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A Factor-Analytic Study of the Social Problem-Solving Inventory: An Integration of Theory and Data

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Restricted (confirmatory) and unrestricted (exploratory) factor analyses were used to investigate the factor structure of the Social Problem-Solving Inventory (SPSI; D'Zurilla & Nezu, 1990). The SPSI is based on a theoretical model consisting of two general components (problem orientation and problem-solving skills) which are further divided into seven primary subcomponents (cognitive, emotional, and behavioral aspects of problem orientation and four specific problem-solving skills). Thus, both a two-factor model and a hierarchical model with seven first-order factors and two second-order factors were tested. The results provided only modest support for the two-factor model, and the hierarchical model failed to show substantial improvement over this model. Further analyses using exploratory as well as confirmatory methods found that an alternative five-factor model was best for the SPSI in the sense of goodness of fit, parsimony, and cross-validation. The implications of these results for social problem-solving theory and assessment are discussed.

KEY WORDS: everyday; personal; interpersonal; problem-solving assessment; cognitive-behavioral assessment.

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Social problem solving is a term that refers to problem solving as it occurs in the real world. Research interest in social problem solving and problem-solving therapy (i.e., the clinical application of problem-solving training) has been increasing rapidly in recent years as empirical support has accumulated for the view that problem solving is an important coping strategy that can have a significant influence on psychological well-being and adjustment (see D'Zurilla, 1986; Heppner, 1990; Nezu & D'Zurilla, 1989; Nezu, Nezu, & Perri, 1989).

Much of the research in this area has been based on a model of social problem solving originally developed by D'Zurilla and Goldfried (1971), and later expanded and refined by D'Zurilla and Nezu (D'Zurilla, 1986; D'Zurilla & Nezu, 1982). According to this view, problem-solving outcomes in the natural environment are largely determined by two major, partially independent processes: (1) problem orientation and (2) problem solving proper—i.e., the application of problem-solving skills.

Problem orientation is the motivational component of the problem-solving process, involving the operation of a set of relatively stable cognitive schemas (constructive as well as dysfunctional) that reflect a person's general awareness and perceptions of everyday problems, as well as his or her own problem-solving ability (for example, generalized threat or challenge appraisals, problem-solving self-efficacy expectancies, problem-solving outcome expectancies). Together with the emotions and behavioral approach–avoidance tendencies that are assumed to accompany them, these cognitive schemas can facilitate or inhibit problem-solving performance in specific situations, but they do *not* include the specific problem-solving techniques that enable individuals to maximize their problem-solving effectiveness.

Problem solving proper, on the other hand, refers to the rational search for a solution through the application of specific problem-solving skills and techniques that are designed to increase the probability of finding the "best" solution or coping response for a particular problematic situation. In D'Zurilla and Nezu's (1990) model, there are four major problem-solving skills: (1) problem definition and formulation, (2) generation of alternative solutions, (3) decision making, and (4) solution implementation and verification (i.e., monitoring and evaluation of solution outcomes). Each of these skilled tasks is assumed to contribute uniquely to the discovery or invention of effective "solutions," or adaptive ways of coping with particular problematic situations.

In an attempt to meet the need for an adequate, theory-based measure of social problem-solving processes for use in research and clinical assessment, D'Zurilla and Nezu (1990) have developed the Social Problem Solving Inventory (SPSI). This instrument consists of 70 Likert-type items organized into the following two major scales and seven subscales, which were designed to reflect the important components of D'Zurilla and Nezu's social problem-solving model:

- Problem Orientation Scale (POS)
- Cognition Subscale (CS)
- Emotion Subscale (ES)
- Behavior Subscale (BS)
- Problem-Solving Skills Scale (PSSS)
- Problem Definition and Formulation Subscale (PDFS)
- Generation of Alternative Solutions Subscale (GASS)
- Decision Making Subscale (DMS)
- Solution Implementation and Verification Subscale (SIVS)

