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Susan H. Spence, Jeanie Sheffield, Caroline L. Donovan

Published on: 01 Jan 2003 - Journal of Consulting and Clinical Psychology (American Psychological Association)

Journal of Consulting and Clinical Psychology
2003, Vol. 71, No. 1, 3–13

0022-006X/03/$12.00 DOI: 10.1037/0022-006X.71.1.3

Preventing Adolescent Depression: An Evaluation of the Problem Solving for Life Program

Susan H. Spence, Jeanie K. Sheffield, and Caroline L. Donovan
University of Queensland

This study evaluated the effectiveness of the Problem Solving For Life program as a universal approach to the prevention of adolescent depression. Short-term results indicated that participants with initially elevated depressions scores (high risk) who received the intervention showed a significantly greater decrease in depressive symptoms and increase in life problem-solving scores from pre- to postintervention compared with a high-risk control group. Low-risk participants who received the intervention reported a small but significant decrease in depression scores over the intervention period, whereas the low-risk controls reported an increase in depression scores. The low-risk group reported a significantly greater increase in problem-solving scores over the intervention period compared with low-risk controls. These results were not maintained, however, at 12-month follow-up.

The development of depression in adolescence is influenced by a complex interplay of biological, psychological, and environmental factors (Rehm & Sharp, 1996). Several psychosocial risk factors for depression have been identified, including negative life events, relationship difficulties, interpersonal skills deficits, and a cognitive style characterized by pessimistic attributions and expectations (J. Adams & Adams, 1993; Garber, Weiss, & Shanley, 1993; Kazdin, Rodgers, & Colbus, 1986; Lewinsohn, Clarke, & Rohde, 1994; Nolen-Hoeksema, Girgus, & Seligman, 1992; Puig-Antich et al., 1993; Puig-Antich et al., 1985a; Puig-Antich et al., 1985b). In addition, a range of protective variables has been proposed to reduce the negative impact of adverse life circumstances. These include family and peer support, coping skills, positive self-esteem, interpersonal problem-solving skills, and positive problem-solving orientation (M. Adams & Adams, 1991; J. Adams & Adams, 1993; Cheng & Lam, 1997; Goodman, Gravitt, & Kaslow, 1995; Lewinsohn et al., 1994; Sadowski & Kelly, 1993). There is, therefore, a strong theoretical rationale for proposing that an intervention designed to enhance positive problem-solving orientation, problem-solving skills, and positive explanatory style will be effective in decreasing the risk of developing depression during adolescence.

To date, research into the prevention of depression in young people is in its infancy. Of the few evaluations that have focused specifically on depression, the majority have involved targeted interventions with individuals who manifested some risk factor for the development of depression (selective prevention) or who showed already subclinical symptoms of the disorder (indicated prevention; Gordon, 1987). For example, Clarke et al. (1995) reported positive findings in terms of incidence of depressive disorders for a cognitive–behavioral program with high school adolescents who were assessed as showing elevated depressive symptoms. Similarly, Jaycox, Reivich, Gillham, and Seligman (1994) reported positive outcomes from a cognitive–behavioral intervention with primary school children who reported mild symptoms of depression and parental conflict in the home. The preventive intervention group reported significantly fewer symptoms of depression compared with a nonintervention control group (Gillham, Reivich, Jaycox, & Seligman, 1995) at 6-month and 2-year follow-ups but not at 12-month and 3-year follow-ups (Gillham & Reivich, 1999). Other studies have produced some encouraging results in the prevention of depression in young people following parental divorce (Wolchik, West, Westover, & Sandler, 1993), death of a parent (Sandler et al., 1992), and with children of depressed parents (Beardslee et al., 1997).

These selective or indicated prevention approaches contrast with universal programs in which all individuals in a particular population or community participate. Universal programs are proposed to have the advantages of avoiding participant stigma and the labeling effects of being singled out and of reaching individuals with a wide range of risk factors rather than of being limited to those who are influenced by only one or two risk factors (Offord, 2000). Universal interventions have also been associated with lower dropout and greater participation rates than those typically associated with selective or indicated prevention (Clarke et al., 1995; Shochet et al., 2001).

There have been few empirical investigations of universal preventive interventions that aim specifically to prevent depression with adolescents, although there have been several controlled trials examining the benefits of broader based interventions designed to promote general psychological well-being or to prevent substance abuse (e.g., Botvin, Schinke, Epstein, Diaz, & Botvin, 1995; Caplan et al., 1992; Ellickson, Bell, & Harrison, 1993; Hansen & Graham, 1991). Clarke, Hawkins, Murphy, and Sheeber (1993) described two very brief, psychoeducational interventions that aimed to prevent adolescent depression, neither of which produced a significant impact on depressive symptoms. Clarke et al. (1993) criticized their programs for failing to include a skills-training component to rectify those skills deficits (e.g., social or problem-

Susan H. Spence, Jeanie K. Sheffield, and Caroline L. Donovan, School of Psychology, University of Queensland, Brisbane, Queensland, Australia.

Correspondence concerning this article should be addressed to Susan H. Spence, University of Queensland, School of Psychology, Brisbane, Queensland 4072, Australia.

solving skills deficits) associated with depression in young people. Shochet et al. (2001) examined the impact of a skills-based universal program designed to prevent depression in young people. These authors evaluated the effects of an 11-session intervention, supplemented by 3 sessions for parents. A total of 240 pupils ages 12–15 years were assigned to either a monitoring control group or a preventive intervention (with or without parental involvement). The intervention was conducted by a psychologist in small groups, and combined elements of cognitive–behavioral therapy and interpersonal psychotherapy. Attendance by parents was low, and no difference was found between intervention with and without parent participation. However, students who completed the interventions showed a small but significant reduction in depression symptoms on one of the two measures of depression and on the hopelessness scale. This effect was not shown by the monitoring-only group, and the effect was maintained at 10-month follow-up.

Shochet et al.'s (2001) study provided a more optimistic picture of universal prevention for depression, but methodological limitations restrict the conclusions that can be drawn. The sample size was small, and students were not randomly assigned to conditions. The monitoring-only group included Grade 9 students in a single school in 1996, whereas the intervention group involved Grade 9 students from the same school in 1997. Furthermore, assessments were taken at different times during the school year, with the monitoring-only students being around 6 months older than the intervention group was at the time of assessments. Also, from a practical point of view, the use of psychologists and the small group format make the program expensive to run. It would be valuable to determine the feasibility and efficacy of a larger scale school-based prevention implemented in whole classrooms by teachers.

