to control for depression. Further studies will need to use depressed control groups in establishing the unique connections of problem-solving deficits and suicidality.

At this point, it appears that the SPSI is superior to the SPSI-R at predicting suicidality and/or level of depression. This differential ability between instruments may be due to the manner in which the SPSI-R was constructed. For the SPSI-R, a total of 18 items was eliminated from the SPSI which, when factor analyzed, resulted in a different factor structure. When examining the content of the 18 eliminated items for trends, the items were found to reflect several content areas, including (1) staying calm when facing a problem (e.g., "When I am working on a difficult problem, I often get so upset that I feel confused and disoriented"), (2) negative attitude toward self or problem-solution (e.g., "When I cannot solve a problem quickly and without much effort, I tend to think that I am stupid or incompetent"), and (3) problem-solving skills per se (e.g., "When I am faced with a large complex problem, I often try to break it down into smaller problems that I can solve one at a time"). While there is no obvious reason for the loss of the validity with deletion of these items, it is possible that those items reflecting orientation to problem-solving—which have been consistently related to suicide behavior and depression—were accounting for the drop in validity. At present, therefore, the original version of the SPSI appears to be preferable to the revised version for purposes of predicting high-suicidal groups, recognizing that this relationship may exist be-

cause of the relatively greater levels of depression that characterize such individuals. Based on the evidence from the present study, the SPSI has such validity in differentiating suicidal from depressed college students.

The question arises of whether other measures of problem-solving have potential as unique predictors of suicidality, especially when controlling for depression. One such link has been between problem-solving appraisal (as measured by the PSI and suicidality (Bonner & Rich, 1987, 1988; Clum & Febbraro, 1994; Dixon et al., 1991). None of these studies used an adequate control group, however, leaving it questionable as to whether problem-solving orientation as measured by the PSI has a specific relationship to suicidality. A more recent study by Clum et al. (1996), however, established the specificity of the approach-avoidance subscale of the PSI to suicidality while controlling for depression. The latter study also found an independent relationship for problem-solving deficits as measured by the PPSE and suicidality. The latter study, considered in tandem with the present study, suggests that problem-solving deficits do have a unique predictive relationship to suicidality relative to depression but only when tapping specific aspects of problem orientation (an avoidance style) or when problem-solving deficits are measured objectively. Self-report measures of problem-solving skills may tap the perception of such skills rather than the skills per se. The validity of self-report measures of problem-solving skills relative to more objective measures is a matter of some importance given the potential validity of problem-solving skills in predicting adjustment.

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