

Stress, Social Support, and Problem-Solving Appraisal/Skills: Prediction of Suicide Severity Within a College Sample

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This study assessed whether stress, social support, and interpersonal problem-solving appraisal/skills were predictive of level of suicidality within a chronic suicidal college sample. Stepwise regression analyses were used to assess whether stress, social support, and problem-solving were independently predictive of severity of suicide ideation. In addition, hierarchical regression analyses were used to test the mediational nature of social support and problem-solving in the stress-suicidality relationship. Problem-solving confidence was found to be a significant predictor of severity of suicide ideation. In addition, both perceived problem-solving skills and social support mediated the relationship between stress and level of suicide ideation. However, only one of the two perceived problem-solving skills interactions was in the expected direction. This study provided support for the importance of problem-solving confidence and the interaction of stress and social support in the prediction of suicide severity. Unlike previous studies, this study did not find problem-solving skills/deficits to mediate the stress-suicidality relationship.

KEY WORDS: stress; social support; problem-solving appraisal; problem-solving skills.

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INTRODUCTION

Stress, social support and problem-solving appraisal/skills have been identified as important predictors of suicidal behavior (Bonner & Rich, 1987, 1988; Clum, Patsiokas, & Luscomb, 1979; D'Attilio, Campbell, Lubold, Jacobson, & Richard, 1922; Dixon, Heppner, & Anderson, 1991; Linehan, Camper, Chiles, Strosahl, & Shearin, 1987; Priester & Clum, 1993b; Rudd, 1990; Sadowski & Kelley, 1993; Schotte & Clum, 1982, 1987). Social support and problem-solving skills have been found to predict suicidality directly and to mediate the relationship between stress and suicidality. Typically, these studies have compared a suicidal group (i.e., ideators, attempters) to a control group of either normal or other psychiatrically diagnosed but nonsuicidal individuals. No study has yet assessed whether stress, social support, and interpersonal problem-solving skills are predictive of level of suicidality within a suicidal sample. The present study sought to remedy this deficiency.

The relationship between stress and suicidality has been well documented. For example, suicidal ideators report four times as many negative life events in the 6 months preceding their attempts than do nonsuicidal people and one-and-a-half times the number of negative life events reported by depressed patients (Paykel, Prusoff, & Meyers, 1975). Greater psychological distress has consistently been reported by individuals who have experienced the greatest number of and most negative life events (Meyers, Lindenthal, & Pepper, 1971, 1974; Meyers, Lindenthal, Pepper, & Ostrander, 1972; Paykel *et al.*, 1975). This relationship has been demonstrated to exist independently of age, sex, and social-class variables (Cochrane & Robertson, 1975).

In attempting to understand why some individuals with high levels of stress do not manifest suicidal behavior, social support and problem-solving skills have been examined as possible mediating variables. Evidence from these studies suggests that social support mediates the effects of significant life events with regard to suicidal behavior. Social support is most useful and effective in minimizing psychological impairment during times of severe stress but does not appear to have a significant effect on psychological impairment during periods of lesser stress (Cassel, 1974; Cobb, 1974, 1976; Holahan & Moos, 1981). Rudd (1990) tested an integrative path model of suicidal ideation in which the predictive contribution of several variables, one of which was social support, were examined simultaneously and found that the model accounted for 34% of the total variance in suicidal ideation. In a multiple regression study, D'Attilio *et al.* (1992) examined the relationship between adolescent suicide potential and both the quantity and the quality of experienced social support. Their results indicated that ado-

lescents at greater risk for suicide appear to have fewer social contacts and are less satisfied with their social support from friends, family members, and others than those adolescents who are not at serious risk. It is reasonable to expect that more severe levels of suicidality would be accompanied by relatively lower levels of social support, especially when under high levels of stress.