Each of the subscales has 10 items, and accordingly, the POS consists of 30 items, and the PSSS contains 40 items. Each item is a self-statement reflecting either a positive (facilitative) or negative (dysfunctional) cognitive, affective, or behavioral (approach–avoidance) response to real-life problem-solving situations. One-half of the items are positive, and the other half are negative. The positive and negative items, as well as the items corresponding to the different subscales, are distributed at random throughout the inventory. The instructions for the SPSI ask subjects to report how they typically respond to current problems in general on a 5-point Likert-type scale ranging from *not at all true of me* to *extremely true of me*. The SPSI provides a global problem-solving score, as well as separate scores for the two major scales and the seven subscales. The present data on the psychometric properties of the SPSI are very promising (D'Zurilla & Nezu, 1990; D'Zurilla & Sheedy, 1991, 1992). Test–retest (approximately 3 weeks) reliability coefficients for the POS and the PSSS are .83 and .88, respectively. The test–retest reliabilities for the subscales range from .86 (PDFS) to .73 (CS). The alpha coefficients for the POS and the PSSS are .94 and .92, respectively. Alpha coefficients for the subscales range from .90 (ES) to .65 (SIVS). Regarding criterion validity, studies using college student samples have found that SPSI scores are related to internal locus-of-control, psychological stress, frequency of personal problems, general severity of psychological symptoms, and academic grades (D'Zurilla & Nezu, 1990; D'Zurilla & Sheedy, 1991, 1992). Likewise, in middle-aged and elderly community residents, the SPSI has been found to be related to psychological stress, personal problems, state and trait anxiety, depression, and general severity of psychological symptoms (D'Zurilla & Nezu, 1990; Kant, 1992). In addition, the SPSI has been shown to be sensitive to problem-solving training effects in high-stressed community residents (D'Zurilla & Maschka, 1988). With regard to clinical populations, SPSI scores have been found to be related to hopelessness and suicidal probability in suicidal adult psychiatric patients (Faccini, 1992). The SPSI has also been found to distinguish significantly among adolescent suicide attempters, nonsuicidal psychiatric patients, and normal controls (Sadowski & Kelley, 1993).

The promising psychometric data notwithstanding, the structure of the SPSI is primarily theory-driven; no factor analyses were used in its development. Such analyses were deemed necessary in order to investigate the relations between the empirical data generated by the SPSI and the theoretical model of social problem solving on which it is based. Thus, the purpose of the present study was to investigate the factor structure of the SPSI. The study was conducted in two parts. In Part I, restricted (confirmatory) factor analysis was used to assess the goodness of fit of the two models on which the SPSI is based (a two-factor model, and a hierarchical model with seven first-order factors and two second-order factors). In Part II, unrestricted (exploratory) factor analysis was first performed in order to identify plausible alternative factor models for the SPSI. Then restricted factor analysis was used to compare these empirically derived models to the theoretically driven ones.

PART I

Method

The data for this study were obtained by merging several samples of undergraduate students from the State University of New York at Stony Brook who were enrolled in the introductory course in psychology at the time of the study. The first sample (n = 233) was assessed during the fall of 1987, the second (n = 261) during the fall of 1988, and the third (n = 107) during the fall of 1990. The total sample (n = 601) included 281 men and 320 women. The mean age was 19.4 years. The ethnic/racial composition was approximately, 72% white, 12% Asian-American, 8% Black, and 5% Hispanic.

All subjects completed the SPSI in group testing sessions lasting approximately 1 hour as part of a course requirement. Several additional questionnaires were also completed during these testing sessions, which provided data for other studies. To protect the subjects' anonymity, only subject numbers were placed on these questionnaires. In addition, all subjects signed consent forms which indicated that their test responses would be kept strictly confidential.

Results and Discussion

Maximum-likelihood restricted factor analysis was performed on the interitem correlation matrix of the SPSI.[3] Since D'Zurilla and Nezu's theoretical model hypothesizes a nested model with two major components (problem orientation and problem solving skills), and seven secondary components (the cognitive, emotional, and behavioral aspects of problem orientation and the four specific problem solving skills), we fitted three models to these data: (a) a two-factor model, (b) a seven-factor model, and (c) a hierarchical model with seven first-order factors and two second-order factors.

