

Social Problem Solving as a Moderator of Stress-Related Depressive Symptoms: A Prospective Analysis

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Previous research has suggested that problem-solving skills serve to moderate the likelihood that individuals will experience depressive symptoms as a function of negative stressful life events. The present study attempted both to replicate this finding and to provide for a more rigorous test of this hypothesis by (a) using a prospective design, (b) controlling for prior level of depression, (c) incorporating two measures of problem solving, and (d) including several methodological controls to increase the validity of the assessment of stressful life events. Results from both the cross-sectional and prospective analyses involving data collected from 150 university students provided support for the hypothesis that problem solving moderates stress-related depressive symptoms. More specifically, for both measures of problem solving, results indicated that effective problem solvers under high levels of stress reported significantly lower depression scores than ineffective problem solvers under similar levels of stress.

Social problem solving refers to the cognitive-behavioral process by which people identify or discover effective strategies of coping with problematic situations encountered in daily living. More important, it can be considered a general coping strategy whose goal is the discovery and identification of a wide range of effective solutions and therefore contributes to the facilitation and maintenance of general social competence (D'Zurilla, 1986; D'Zurilla & Nezu, 1982). The important implications of problem solving and problem-solving training within the counseling process has recently been highlighted (Heppner, 1978).

According to D'Zurilla and Nezu (1982), problem solving involves five specific component processes: (a) problem orientation (the cognitive and motivational set with which one approaches and recognizes problems in general); (b) problem definition and formulation (the delineation of a problem into concrete and specific terms and the identification of specific goals); (c) generation of alternatives (the production of an exhaustive list of appropriate solution possibilities); (d) decision making (the systematic evaluation of a range of alternative solutions regarding consequences and the selection of the most optimal choices); and (e) solution implementation and verification (the monitoring and evaluation of the actual solution outcome after its implementation).

Recently, research has identified a strong association between social problem solving and depression (Nezu, 1987; Nezu, Nezu, & Perri, in press). For example, studies indicate that ineffective problem solvers report higher levels of depressive symptoms than effective problem solvers do (Heppner & Anderson, 1985; Nezu, 1985). Depressed individuals have also been found to evidence certain problem-solving deficits when compared with normal controls (Gottlib & Asarnow,

1979; Nezu, 1986a; Nezu & Ronan, 1987). Treatment approaches developed specifically upon problem-solving principles have been found to be efficacious in significantly reducing depression (Hussian & Lawrence, 1981; Nezu, 1986b).

Within a life-stress framework of depression, problem solving has been hypothesized to serve as a moderator of depressive symptoms for individuals experiencing high levels of stress emanating from major negative life-change events. According to this hypothesis, people who are unable effectively to resolve the problems inherent in negative life events will experience more depressive symptoms than individuals characterized by effective problem-solving skills (Nezu, 1987). Indirect evidence is provided by a study (Nezu & Ronan, 1985) that found support for the following sequence of relations: (a) Experiencing negative stressful events often results in an increase in problematic situations; (b) the degree to which individuals cope effectively with these problems is a function of their problem-solving skills; and (c) effective resolution of these problems serves to decrease the probability of depressive symptoms.

A more direct test of this hypothesis was conducted recently by Nezu, Nezu, Saraydarian, Kalmar, and Ronan (1986). Results from this study indicated that effective problem solvers under high levels of stress reported significantly lower levels of depressive symptoms as compared with ineffective problem solvers under similar levels of high stress. Although this investigation does provide initial support for problem solving as a moderator of the stress-related depression hypothesis, because of its cross-sectional nature, conclusive interpretations are limited. More specifically, concurrent assessment of problem-solving skills and depressive symptoms does not allow for an accurate determination of the validity between alternative rival hypotheses. For example, it is possible that individuals who are already distressed, when asked at the same time to complete inventories assessing stress and coping, may attempt to justify their affliction by either artificially reporting an increased amount of preceding stress or lowered use of the coping strategy under investigation (i.e., problem-

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solving skills). Conclusions regarding the specific relations among stressful events, psychological distress, and moderator variables are therefore difficult to determine.

