Psychometric Properties of the Social Problem Solving Inventory (SPSI) with Normal and Emotionally Disturbed Adolescents

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The factor structure of the Social Problem Solving Inventory (SPSI; D'Zurilla & Nezu, 1990) was evaluated with a sample of 708 normal adolescents. Confirmatory factor analysis supported the empirically derived five-factor model reported by D'Zurilla and Maydeu-Olivares (1994) using an adult sample, but not the theoretically derived seven-factor structure of the original SPSI. The psychometric properties of the original and revised inventories are reported for normal adolescents and psychiatrically hospitalized adolescents (n = 63). Internal consistency and reliability estimates were adequate. Support for the validity of the revised SPSI was demonstrated by examining the relationship between social skills, depression, and social problem solving; in addition, differences between normal and inpatient adolescent samples were examined. The findings are discussed in terms of the utility of the inventories with adolescents.

INTRODUCTION

Social problem solving has been defined as a complex process that makes available a variety of potentially effective alternatives for dealing with problematic situations and increases the likelihood of selecting the best response from among these alternatives (D'Zurilla & Nezu, 1982). While effective problem solving has been related to adjustment and social competence (Heppner and Anderson, 1985; Hopper & Kirschenbaum, 1985; Nezu, 1985), problem-solving deficits have been linked to depression, suicidal behavior, and poor social adjustment among children (Asarnow & Callan,

1985; Orbach, Rosenheim, & Hary, 1987), adolescents (Joffe, Dobson, Fine, Marriage, & Haley, 1990; Platt, Spivack, Altman, & Altman, 1974), and adults (Orbach, Bar-Joseph, & Dror 1990; Schotte and Clum, 1987). Social problem solving also has been related to suicidal behavior in adolescent and adult suicide attempters (McLeavey, Daly, Murray, O'Riordan, & Taylor, 1987; Rotheram-Borus, Trautman, Dopkins, & Shrout, 1990; Sadowski and Kelley, 1993). Further, singular deficits in problem orientation, a component of social problem solving, have been documented suggesting that suicide attempters tended to think about problems in a less accurate fashion, to respond more affectively to dilemmas, and to adopt less adaptive behavioral responses to problematic situations than distressed and nondistressed peers (Sadowski & Kelley, 1993).

Although some problems have been noted with the assessment of social problem-solving skills, such as poor psychometric properties (e.g., poor reliability and validity, lack of normative data and standardized procedures) and sampling a narrow range of content areas and skills (Gresham, 1985; Krasnor & Rubin, 1981), D'Zurilla and Nezu (1990) recently developed a comprehensive measure of social problem solving, the Social Problem Solving Inventory (SPSI), that has favorable psychometric properties with adults. The SPSI assesses problem orientation and problem-solving skills. Problem orientation is the generalized cognitive–affective–behavioral response set problems solvers bring to interpersonal dilemmas. Problem definition, generation of alternatives, decision making, and solution implementation and verification are the four problem-solving skills. Subsequent factor-analytic investigations of the SPSI with adults identified five social problem-solving dimensions: positive problem orientation, negative problem orientation, rational problem solving, impulsive/careless style, and avoidance coping style (D'Zurilla & Maydeu-Olivares, 1994). Positive problem orientation has been conceptualized as being challenged by problems, self-efficacy, reliance on problem-solving coping strategies, and positive expectations. In contrast, negative problem orientation encompassed maladaptive attributions, negative expectations, and disruptive emotions, such as anxiety and anger. Problem definition, generation of alternatives, decision making, and solution implementation comprised a single rational problem-solving factor reflecting systematic, efficacious use of problem-solving strategies. Finally, impulsive careless responses to problems were differentiated from avoidant styles, such as denial, procrastination, passivity, and dependency. Based on these empirical findings, D'Zurilla and associates have revised the inventory resulting in a 52-item measure, the Social Problem Solving Inventory—Revised (SPSI-R; D'Zurilla & Maydeu-Olivares, 1994).