The present study evaluated the long-term impact of a universal, teacher-implemented, classroom-based intervention to prevent depression among adolescents. The study used a large sample size, with multiple schools and random assignment of schools to experimental conditions. The study also provided the opportunity to determine whether the effects of the program on depression were mediated by changes in problem-solving skills.

Method

Participants

Participants were 1,500 Grade 8 students, ranging in age from 12 to 14 years (at commencement of the study), who attended one of the 16 participating high schools in the Brisbane region of Queensland, Australia. All schools were coeducational. The intervention condition was implemented by 28 teachers from 8 schools, with a total of 751 participating students (47.5% male and 52.5% female) with an average age of 12.85 years ($SD = 0.54$). Socioeconomic status (SES), based on parental occupation, was coded using the 10-point Australian Standard Classification of Occupations Dictionary (Australian Bureau of Statistics, 1997). The average SES rating for the intervention school students was 4.55 ($SD = 2.66$), typical of the SES distribution of Australia in general. This value is indicative of lower middle SES, on average (e.g., *trades* occupations are coded as 4, *clerical* occupations as 5). In the intervention condition, 90.1% of the students were born in Australia, with the remainder coming from a wide variety of ethnic backgrounds typical of the Australian population. The intervention condition included 523 students from six state schools, and 228 students from two private schools.

The control condition consisted of eight schools with a total of 749 participating students (49.4% male and 50.6% female) with an average age of 12.90 years ($SD = 0.53$). Average SES for this group was 4.32 ($SD = 2.61$), and 88.8% of the control students were born in Australia. The control condition included 501 students from five state schools, and 248 students from three private schools.

Measures

Beck Depression Inventory (BDI). Depressive symptoms were assessed using the BDI (Beck, Rush, Shaw, & Emery, 1979). The BDI was initially developed for use with adults and has well-established psychometric properties (Beck, Steer, & Garbin, 1988). Several studies have shown it to have acceptable internal consistency, test–retest reliability, and construct validity with adolescents (see Reynolds, 1994, for a review). In the present study, minor modifications were made to the original BDI, in accordance with other research studies that have used the BDI with adolescent samples (Bennett et al., 1997; Carter & Dacey, 1996; Reynolds, 1994). These changes included the removal of Item 21, which asked about sexual interest, and simplification of terminology to aid understanding of Item 11 (the word *annoyed* was used to define *irritable*).

Dysthymia (DY). Given concerns that some adolescents who experienced symptoms of DY rather than depression may not be identified by the BDI, four questions were developed to reflect *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) diagnostic criteria for DY in adolescents. Students who responded positively to both the frequency and duration questions for symptoms of sadness or irritability, consistent with *DSM–IV* criteria for DY, were categorized as high risk and received a clinical interview. The DY questions were completed at preintervention and 12-month follow-up and were used only for screening purposes and not as an outcome measure.

Structured diagnostic interview with high-risk students. The Anxiety Disorders Interview Schedule for Children (ADIS-C; Silverman & Albano, 1996) is a semistructured interview designed to allow the diagnosis of childhood disorders on the basis of the *DSM–IV*. Interrater reliability of ADIS-C diagnoses and test–retest reliability have been found to be good (Silverman & Eisen, 1992; Silverman & Nelles, 1988). Only the major depressive disorder (MDD), DY, and bipolar disorder (BD) sections of the interview were administered in the present study. The measure was selected on the basis of its ease and speed of administration, and relative ease of training interviewers to a satisfactory criterion of reliability. Although a parallel parent version of the interview is available, resources allowed only for the child interview to be conducted.

Interviewers were trained on the ADIS-C for a minimum of 6 hr to ensure adequate proficiency and interassessor reliability using the instrument. Interrater reliability for diagnosis of depressive disorders using the ADIS-C was examined by audiotaping a random sample of 30 (10%) preintervention interviews and later allowing an independent clinician to listen to the audiotapes and determine diagnostic status. However, among this sample, only 1 individual received a diagnosis of depression, and there was 100% agreement between independent assessors regarding diagnostic status of all 30 interviewees. To examine further the reliability of diagnoses, 167 written transcripts from an equal proportion of preintervention, 6-, and 12-month interviews were examined by an independent assessor. Of the 167 interviews, 12 revealed a clinical diagnosis of a depressive disorder, with 99% overall agreement between the original interviewer and the independent assessor regarding the presence and type of depressive disorder.

Survival analysis. To track new or continuing episodes of depression during the follow-up period, we interviewed high-risk students at 6- and 12-month follow-ups using the Longitudinal Follow-Up Evaluation (LIFE; Shapiro & Keller, 1979). The LIFE interview uses a series of structured prompts to identify episodes of depression over the previous 6 months. A question tree is used that prompts the interviewee about depressive symptoms experienced currently and at the previous interview. Periods of deterioration or improvement in symptoms, symptom-free periods, and periods in which symptoms were present are then explored over the period

between interviews. LIFE grids are used that contain dates of significant events relevant to the individual (e.g., school and personal) as anchor points to identify weeks in the preceding 6 months in which the individual met criteria for a depressive disorder or episode. This technique has been used in previous longitudinal research with adolescents and has been shown to have high interassessor reliability (Clarke et al., 1995). A more detailed description of the LIFE is provided by Shapiro and Keller (1979).

General psychopathology. Participants completed the Youth Self-Report form of the Child Behavior Checklist (YSR; Achenbach, 1991) at preintervention and 12-month follow-up. This measure has been widely used in the literature and has well-established psychometric properties. The Internalizing and Externalizing scales were used in the analyses.

Social functioning. The Child and Adolescent Social and Adaptive Functioning Scale (CASAFS; Price, Spence, Sheffield & Donovan, 2002) assesses social and adaptive functioning across four domains. The CASAFS is a 24-item self-report measure with four subscales (each containing 6 items), allowing for the examination of adaptive social functioning in the areas of school performance, peer relationships, family relationships, and home duties and self-care. The scale has high internal consistency and acceptable test–retest reliability, with confirmatory factor analysis supporting the construct validity of the four subscales (Price et al., 2002).