Prospective or longitudinal designs have been advocated recently as a more stringent method of assessing these relations (S. Cohen & Wills, 1985; Monroe, 1982). Such designs attempt to predict future distress as a function of individual differences in the hypothesized moderator variable assessed at an earlier time. In other words, this design can answer the question, Does problem solving (assessed at Time 1) predict future depressive symptoms (assessed at Time 2)? And if so, does problem solving serve further to interact with the stress experienced between Time 1 and Time 2 in a moderating fashion such that effective problem solvers under high levels of stress experience less depression than ineffective problem solvers under similar levels of stress? Evaluation of the statistical interaction between stress and problem-solving scores provides a direct means of addressing this latter question.

Additionally, it is possible that prior level of distress may confound any interpretations concerning the actual influence of stressful events on illness. Therefore recommendations have been made routinely to include a preassessment of the dependent variable under study as an important ingredient in stress research (Monroe, 1982).

The present investigation attempted to take these recommendations into account by using a prospective design. The previous level of depressive symptoms was used as a covariate to rule out alternative explanations related to the influence of premorbid status.

Because the Nezu, Nezu, Saraydarian, Kalmar, and Ronan (1986) study relied solely on a self-report inventory (Problem-Solving Inventory, or PSI), in the present investigation we included two different types of problem-solving measures: the PSI and the Means-End Problem-Solving Procedure (MEPS; Platt & Spivack, 1975), which is a performance-based instrument.

Method

Subjects

Subjects in this study included 150 undergraduate and graduate students (83 male and 72 female) enrolled in various courses at a northeastern university. They volunteered in response to general requests for subjects and received partial credit for certain course requirements. Their ages ranged from 19 to 31 with a mean of 26.4 years ($SD = 4.9$). College students were selected as an appropriate sample because previous research has indicated that they experience a wide range of affective disorders, including those in the severe range (Hammen, 1980), as well as numerous stressful life events (Hammen & Cochran, 1981). Furthermore, the focus of this study was to investigate the manner in which problem solving moderates stress-related depressive symptoms in the natural environment (cf. Perri & Richards, 1977) rather than as a function of counseling.

Measures

Depressive symptoms were measured by the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a 21-item, self-report measure. Estimates of reliability and validity (psychiatric criterion estimates) have been found to be .78 and .77, respectively, within a university population (Bumberry, Oliver, & McClure, 1978; Oliver & Burkham, 1979).

Negative life stress was assessed by the Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978), which is a 47-item, self-report measure that allows subjects to indicate both the incidence and perceived stressful impact of various important life-change events (e.g., death of a family member, leaving home for the first time) experienced in the recent past (6 months in this study). The LES also contains a supplemental list of 10 events relevant specifically to a university population (e.g., beginning a new school experience). Stressful impact ratings for all reported events are made along a 7-point scale ranging from -3 to 3. Scores could thus be computed for negative (-3 to -1), positive (1 to 3), and total life stress (sum of absolute values). Because previous research has indicated that those life events rated as having a positive impact are uncorrelated with depressive symptoms (Nezu, Nezu, Saraydarian, Kalmar, & Ronan, 1986), only negative life stress scores were used in this study. Test-retest reliability for the negative-stress scale has been estimated to range between .56 to .88 (Sarason et al., 1978).

The two measures of problem solving included the PSI (Heppner & Peterson, 1982) and the MEPS (Platt & Spivack, 1975). The PSI is a 32-item, self-report measure that assesses self-appraised personal problem-solving behavior (e.g., generating several solutions to a problem) and attitudes (e.g., it is better to confront a problem than to avoid it). Low scores indicate effective problem solving. The PSI has considerable support from several studies that suggest its validity in discriminating differences across problem-solving styles, attitudes, and behaviors (Heppner & Peterson, 1982; Heppner, Reeder, & Larson, 1983; Nezu, 1985). Reliability estimates indicate PSI scores to be internally consistent (coefficient alpha estimates range between .72 and .90) and stable over a 2-week period (test-retest coefficients range from .83 to .89). Although the PSI is a self-report measure, research has indicated that such scores correlate significantly with observational ratings of problem-solving behavioral competence (Heppner, Hibbel, Neal, Weinstein, & Rabinowitz, 1982), in addition to being unrelated to measures of social desirability (Heppner & Peterson, 1982).