In this study, the psychometric properties of the SPSI were investigated in a sample of normal adolescents. Confirmatory factor analysis was utilized in an attempt to replicate the factor structure of the SPSI and, subsequently, the SPSI-R. Based on the results of the confirmatory factor analyses, the psychometric properties of the original and the revised inventory were evaluated with samples of normal and disturbed adolescents. Internal consistency and split-half reliability estimates were obtained. Validity was assessed by examining the relation between measures of social problem solving, social skills, and depression; in addition, differences between psychiatric patients and normals were examined.

METHOD

Subjects and Procedures

High School Students. A total of 708 adolescents from local junior and senior high schools participated in this study. The students completed the questionnaires in their classroom during a free period or at home under parental supervision. Questionnaires with missing data and/or self-reports of past psychiatric hospitalization(s) were excluded from the analyses. The sample was comprised of 394 (55%) females and 314 (44%) males. Participants ranged in age from 13 to 17 with a mean age of 15.18 (SD = 1.27). All grades (7 through 12) and socioeconomic levels were represented. The majority of the sample (85.6%) had never received any mental health treatment with the remaining subjects reporting treatment duration of less than 3 months (6.0%), 3 to 6 months (3.0%), and greater than 6 months (5.4%).

Inpatient Clinical Sample. Sixty-three psychiatric inpatients (39 females, 24 males) participated in the study. Adolescents completed the questionnaires within 2 weeks of admission. The subjects, who ranged in age from 13 to 17 years, with a mean age of 14.76 years (SD = 1.23), were consecutively admitted to state and private psychiatric facilities in a mid-sized urban community. All grades and socioeconomic levels were represented. The majority of the sample had a history of mental health treatment in outpatient settings (61.8%). Psychiatric diagnoses for the inpatient sample were based on criteria from the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.) (DSM-IIIR; American Psychiatric Association, 1978) by staff psychiatrists based on interviews with the adolescent and the parents, as well as on observations by other hospital staff. A reliability check of the diagnoses was performed by having two independent graduate student raters apply DSM-IIIR criteria to a randomly selected group (25%) of charts. Interrater reliability on the

randomly selected group of charts was high (kappa = .99). The reliability between the independent raters and psychiatric diagnoses at discharge was within acceptable limits (kappa = .87). Principal diagnoses included major depression (n = 12), dysthymia (n = 10), conduct disorder (n = 9), adjustment disorder (n = 9), alcohol/substance abuse (n = 9), depression not otherwise specified (n = 7), bipolar disorder (n = 4), and other mental disorders (n = 3).

Preliminary analyses revealed significant differences for age [$t(769)$ = $-2.148, p$ < .013] and socioeconomic status [$\chi^2(4)$ = 22.95, p < .0001], indicating that the high school sample was slightly older and of higher socioeconomic status. No significant differences emerged for gender [$\chi^2(1)$ = .92, $p \leq$ .34]. Age and socioeconomic status were treated as covariates in subsequent analyses.

Measures

Social Problem Solving Inventory. The SPSI (D'Zurilla & Nezu, 1990) is a theoretically derived, 70-item measure of social problem solving which is comprised of two scales, problem orientation and problem-solving skills. The problem orientation scale consists of three subscales: cognition (e.g., generalized beliefs, appraisals, attributions), emotion (e.g., distress vs. calm), and behavior (e.g., approach vs. avoidance). The problem-solving skills factor consists of four subscales: problem definition and formulation, generation of alternative solutions, decision making, and solution implementation and verification. Factor analysis of the SPSI revealed five factors: positive problem orientation, negative problem orientation, rational problem solving, impulsive/careless problem-solving style, and avoidant coping style (D'Zurilla & Maydeu-Olivares, 1993). On the basis of the factor analysis, the measure was revised resulting in the 52-item Social Problem Solving Inventory—Revised (D'Zurilla & Maydeu-Olivares, 1994), which is comprised of five scales: Positive Problem Orientation (PPO), Negative Problem Orientation (NPO), Rational Problem Solving (RPS), Impulsivity/Carelessness Style (ICS), and Avoidant Style (AS). Items are self-statements depicting either positive (facilitative) or negative (inhibitive) responses to real-life problem-solving situations. Each item is rated on a 5-point scale ranging from *not at all true of me* (0) to *extremely true of me* (4) by the respondent. Both versions of the measure has been shown to have adequate reliability and validity with adults (D'Zurilla & Maydeu-Olivares, 1994; D'Zurilla & Nezu, 1990).