Problem solving. The Social Problem-Solving Inventory—Revised Short Form (D'Zurilla & Maydeu Olivares, 1995) is a 25-item self-report questionnaire, with five subscales. Two of these subscales, Positive Problem Orientation and Negative Problem Orientation assess functional and dysfunctional cognitive and emotional orientations toward solving life problems. The three remaining subscales, Rational Problem Solving, Impulsivity–Carelessness Style (ICS), and Avoidance Style assess problem-solving skills and behavioral style. The five subscales have been shown to have good internal consistency and test–retest reliability (D'Zurilla, Nezu, & Maydeu-Olivares, in press).

Attributional style. The Children's Attributional Style Questionnaire—Revised (CASQ–R; Seligman et al., 1984) was used to assess optimistic and pessimistic explanatory style at baseline and 12-month follow-up. The CASQ–R consists of 24 items with six subscales providing internal, stable, and global attribution scores for both positive and negative events. Each item consists of a hypothetical event for which participants are required to choose the most likely explanation from two alternatives. A composite positive event score is calculated by adding the internal, stable and global attribution scores for positive events. Similarly, a composite negative event score is calculated by adding the internal, stable and global attribution scores for negative events. The overall composite score used in the present study was calculated by subtracting the composite negative event score from the composite positive event score, with lower scores indicating a more depressive attributional style. The psychometric properties of the CASQ–R have been shown to be acceptable, but not strong, with moderate internal consistency and fair test–retest reliability (Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998).

Negative life events. A modified version of the Life Events Record (Coddington, 1972) for junior high students was used at baseline to examine the profile of those who would subsequently drop out from the study. The scale examined the occurrence of 22 negative life events relating to family, school and relationship problems, major changes in life circumstances, self- or other illness or injury, and bereavement over the previous 12 months.

Family conflict. Student report of family conflict was also included to examine the profile of future dropouts from the study. This measure included five items from the Family Conflict subscale of the Colorado Self-Report of Family Functioning Inventory (CSRFFI; Bloom, 1985), plus three items that examined the level of parental conflict. Bloom (1985) reported high internal consistency for the Family Conflict subscale of the CSRFFI.

Teacher and student evaluations. After each session, teachers recorded whether they completed each component of the program for that session. These records permitted assessment of teacher compliance and adherence to the intervention protocol. At the end of the final session, teachers completed a final evaluation of the adequacy of the curriculum as a whole, whether they felt that the program was effective in teaching life problem-solving skills, and whether they would teach the program again.

Students were also asked to complete a student evaluation sheet during the final session of the Problem Solving for Life (PSFL) program. They recorded whether they expected to use the skills taught during the program, self-ratings of problem-solving ability before and after the program, and the likelihood that they would recommend the course to other students.

Informed consent and assignment to experimental conditions. Ethical approval from both the state and Catholic Education Departments was granted and schools volunteered to participate in the program in response to information in school guidance newsletters. Schools were matched in pairs on the basis of state versus private funding status and size of enrolment across Grades 8–12. All schools were classified as urban, and all were coeducational, with an approximately equal number of boys and girls. Out of 16 schools, matching on both variables was possible for 7 out of 8 pairs. Schools were then randomly assigned from each pair to either the PSFL intervention or the monitoring control (MC) condition.

All children in each intervention classroom received the PSFL curriculum as part of their regular education. However, only students with written informed consent completed the questionnaire and interviews for program evaluation. Informed consent forms were given out to teachers of all participating classes. Written, informed consent forms were returned by 66% of enrollments in participating classrooms. In addition, student participation in the evaluation component of the study required the ability to read, write, and speak English proficiently, as judged by the class teacher. Given that we were not permitted to collect background information relating to children who did not provide informed consent, it was not possible to determine whether participants differed significantly from nonparticipants. There was no difference in the proportion of students in intervention versus control classrooms who agreed to participate. The rationale for participation in the MC condition was that the regular assessments provide a helpful method of tracking the social well-being of young people and early identification of depression. This process was widely accepted as beneficial by parents and school personnel.

Program evaluation. Students in the PSFL group were assessed at preintervention (full assessment package), postintervention (BDI and Social Problem Solving Inventory only), and 12-month follow-up (full assessment package). The MC students completed the same measures at equivalent time points. Students completed the questionnaires in class, under the supervision of their home class teacher. Staff who administered the questionnaire sessions were not the same teachers who conducted the intervention in the PSFL condition. Teachers read aloud a set text that explained the questionnaire and emphasized confidentiality of the information, followed by each questionnaire item. Questionnaires were presented in three counterbalanced orders, with orders being randomly distributed across schools and conditions. The high-risk students also participated in 6-monthly interviews to identify episodes of depression (as described below) over the 12-month follow-up period.

Identification of high-risk and low-risk students. Following questionnaire administration, depression questionnaires were immediately scored and students were classified as high risk on the basis of scores greater than or equal to 13 on the BDI. An additional 8 students (0.5% of the total sample) who did not report elevated BDI scores were included in the high-risk group on the basis of positive responses to specific DY questions or a positive response to the suicide question on the BDI. Students whose BDI scores were less than 13 were categorized as low-risk status. The BDI cutoff of 13 was used given that this score represents the cut off for the top 20%–25% of BDI scores for adolescents (Roberts, Lewinsohn, & Seeley, 1991) and approximately 25% of participants in the present study. Discus-

sion of the issues and recommendations regarding the use of BDI cut scores for a variety of samples may be found in Kendall, Hollon, Beck, Hammen, and Ingram (1987).

All high-risk students were then interviewed using the MDD, DY, and BD sections of the ADIS-C. In the PSFL condition, 27.1% of the sample was categorized as high risk compared with 26.0% in the MC condition. Clinical interviews with the high-risk students revealed that 26 (3.5% of the total and 12.7% of the high risk) students in the intervention group and 17 (2.3% of the total and 8.7% of the high risk) students in the control group met diagnostic criteria for an affective disorder at preintervention. For ethical reasons, students obtaining a clinical diagnosis of an affective disorder were referred to the school guidance officer or counselor. Given that these students were likely to receive treatment during the course of the preventive intervention period, they were removed from further data analysis within the study. However, those children receiving a clinical diagnosis attending an intervention school still completed the PSFL program, as part of their school curriculum.