Six situations from the MEPS served as the second measure of problem solving. Although the MEPS actually contains nine stories, because of certain ethical considerations we decided to eliminate those three that involve potentially socially inappropriate goals (i.e., killing a former SS trooper, stealing a diamond, and getting revenge). The MEPS, being more performance oriented than the PSI, includes a series of story stems that requires subjects to generate specific actions that one could take in order to resolve various interpersonal and social problems (e.g., making friends). Subjects in this study were provided with the beginning and end of each situation and asked to generate various means by which the protagonist within the story can actually reach the stated goal. To allow subjects to become more involved with the problems, each situation was described in the second person (i.e., you) rather than in the third person (i.e., he or she). The specific MEPS dependent measure used in this study included the number of relevant means generated by subjects. Relevant means are defined according to the MEPS manual as discrete steps that are effective in enabling the protagonist to reach the specified goal or to overcome an obstacle. Test-retest reliability for the MEPS has been estimated to be .64 (Platt & Spivack, 1975).

Procedure

This study was conducted at two different time periods. During the first testing (T1), subjects were requested to complete the BDI, LES, PSI, and MEPS. Three months after the initial session, subjects were recontacted to complete a second BDI and LES (T2). Previous research has indicated that this time period is sufficient to demonstrate the deleterious effects of negative life experiences (e.g., Nelson & Cohen, 1983). For the second LES, the subjects were instructed to indicate only those stressful events that they had experienced during

the period between testing sessions. As a control, subjects' responses on the LES for both sessions were checked for duplication. On the occasions when this occurred, they were asked if this represented a duplication or two separate events. Corrections were made according to the appropriate time period when necessary.

A further random sample of 30 subjects was interviewed within 3 days of the T2 testing concerning their experience of stressful events. Specifically they were asked open-ended questions concerning the type and perceived stressful impact of various events they had experienced between the two testing sessions. These interviews were conducted as a check to determine the validity of the LES within this sample. The correlation between their responses to the LES and in the interview was found to be .97 ($p < .001$), suggesting that the measure of stress used in this study was representative of their actual experiences.

As a further methodological control, LES items that can be viewed as potentially confounded with depressive symptoms were removed as scorable items (e.g., major change in sleeping habits). This procedure (cf. Nezu, 1986a) attempts to minimize the possibility of artificially inflating the correlation between stress and depression that can be due to the potential overlap between items that may be actual symptoms of depression rather than a previously occurring stressor (Fairbank & Hough, 1979).

Lastly, subjects' responses to the MEPS were scored by two graduate students in clinical psychology according to guidelines outlined in the manual (Platt & Spivak, 1975). An estimate of their interrater reliability indicated a high level of agreement between raters ($\kappa = .86$). Subjects' MEPS scores represented the mean score between raters as averaged across the six problems.

Results

Because initial multivariate analysis of variance tests indicated a lack of differences as a function of sex regarding all measures, male and female data were combined in all subsequent statistical tests. Two sets of regression analyses were conducted to assess the relations among stress, problem solving, and depressive symptoms. One set focused on the cross-sectional data collected at T1, and the second set used a prospective analysis and included data from both assessment periods. Table 1 contains the zero-order intercorrelations among all measures as well as their means and standard deviations.

For the cross-sectional analysis, two hierarchical multiple regression analyses were conducted: The first used the PSI as the measure of problem solving, and the second included the MEPS as the problem-solving measure. For both analyses T1 BDI scores served as the dependent measure, with the following terms included in the order that they were entered independently into the equations: negative life stress (NLS), problem solving (either the PSI or MEPS), and the NLS \times Problem Solving interaction.

Results of these analyses indicated that regardless of which measure of problem solving was included, the interaction between problem solving and life stress was found to be significant, suggesting that problem solving served as a moderator of stress-related depressive symptoms (see Table 2). For the analysis involving the PSI, the included variables accounted for over 40% of the variance in predicting T1 BDI scores (adjusted $R^2 = .42$), $F(3, 146) = 12.19$, $p < .001$. For the MEPS analysis the resulting adjusted multiple R^2 was found to be .43, $F(3, 146) = 14.96$, $p < .001$. These results support previous research that indicated problem solving to

Table 1
Zero-Order Correlations Among Variables and Their Means and Standard Deviations

Variable	1	2	3	4	5	6	<i>M</i>	<i>SD</i>
1. BDI (1)	—	.35	-.59	.54	.71	.55	7.50	6.28
2. NLS (1)		—	-.08	.01	.29	.28	10.28	6.79
3. MEPS			—	-.69	-.66	-.15	5.18	3.43
4. PSI				—	.72	.19	84.02	19.62
5. BDI (2)					—	.32	8.74	7.65
6. NLS (2)						—	5.24	3.79