Reynolds Adolescent Depression Scale. The Reynolds Adolescent Depression Scale (RADS) is a well-normed, 30-item measure for assessing depressive symptoms in adolescents (Reynolds, 1986). Internal consistency

coefficients between .92 to .96 and test–retest reliability of .84 have been reported (Reynolds, 1986).

Social Skills Rating Scale. The Social Skills Rating Scale (SSRS; Gresham & Elliot, 1990) is a well-normed, 30-item measure for assessing social skills in elementary and secondary school students. There are three versions (parent report, teacher report, and self-report) of the SSRS that yield ratings of social skills; in addition, subscale scores for cooperativeness, assertion, self-control, empathy (self-report only), and responsibility (parent/teacher only) can be obtained. The self-report form was used in this study. Internal consistency coefficients for the total SSRS (alpha = .83) and its subscale (alpha = .67-.77) are adequate (Gresham & Elliot, 1990). In addition, test–retest reliability for SSRS (r = .83) has been demonstrated. Convergent and discriminant validity data has also reported (Gresham & Elliot, 1990).

RESULTS

Confirmatory Factor Analysis

Confirmatory factor analyses (CFA) using LISREL > (Joreskog & Sorbom, 1986) were conducted to evaluate the factor structure of the SPSI with an adolescent sample. The theoretically derived seven-factor solution (D'Zurilla & Nezu, 1990) and the empirically derived five-factor solution (D'Zurilla & Maydeu-Olivares, 1993) were compared. Item loadings were assigned a weight of 1 on their respective scales and loadings on other factors were estimated. Because of the limitations associated with various goodness-of-fit indexes (e.g., sample size effects, noncentrality parameters), multiple indices were utilized (Bentler, 1990; Cole, 1987). The goodness-of-fit and adjusted goodness-of-fit indexes (AGFI & GFI; Joreskog & Sorbom, 1986), root mean squared of the residuals (RMS; Joreskog & Sorbom, 1986), Bentler and Bonett Index (BBI; Bentler & Bonett, 1980), and confirmatory fit index (CFIN; Bentler, 1990) are reported in Table I. Generally, GFI, AGFI, BBI, and CFIN values between .80 and .90 represent adequate to good fit with values greater than or equal to .90 reflecting good fit. RMS values less than .10 are suggestive of good fit. As seen in Table I, all the indexes for the five-factor model indicated adequate to good fit. All the indexes for the seven-factor model were inadequate. These results are consistent with prior findings obtained with an adult sample and suggest that the five-factor solution provides a more parsimonious model of the abilities measured by the SPSI, relative to the seven-factor solution. Given the results of the confirmatory factor analyses, subsequent psy-

Table I. Goodness-of-Fit Values from Confirmatory Factor
Analyses[a]

	Seven-factor model (SPSI)	Five-factor model (SPSI-R)
GFI	.74	.88
AGFI	.73	.87
RMS	.10	.05
BBI	.56	.83
CFI	.66	.90

[a]SPSI = Social Problem Solving Inventory; SPSI-R = SPSI
—Revised; GFI = Goodness-of-Fit Index; AGFI = Adjusted
Goodness-of-Fit Index; RMS = Residual Mean Square; BBI =
Bentler-Bonett Index; CFI = Confirmatory Fit Index. $p \leq .001$.

chometric analyses were conducted on the SPSI-R in normal and disturbed
populations.[3]

Reliability and Scale Intercorrelations

The SPSI-R administered to the high school sample had a coefficient
alpha of .85 and a Spearman–Brown split-half reliability index of .81. When
administered to an adolescent psychiatric sample, the SPSI-R achieved a
coefficient alpha of .90 and split-half reliability index of .93. The reliability
estimates for the normal and psychiatric samples and intercorrelations
among SPSI-R scales for the normal sample are presented in Table II. In
general, the reliability estimates were high for the RPS and NPO subscales
and moderate for the ICS, AS, and PPO subscales. Item–total score cor-
relations were greater than .45. While most of the interscale correlations
were significant, the degree of the correlations ranged from low to mod-
erate; in addition, the NPO and RPS subscales were not significantly cor-
related. The degree of the relationship between the subscales and SPSI-R
total score (range = .66 to .69) suggested that all subscale contributed sig-
nificantly to total SPSI-R score.