Subsequent research in the prediction of both suicide ideation (Bonner & Rich, 1987, 1988; Schotte & Clum, 1982) and suicide risk (Schotte & Clum, 1987) has documented the importance of problem-solving deficits both as a predictor of and as a mediating variable in the stress–suicide behavior relationship. Clum *et al.* (1979) proposed a diathesis–stress model of suicidal behavior in which problem-solving deficits were expected to mediate the relation between life stress and suicidal behavior. According to this model, individuals deficient in the capacity for flexible divergent thinking and/or problem-solving are cognitively unprepared to develop the effective alternative solutions necessary for adaptive coping when under naturally occurring conditions of high life stress. Because of their inability to engage in effective problem-solving, they are assumed to become hopeless under such circumstances (Neuringer, 1974). This state of hopelessness places the individual at heightened risk for suicidal behavior. Schotte and Clum (1982, 1987) found that problem-solving deficits mediate the relationship between stress and suicide in both college students and psychiatric inpatients. Priester and Clum (1993b) also found that problem-solving deficits both alone and in interaction with level of stress predicted depression, hopelessness, and suicide ideation. In addition to problem-solving skills, perceived problem-solving ability or problem-solving appraisal has also been found to be related to suicide ideation (Dixon *et al.*, 1991). Perceived problem-solving ability has been interpreted as a measure of self-efficacy in problem-solving situations in that it is the belief that one is capable of successfully solving problems (Dixon *et al.*, 1991; D’Zurilla & Maydeu-Olivares, 1993). Again, it is reasonable to expect that more severe forms of problem-solving deficits would be relevant to more severe forms of suicidality.

Thus, it appears that stress, social support, and problem-solving appraisal/skills are important predictors of suicidal behavior. This paper proposes to assess whether stress, social support, and problem-solving are independently predictive of suicidal severity within an identified group of suicidal college students. This was investigated through the use of stepwise regression analyses. In addition, hierarchical regression analyses were used to test the mediational nature of social support and problem-solving in the stress–suicidality relationship.

Table I. Sample Demographics ($N = 59$ Unless Otherwise Specified)

	Mean	SD
Age (yr)	19.8	1.84
Education (yr)	14.2	1.66
Duration of suicidal thoughts ($N = 46$; mo)	47.3	35.29
	Percentage	
Sex		
Male		42.4
Female		57.6
Race ($N = 58$)		
Caucasian		74.1
African-american		1.7
Hispanic		6.9
Asian		13.8
Mixed		3.4
Marital status		
Single		96.6
Married		3.4
Suicide attempts		
At least 1		44.1
2 or more		20.3

METHOD

Subjects

The sample consisted of 59 subjects with a minimum score of 11 on the Scale for Suicidal Ideation (SSI; Beck, Kovacs, & Weissman, 1979). Subjects with diagnoses of schizophrenia, substance dependence, or borderline personality disorder were excluded. The mean pretreatment score on the SSI was 15.45 (Severe), which is higher than the mean for Beck's original sample (Beck *et al.*, 1979). The sample demographics are presented in Table I.

Measures

Criterion Measures

Scale for Suicidal Ideation (SSI; Beck et al., 1979). The SSI is a 19-item clinical research instrument for assessing and quantifying degree of suicide ideation and intent. The SSI is presented in a structured interview format. Scores range from 0 to 38, with higher scores indicating increasing levels

of suicide intent. The SSI 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).

Modified Scale for Suicidal Ideation (MSSI; Miller, Norman, Bishop, & Dow, 1986). The MSSI is an 18-item instrument which was modified from the SSI for use as a self-report instrument to assess the extent of suicidal ideation and intent. In the construction of the MSSI, six items appearing on the SSI were dropped. In addition, 5 items not appearing on the SSI were added to obtain the present total of 18 items. MSSI scores have been shown to be correlated with administered versions of the interview form of the SSI. The MSSI has been found to have a high internal consistency (coefficient $\alpha = .94$) as well as satisfactory levels of concurrent, discriminant, and construct validity (Miller *et al.*, 1986).

Predictor Measures

Life Experience Survey (LES; Sarason, Johnson, & Siegel, 1978). The LES is a 57-item self-report measure of life stress that allows the respondent to indicate the occurrence of any of 57 experiences and three subject-specific experiences in the past 6 months and 1 year. Respondents are also instructed to rate the desirability and impact of each of these events on a 7-point anchored scale ranging from -3 to 3. Summary scores can be computed for negative, positive, and total life change for the previous 6 months and 1 year. Negative life change scores have been found to correlate in the expected direction with a large number of variables (e.g., anxiety, academic achievement, social desirability, personal maladjustment, depression, locus of control, and patient status; Sarason *et al.*, 1978). Negative life change scores were used as the measure of stress in the present study. The LES has a moderate test-retest reliability over 5-week (.63) and 6-week (.64) test-retest intervals.