Assessing the goodness of fit of a model is a multifaceted and controversial issue (Tanaka, 1993); therefore, we used several different indices to select the most appropriate model for these data (see Bentler, 1990; Bollen, 1989; Bollen & Long, 1993; McDonald & Marsh, 1990). Because the above models are only approximations to reality, they will be rejected by the chi square test statistic at a conventional alpha level if a large enough sample is used and, conversely, they will be accepted if a small enough sample is used (Browne & Cudeck, 1993). Thus, in addition to chi-square, we also used the following indices to assess goodness of fit: the Root Mean Squared Error of Approximation (RMSEA; Steiger, 1990), the Root Mean Squared Residual (RMSR; Jöreskog & Sörbom, 1993), the Adjusted Goodness-of-Fit Index (AGFI; Jöreskog & Sörbom, 1993), and the Relative Noncentrality Index (RNI; McDonald & Marsh, 1990; see also Bentler, 1990), using the independence model as baseline (where all items are assumed to be uncorrelated). Adequate to good fit is suggested by RMSEA and RMSR values approaching .05. For the AGFI and the RNI indices, values between .80 and 1.00 indicate adequate to good fit.

With regard to the two-factor model, the RMSEA value indicates that this model can be considered a reasonable approximation to these data in relation to its degrees of freedom, RMSEA = .065, $p = 1.0$,[4] and the RNI value suggests a borderline acceptable fit, RNI = .70. However, the values of the RMSR and AGFI indices do not support this model, RMSR = .11; AGFI = .61. The chi-square statistic for this model is $\chi^2(2344) = 8279.47$, $p < .01$.

[3]Some investigators might question the appropriateness of using maximum-likelihood estimation, which assumes multivariate normality, on Likert data. However, alternative estimation methods specifically designed for categorical data (e.g., Muthén, 1984) are not computationally feasible with models of the size considered here (70 items). In addition, some studies (e.g., Muthén & Kaplan, 1992) have shown that maximum likelihood is somewhat robust to violations of the multinormality assumption when applied to Likert data.
[4]This is the p-value for the test of close fit, H_0: RMSEA .05.

The hierarchical model with seven first-order factors and two second-order factors fits these data only slightly better than the two-factor model. The RMSR value is identical for both models, the RMSEA value improves to .061, the RNI index improves to .74, and the AGFI index improves to .63. Using the two-factor model as a baseline, the hierarchical model represents only a 12% improvement as assessed by the RNI index. The chi-square statistic for this model is $\chi^2(2337) = 7576.52$, $p < .01$.

We tried to obtain a better fitting model by relaxing the constraints of the hierarchical model. Hence, we fitted a seven-factor model without a second-order structure. In so doing, we observed that despite being a less restrictive model, the fit of this model did not represent an improvement over that provided by the hierarchical model. In fact, the RMSEA, RMSR, AGFI, and RNI values are identical for both models. The chi-square statistic for the seven-factor model is $\chi^2(2324) = 7496.09$, $p < .01$. The reason for the lack of improvement can be found by inspecting the matrix of correlations among the first-order factors. The correlations between the factors underlying the cognitive and emotional aspects of problem orientation is .90, and the correlations among the four specific problem-solving skills (problem definition and formulation, generation of alternative solutions, decision making, and solution implementation and verification) are also all above .90. The magnitude of these correlations suggests that it is inappropriate to treat these components as separate dimensions within the domains of problem orientation and problem-solving skills.

In summary, the hierarchical model and the seven-factor model failed to show a substantial improvement over the two-factor model. However, the absolute goodness-of-fit of the two-factor model is only modest. Although the RMSEA value provides some support for this model, the other goodness-of-fit indices raise the question of whether a better low-dimensional model could be found for these data. Consequently, in Part II of this study, we reanalyzed these data in an exploratory fashion in an attempt to identify plausible alternative dimensionality hypotheses for the SPSI that would be interpretable within social problem-solving theory. We subsequently used restricted factor analyses to compare the fit of these empirically derived models to the theoretically driven two-factor model. In order to avoid capitalizing on chance, the restricted factor analyses were performed on two independent samples—the sample used in Part I (which was also used in the exploratory analyses in Part II), and a cross-validation sample drawn from the same population. The following three criteria were used to determine the best model: cross-validation, parsimony, and relative goodness of fit.

PART II

Method

Two samples were used in this part of the study. Sample 1 was the same sample described in Part I. Sample 2 consisted of an additional sample of undergraduate students from the State University of New York at Stony Brook ($n = 323$) who completed the SPSI as part of a course requirement during the fall of 1991.[5] This sample consisted of 169 women and 36 men. Their mean age was 19.5 years and the ethnic/racial composition was 55% white, 9% Asian-American, 8% Black, and 20% Hispanic. The data collection procedures were the same as described in Part I.