Validity

Concurrent Validity. Concurrent validity were examined by calculating
Pearson correlation coefficients to determine the degree of relationship be-

[3]Summary statistics and reliabilities for the original SPSI in a normal adolescent sample are
provided in the appendix. Total SPSI and SPSI-R scores were highly correlated ($r = .9871$).

Table II. Reliability Estimates and Intercorrelations Among SPSI Subscales and Total Scale Score[a]

	1	2	3	4	5	6	Coefficient alpha (normal)	Coefficient alpha (psychiatric)
1. NPO	—	-.02	$-.29^d$	$.54^d$	$.63^d$	$-.67^d$	.84	.85
2. RPS		—	$.59^d$	$-.12^c$	$.09^b$	$.67^d$	.87	.88
3. PPO			—	$-.14^d$	$-.31^d$	$.66^d$	.60	.62
4. ICS				—	$.59^d$	$-.66^d$	.74	.75
5. AS					—	$-.69^d$	.75	.76
6. SPSI-R						—	.85	.90

[a]SPSI = Social Problem Solving Inventory; NPO = Negative Problem Orientation; RPS = Rational Problem Solving; PPO = Positive Problem Orientation; ICS = Impulsivity/Carelessness Style; AS = Avoidant Style; SPSI-R = Social Problem Solving Inventory—Revised.
[b]$p \leq .05$.
[c]$p \leq .001$ (Bonferroni adjusted).
[d]$p \leq .001$.

tween the SPSI-R total score, SPSI-R subscale scores, and criterion scores on the RADS and SSRS for the high school sample. It was predicted that social problem solving would be negatively associated with depression and positively associated with social skills. Correlational analyses are presented in Table III. Due to the large number of correlations calculated, a Bonferroni correction procedure was utilized to adjust for experimentwise error

Table III. Correlations Between Social Problems Solving, Depression, and Social Skills

	RADS	SSRS
1. NPO	$.49^b$	$-.26^b$
2. RPS	$-.05^b$	$.32^b$
3. PPO	$-.26^b$	$.33^b$
4. ICS	$.26^b$	$-.25^b$
5. AS	$.31^b$	$-.22^b$
6. Total SPSI-R	$-.36^b$	$.42^b$

[a]NPO = Negative Problem Orientation; RPS = Rational Problem Solving; PPO = Positive Problem Orientation; ICS = Impulsivity/Carelessness Style; AS = Avoidance Style; SPSI-R = Social Problem Solving Inventory—Revised. RADS = Reynolds Adolescent Depression Inventory; SSRS = Social Skills Rating Scale.
[b]$p \leq .001$ (Bonferroni adjusted).

rate associated with conducting multiple comparisons and alpha was set at
.006. As predicted, there was a negative correlation between RADS and
total SPSI-R scores and a positive correlation between SSRS and SPSI-R
total scores. Further, PPO scale scores were negatively correlated with
RADS scores and positively correlated to SSRS scores. Conversely, NPO,
ICS, and AS scale scores were positively correlated with the RADS and
negatively correlated with the SSRS. RPS scale scores were not correlated
with RADS scores. *Post hoc* comparisons of correlated coefficients indi-
cated that the relationships between RADS and NPO scores and SSRS,
RPS, and PPO scores were stronger than other correlations.

Group Discrimination. The ability of the SPSI-R to discriminate be-
tween groups of adolescents was demonstrated by comparing the SPSI-R
scores of the 708 high school students with the 63 psychiatric patients. The
means and standard deviations for the SPSI-R in the high school and clini-
cal samples are presented in Table IV. Due to the potentially high corre-
lations among SPSI-R subscales, a multivariate analysis of covariance
(MANCOVA) was utilized with age, socioeconomic status, and depression
$[F(1, 767) = 36.10, p \leq .0001]$ as covariates. A significant effect for group

Table IV. Social Problem Solving Scores and Standard Deviations for High School and
Clinical Samples