PSFL Intervention

Teachers in the PSFL condition attended a training day (or two evening sessions) lasting approximately 6 hr that covered the theory underlying the program, the content, and implementation techniques. The program was developed to fit into a school term, and involved eight self-contained sessions, each lasting a class period of 45–50 min, once per week, over 8 weeks. Teachers were provided with prepared curriculum materials designed to teach life problem-solving skills, positive problem-solving orientation, and optimistic-thinking styles. The content was developed to be youth, teacher, and school user friendly; relatively culture free; age appropriate; and appealing, interesting, meaningful, and relevant. Implementation required minimal preparation by teachers, with supporting materials such as resource book, overheads, background notes, handouts, cartoons, puzzle pieces, and posters being provided for each session.

The PSFL program integrates two components, namely cognitive restructuring and problem-solving skills training (Beck et al., 1979; D'Zurilla & Nezu, 1980). The first component focuses on cognitive style and teaches young people to identify thoughts, feelings, and problem situations and the relationships between these. This phase also teaches cognitive techniques to identify and challenge negative or irrational thoughts that may contribute to the development of negative affect and depressive symptoms. The second phase focuses on teaching life problem-solving skills, including the development of positive problem-solving orientation. This aspect makes use of cognitive restructuring methods to develop positive orientation toward problem solving. Teaching methods include didactic sessions; cartoons; individual, small group, and whole class interactive exercises and activities; home-tasks; and diary keeping.

Teachers in the program were encouraged to contact the researchers at any time regarding problems or questions that arose. However, teachers required very little support in their implementation of the program. Teachers completed an evaluation form after each session to assess the usefulness, organization, and implementation of the program. After completion of Session 8, students were given a student evaluation form for the assessment of student reaction to the program. Feedback sessions with all teachers were arranged after completion of the PSFL program. Further detail regarding the content of the PSFL program may be obtained from the authors on request.

Results

Preintervention Comparisons

A multivariate analysis of variance (MANOVA) revealed no significant differences between the PSFL and MC groups for the high-risk, low-risk, or whole samples for any of the preintervention demographic or outcome variables.

Dropouts at Postintervention

At postintervention, 84.7% of participants were available for reassessment, with this figure being equivalent in the PSFL and MC conditions. Students who were unavailable at posttest differed significantly from those remaining in the study in that they initially reported higher levels of negative life events and higher parent conflict in the home, and were less likely to live with both parents. However, they did not differ significantly on the measure of SES or on baseline levels of the dependent variables such as depression, general psychopathology, social functioning, or problem solving.

Intervention Effects

The first step in the analyses was to determine whether single or multilevel analysis of the data was most appropriate, given that students were nested within schools, and school characteristics have the potential to influence the impact of the intervention. If school level factors significantly influence the effect of the program on changes in depression, then it would be appropriate to evaluate outcomes with multilevel analysis, using hierarchical linear modeling (Arnold, 1992; Lee, 2000). Lee (2000) proposed that prior to conducting multilevel analysis, the researcher should partition the variance in the dependent variable into component parts relating to that which lies between students in the same school (pooled over schools) and that which lies systematically between schools. The proportion of variance that lies systematically between schools is reflected in the intraclass correlation (ICC). Only when the ICC for the between schools effect is greater than 10% of the total variance in the outcome would the analyst consider multilevel methods (Lee, 2000). The ICC was determined for the unconditional model using hierarchical linear modeling (Bryk & Raudenbush, 1992) for three levels (Level 1, within students over time; Level 2, students within schools; Level 3, between schools) for depression scores. The ICC for the Level 3 between-schools effect was .0225, explaining only 2.25% of variance in depression scores, with the remainder being explained by the Levels 1 and 2 student effects. Given that the between-schools effect on depression scores was considerably less than 10% of the variance, it was not considered appropriate to proceed with multilevel analysis, and the data were analyzed using single-level analysis.

Pre- to Postintervention

Analyses were conducted separately for pre- to postintervention and for preintervention to 12-month follow-up as different measures were used across these time points. Repeated measures MANOVAs from pre- to postintervention were conducted for depression and problem-solving scores, with time as a within-subject factor and risk and experimental condition as between-subject factors. This analysis revealed a significant effect for time, Pillais $F(2, 1208) = 47.03$, $p < .01$, $\eta^2 = .07$; Group × Time, Pillais $F(2, 1208) = 25.86$, $p < .01$, $\eta^2 = .04$; Risk Level × Time, Pillais $F(2, 1208) = 84.45$, $p < .01$, $\eta^2 = .12$; and Group × Time × Risk, Pillais $F(2, 1208) = 3.16$, $p < .05$, $\eta^2 = .01$. Given

the significant effects involving risk status, high- and low-risk groups were examined separately.

High-risk group. A repeated measures MANOVA involving BDI and problem-solving scores for the high-risk students from pre- to postintervention revealed a significant Group × Time effect, Pillais $F(2, 292) = 9.11$, $p < .01$, $\eta^2 = .06$. There was also a significant effect for time, Pillais $F(2, 292) = 52.37$, $p < .01$, $\eta^2 = .26$, but not for group. Univariate comparison of depression scores from pre- to postintervention for the high-risk group revealed a significant Group × Time effect, $F(1, 298) = 18.17$, $p < .01$, $\eta^2 = .06$. There was also a significant time effect, $F(1, 298) = 108.82$, $p < .01$, $\eta^2 = .27$, but no significant group effect. Table 1 and Figure 1 show that although both conditions reported a decrease in depression scores over the intervention period, the PSFL group reported a greater decline in BDI scores than the MC group. The reduction in BDI scores for the high-risk sample was of clinical magnitude, reducing the scores to within the normal range and below the cut-off point of 13 used to identify risk status. Although the high-risk MC participants also showed a reduction in BDI scores, the mean score did not move into the low-risk range. At postassessment, 36% of the high-risk adolescents who received PSFL were still categorized as being high risk (BDI > 13), whereas 56% of high-risk students in the MC condition retained their high-risk status, $\chi^2(1, N = 299) = 9.59$, $p < .01$ (see Figure 2). Using the BDI ranges suggested by Kendall et al. (1987), we found that at postintervention 53% of the intervention group was classified as nondepressed (0–9), compared with 41% of the MC group; 27% of the intervention and 19% of the MC groups' scores fell between 10–15; and 20% of the intervention and 38% of the MC group were 16 and above, $\chi^2(2, N = 299) = 11.9$, $p < .01$.