UCLA Loneliness Scale (UCLA; Russell, Peplau, & Ferguson, 1978). The UCLA was designed for assessing social support network and degree of social integration. It consists of 20 statements, which the individual rates from "1" (never) to "4" (often) according to how often the individual "feels the way described in each statement." The UCLA has a high internal consistency, which ranges from .91 to .94. Concurrent validity has been established by demonstrating that lonely people report emotions theoretically tied to loneliness (i.e., depression, emptiness, hopelessness, and isolation), whereas emotions such as embarrassment, surprise, and creativity are not correlated with loneliness. Discriminant validity has demonstrated that the scale is nonconfounded by social desirability ($r = -.203$) but is related to

affiliative motivation, social risk-taking, and negative affect. Higher scores indicate greater loneliness.

Personal Problem-Solving Evaluation (PPSE). The PPSE is a modified version of Platt and Spivack's (1975) Means-End Problem-Solving Procedure (MEPS) that has been developed at Virginia Polytechnic Institute and State University (Clum, unpublished manuscript). The PPSE is based upon D'Zurilla and Goldfried's (1971) model of general problem-solving and measures the third and fourth of the following five steps of this model: (1) a general set or orientation to problems, (2) problem identification and specification, (3) generation of potential alternative solutions, (4) evaluation and selection of generated alternatives, and (5) implementation and verification of the chosen alternative. On the PPSE, subjects were asked to generate alternative solutions to six hypothetical interpersonal problems and outcomes given (Step 3). Subjects then listed as many as six alternative solutions to each of six hypothetical problems and outcomes. They then identified as many as four Pros (i.e., advantages to alternative solution) and four Cons (i.e., disadvantages to alternative solution) for each alternative solution (Step 4). Subjects' problem-solving ability on the PPSE is quantified by (1) the number of alternatives which are relevant (RA) or irrelevant (IRA) to the prespecified outcome, (2) the number of alternatives which are avoidant (AA) or nonavoidant (NAA) in nature, and (3) the number of Pros and Cons given for each alternative. For some of the ratings, scoring requires a subjective judgment by the rater. For these ratings, interrater reliability was calculated randomly on 17 of 59 subjects. Interrater reliabilities for the above measures were as follows: RA, .92; IRA, .64; AA, .74; NAA, .94; total alternatives, .99; Pros, .97; and Cons, .96.

Problem-Solving Inventory (PSI; Heppner & Petersen, 1982). The PSI is a 35-item self-report scale which measures how the respondent perceives his/her general problem-solving ability and, as such, can be considered a measure of Step 1 in D'Zurilla and Goldfried's model—orientation to problems. The format asks the respondent to agree or disagree (using a 6-point Likert scale) with statements describing his/her problem-solving ability. Items are reverse scored so that lower scores reflect more positive perceptions of problem-solving ability. The PSI consists of three factors: (1) Problem-Solving Confidence, (2) Approach/Avoidance, and (3) Personal Control (Heppner, 1986). Internal consistency was found to be higher for the total inventory (coefficient $\alpha = 0.90$). Test-retest reliability (2 weeks apart) was also high ($r = 0.89$) (Heppner & Petersen, 1982). The PSI was also shown to be moderately correlated with other problem-solving measures and to have a high divergent validity with measures of intelligence and social desirability (Heppner & Petersen, 1982).

Procedure

Subjects were part of a treatment study for severe and chronic suicide ideators. *S*'s were recruited among college students at Virginia Polytechnic Institute and State University in Blacksburg, Virginia, through various types of advertisements. The assessment phase of the study consisted of two sessions. In the first session, *S*'s first read and signed an informed consent form. *S*'s were then screened using the SSI (Beck *et al.*, 1979). Subjects who scored 11 or higher on the SSI completed the other measures. At the second assessment session, held approximately 2 weeks after the first, the following measures were given: SSI, MSSSI, LES, UCLA Loneliness Scale, PPSE, and the PSI.