Results and Discussion

Exploratory Factor Analysis

Unrestricted factor analysis was performed on the SPSI data for Sample 1 using unweighted least-squares estimation. Oblique rotations (promax) were used in interpreting the multifactor solutions because correlated factors were expected. In our analysis, we used a rather conservative procedure for identifying plausible dimensionality hypotheses that consisted of (a) constructing a confidence interval of two factors above and below the dimensionality hypothesis suggested by the ratio-of-eigenvalue-differences criterion (also known as "scree plot"), and then (b) determining if these hypotheses could be interpreted meaningfully within social problem-solving theory.

Table I presents the eigenvalues of the correlation matrix of the 70-item SPSI. The ratio-of-eigenvalue differences criterion suggested that a three-factor solution might be most appropriate. Consequently, we decided to examine dimensionality hypotheses ranging from two to five factors. In attempting to interpret these four models using social problem-solving theory, we decided to eliminate four items from the inventory because they seemed to be measuring divergent dimensions that could not be integrated meaningfully within any of the theoretical constructs that we were considering. The eigenvalues for the reduced 66-item SPSI are also presented in Table I. Using social problem-solving theory, we interpreted the four hypothesized models as follows:

[5]The authors would like to thank Ed Chang for kindly providing the data for Sample 2.

Table I. Eigenvalues of the Correlation Matrix of the Social Problem-Solving Inventory[a]

Factor	70-Item SPSI	66-item SPSI
1	17.28598	16.46486
2	9.18284	9.14969
3	3.15687	2.78452
4	1.87072	1.81548
5	1.38361	1.37328
6	1.32093	1.26569
7	1.26800	1.25995
8	1.19957	1.15224
9	1.12227	1.07135
10	1.08950	1.05738

[a]$N = 601$; SPSI = Social Problem-Solving Inventory.

- *Five-factor model*: (1) positive problem orientation (PPO), (2) negative problem orientation (NPO), (3) rational problem solving (RPS), (4) impulsivity/carelessness style (ICS), and (5) avoidance style (AS).
- *Four-factor model*: (1) PPO + RPS, (2) NPO, (3) ICS, (4) AS.
- *Three-factor model*: (1) PPO + RPS, (2) NPO + AS, (3) ICS.
- *Two-factor model*: (1) PPO + RPS, (2) NPO + ICS + AS.

The percentages of variance accounted for by these four models (in the order presented above) are 48.8%, 47.3%, 45%, and 41.1%. To be sure that five factors would be sufficient, we also examined the six-factor solution and discarded it because we could not interpret substantively the rotated solution. Table II presents the factor loadings for the five factor solution. The clusters of items corresponding to each of the five factors are shown in bold print.[6]

Confirmatory Factor Analysis

In our final set of analyses, we used maximum-likelihood restricted factor analysis to compare the fit of each of these four empirically derived models to each other and to that of the original theory-derived two-factor model. Because the models obtained in the exploratory factor analysis are

[6]The item numbers that appear in this table correspond to those in the SPSI, which is available from the authors upon request.

Table II. Matrix of Loadings of the Five-Factor Model for the Social Problem-Solving Inventory Obtained Using Unrestricted Factor Analysis[a]

Item No.	PPO	NPO	RPS	ICS	AS
10	**0.65015**				
12	**0.57354**	−0.27056			
26	**0.35783**		0.27878	−0.45581	0.24379
37	**0.34419**	−0.25463	0.38040		0.21124
51	**0.21556**	−0.27765	0.48606		0.25312
1		**0.51310**			
3		**0.54332**			
6	−0.28215	**0.46883**			0.23895
18	−0.23691	**0.55363**			
59		**0.50324**			
63	−0.20112	**0.47865**			
67		**0.51576**	0.20087		
4		**0.69231**			
9		**0.67985**			
17		**0.61245**			
24		**0.71524**			
43		**0.75373**			
47		**0.85187**			
48		**0.42297**		0.33510	
54		**0.82889**			
68		**0.79780**			
2			**0.52502**		
13	0.22671	−0.21414	**0.48916**		0.23294
16	0.21701		**0.54421**		
20			**0.52809**		
38			**0.73224**		
39			**0.68188**		
41			**0.53235**		
44			**0.56239**		
58			**0.62632**		
66			**0.65589**		
8			**0.55137**		
27			**0.44086**		
29			**0.68373**		
34			**0.65841**		
52			**0.73845**		
62			**0.62149**		
65			**0.74357**		
25		0.28040	**0.46436**		
32			**0.50798**		
53			**0.77664**	−0.22214	
57		0.21949	**0.55868**	−0.20352	
61			**0.65405**		
33		0.21214	**0.54966**		
35		0.29858	**0.57383**		
36			**0.50453**		
46	0.22607		**0.51384**		
49			**0.60567**		