Note BDI (1) = Beck Depression Inventory at Time 1; NLS (1) = Negative Life Stress at Time 1; MEPS = Means-End Problem Solving Procedure; PSI = Problem-Solving Inventory; BDI (2) = Beck Depression Inventory at Time 2; NLS (2) = Negative Life Stress at Time 2. The PSI is scored such that higher values reflect ineffective problem solving, hence the positive correlation between PSI and BDI scores.

serve as a moderator of negative life stress (Nezu, Nezu, Saraydarian, Kalmar, Ronan, 1986). However, because of the cross-sectional nature of this data, predictive interpretations are limited. Therefore prospective analyses were conducted next.

For these prospective analyses T2 BDI scores served as the dependent measure in the hierarchical multiple regression analyses. To control for premorbid level of depression, T1 BDI scores were entered first into each equation independently, then the following variables were entered hierarchically: NLS (T2), problem solving (either PSI or MEPS), and the NLS (T2) \times Problem Solving interaction. According to this model, it is possible to determine whether problem solving served as a moderator of the stressful effects associated with the life-change events experienced during the period between testing sessions, even after the previous level of distress had been controlled.

Again, as can be seen in Table 2, regardless of which measure of problem solving was included, the NLS \times Problem Solving interactions were found to be significantly related to T2 depression scores beyond the variance associated with prior level of depressive symptoms. For the analysis involving the PSI as the measure of problem solving, the resulting adjusted multiple R^2 was .87, $F(4, 145) = 79.48$, $p < .0001$. For the MEPS analysis, the adjusted multiple R^2 was .84, $F(4, 145) = 64.98$, $p < .0001$.

According to follow-up analyses suggested by J. Cohen and P. Cohen (1983), it is possible to determine estimates of the regression lines for BDI scores at high, low (1 standard deviation above and below the mean), and average (at the mean) levels for problem-solving effectiveness and at the same levels for negative life stress. The significant interaction terms within the prospective analyses indicate that effective problem-solving skills serve to buffer the negative effects of stress with regard to the likelihood of experiencing depressive symptoms. More specifically, effective problem solvers under high stress were found to report lower depression scores than ineffective problem solvers under similar levels of stress (see Figure 1).

Discussion

The major purpose of this study was to provide a more internally valid test of the hypothesis that problem-solving skills moderate the likelihood that individuals will experience

Table 2
Results From Hierarchical Multiple Regression Analyses for the Problem-Solving Inventory (PSI) and the Means-End Problem-Solving Procedure (MEPS) Regarding the Cross-Sectional and Prospective Approaches

Variable	B	Change in R ²
Cross-sectional analyses		
NLS (1)	.29	.12**
PSI	.41	.17**
NLS (1) × PSI	-.40	.14**
NLS (1)	.29	.12**
MEPS	-.34	.14**
NLS (1) × MEPS	-.45	.18**
Prospective analyses		
BDI (1)	.46	.50***
NLS (2)	.31	.09*
PSI	.24	.15**
NLS (2) × PSI	-.59	.14**
BDI (1)	.46	.50***
NLS (2)	.31	.09*
MEPS	-.25	.11**
NLS (2) × MEPS	-.41	.15**

Note. NLS (1) = Negative Life Stress at Time 1; BDI (1) = Beck Depression Inventory at Time 1; NLS (2) = Negative Life Stress at Time 2. The PSI is scored such that higher values reflect ineffective problem solving. For the cross-sectional analyses, Time 1 BDI scores served as the dependent variable, whereas Time 2 BDI scores served as the dependent measure within the prospective analyses.

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

depressive symptoms as a result of major negative life stress. To provide for such an evaluation, a prospective design was used that also attempted to control for the variance attributable to prior level of distress. Additionally, we incorporated various methodological controls to increase the confidence that negative life stress was validly measured within this study. Moreover, two different measures of problem-solving effectiveness (one self-report and the second performance-oriented) were included as a means of determining whether previous research supportive of the problem solving as moderator hypothesis was not instrument specific (Nezu, Nezu, Saraydarian, Kalmar, & Ronan, 1986).