RESULTS

Correlations and stepwise and hierarchical multiple regression analyses were used in examining the data. Table II presents mean scores, standard deviations, and intercorrelations among predictor and criterion variables.

Stepwise and hierarchical multiple regression analyses were performed predicting suicide ideation as measured by both the SSI and the MSSSI. The criterion for entry into and for being retained in the regression equations was $p = .25$ and $p = .05$, respectively. Stepwise regression analyses were used to test whether stress, social support, and problem-solving were independently predictive of suicide ideation. In the stepwise regression analyses, as shown in Table III, problem-solving confidence (SPIF1) was found to be a significant predictor of SSI severity and MSSSI severity and accounted for 9.5 and 9.2% of the variance, respectively. No other variables entered the equations.

Hierarchical regression analyses were used to test the interactions of both social support \times stress and problem-solving \times stress to the two suicide ideation criteria. For the hierarchical regression analyses, nine variables were forced into the model (LESNS, UCLA, PSIF1, PSIF2, PSIF3, RA, IRA, Pros, Cons) for both the SSI and the MSSSI. Interactions of social support \times stress and problem-solving \times stress were then tested in a stepwise fashion. The results of the hierarchical regression analyses with the SSI and MSSSI as the dependent measures are presented in Table IV.

The summary of the hierarchical regression analyses for predicting SSI severity yielded significant interactions for stress \times approach/avoidance problem-solving style and stress \times problem-solving confidence. The model accounted for 38% of the variance, with the stress \times approach/avoidance

Table II. Correlations Among Predictor, Criterion, and Other Measures at Pretreatment^a

Measure	SSI	MSSI	LESNS	UCLA	PSIF1	PSIF2	PSIF3	RA	IRA	Pros	Cons
SSI	—										
MSSI	.79*****	—									
LESNS	-.19	-.25	—								
UCLA	.23	.03	-.21	—							
PSIF1	.31**	.30**	-.19	.51*****	—						
PSIF2	.01	.01	-.33**	.32**	.53*****	—					
PSIF3	.22	.13	-.12	.36***	.67*****	.57*****	—				
RA	-.09	-.09	-.11	-.15	-.21	-.20	-.14	—			
IRA	.07	.03	-.04	-.00	-.08	-.09	-.06	.07	—		
Pros	-.16	-.17	-.25	-.08	-.12	-.16	-.17	.46*****	.08	—	
Cons	-.02	-.02	-.33**	-.15	-.03	-.10	-.01	.33**	.28*	.70*****	—
Mean	15.46	17.56	-13.81	56.38	40.91	51.91	20.6	14.6	1.25	1.41	1.31
SD	5.59	9.60	7.99	9.66	11.23	15.8	3.09	4.57	2.03	.43	.53

^aPSI, Problem-Solving Inventory; PSIF1, Confidence factor; PSIF2, Approach-Avoidance factor; PSIF3, Personal Control factor. RA, relevant alternatives on PPSE; IRA, irrelevant alternatives on PPSE; Pros, advantages for alternative solutions on PPSE; Cons, disadvantages to alternative solutions on PPSE.

* $p < .05$.

** $p < .02$.

*** $p < .005$.

**** $p < .0002$.

***** $p < .0001$.

Table III. Results of Stepwise Regression for Prediction of Severity of Suicide Ideation

Predictor variable	Partial R^2 at each step	F score	df	p value
(1) Criterion variable: SSI score				
Problem-solving confidence	.095	5.99	1,57	.02
Total R^2	.095			
(2) Criterion variable: MSSSI score				
Problem-solving confidence	.092	5.75	1,57	.02
Total R^2	.092			

Table IV. Hierarchical Regression Analyses Examining Interactions of Stress \times Problem-Solving and Stress \times Social Support in Predicting Severity of Suicide Ideation^a

