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

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Abstract

Evaluated the effectiveness of the Problem Solving For Life program (PSFL) as a universal approach to the prevention of adolescent depression. Short-term results indicated that participants with initially elevated depression 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 post-intervention compared to 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 over the same period. The low-risk group also reported a significantly greater increase in problem solving scores over the intervention period, compared to the low-risk controls. From pre-intervention to 12-month follow-up there were no significant differences between intervention versus control groups in changes in depression, social functioning, internalizing or externalizing problems, although some improvements in avoidant problem solving and negative problem solving orientation were maintained.
The development of depression in adolescence is influenced by a complex interplay of biological, psychological and environmental factors (Rehm & Sharp, 1996). Several psycho-social 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 (Adams & Adams, 1993; Garber, Weiss, & Shanley, 1993; Kazdin, Rodgers, & Colbus, 1986; Lewinsohn, Clarke, & Rohde, 1994; Nolen Hoeksema, Girgs, & 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 (Adams & Adams, 1991; Adams & Adams, 1993; Cheng & Lam, 1997; Goodman, Gravitt, & Kaslow, 1995; Lewinsohn, Clarke, & Rohde, 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 focussed specifically upon depression, the majority has involved targeted interventions with individuals who manifest some risk factor for the development of depression (selective prevention) or who already show sub-clinical 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 to a non-intervention 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) and 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 advantage avoiding the stigma and labeling effects of being singled out and of reaching individuals with a wide range of risk factors, rather than being limited to those who are influenced by only one or two risk factors (Offord, 2000). Universal interventions have also been associated with lower drop-out and greater participation rates than those typically associated with selective or indicated prevention (Clarke et al., 1995; Shochet et al., in press).

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 wellbeing, 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, psych-educational 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 solving skills deficits) associated with depression in young people. Shochet et al. (in press) 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 aged 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 behavior 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.

The Shochet et al. study provides 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 from 1996 in a single school, with the intervention group involving 1997 grade 9 students from the same school. Furthermore, assessments were taken at different times of the school year, with the monitoring only students being around 6 months older than the intervention group at the time of the assessment. Also, from a practical point of view, the use of psychologists and the small group format makes 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 1500 Year 8 students, ranging in age from 12-14 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 co-educational. 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) who had an average age of 12.85 years ($SD = .54$). Socio-economic status (SES), based upon 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 socioeconomic status 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 6 State schools, and 228 students from 2 private schools.

The control condition consisted of 8 schools with a total of 749 participating students (49.4% male and 50.6% female) who had an average age of 12.90 years ($SD = .53$). 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 5 State schools, and 248 students from 3 private schools.

**Measures**

*Beck Depression Inventory*. Depressive symptoms were assessed using the Beck Depression Inventory (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 that asked about sexual interest, and simplification of terminology to aid understanding of item 11 (the word ‘annoyed’ was used to define irritable).

*Dysthymia*. Given concerns that some adolescents who experienced symptoms of dysthymia rather than depression may not be identified by the BDI, 4 questions were developed to reflect the Diagnostic and Statistical Manual of Mental Disorders - IV edition (DSM-IV; American Psychiatric Association, 1994) diagnostic criteria for dysthymia 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 dysthymia were categorized as “high-risk” and received a clinical interview. The dysthymia questions were completed at pre-intervention 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 semi-structured
interview designed to allow the diagnosis of the childhood disorders based on the DSM-IV. Inter-rater reliability of ADIS-C diagnoses and test-retest reliability has been found to be good (Silverman & Eisen, 1992; Silverman & Nelles, 1988). Only the Major Depressive Disorder, Dysthymia, and Bipolar Disorder sections of the interview were administered in the present study. The measure was selected based on 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, the resources allowed only for the child interview.

Interviewers were trained on the ADIS-C for a minimum of 6 hours to ensure adequate proficiency and inter-assessor reliability using the instrument. Inter-rater reliability for diagnosis of depressive disorders using the ADIS-C was examined by audio-taping a random sample of 30 (10%) of pre-intervention interviews and later allowing an independent clinician to listen to the audio-tapes and determine diagnostic status. However, among this sample, only one individual received a diagnosis of depression and there was 100% agreement between independent assessors regarding diagnostic status of all 30 interviewees. In order to examine further the reliability of diagnoses, 167 written transcripts from an equal proportion of pre-intervention, 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, high-risk students were interviewed 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 inter-assessor 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 pre-intervention 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, in press) assesses social and adaptive functioning across 4 domains. The CASAFS is a 24-item self-report measure with 4 sub-scales (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 / self-care. The scale has high internal consistency and acceptable test-retest reliability, with confirmatory factor analysis supporting the construct validity of the 4 sub-scales (Price et al., in press).