To examine the clinical meaningfulness of pre- to postintervention changes, we categorized high-risk students on the basis of pre- to postintervention changes in BDI scores, using Jacobsen and Truax's (1991) reliable change index (RCI), into improved (RCI > 1.96), no change (RCI = −1.95 to 1.95), or deteriorated (RCI < −1.96). For the PSFL group, 28.7% were reliably improved, 69.9% unchanged, and 1.4% deteriorated. For the MC group, 11.5% were categorized as reliably improved, 84.6% as unchanged, and 3.8% as deteriorated. Chi-square analysis for individuals meeting criteria for reliable change across the two groups showed the superiority of PSFL in comparison with the MC, $\chi^2(2, N = 299) = 14.83$, $p < .01$. Normative comparative analyses were conducted to examine whether the PSFL group was distinguishable on BDI scores postintervention from a normative sample made up of all preintervention students in the study ($N = 1{,}500$). Using the procedure suggested by Kendall, Marrs-Garcia, Nath, and Sheldrick (1999), we found the difference between the normative ($M = 8.36$) and the postintervention PSFL

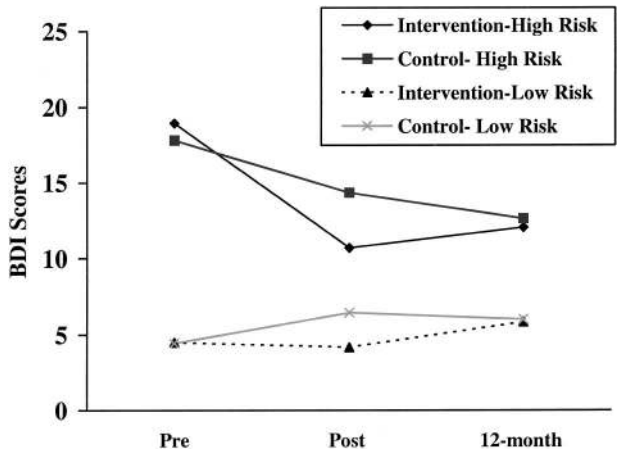

Figure 1. Beck Depression Inventory (BDI) scores for the high- and low-risk groups.

Table 1
Means and Standard Deviations on Outcome Measures From Pre- to Postintervention and at 12-month Follow-Up

Risk status and experimental condition	BDI			Total problem solving			Negative problem orientation			Avoidant problem solving		
	Pre	Post	12 mth	Pre	Post	12 mth	Pre	Post	12 mth	Pre	Post	12 mth
High-risk group												
PSFL intervention												
M	18.94	10.68	12.03	51.11	55.03	54.30	9.29	6.71	7.22	8.93	7.07	7.10
SD	7.71	9.10	11.09	13.61	14.01	14.17	4.39	3.77	4.70	4.76	4.53	4.84
n	144	144	111	144	144	111	144	144	116	144	144	116
Monitoring control												
M	17.81	14.34	12.63	53.19	53.89	54.51	8.85	8.24	7.83	7.62	7.99	7.26
SD	8.65	10.98	8.44	11.97	13.65	11.17	3.95	4.35	4.04	4.33	4.56	4.42
n	156	156	113	156	156	111	156	156	115	156	156	115
Low-risk group												
PSFL intervention												
M	4.50	4.17	5.84	64.30	66.00	61.31	5.11	4.52	5.43	5.35	4.54	5.51
SD	3.74	5.11	7.86	11.51	13.65	13.86	3.14	3.33	3.79	3.55	3.54	4.14
n	463	463	360	463	463	360	463	463	379	463	463	379
Monitoring control												
M	4.44	6.44	6.01	62.79	61.85	60.84	5.57	5.69	5.53	4.47	5.70	5.89
SD	3.61	8.67	7.65	12.07	13.43	14.43	3.25	3.43	3.73	3.57	3.84	4.00
n	471	471	389	471	471	389	471	471	409	471	471	409

Note. Pre = preintervention; Post = postintervention; mth = month; PSFL = Problem Solving for Life program.

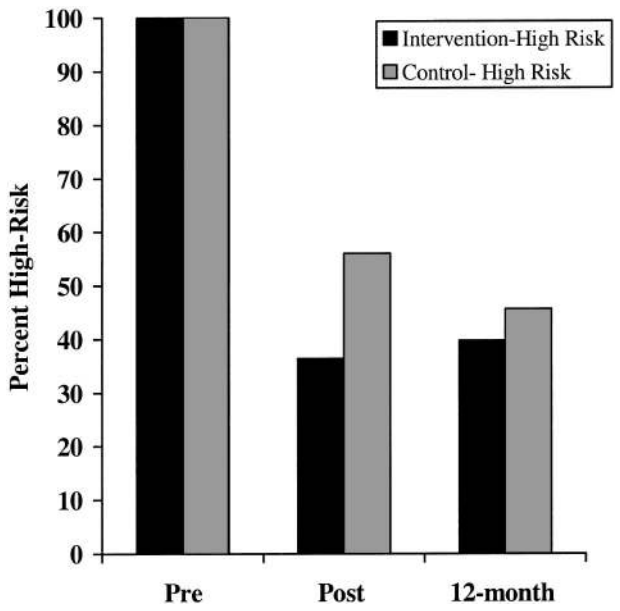

Figure 2. Percentage of students in the high-risk condition retaining high-risk status at each occasion. Pre = preintervention; Post = postintervention.

group (M = 10.71) to have clinical equivalency (CE), using a stringent range of closeness (δ = .5 *SD*), CE Z_{un} = 2.50, $p < .01$. Thus, the PSFL group was not distinguishable from the normative sample on BDI scores postintervention.

Changes in total problem-solving scores for the high-risk group were examined using repeated measures analysis of variance (ANOVA). The results revealed a significant Group × Time effect, $F(1, 295) = 4.71$, $p < .05$, $\eta^2 = .02$, and a significant time effect, $F(1, 295) = 9.70$, $p < .01$, $\eta^2 = .03$, with the high-risk PSFL group demonstrating a greater improvement in problem-solving scores than the MC group (see Table 1). There was no significant overall group effect. Although the high-risk PSFL students showed an improvement in problem-solving skills following the program, the level attained was still well below that of the low-risk samples.