Predictor variable	Partial R^2 at each step	F score	df	p value
(1) Criterion variable: SSI score				
Step 1 variable entered LESNS, UCLA, PSIF1, PSIF2, PSIF3, RA, IRA, Pros, Cons	.24	1.70	9,49	.12
Step 2 variable entered LES \times PSIF2	.08	6.01	10,48	.02
LES \times PSIF1	.06	4.49	11,47	.04
Total R^2	.38			
(2) Criterion variable: MSSSI score				
Step 1 variable entered LESNS, UCLA, PSIF1, PSIF2, PSIF3, RA, IRA, Pros, Cons	.28	2.11	9,49	.05
Step 2 variable entered LES \times UCLA	.06	4.59	10,48	.04
Total R^2	.34			

^aLESNS, Negative score on Life Experiences Survey; UCLA, UCLA Loneliness Scale; PSI, Problem-Solving Inventory; PSIF1, Confidence factor; PSIF2, Approach-Avoidance factor; RA, relevant alternatives on PPSE; IRA, irrelevant alternatives on PPSE; Pros, advantages to alternative solutions on PPSE; Cons, disadvantages to alternative solutions on PPSE.

problem-solving style and stress \times problem-solving confidence interactions accounting for 8 and 6% of the variance, respectively. The summary of the hierarchical regression analyses for predicting MSSSI severity yielded a significant interaction of stress \times social support. The model accounted for 34% of the variance, with the stress \times social support interaction accounting for 6% of the variance.

To examine the nature of the above significant interactions, mean splits were performed on the LESNS, PSI Confidence factor, PSI Approach-Avoidance factor, and UCLA Loneliness scale. For each analysis, subjects were divided into four groups (i.e., high and low stress and high and low scores on relevant measures). The directions of the interactions are presented in Table V. When under high stress, individuals with low problem-solving confidence experienced the most severe suicide ideation. It should be noted that their suicide ideation (17.38 on the SSI), however, was only slightly more severe than the suicide ideation of individuals with low problem-solving confidence when under low stress (17.22 on the SSI). With regard to approach/avoidance problem-solving style, when under low stress individuals high in approach problem-solving style (and therefore low in avoidance problem-solving style) experienced the most severe suicide ideation. However, their suicide ideation (16.94 on the SSI) was only slightly

Table V. Levels of Suicide Ideation for Comparisons of Individuals High and Low on Stress and Problem-Solving and Stress and Social Support Measures

	Stress	
	Low	High
Prediction of SSI severity		
Problem-solving confidence (PSIF1) \times stress (LESNS)		
Problem-solving confidence		
High	12.43	13.64
Low	17.22	17.38
Problem-solving approach/avoidance (PSIF2) \times stress (LESNS)		
Problem approach		
High	16.94	15.00
Low	13.31	16.64
Prediction of MSSSI severity		
Social support (UCLA Loneliness Scale) \times stress (LESNS)		
Social support		
High	18.75	13.17
Low	15.25	22.27

more severe than the suicide ideation of individuals low in approach problem-solving style (and therefore high in avoidance problem-solving style) when under high stress (16.64 on the SSI). Finally, when under high stress, individuals with low social support experienced the most severe suicide ideation.

DISCUSSION

This study was an extension of past work (Bonner & Rich, 1987, 1988; Clum *et al.*, 1979; D'Attilio *et al.*, 1992; Dixon *et al.*, 1991; Linehan *et al.*, 1987; Priester & Clum, 1993b; Rudd, 1990; Sadowski & Kelley, 1993; Schotte & Clum, 1982, 1987) which has identified stress, social support, and problem-solving appraisal/skills as important predictors of suicidal behavior. This study extended these findings in two ways: (1) by examining the independent contributions of these predictors to level of suicidality and (2) by investigating whether the above factors were predictive of level of suicidality within a chronic, suicidal sample. In these analyses, problem-solving appraisal, as reflected by the problem-solving confidence factor on the PSI, emerged as the only important variable in predicting suicidal severity. The importance of problem-solving confidence in predicting suicide ideation has been demonstrated by Dixon *et al.* (1991), though it was not supported as an independent predictor in a previous study in our laboratory (Priester & Clum, 1993a). Dixon *et al.* (1991) found the PSI confidence factor to be the strongest predictor of suicide ideation in a college sample. Problem-solving appraisal, or confidence, however, accounted for only 1.4% of the variance in the Dixon *et al.* (1990) study, whereas it accounted for 9.5 and 9.2% of the variance in the prediction of SSI and MSSSI severity in the present study, respectively. One possible reason for this difference may lie in the composition of both samples.