Results of the cross-sectional analysis using the PSI as the problem-solving measure provide initial support for the major hypothesis and are a direct replication of previous research (Nezu, Nezu, Saraydarian, Kalmar, & Ronan, 1986). The regression analysis incorporating the MEPS measure found similar results, indicating that the construct validity of the findings is not limited to self-report assessments of one's problem solving. As such it would appear that at least within the present sample, subjects' self-appraisal of their problem-solving skills accurately reflected their performance. Note, however, that the significant association between the PSI and MEPS found in this study conflicts with earlier work by Heppner and Peterson (1982), which indicated a nonsignificant correlation. Within that study though, only three MEPS stories were actually used to assess the association between these two measures of problem solving. As such it is possible that the nonsignificant relation was due to a constricted range of MEPS scores.

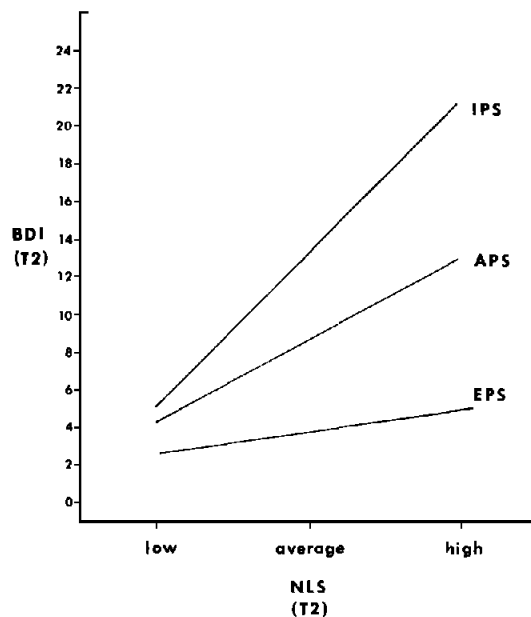


Figure 1 Regression lines depicting predicted T2 Beck Depression Inventory scores as a function of the interaction between Negative Life Stress at Time 2 (NLS T2) and problem solving (Means-End Problem-Solving Procedure) after premorbid level of depression (T1) is controlled for statistically. (IPS = ineffective problem solving; APS = average problem solving; EPS = effective problem solving.)

More important, both prospective analyses conducted to determine the moderating nature of problem solving in predicting T2 depression scores also revealed significant Life Stress × Problem Solving interactions. Follow-up analyses indicated that this interaction took the form such that effective problem solvers (e.g., high MEPS scores) under high levels of stress reported significantly lower T2 depression scores than ineffective problem solvers (e.g., low MEPS scores) under similar levels of stress (see Figure 1).

Within both prospective analyses, prior level of depression accounted for a sizable amount of the variance in predicting Time 2 BDI scores (50%). This supports the recommendations that inclusion of this methodological procedure is extremely important in assessing the relation of prior level of distress and the prediction of future depression scores (Monroe, 1982). However, because both prospective analyses yielded significant findings regarding the interaction between problem solving and stress beyond the variance attributable to prior depressive level, the present investigation provides support for the hypothesis that problem-solving effectiveness does function as a moderator of stress-related depression.

The present results are generally consistent with previous research (cf. Nezu, Nezu, Saraydarian, Kalmar, & Ronan, 1986; Nezu & Ronan, 1985) as well as supportive of the assumptions underlying treatment programs for depression based on a social problem-solving paradigm (Nezu, 1986b, 1987). Moreover, from the perspective of a life stress framework, these results also have important implications for the utility of problem-solving training as an important strategy for both prevention and maintenance within the counseling process. In other words, teaching clients to cope more effec-

tively with problematic situations might serve to prevent depression when they encounter circumstances of high stress.

Although this study was designed to increase the internal and construct validity of the findings, it remains limited in its generalizability. Future research should focus on populations that include subjects experiencing depressive symptoms on a more severe level. Although various attempts were made to provide for reasonable methodological controls, the basic design of this study was correlational. As such it remains at best only an approximation of an accurate picture of the complexities involved in the phenomena under study. Our interpretation of the present findings therefore remain tentative and await future validation or refutation.

We are not attempting to suggest that problem-solving skills are the sole or predominant coping response pattern that moderates the relation between stress and depressive symptoms. In fact it is highly likely that problem solving functions within a complex process with other psychosocial variables in both an interactive and conjunctive manner (cf. Nezu, 1987; Nezu, Kalmar, Ronan, & Clavijo, 1986; Nezu, Nezu, & Perri, in press). However, the present study provides support for the view that problem solving is an important variable to consider in attempts to better understand how individuals cope with their stressful environment.

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