Table II. Continued

Item No.	PPO	NPO	RPS	ICS	AS
11				**0.58843**	0.22560
28				**0.63283**	0.28299
30		0.36971		**0.37265**	
60				**0.55052**	0.23810
70				**0.52912**	0.26696
5				**0.40943**	
7	0.21088			**0.44822**	0.23369
22				**0.40259**	0.49161
45	0.29180		−0.21592	**0.57715**	0.22194
69		0.20506		**0.29139**	0.27125
15					**0.63632**
21					**0.83679**
23					**0.56880**
31					**0.69031**
40					**0.71206**
42					**0.71492**
56		0.30897			**0.46508**
64		0.32038		0.22790	**0.33752**

[a] $N = 601$; factor loadings $< |.2|$ have not been printed; the factor loadings in bold are those to be estimated by restricted factor analysis; PPO = positive problem orientation; NPO = negative problem orientation; RPS = rational problem solving; ICS = impulsivity/carelessness style; AS = avoidance style.

nested models, the five factor model was obtained by estimating all factor loadings appearing in bold print in Table II while fixing all other loadings at zero, and the two- to four-factor models were obtained by suitably constraining the five factor model. In all cases, the factors were assumed to be correlated. The goodness of fit indices obtained after fitting these models to both samples are presented in Table III. For purposes of comparison, the indices for the original theory-driven two-factor model are also included in this table. Two different RNI values are reported: RNI_a uses the independence model as baseline, whereas RNI_b uses the original two-factor model as the baseline. In addition, two new goodness of fit indices are reported which take into account parsimony and expected cross-validation, respectively, as well as goodness of fit: the Corrected Akaike's Information Criterion (CAIC: Bozdogan, 1987) and the Expected Cross-Validation Index (ECVI: Browne & Cudeck, 1989).

Using the original two-factor model as baseline, the RNI_b shows that the empirically derived two-factor model represents an improvement over the original two-factor model of 18% and 12% in Samples 1 and 2, re-

Table III. Goodness-of-Fit Indices of the Original Two-Factor Model and Four Empirically Derived Models for the Social Problem-Solving Inventory[a]

	Sample 1 (N = 601)	Empirically derived models[b]				Sample 2 (N = 323)	Empirically derived models[b]			
Index	Original two factors	Two factors	Three factors	Four factors	Five factors	Original two factors	Two factors	Three factors	Four factors	Five factors
χ^2	7394.73	6462.04	5931.02	5372.61	4961.83	5570.37	5146.30	4750.35	4305.35	3971.11
d.f.	2078	2078	2076	2073	2069	2078	2078	2076	2073	2069
p-value	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
RMSEA	.065	.059	.056	.052	.048	.072	.068	.063	.058	.053
RMSR	.11	.080	.074	.070	.060	.12	.094	.091	.087	.073
AGFI	.62	.67	.71	.75	.77	.54	.57	.62	.67	.70
RNI_a	.72	.77	.80	.83	.85	.69	.73	.76	.80	.83
RNI_b	—	.18	.28	.38	.46	—	.12	.23	.36	.46
ECVI	12.77	11.21	10.34	9.41	8.74	18.13	16.81	15.59	14.23	13.21
CAIC	8378.74	7446.05	6929.83	6393.62	6012.43	6471.80	6047.73	5665.33	5240.94	4933.53