When individual subscales of the problem-solving inventory were examined, significant Group × Time effects were evident for negative problem-solving orientation, $F(1, 295) = 13.70$, $p < .01$, $\eta^2 = .04$, and avoidant problem solving, $F(1, 295) = 15.72$, $p < .01$, $\eta^2 = .05$. Table 1 shows that the high-risk intervention group showed reductions in negative problem-solving orientation and avoidant problem-solving strategies, whereas these improvements were not shown by the control group over the intervention period.

The data were then examined to determine whether changes in problem solving predicted changes in depression scores for the high-risk students. Hierarchical linear regression analysis was used to examine predictors of change in depression score from pre- to postintervention, entering gender and SES as control variables at Step 1, preintervention BDI score at Step 2, experimental group at Step 3, and change in problem-solving score at Step 4. The correlation between change in BDI score and change in problem-solving score was –.41 (N = 295), $p < .01$. Gender and SES did not significantly predict change in BDI scores. However, initial BDI was a significant predictor ($\beta = -.33$, $t = -6.46$, $p < .01$, $\Delta R^2 = .14$), as was experimental condition ($\beta = -.17$, $t = 3.35$, $p < .01$, $\Delta R^2 = .04$) and change in problem solving ($\beta = -.35$, $t = -6.91$, $p < .01$, $\Delta R^2 = .12$). High-risk students who reported greater reductions in depression tended to be those who reported higher initial depression scores, participated in PSFL rather than the MC condition, and reported greater improvements in problem solving.

Low-risk sample. A repeated measures MANOVA involving BDI and problem-solving scores for the low-risk students from pre- to postintervention revealed a significant Group × Time effect, Pillais $F(2, 915) = 15.88$, $p < .01$, $\eta^2 = .03$. There was also a significant effect for time, Pillais $F(2, 915) = 8.48$, $p < .01$, $\eta^2 = .01$, but not for group. Univariate analyses for the BDI showed a significant Group × Time effect, $F(1, 916) = 25.59$, $p < .01$, $\eta^2 = .014$, from pre- to postintervention. Table 1 and Figure 1 show that, whereas the low-risk MC group showed an increase in BDI scores, the low-risk PSFL condition showed a slight decline in BDI scores over time.

Significantly greater improvement in total problem-solving skills was also found for the low-risk PSFL condition compared with the MC group, $F(1, 919) = 12.61$, $p < .01$, $\eta^2 = .03$. There were no significant group or time effects. Table 1 shows that whereas the low-risk PSFL group showed an increase in total problem-solving scores, the MC group showed a slight decrease over time. PSFL students showed significantly greater reductions than MC students in negative problem orientation, $F(1, 919) = 9.45$, $p < .01$, $\eta^2 = .01$, impulsive problem-solving strategies, $F(1, 919) = 9.70$, $p < .01$, $\eta^2 = .01$, and avoidant problem-solving strategies, $F(1, 919) = 15.29$, $p < .01$, $\eta^2 = .02$ (see Table 1). As with the high-risk group, change in problem solving was a significant predictor of change in depression scores ($\beta = -.22$, $t = -6.99$, $p < .01$, $\Delta R^2 = .05$), after controlling for the effects of gender, SES, initial BDI score, and intervention status. Again, students who reported the greatest reductions in depression scores were those who reported higher initial BDI scores, participated in the PSFL rather than the MC condition, and reported greater improvements in problem solving over the course of the intervention period.

Dropouts at 12-Month Follow-Up

At 12-month follow-up 1,070 (71.1%) of the original sample completed the assessment battery. Participants who were unavailable at 12-month follow-up reported significantly higher preintervention scores for BDI, family conflict, YSR externalizing, and negative life events and lower social functioning scores compared with those remaining in the study ($p < .01$ in all cases). There were no significant differences between groups for sociodemographic variables, except dropouts were significantly less likely to reside with both parents at preintervention compared with those remaining in the study, 61% versus 74%, $\chi^2(1, N = 1{,}489) = 24.72$, $p < .01$.

Outcome at 12-Month Follow-Up

High-risk group. A repeated measures MANOVA, including BDI, YSR internalizing, YSR externalizing, social functioning, problem-solving total score, and attributional style from preintervention to 12-month follow-up revealed no significant Group ×

Time or group effects. There was, however, a significant time effect, Pillai's $F(6, 217) = 11.62$, $p < .01$, $\eta^2 = .24$. Univariate repeated measures ANOVAs revealed significant reductions over time for students in general on measures of depression, $F(1, 222) = 57.32$, $p < .01$, $\eta^2 = .21$, and YSR internalizing scores, $F(1, 222) = 22.91$, $p < .01$, $\eta^2 = .09$, and a significant increase in problem-solving skills, $F(1, 222) = 7.99$, $p < .01$, $\eta^2 = .04$ (see Tables 1 and 2). At 12-month follow-up, 39.8% of the high-risk adolescents who received PSFL were still categorized as being high risk (BDI > 13), whereas 46.7% of high-risk students in the MC condition retained their high-risk status (see Figure 2). This difference was not statistically significant.

When the separate problem-solving scales were examined in a repeated measures MANOVA, a significant Group × Time effect was evident, Pillai's $F(5, 225) = 2.56$, $p < .05$, $\eta^2 = .05$. There was also a significant effect for time, but not for group. Univariate tests revealed significantly greater reductions in negative problem-solving orientation, $F(1, 229) = 4.54$, $p < .05$, $\eta^2 = .02$, and avoidant problem solving, $F(1, 229) = 9.28$, $p < .01$, $\eta^2 = .04$, for the PSFL compared with the MC group from preintervention to 12-month follow-up.

Low-risk group. No significant group or Group × Time effects were evident between preintervention and 12-month follow-up. There was, however, a significant time effect for students in general, $F(6, 742) = 19.77$, $p = .001$, $\eta^2 = .14$. The univariate analyses revealed that, over the 1-year follow-up, low-risk students in general tended to show decreases in problem-solving scores, social functioning, and attributional style scores (indicative of increases in depressogenic attributional style) and increases in depressive symptoms and externalizing scores.