**Problem Solving.** The Social Problem-Solving Inventory-Revised Short Form (SPSI-R; D'Zurilla & Maydeu Olivares, 1995) is a 25-item self-report questionnaire, with 5 sub-scales. Two of these sub-scales, positive problem orientation (PPO) and negative problem orientation (NPO) assess functional/dysfunctional cognitive and emotional orientations towards solving
life problems. The three remaining sub-scales, rational problem solving (RPS), impulsivity/carelessness style (ICS) and avoidance style (AS) 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 6 sub-scales, providing internal, stable and global attribution scores for both positive and negative events. Each item consists of a hypothetical event for which subjects are required to choose the most likely explanation from a choice of two alternatives. A composite positive event score (CP) is calculated by adding the internal, stable and global attribution scores for positive events. Similarly, a composite negative event score (CN) 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 CN from the CP, 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 and self or other illness or injury, or bereavement over the previous 12 months.

Family Conflict. Student report of family conflict was also included to examine the profile of future drop-outs from the study. This measure included 5 items from the Family
Conflict sub-scale of the Colorado Self-Report of Family Functioning Inventory (CSRFFI; Bloom, 1985), plus 3 items that examined the level of parental conflict. Bloom (1985) reported high internal consistency for the family conflict sub-scale of the CSFFFI.

Teacher and Student Evaluations. After each session, teachers recorded whether or not 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 or not they felt that the program was effective in teaching life problem solving skills, and whether or not they would teach the program again.

Students were also asked to complete a student evaluation sheet during the final session of the PSFL. They recorded whether or not 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 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 based on State versus Private funding status and size of enrolment across grades 8 to 12. All schools were classified as urban and all were co-educational, 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 Problem Solving for Life (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, students only completed the questionnaire and interviews for program evaluation with parent and student written, informed consent. Informed consent forms
were given out to teachers of all participating classes. Written, informed consent was returned by 66% of enrolments 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 is not possible to determine whether participants differed significantly from non-participants. 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 social wellbeing 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 pre-intervention (full assessment package), post-intervention (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 in order 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” based on 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 based on positive response to specific dysthymia 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 cut-off 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. Discussion 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 Major Depressive Disorder (MDD), Dysthymia (DY), and Bipolar Disorder (BD) sections of the ADIS-C. In the PSFL condition, 27.1% of the sample were categorized as high-risk, compared to 26% 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 pre-intervention. 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 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 hours that covered the theory underlying the program, the content, and
implementation techniques. The program was developed to fit into a school term, and involved 8, self-contained sessions, each lasting a class period of 45-50 mins, once per week, over 8 weeks. Teachers were provided with pre-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, 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 integrated 2 components, namely cognitive restructuring and problem solving skills training (Beck, Rush, Shaw, & Emery, 1979; D’Zurilla & Nezu, 1980). The first component focused on cognitive style and teaches young people to identify thoughts, feelings, problem situations and the relationship between these. This phase also taught 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 focused on teaching life problem solving skills, including the development of positive problem solving orientation. This aspect made use of cognitive restructuring methods to develop
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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. Further detail regarding the content of PSFL may be obtained from the authors upon request.
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Results

Pre-intervention comparisons

A MANOVA revealed no significant differences between the PSFL and MC groups for the high-risk, low-risk, or whole samples, for any of the pre-intervention demographic or outcome variables.

Drop-Outs at Post-intervention

At post-intervention, 84.7% of participants were available for reassessment, with this figure being equivalent in the PSFL and MC conditions. Students who were unavailable at post-test differed significantly from those remaining in the study in that they initially reported higher levels of negative life events, 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 upon changes in depression, then it would be appropriate to evaluate outcomes with multilevel analysis, using hierarchical linear
modeling (Arnold, 1992; Lee, 2000). Lee 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). 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 .225, 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 school effect upon 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 Post-intervention

Analyses were conducted separately for pre- to post-intervention and pre-intervention to 12-month follow-up as different measures were used across these time points. Repeated measures MANOVA from pre- to post-intervention was 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 $F(2,1208) = 47.03, p < .001$, Eta squared = .07, group by time Pillais $F(2,1208) = 25.86, p < .001$, Eta squared = .04, risk level by time Pillais $F(2,1208) = 84.45, p < .001$, Eta squared = .12, and group by time by risk Pillais $F(2,1208) = 3.16, p < .05$, Eta squared = .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 post-intervention revealed a significant group by time effect, Pillais $F(2,292) = 9.11, p < .001$, Eta squared = .06. There was also a significant effect for time, Pillais $F(2,292) = 52.37, p < .001$, Eta squared = .26, but not for group.