	High school sample ($N = 708$)	Clinical sample ($N = 63$)	F	p
Negative Problem Orientation (NPO)				
Mean	17.68	24.35	8.63	.000
SD	8.43	9.63		
Rational Problem Solving (RPS)				
Mean	41.45	36.16	4.28	.039
SD	13.00	14.75		
Positive Problem Orientation (PPO)				
Mean	11.47	9.40	4.81	.029
SD	3.81	4.27		
Impulsivity/Carelessness Style (ICS)				
Mean	16.81	21.46	9.85	.002
SD	6.44	6.44		
Avoidance Style (AS)				
Mean	12.02	15.92	9.50	.002
SD	5.73	6.10		
Total Social Problem Solving (SPSI-R)[a]				
Mean	114.47	91.83	15.63	.000
SD	25.20	32.39		

[a]SPSI-R = Social Problem Solving Inventory—Revised.

membership emerged (Wilks's lambda = .95, $p \leq .0001$), with followup univariate analyses of covariance (ANCOVA) revealing that NPO, ICS, and AS scores were significantly higher and PPO and RPS scores were significantly lower in the emotionally-disturbed sample (see Table IV).

In order to further investigate the extent to which the SPSI-R scales differentiated between normal and emotionally disturbed adolescents, discriminant function analysis was employed (Huberty, 1975). Due to the discrepant group sizes, the Box statistic was computed (Stevens, 1986) and no significant effect for group size emerged ($F = 1.32, p \leq .15$). In order to account for group differences in demographic variables (age, socioeconomic status) and depression, these variables were entered first and second, respectively, in the stepwise procedure followed by the SPSI-R scales. Using the scales to classify adolescents resulted in a significant discriminant function (Wilks's lambda = .91, $p \leq .001$). Scores on the ICS, PPO, and NPO scales contributed significantly to the discriminate function, but RPS and AS scores did not. The overall classification rate was 70.08%; in addition, 70.1% of normal and 69.8% of emotionally disturbed adolescents were classified correctly. Cross-validation analysis (Stevens, 1986) was conducted by randomly splitting the sample, which resulted in stable classification functions with comparable proportions of adolescents correctly classified.

DISCUSSION

In this study, the factor structure of the Social Problem-Solving Inventory was evaluated with an adolescent sample. Confirmatory factor analyses were utilized to test models of social problem solving derived in studies with adults. The empirically derived five-factor model reported by D'Zurilla and Maydeu-Olivares (1994) was replicated with a sample of normal adolescents; however, the theoretically derived seven-factor structure of the original SPSI (D'Zurilla & Nezu, 1990) was not supported. Subsequently, the psychometric properties were evaluated using samples of normal and inpatient adolescents. Internal consistency and split half-reliability estimates were adequate. Support for the validity of the revised SPSI was provided with studies of the relationship between social skills, depression, and social problem solving; in addition, differences in the social problem-solving abilities of normal adolescent and inpatient samples were demonstrated. While research on adolescent social problem solving with the original or revised SPSI appears to be a worthwhile endeavor, the shorter, 52-item revision of the SPSI would appear to be more efficient and may be better tolerated by adolescents.

In earlier work, problem solving was theoretically conceptualized in terms of problem orientation, problem definition, generation of alternatives, decision making, and solution implementation (D'Zurilla and Goldfried, 1971). Factor-analytic studies with adults (D'Zurilla & Maydeu-Olivares, 1994) coupled with our finding with adolescents suggest that an alternative model of social problem solving involving positive problem orientation, negative problem orientation, impulsive style, avoidant style, and rational problem solving warrants additional study. Further, the results of the discriminant analysis suggest that positive problem orientation, negative problem orientation, and impulsivity/carelessness style dimensions may be particularly useful in differentiating between groups of adolescents.

While positive problem orientation reflects a facilitative cognitive orientation toward problems (e.g., being challenged by problems, self-efficacy, reliance on problem-solving coping strategies, positive expectations), negative problem orientation reflects inhibitive or disruptive cognitions or emotions (e.g., maladaptive attributions, negative expectations, anxiety, anger). Similar to studies with children and adults (Asarnow & Callan, 1985; Sacco & Graves, 1984; Zenmore & Dell, 1983), the present data suggest that depression was associated with poor problem solving in this adolescent sample. Further, depression was most significantly related to negative problem orientation, which is consistent with findings linking negative attributions to depression (Craighead, 1991; Sweeney, Anderson & Bailey, 1986) and suicidal behavior (McLeavey et al., 1987; Orbach et al., 1990; Sadowski & Kelley, 1993). In this study, positive problem orientation also differentiated between normal and disturbed adolescents. Although the research on positive cognitions is less extensive, the mediating role of control-related cognitions and coping strategies in depression and suicidal behavior has been documented (Asarnow, Carlson, & Guthrie, 1987; Brown & Siegel, 1988).