[a]Sixty-six items; RMSEA = Root Mean Squared Error of Approximation; RMSR = Root Mean Squared Residual; AGFI = Adjusted Goodness-of-Fit Index; RNI_a = Relative Noncentrality Index using the independence model as baseline; RNI_b = Relative Noncentrality Index using the original two factor model as baseline; ECVI = Expected Cross-Validation Index; CAIC = Corrected Akaike's Information Criterion
[b]Models: Original two factors: (1) POS, (2) PSSS.
Empirically derived two factors: (1) RPS + PPO, (2) NPO + AS + ICS.
Empirically derived three factors: (1) RPS + PPO, (2) NPO + AS, (3) ICS.
Empirically derived four factors: (1) RPS + PPO, (2) NPO, (3) AS, (4) ICS.
Empirically derived five factors: (1) RPS, (2) PPO, (3) NPO, (4) AS, (5) ICS.
where POS = Problem Orientation Scale; PSSS = Problem Solving Skills Scale; PPO = Positive Problem Orientation; NPO = Negative Problem Orientation; RPS = Rational Problem Solving; ICS = Impulsivity/ Carelessness Style; AS = Avoidance Style.

spectively. Indeed, with the same number of degrees of freedom, the empirically derived two-factor model represents a substantial improvement over the baseline model as assessed by every goodness-of-fit index. Thus, even the simplest empirically derived model for the SPSI was found to provide a better fit to these data than the theoretically-driven model.

As expected, an inspection of the goodness-of-fit indices for all four empirically derived models reveals that models of increased complexity provide a better fit to these data than models of lesser complexity. That is, the three-factor model provides a better fit to these data on every goodness-of-fit index than the two-factor model, but a poorer fit than the four-factor model, and so on. Furthermore, the increments in goodness-of-fit for models of increased complexity appear nontrivial. Thus, using absolute and relative goodness-of-fit as criteria, the best model for these data is the five factor model.

If we were to use parsimony as the criterion to choose the best model, we would select the model with smallest CAIC value, which in both samples is the five factor model. Finally, if we were to use expected cross-validation as the criterion to choose the best model, we would select the model with lowest ECVI value, which again in both samples is the five factor model. In fact, the ECVI value obtained in Sample 2 and reported in Table III, 13.21, is smaller than the ECVI for the saturated model (where all items are assumed to be intercorrelated), 13.73, which indicates that the five factor model is a excellent model in a cross-validation sense. Thus, using as criteria goodness-of-fit, expected cross-validation, and parsimony, we concluded that the five factor model is the best fitting model for these data. According to the RNI_b, this model represents an improvement of 46% over the two-factor baseline model in both samples.

In Table IV, we present the interfactor correlations obtained after fitting the five-dimensional model to both samples. Except for the correlation between the positive and negative problem orientation factors, which is slightly different between samples, both matrices appear identical, which indicates that the relationships among the factors are very stable in cross-validation samples. Although some of the correlations reported in this table are relatively high (above .70), none of them is high enough as to suggest that any of the factors may be redundant. In fact the highest amount of variance that any two factors share is 60% (negative problem orientation and avoidance style in the derivation sample). The smallest correlations in this table are between negative problem orientation and rational problem solving, which only share 4% of their variance.

The factors in Table IV correlate positively or negatively with one another because two of them are constructive or facilitative dimensions (positive problem orientation and rational problem solving), whereas the

Table IV. Interfactor Correlations in the Five-Factor Model of the Social Problem-Solving Inventory[a]

	PPO	NPO	RPS	ICS	AS
PPO		−.52 (.04)	.74 (.03)	−.35 (.05)	−.59 (.04)
NPO	−.66 (.04)		−.17 (.04)	.61 (.03)	.78 (.02)
RPS	.72 (.04)	−.20 (.04)		−.46 (.04)	−.31 (.04)
ICS	−.36 (.04)	.61 (.04)	−.45 (.04)		.72 (.03)
AS	−.67 (.04)	.75 (.04)	−.33 (.04)	.70 (.04)	

[a]The results obtained from Sample 1 are provided above the diagonal (*N* =601), while the results from Sample 2 are provided below the diagonal (*N* = 323); the values in parentheses are estimated standard errors; PPO = Positive Problem Orientation; NPO = Negative Problem Orientation; RPS = Rational Problem Solving; ICS = Impulsivity/ Carelessness Style; AS = Avoidance Style.

remaining three are dysfunctional dimensions (negative problem orientation, impulsivity/carelessness style, and avoidance style). This difference is reflected in the sign of their intercorrelations. The intercorrelations between the constructive factors and those among the dysfunctional factors are positive, whereas the intercorrelations between constructive and dysfunctional factors are negative.