Univariate comparison of depression scores from pre- to post-intervention for the high-risk group revealed a significant group by time effect, $F(1,298) = 18.17, p < .001$, Eta squared = .06. There was also a significant time effect, $F(1,298) = 108.82, p < .001$, Eta squared = .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 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 post-assessment, 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 MC condition retained their high-risk status, $\chi^2 (1, N=299) = 9.59, p < .001$ (See Figure 2). Using the BDI ranges suggested by Kendall et al. (1987), at post-intervention 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 post- changes, high risk students were categorized, based on pre- to post- 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 2 groups showed superiority of PSFL in comparison to the MC, $\chi^2(2, N=299) = 14.83$, $p < .001$. Normative comparative analyses were conducted to examine whether the PSFL group was distinguishable on BDI scores post-intervention from a normative sample made up of all pre-intervention students in the study ($N = 1500$). Using the procedure suggested by Kendall, Marrs-Garcia, Nath, and Sheldrick (1999), the difference between the normative mean ($M = 8.36$) and the post-intervention PSFL group mean ($M = 10.71$) was found to have clinical equivalency, using a stringent range of closeness (delta = .5 $SD$), $C.E. Z_{un} = 2.50$, $p < .01$. Thus, the PSFL group was not distinguishable from the normative sample on BDI scores post-intervention.

Changes in total problem solving scores for the high-risk group were examined using repeated measures ANOVA. The results revealed a significant group by time effect, $F(1,295) = 4.71$, $p < .05$, Eta squared = .02, and a significant time effect, $F(1,295) = 9.70$, $p < .01$, Eta squared = .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 sub-scales of the problem solving inventory were examined, significant group by time effects were evident for negative problem solving orientation, $F(1,295) = 13.70$, $p < .001$, Eta squared = .04, and avoidant problem solving, $F(1,295) = 15.72$, $p < .001$, Eta squared = .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 post-intervention, entering gender and socioeconomic status as control variables at Step 1, pre-intervention 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 \((N=295), p < .001\). Gender and socioeconomic status did not significantly predict change in BDI scores. However, initial BDI was a significant predictor \((\text{Beta} = -.33, t = -6.46, p < .001, \Delta R^2 = .14)\), as was experimental condition \((\text{Beta} = -.17, t = 3.35, p < .001, \Delta R^2 = .04)\) and change in problem solving \((\text{Beta} = -.35, t = -6.91, p < .001, \Delta R^2 = .12)\). High-risk students who reported greater reductions in depression tended to be those who report 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 post-intervention revealed a significant group by time effect, Pillais \(F(2,915) = 15.88, p < .001\), Eta squared = .03. There was also a significant effect for time, Pillais \(F(2,915) = 8.48, p < .001\), Eta squared = .01, but not for group. Univariate analyses for the BDI, showed a significant group by time effect, \(F(1,916) = 25.59, p < .001\), Eta squared = .014, from pre- to post-intervention. 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 to the MC group, $F(1,919) = 12.61, p < .001$, Eta squared = .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 squared = .01, impulsive problem solving strategies, $F(1,919) = 9.70, p < .01$, Eta squared = .01, and avoidant problem solving strategies, $F(1,919) = 15.29, p < .001$, Eta squared = .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, $t = -6.99$, $p < .001$, $\Delta R^2 = .05$), after controlling for the effects of gender, socioeconomic status, initial BDI score and intervention status. Again, students who reported the greatest reductions in depression scores were those who reported higher initial BDI scores, had participated in PSFL rather than the MC condition and reported greater improvements in problem solving over the course of the intervention period.

Drop-outs at 12-Month Follow-up

At 12-month follow-up 1070 (71.1%) of the original sample completed the assessment battery. Participants who were unavailable at 12-month follow-up reported significantly higher pre-intervention scores for BDI, family conflict, YSR externalizing, and negative life events and lower social functioning scores compared to those remaining in the study ($p < .001$ in all cases). There were no significant differences between groups for socio-demographic variables, except drop-outs were significantly less likely to reside with both parents at pre-intervention compared to those remaining in the study (61% vs 74%, $\chi^2 (7) = 31.94, p < .001$).
Outcomes 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 pre-intervention to 12-month follow-up, revealed no significant group by time, or group effects. There was, however, a significant time effect, Pillai’s $F(6,217) = 11.62, p < .001$, Eta squared = .24. Univariate repeated measures ANOVAs revealed significant reductions over time for students in general on measures of depression, $F(1,222) = 57.32, p < .001$, Eta squared = .21 and YSR internalizing scores, $F(1,222) = 22.91, p < .001$, Eta squared = .09, and a significant increase in problem solving skills, $F(1,222) = 7.99, p < .005$, Eta squared = .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 by time effect was evident, Pillai’s $F(5,225) = 2.56, p < .05$, Eta squared = .05. There was also a significant effect for time, but not group. Univariate tests revealed significantly greater reductions in negative problem solving orientation, $F(1,229) = 4.54, p < .05$, Eta squared = .02, and avoidant problem solving, $F(1,229) = 9.28, p < .003$, Eta squared = .04, for the PSFL compared to the MC group, from pre-intervention to 12-month follow-up.