Active attempts to solve problems that are hurried, unsystematic, and likely to have negative consequences, such as failure or emotional distress, define an impulsive/careless problem solving style. In contrast, an avoidant coping style reflects denial, procrastination, passivity, and dependence in problem solving. While impulsive/careless problem solvers consider few alternative solutions in a haphazard manner with inadequate consideration of solution outcome, avoidant problem solvers delay solving problems or transfer responsibility for problem solving to others. Given that certain behaviors, such as impulsivity and avoidance, are characteristic of some psychiatric disorders, further research on problem solving response styles among disturbed populations (e.g., attention deficit disorder, avoidant disorder) would elucidate these dimensions.

In contrast to previous formulations of unique social problem-solving skills, the items assessing problem definition, generation of alternatives, de-

cision making, and solution implementation appear to comprise a single rational problem solving factor, suggesting that adolescents who are proficient in one skill are likely to utilize related skills. Further, rational problem solving was not associated with depression in this high school sample, suggesting that differences in the use of problem solving skills may be more relevant in disturbed populations (Joffe *et al.*, 1990; Rotheram-Borus et al., 1990; Sadowski & Kelley, 1993).

Given that self-reports of problem-solving abilities may not accurately reflect actual problem solving in real-life situations and that the covariation among measures may be related to similarity of measurement method (e.g., self-report), it would be beneficial to compare self-report of problem-solving abilities with behavioral observations and/or parent report of behavior in problem-solving situations. Future research might also examine the temporal stability and predictive validity of the SPSI with adolescents; in addition, the stability of the factor structure using a larger, independent sample of adolescent also might be investigated. Future research should explore the relationship between measures of maladaptive cognitions, such as automatic thoughts (Hollon & Kendall, 1980) and dysfunctional attitudes (Beck, Brown, Steer, & Weissman, 1991), and deleterious problem-solving components, particularly negative problem orientation, to further validate these problem-solving dimensions.

APPENDIX

Means and Standard Deviations for the Social Problem solving Inventory in High School and Clinical Samples[a]

	High school sample (N = 708)	Clinical sample (N = 63)	F	p
Social Problem Solving (SPSI)				
Mean	155.26	125.19	5.59	.001
SD	32.21	41.52		
Problem Orientation (POS)				
Mean	68.90	51.76	5.94	.001
SD	18.76	22.21		
Cognition (CS)				
Mean	24.90	19.68	6.21	.001
SD	5.72	6.45		
Emotion (ES)				
Mean	21.50	15.54	4.63	.001
SD	8.29	9.89		

APPENDIX. Continued

	High school sample (N = 708)	Clinical sample (N = 63)	F	p
Behavior (BS)				
Mean	22.55	16.54	5.55	.001
SD	7.49	8.29		
Problem Solving Skills (PSSS)				
Mean	86.19	73.43	4.01	.001
SD	20.07	24.53		
Positive Definition and Formulation (PDFS)				
Mean	21.16	18.79	2.26	.027
SD	6.65	8.05		
Generation of Alternative Solutions (GASS)				
Mean	21.17	18.38	2.92	·005
SD	6.65	7.38		
Decision Making (DMS)				
Mean	22.14	17.08	6.88	.001
SD	5.78	5.58		
Solution Implementation and Verification (SIVS)				
Mean	21.76	19.17	3.16	.002
SD	5.55	6.27		

[a]Prior to administering the SPSI to our adolescent sample, Flesch-Kincaid readability statistics (Wampler, 1989) were calculated and several items were simplified to a 10th-grade reading level that is "preferred" for most readers. The items changed are: 1, 4, 5, 10, 13, 14, 15, 16, 18, 27, 29, 31, 32, 33, 35, 36, 41, 45, 46, 47, 49, 54, 58, 61, 66, 67, 69, 70.

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