Diagnoses of Depression for the High-Risk Students Over 12-Month Follow-Up: Survival Analysis

A survival analysis (Singer & Willett, 1991) identified the percentage of high-risk young people in each condition who remained diagnosis free over the 12-month follow-up period. At preintervention none of the high-risk students, by definition, held a diagnosis of a depressive disorder. The survival analysis method calculates successive interval-specific (conditional) probabilities of onset of a depressive episode based on the number of participants remaining at risk for the outcome event at successive time points. The unconditional probability of becoming depressed from the first assessment interval to the last interval of follow-up is calculated as the product of all previous interval-specific probabilities of becoming depressed. The PSFL and MC groups were compared at all points simultaneously with a summary chi-square, using the Mantel–Cox test. Analyses were limited to those participants who were present for the follow-up period. The incidence rates of depressive disorder over the 12-month follow-up revealed no significant difference between conditions, 9.9% for the PSFL and 8.4% for the MC group.

Teacher and Student Evaluation

After completion of the program, 90% of teachers recorded that they thought the course was effective in teaching life problem-solving skills, and 88% stated that they would teach the course again. Their mean rating of usefulness/adequacy of the curriculum materials was 4.0 on a 5.0-point scale (1 = *not useful* to 5 = *extremely useful*). All teachers reported full implementation of Sessions 1, 2, 6, 7, and 8. However, around half the teachers did not have time to complete all the tasks set in Sessions 3, 4, and 5.

Prior to the intervention, students rated their ability to solve life problems at a mean of 5.84 on a 10.00-point scale ranging from 1 (*very poor*) to 10 (*very good*), compared with a mean of 6.72 at postintervention. When asked whether they would recommend the course to other students, 42% responded yes, 31% maybe, and 27% no. In terms of whether they believed that they would use the skills taught in the program in their everyday life, 34% responded yes, 49% maybe, and 17% no.

Discussion

From pre- to postintervention, the high-risk PSFL students showed significantly greater reductions in depressive symptoms

Table 2
Means and Standard Deviations on Outcome Measures for Dependent Variables at Preintervention and at 12-Month Follow-Up

Risk status and experimental condition	*n*	YSR Internalizing		YSR Externalizing		Attributional style		Social functioning	
		Pre	12 month	Pre	12 month	Pre	12 month	Pre	12 month
High risk									
PSFL intervention	111								
M		20.63	16.11	16.48	18.22	1.49	1.66	66.45	67.33
SD		9.84	9.94	10.30	9.55	3.79	3.92	9.50	10.89
Monitoring control	113								
M		20.31	18.00	16.10	16.19	2.00	2.28	67.17	67.33
SD		9.17	10.04	10.13	9.72	3.57	3.37	8.23	9.55
Low risk									
PSFL intervention	360								
M		9.81	10.54	11.71	10.00	4.77	3.77	73.79	72.03
SD		6.67	9.10	8.88	5.96	3.15	3.76	8.14	9.98
Monitoring control	389								
M		10.42	10.09	12.28	10.33	4.61	3.86	72.68	70.88
SD		6.86	8.27	8.89	6.40	3.13	3.58	8.22	9.24

Note. YSR = Youth Self-Report form of the Child Behavior Checklist; Pre = preintervention; PSFL = Problem Solving for Life program.

compared with the control group, with mean BDI scores moving into the nonclinical range. Significantly fewer high-risk students in the PSFL condition retained their high-risk status at postintervention in comparison with those in the MC group. Furthermore, significantly more high-risk students in the PSFL group showed not only a clinically significant and reliable improvement in depression in terms of reduction of BDI scores into the nonclinical range in comparison to the MC group but also clinical equivalence with a normative sample. The low-risk PSFL students also showed a small but significant decrease in BDI scores over the intervention period, whereas the low-risk MC group showed a slight increase in depression scores over time. This suggests that the intervention may have provided a buffer against increasing levels of depressive symptoms normally found in this age group. Furthermore, the finding demonstrates that participation in the intervention did not produce an iatrogenic effect.

The short-term results on the measure of problem-solving skills and orientation were also positive. At postintervention, the high-risk intervention group showed an increase in total problem-solving scores, whereas their control peers did not. This effect reflected small but significantly greater reductions in negative problem-solving orientation and avoidant problem-solving strategies by the PSFL students compared with the controls. Despite this improvement, it must be noted that the problem-solving scores of the high-risk students remained well below those of their low-risk counterparts. Interestingly, there was some evidence to suggest that improvements in problem solving were associated with reductions in depressive symptoms. High-risk students who reported greater reductions in depression tended to be those who reported greater improvements in problem solving from pre- to postintervention. Although the direction of causality cannot be clearly determined, the result is consistent with the proposition that improvements in problem solving may mediate reductions in depressive symptoms.

The low-risk students in the PSFL program also showed a significantly greater improvement in problem solving than did controls, reflecting small reductions in avoidant problem solving and negative problem orientation. Again, changes in problem solving significantly predicted changes in depression from pre- to postintervention.

At 12-month follow-up, there was no significant difference across experimental groups in the percentage of high-risk students who developed a clinical diagnosis of depression or who retained high-risk status. There was also no difference between groups in changes from preintervention to 12-month follow-up on measures of depression, social functioning, attributional style, total problem-solving score, internalizing, and externalizing problems. The only significant difference between groups over the long-term follow-up related to significantly greater reductions in avoidant problem-solving strategies and negative problem-solving orientation among the high-risk intervention versus control participants.

The results of the present study are consistent with those of Gillham et al. (1995), who did not find a statistically significant difference between prevention and control groups on measures of self-reported depression with their at-risk sample of 10–13-year-olds at 12-month follow-up. Significant intervention effects did emerge, however, at 18-month and 2-year follow-ups in that study. The results of the present study contrast, however, with the findings of Clarke et al. (1995) and Shochet et al. (2001), both of which reported some benefits with high-risk students over 10–12-month follow-ups. However, the outcomes in both these studies varied according to the measure of depression. For example, Clarke et al. (1995) reported a significant difference between cognitive–behavioral intervention compared with a usual care condition at 12-month follow-up in terms of clinically diagnosed depression status. However, no difference between groups was found on two measures of self-reported depression or in global assessment of functioning. The results of the Shochet et al. study also varied according to the measure used. Thus the impact of prevention programs to date does not appear to be sufficiently robust as to be detectable across all measures of depression, nor does it appear to generalize to more general indicators of social adjustment.