GENERAL DISCUSSION AND CONCLUSIONS

Using both exploratory and confirmatory factor analyses, we found that a five factor model was most appropriate for the SPSI, based on the criteria of goodness-of-fit, parsimony, and cross-validation. The five factors are: (1) positive problem orientation, (2) negative problem orientation, (3) rational problem solving, (4) impulsivity/carelessness style, and (5) avoidance style. Whereas the first two factors are both problem-orientation dimensions, the remaining three factors can be identified as problem-solving proper dimensions.

As defined by the corresponding items of the SPSI, *positive problem orientation* may be described as a constructive, problem-solving cognitive "set," which involves the general tendency to (a) appraise a problem as a challenge; (b) believe that problems are solvable ("optimism"); (c) believe in one's own personal ability to solve problems successfully ("self-efficacy"); (d) believe that successful problem solving takes time, effort, and persistence; and (e) commit oneself to solving problems with dispatch rather than avoiding them. In contrast, *negative problem orientation* is a dysfunctional cognitive-emotional set, which involves the general tendency to (a) view a problem as a significant threat to well-being, (b) believe that problems are unsolvable ("pessimism"), (d) doubt one's own personal ability to solve problems successfully ("low self-efficacy"), and (e) become frustrated and upset when confronted with problems in living ("low frustration tolerance").

With regard to the problem-solving proper dimensions, *rational problem solving* is a constructive dimension that may be defined as the rational, deliberate, systematic, and efficient application of effective or adaptive problem-solving skills and techniques (i.e., problem definition and formulation, generation of alternative solutions, decision making, and solution implementation and verification). *Impulsivity/carelessness style*, on the other hand, is a dysfunctional dimension characterized by active attempts to apply problem-solving strategies and techniques, but these attempts tend to be impulsive, careless, hurried, and incomplete. Finally, *avoidance style* is another dysfunctional dimension characterized by procrastination (putting off solving problems), passivity (waiting for problems to resolve themselves), and dependency (attempting to shift the responsibility for problem solving to others). Below are some examples of SPSI items that load on each of these factors:

Positive Problem Orientation

10. When my first efforts to solve a problem fail, I usually think that if I persist and do not give up easily, I will be able to find a good solution eventually.
12. When I have a problem, I usually believe that there is a solution for it.

Negative Problem Orientation

4. I usually feel threatened and afraid when I have an important problem to solve.
17. When my first efforts to solve a problem fail, I get very angry and frustrated.

Rational Problem Solving

38. When I have a problem to solve, one of the first things I do is get as many facts about the problem as possible.
52. When I am attempting to solve a problem, I usually think of as many alternative solutions as possible until I cannot come up with any more ideas.

Impulsivity/Carelessness Style

5. When making decisions, I do *not* usually evaluate and compare the different alternatives carefully enough.
11. When I am attempting to solve a problem, I usually act on the first idea that comes to mind.

Avoidance Style

15. I usually wait to see if a problem will resolve itself first, before trying to solve it myself.
21. When a problem occurs in my life, I usually put off trying to solve it for as long as possible.

This five-dimensional model can be viewed as an empirically derived improvement of the original social problem-solving model proposed by D'Zurilla and Nezu (D'Zurilla, 1986; D'Zurilla & Nezu, 1990). At a general level, the present results support the major distinction postulated by D'Zurilla and Nezu between problem orientation and problem solving proper, or the application of problem-solving strategies and techniques. At a more specific level, however, the findings suggest five important revisions.

First, contrary to the original model, the present results indicate that positive problem orientation and negative problem orientation are not polar opposites on a single problem orientation dimension. Instead, they are best viewed as two different, albeit related problem orientation dimensions. This finding parallels results for the constructs of optimism and pessimism, which are assumed to overlap with positive and negative problem orientation (Chang, D'Zurilla, & Maydeu-Olivares, 1994; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992).

Second, the present results failed to support the hypothesized distinction in the original model between cognitive and emotional subcomponents of problem orientation. Therefore, these components should no longer be viewed as separate dimensions within problem orientation. Third, the avoidance behavior items of the original Problem Orientation Scale of the SPSI were found to form a separate factor, which is empirically distinguishable from the cognitive and emotional aspects of problem orientation. A content analysis of this item cluster suggested that this factor is best viewed as a dysfunctional problem-solving proper dimension, which we have labeled "avoidance style." This construct may overlap with the "defensive avoidance" decision-making pattern in Janis and Mann's (1977) model of decision making under stress, which is characterized by procrastination, passivity or inaction, and attempts to shift decision-making responsibility to others.