The present study used a chronic, severely suicidal population, unlike that used by Dixon *et al.* (1991), who used a general undergraduate population in which some subjects were mildly suicidal. It appears that confidence in one's problem-solving abilities, a factor closely identified with D'Zurilla and Goldfried's (1971) "general orientation to problems," is an important predictor of level of suicidality in severely suicidal samples.

The present study also found support for the importance of two interactions, problem-solving confidence \times stress and problem-solving avoidance \times stress, to the interview-based measure of suicidal ideation (i.e., SSI). These results indicate the importance of these two general orientations toward problem-solving to suicide severity when under stress. Specifically, individuals who lack confidence in their problem-solving ability when under

high stress are prone to more suicide ideation. This is consistent with other studies (Dixon *et al.*, 1991; Priester & Clum 1993b). However, this finding should be interpreted with caution given that individuals with low problem-solving confidence when under low stress also had a comparable level of suicide ideation. Clearly, however, individuals with low confidence in their problem-solving ability were prone to more severe suicidal ideation.

With regard to approach/avoidance problem-solving style, it appears that individuals either who experience low stress and use more of an approach problem-solving style or who experience high stress and use more of an avoidant problem-solving style are likely to experience more severe levels of suicide ideation. While the latter relationship was expected, the former was not. At this point, no reasonable explanation can be given for this first relationship, though future studies are needed to evaluate whether it is consistent or artifactual.

When using hierarchical regression analyses to predict MSSSI severity, social support as measured by the UCLA Loneliness Scale was found to interact significantly with stress, suggesting that social support has a mediational nature in the stress-suicidality relationship. Specifically, individuals under high stress who have low levels of social support were prone to more severe levels of suicide ideation. This supports Rudd (1990) and D'Attilio and co-workers' (1992) findings that social support is an important variable in the prediction of suicidality when individuals are experiencing high stress. Of the three interactions, the social support \times stress interaction was the most clearly in the expected direction.

Problem-solving skills/deficits, as reflected by the PPSE measures, were not found to predict suicidal severity significantly in either the stepwise or the hierarchical regression analyses. This is inconsistent with some past research. Schotte and Clum (1982, 1987) found that problem-solving deficits mediated the relationship between stress and suicide ideation. In addition, Priester and Clum (1993b) found that problem-solving deficits both alone and in interaction with level of stress predicted depression, hopelessness and suicide ideation. It should be noted that Schotte and Clum (1987) and Priester and Clum (1993b) used a measure of problem-solving different than the PPSE. In fact, the above studies used idiosyncratic problems identified by the individuals or known to be experienced by these individuals. The PPSE, in contrast, uses standard stressful scenarios to tap problem-solving skills. Therefore, the type of interpersonal problem-solving measure used may have been a factor. The PPSE is a general measure of interpersonal problem-solving in which tasks may not be personally relevant to the subject. This method may not give the clearest results given Gotlib and Asarnow's (1979) conclusion that depressed and nondepressed subjects fail to differ on performance tasks which are not

personally relevant. However, Canfield, Van Arsdale, Yang, Wright, and Clum (1993), in a study investigating factors differentiating high suicide ideators from depressed nonideators in our laboratory, found that the identification of the number of relevant alternatives on the PPSE was a significant predictor of suicide ideation when both controlling and not controlling for depression in their sample. Regardless of level of depression, high suicide ideators tended to identify fewer relevant alternatives than low or nonideators. Thus, the PPSE may differentiate suicidal from nonsuicidal individuals, but it may not differentiate level of suicidality.

Overall, results from the present study support the general hypotheses. Problem-solving appraisal and social support both contribute uniquely to the prediction of severity of suicide ideation in a severely suicidal sample.

There are some limitations to the present study. First, the results of the stepwise and hierarchical regression analyses accounted for only a small part of the variance. Second, the results are probably limited to college students experiencing severe suicidal ideation. It is possible that the subjects in this sample may respond differently than other suicidal individuals. Finally, a larger sample would have provided more reliable conclusions to have been drawn from the stepwise regression analyses. Future studies are needed to clarify further and expand the findings of the present study.

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