There are various other reasons that may explain the apparent differences in outcome between studies. The first possibility concerns differences in the characteristics of the samples. The present evaluation involved a universal intervention that included a combination of high- and low-risk students in their first year of secondary school ($M = 12.9$ years). Both the Clarke et al. (1995) and Jaycox et al. (1994) studies focused purely on identified high-risk students. The Clarke et al. sample was also several years older ($M = 15.3$ years). Although Shochet et al. (2001) included both high- and low-risk students, their sample was also older (by 1 year on average) than the present participants. Given that the prevalence of depression increases with age (Clarke et al., 1995), it is possible that preventive interventions may be more effective if introduced in mid- rather than early adolescence. The higher prevalence of depression in later adolescence may also increase the probability of detecting differences in depression levels across experimental conditions.

In addition to variation in participant characteristics, differences in format and presentation of the preventive programs across different studies must also be considered. The Clarke et al. (1995) study represented a selective intervention, run by master's- or doctoral-level school counselors, after 40 hr of training in the intervention. Their program involved 15 sessions of 45 min over 5 weeks, with small groups focusing on the teaching of cognitive techniques to identify and challenge negative or irrational thoughts. Both Shochet et al. (2001) and Jaycox et al. (1994) programs involved small group implementation by mental health professionals. These forms of implementation differ from the present study, which involved 8 sessions of 45 min implemented by teachers who had received 6 hr of training. Thus, it is possible that effective long-term prevention of depression requires a greater number of sessions, in small-group format, administered by more highly trained mental health professionals, with a greater level of training in the cognitive–behavioral techniques of the program.

Another factor that may have influenced the lack of long-term benefits of the PSFL program in comparison with the MC condition may relate to the response of the MC schools to participation in the research. It is possible that the monitoring process in the MC schools increased teacher and student awareness of depression. This may, indirectly, have influenced referral practices and the content of support programs within the school. Although no evidence concerning school climate and curriculum content was collected to examine this proposition, the possibility must be considered.

In interpreting the findings of the present study, it is important to take into account the impact of dropouts. Students who dropped out of the evaluation differed significantly on a range of risk factors for depression (e.g., initial depression severity, family conflict, negative life events, social functioning, and family structure) from those who remained in the study at 12-month follow-up. It is likely that those most at risk of developing depression were those who were not available for long-term follow-up assessment. The retention rate of 71% at 12-month follow-up is in keeping with the 12-month retention rates of 69% reported by Gillham et al. (1995), 73% by Clarke et al. (1995), and 80% by Shochet et al. (2001) at 10-month follow-up. Clearly the issue of loss of participants at follow-up is a major problem in prevention research, given the characteristics of those most likely to drop out.

There are several methodological limitations of the study that warrant discussion and that influence interpretation of the results. For example, it is important to consider the generalizability of the results to schools in general, given that participating schools volunteered to take part in the research. It is possible that staff in the participating schools may have been somewhat more enthusiastic and interested in mental health issues than is normally the case among teachers. Similarly, there may be a selection bias operating between those parents who returned consent forms and those who did not. A further consideration relates to teacher adherence to program implementation and student participation levels. It was beyond the scope and resources of the present study to obtain detailed observational data relating to teacher adherence to protocols in the administration of PSFL or student participation levels (attendance and homework completion). This assessment was limited to teacher self-report. Although teachers reported being able to implement the majority of program content, independent validation of compliance and program fidelity should be obtained in future research.

A further methodological limitation concerns the failure to use interviewers who were blind to experimental conditions. Of the six interviewers, only three were blind to experimental and diagnostic status. The reliance on the young person as the sole informant is a further experimental weakness. It would have been preferable to include reports from parents and teachers to provide independent validation of emotional and behavioral changes. This would have allowed us to determine whether improvements in depression and problem solving reported by the students simply reflected an effect of "teaching to the test." This possibility is unlikely, however, given that students and parents were informed that the study concerned the teaching of problem-solving skills as part of an adolescent well-being project rather than as a depression prevention program. Furthermore, teachers did not discuss the topic of depression, as the focus of the intervention was on the development of cognitive and problem-solving skills rather than depression reduction or prevention.

The reliability and validity of the LIFE interview in providing retrospective reports of clinical depression over the follow-up period must also be questioned. Although prior research with adolescents has shown high levels of interassessor reliability for the LIFE (Clarke et al., 1995), it would have been preferable to provide a similar check in the present study.

A final methodological limitation concerned the sample size. Although the sample size of 1,500 appears to be impressive at first sight, it is inadequate to detect differences across groups when the relatively low incidence of new cases of depression over 12 months for 12–13-year-olds is taken into account. Given sufficient funding and resources, future studies should attend to these methodological issues.

It is important that the strengths of the present research are also noted. Compared with previous studies, the sample size is relatively large. The study is also unusual in attempting a "real-world" intervention that required minimal training of teachers and was relatively cheap to administer, thereby increasing the likelihood that the program would be sustained and disseminated within the education sector. Whereas previous prevention research has tended to use small group format and be conducted by highly trained mental health specialists, the PSFL program produced strong and significant short-term reductions in depressive symptoms and improvements in problem solving with high-risk students with a relatively brief, classroom-based intervention conducted by teachers. The teachers generally rated the program positively in terms of effectiveness in teaching new skills, and most stated that they would teach the program again. Positive teacher perceptions of this type are essential for effective dissemination and sustainability of interventions.

The results suggest that a brief cognitive–behavioral universal intervention delivered by teachers can bring about short-term changes in depressive symptoms and enhance problem-solving skills, although these gains were not maintained longer term. It is possible that high-risk students may require a more prolonged, intensive, small-group intervention to bring about lasting effects in the prevention of depression. Issues for future research could include the feasibility and effectiveness of multilevel stepped approaches including both universal and selective interventions and the benefits of including booster or maintenance sessions for universal interventions over the course of schooling. It may be unrealistic to expect a brief, one-term program to produce marked and long-lasting acquisition of mental health-promoting skills. However, the present results suggest that a classroom-based approach offers promise in the prevention of adolescent depression. The challenge remains for researchers to identify methods of enhancing and maintaining the effects of such interventions.

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Received December 15, 2001
Revision received January 20, 2002
Accepted January 29, 2002 ■