Fourth, the four hypothesized problem-solving skills in the original model (problem definition and formulation, generation of alternative solutions, etc.) were found to be empirically indistinguishable. Thus, these four skills are best conceived as a single, general problem-solving construct, which we have termed "rational problem solving." Finally, we found that the items within the original Problem-Solving Skills Scale that were designed to assess *deficits* in rational problem-solving skills are best viewed as a separate problem-solving proper dimension, which we have named "impulsivity/carelessness style." This dysfunctional problem-solving dimension may overlap with Janis and Mann's (1977) "hypervigilance," which is a decision-making pattern characterized by a sense of time pressure, narrowing of attention to only a few response alternatives, careless and unsystematic scanning of alternatives and consequences, and impulsive response selection.

The possible overlap between the constructs of avoidance style and impulsivity/carelessness style on the one hand, and Janis and Mann's (1977) concepts of defensive avoidance and hypervigilance on the other, should be investigated further in future empirical research. Whereas the construct of rational problem solving can be interpreted as representing the constructive problem-solving skills in a person's response repertoire, the dysfunctional dimensions of avoidance style and impulsivity/carelessness style might represent the detrimental influence of stress and negative problem orientation on the performance on these skills.

Although we have concluded from the present factor-analytic results that a revision of the original social problem-solving model described by D'Zurilla and Nezu (1982, 1990) is warranted, one reviewer noted that the evidence supporting our best-fitting model, the empirically derived five factor model, is not particularly strong, considering the modest AGFI results (.77 in Sample 1 and .70 in Sample 2). Absolute goodness-of-fit of a factor model is best examined by inspecting the residual correlations after fitting the model (McDonald, 1981), since by definition we say that a factor model fits the data if the residual correlations approach zero. Using an arbitrary cutoff of .15, we found that out of the total number of residual correlations, $p\ (p - 1)\ /\ 2 = 2{,}415$, the number of residual correlations above this criterion after fitting the five factor model was only 43 (or 1.78%) in Sample 1, and 121 (or 5%) in Sample 2 (the cross-validation sample). In contrast, we found that the number of residual correlations above .15 after fitting the original theory-driven two-factor model was 337 (or 13.95%) in Sample 1, and 432 (or 17.88%) in Sample 2. These results provide additional convincing support for the absolute goodness-of-fit of the empirically derived five factor model.

Questions might also be raised about the possibilities that the subjects in this study might not be representative of the population for which the SPSI was designed, or that the SPSI's scales and subscales are not adequately representative of the components of social problem-solving model described by D'Zurilla and his associates. However, neither of these two alternative explanations is likely to be valid. With regard to subject representativeness, the present college student samples in this study were drawn from the same population on which the SPSI was based. As far as content sampling and validation are concerned, specific steps were taken by D'Zurilla and Nezu (1990) to ensure the sampling representativeness of the SPSI items (see also D'Zurilla & Maydeu-Olivares, 1995). First, these investigators personally constructed an initial item pool of nearly 300 items to accurately reflect the major components of their model. Second, they validated the content sampling procedure by asking 10 graduate students, who were familiar with the problem-solving model, to rate the items in each subscale for the extent to which they adequately represented the relevant components of the model. Items were retained for the final version of the inventory only if they met a predetermined criterion of sampling representativeness.

Elsewhere (D'Zurilla, Nezu, & Maydeu-Olivares, 1995), we have presented a revised version of the Social Problem-Solving Inventory (the SPSI-R), which was designed to fit the five-dimensional social problem-solving model outlined above. The data accumulated thus far on the psychometric properties of the SPSI-R indicate that it is a very promising measure of social problem-solving processes which relates to measures of psychological symptoms, positive psychological well-being, social competence, and/or coping activities in several different populations, including college students, high school students, middle-aged community residents, elderly community residents, psychiatric patients, cancer patients, and caregivers of Alzheimer's patients (see D'Zurilla & Maydeu-Olivares, 1995; D'Zurilla *et al.*, 1995; Sadowski, Moore, & Kelley, 1994).

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