Low-risk group. No significant group, or group by time effects were evident between pre-intervention and 12-month follow-up. There was, however, a significant time effect for students in general, $F(6,742) = 19.77, p = .001$, Eta squared = .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 pre-intervention 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 using 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, being 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 to be 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-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 point scale ranging from 1 (very poor) to 10 (very good), compared to a mean of 6.72 at post-intervention. 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 things taught in the program in their everyday life, 34% responded “yes”, 49% “maybe” and 17% “no”.

Discussion

From pre- to post-intervention, the high-risk PSFL students showed significantly greater reductions in depressive symptoms compared to the control group, with mean BDI scores moving into the non-clinical range. Significantly fewer high-risk students in the PSFL condition retained their high-risk status at post-intervention in comparison to those in the monitoring only 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 non-clinical 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 post-intervention, 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 problems among participants in the PSFL program compared to controls. This effect was consistent across all participants, regardless of intervention group assignment.

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 post-intervention.

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, nor who retained high-risk status. There was also no difference between groups in changes from
pre-intervention 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. (in press) 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 to a “usual care” condition at 12-month follow-up in terms of clinically diagnosed depression status. However, no difference between groups was found on 2 measures of self-reported depression or in global assessment of functioning. The results of the Shochet et al. (in press) 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 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 (mean age 12.9 years). Both the
Clarke et al. (1995) and Jaycox (1994) studies focussed purely upon high-risk, identified students. The Clarke et al. sample was also several years older (mean age 15.3 years). Although Shochet et al. (in press) included both high- and low-risk students, their sample was also older (by one year on average) than the present participants. Given that the prevalence of depression increases with age (Clarke et al.) 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 school counselors with a Masters or PhD degree, after 40 hours of training in the intervention. Their program involved 15, 45-minute sessions, over 5 weeks, with small groups focussing on the teaching of cognitive techniques to identify and challenge negative or irrational thoughts. Both the Shochet et al. (in press) and Jaycox et al. (1994) programs involved small group implementation by mental health professionals. These forms of implementation compare with the present study that involved 8 sessions, of 45 minutes duration, implemented by teachers, after 6 hours 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 to 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 drop-outs. 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. (in press) 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, versus those who did not. A further consideration relates to teacher adherence in 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, nor 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 in order 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 a depression prevent 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 inter-assessor 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 1500 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 to 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, 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 multi-level 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, 1-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.
References


Tunis, Tunisia

Ulaanbaatar, Mongolia
Vancouver, Canada 0401
"I"
Prevention of Adolescent Depression
"I"
Vienna, Austria
Volgograd, Russia
Warsaw, Poland
Warsaw, Poland


Table 1.

Means and Standard Deviations (in Parentheses) for Depression, Total Problem Solving, Negative Problem Orientation and Avoidant Problem Solving from Pre- to Post-intervention and 12-month Follow-up

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<tr>
<th>Risk Status</th>
<th>Experimental Condition</th>
<th>Outcome Measures</th>
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<th>BDI Post</th>
<th>BDI 12-mth</th>
<th>Total Problem Solving Pre</th>
<th>Total Problem Solving Post</th>
<th>Total Problem Solving 12-mth</th>
<th>Negative Problem Orientation Pre</th>
<th>Negative Problem Orientation Post</th>
<th>Negative Problem Orientation 12-mth</th>
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<td>(13.43)</td>
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<td>(3.43)</td>
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<td>(3.57)</td>
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Table 2.
*Means and Standard Deviations (in Parentheses) for Dependent Variables from Pre- to Post-intervention and 12-month follow-up*

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<th>Risk Status</th>
<th>Experimental Condition</th>
<th>N</th>
<th>YSR Internalizing Pre</th>
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Figure 1. BDI scores for the high- and low-risk groups
Figure 2. Percent of students in high-risk condition retaining high-risk status at each occasion