Problem-Solving Orientation and Attributional Style: Moderators of the Impact of Negative Life Events on the Development of Depressive Symptoms in Adolescence?

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Followed up 733 adolescents, ages 12 to 14 years, from a community sample over a 1-year period. Depressive symptoms at 1-year follow-up, controlling for baseline depression levels, were predicted by negative life events (NLEs) in the previous 12 months, attributional style (AS), negative problem solving orientation (NPSO), and the interaction between NLEs and NPSO. In the presence, but not absence, of high NLEs, NPSO predicted increases in depressive symptoms. In contrast, pessimistic AS predicted future increases in depression irrespective of the occurrence of NLEs. The findings supported a cognitive diathesis-stress model of the development of depression for NPSO but not AS.

A significant association between negative life events (NLEs) and the development of depression in young people is relatively well established. Environmental events such as parents' marital conflict, separation, divorce, bereavements, poverty, abuse, and high levels of daily hassles have been shown to increase the risk of adolescent depression (Goodyer & Altham, 1991a, 1991b). However, the impact of NLEs is not specific to depression and increases the risk of a wide range of emotional and behavioral difficulties (Goodyer, 1990). Furthermore, not all young people exposed to life stressors show elevated depression. One of the challenges for researchers is to identify those characteristics that influence the impact of NLEs on the psychological adjustment of adolescents.

Cognitive diathesis-stress models of depression propose that depression is more likely to result from an interaction between adverse life events and intrinsic cognitive characteristics that increase negative affective states or reduce the person's ability to cope with or remove the stressful events (Abramson, Alloy, & Metalsky, 1988). Such models propose that certain styles of thinking and information processing represent a diathesis, which in the presence but not absence of negative life stress increases vulnerability to the development of depression (Abramson, Metalsky, & Alloy, 1988). Most research in this area has focused on attributional style (AS) as a cognitive diathesis, in keeping with the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989). The hopelessness model proposed that the tendency to attribute neg-

ative events to stable and global causes and positive events to unstable and specific explanations is associated with increased risk for the development of depression, but only in the presence of NLEs. Hopelessness theory also proposed that increased feelings of hopelessness mediated the relation between the cognitive diathesis-stress effect and increases in depression.

Studies examining this hypothesis have provided mixed support for the diathesis-stress model. Support for the diathesis-stress-hopelessness model of depression has been reported in several studies involving adults (Alloy, Reilly Harrington, Fresco, Whitehouse, & Zechmeister, 1999; Reilly Harrington, Alloy, Fresco, & Whitehouse, 1999; Vickers & Vogeltanz, 2000) and children and adolescents (Dixon & Ahrens, 1992). In these studies, negative AS, accompanied by a high level of intervening NLEs, has been shown to predict future increases in depressive symptoms. Furthermore, there is evidence that the impact of this interaction is mediated by hopelessness for adults and adolescents (Abramson et al., 1998; Joiner, 2000) and that the effect is specific to depression and not anxiety or other disorders (Alloy & Clements, 1998; Joiner, 2000). However, not all studies have provided evidence to support the cognitive diathesis-stress component of the hopelessness theory of depression. Hammen, Adrian, and Hiroto (1988) and Nolen Hoeksema, Girgus, and Seligman (1986) found only partial support for the model.

Problem solving represents another cognitive process proposed to moderate the impact of NLEs on the development of depression. Problem solving refers to the attitudes, skills, and abilities that enable a person to find effective or adaptive solutions to specific, everyday problems (D'Zurilla, Chang, Nottingham, & Fac-

cini, 1998). Similar to the research relating to AS, it appears that poor problem-solving processes may represent a diathesis, interacting with NLEs in the development of depression (Adams & Adams, 1993; Cheng & Lam, 1997; Goodman, Gravitt, & Kaslow, 1995). For example, a problem-solving orientation that proposes the use of self-destructive or passive/avoidant solutions to life problems was found to predict future depression in the presence of NLEs among adolescents (Adams & Adams, 1996). There is some evidence to suggest that it is not only specific problem-solving skills (e.g., problem definition and formulation, generation of alternative solutions, prediction of consequences, solution monitoring and evaluation) that are associated with the development of depression, but also the cognitive orientation that the individual takes to the occurrence and management of problems (Haaga, Fine, Terrill, Stewart, & Beck, 1995). Problem orientation refers to the cognitive, emotional, and behavioral variables that reflect a person's awareness of, beliefs about, appraisals, and expectancies relating to both the occurrence of problems and his or her ability to solve them. A negative problem solving orientation (NPSO) relates to those cognitions and emotions that are proposed to inhibit adaptive problem solving. Several studies have demonstrated strong associations between a NPSO and depression, hopelessness, and suicidal ideation (D'Zurilla et al., 1998; Sadowski & Kelly, 1993).

This study examined the role of adverse life events and cognitive variables of AS and NPSO in the development of depression in adolescents. Specifically, it examined the cognitive diathesis-stress model of depression to determine whether the development of depression is related to the interaction between life stressors and cognitive variables of AS and NPSO.

Method

Participants

Participants were 994 (538 male and 456 female) Year 8 students, ranging in age from 12 to 14, from 10 high schools in the Brisbane region of Queensland, Australia. The students had an average age of 12.91 years ($SD = 0.51$). Socioeconomic status (SES) was coded using the Australian Standard Classification of Occupations (Australian Bureau of Statistics and Department of Education Training and Youth Affairs, 1997). The average SES rating for the participants was 3.89 ($SD = 2.32$), typical of the SES distribution of Australia in general. This value is indicative of a middle SES on average (e.g., "paraprofessional" occupations are coded as 3; "trades" occupations as 4, and so on).

We were not permitted to collect information about ethnic background and were restricted to information about country of birth. Around 90% of the students, 73% of their mothers, and 72% of their fathers were born in Australia. Approximately 23% of fathers and 22% mothers were born in European and North American countries. Around 3% of fathers and 4% of mothers were born in Asian or Oceania countries. Thus, the sample was primarily of Caucasian ethnic origin.

Of the original 994 participants, 733 (74%) completed the 12-month follow-up. Reasons for nonparticipation at follow-up included movement of family from the area, change of school, and being absent from school due to illness at the time of follow-up. No students actively refused to take part in the follow-up.

Procedure

Written, informed consent to participate in a project to monitor the psychological development of young people was obtained from State Education and Catholic Education Departments and from parents and adolescents prior to participation. Informed consent forms were given out to teachers of all Year 8 classes in participating schools. We have no way of knowing how many students actually received these forms and took them home to their parents. Written, informed consent was obtained from a minimum of 59% of enrolments in participating classrooms. This is the lowest estimate of participation rate and may be an underestimate. Questionnaires were completed in class and were presented in one of three counterbalanced orders, with order randomly distributed across schools. Each questionnaire was labeled with a student code and a school code to assist in the matching of questionnaires at different time points while ensuring confidentiality. Teachers were instructed to read aloud a set text that explained the questionnaire procedure and confidentiality of the information. To ensure understanding by all students, completion of the questionnaire package was paced by reading each question aloud.

Measures

Depression. Depression was assessed using the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979), with minor modifications to suit the young Australian adolescent population. The BDI is a self-report inventory consisting of 21 items assessing depressive symptoms. Each item consists of four statements from which participants must choose the one that best describes their feelings during the preceding week. Each item is scored from 0 to 3, with 3 indicating the highest level of depressive symptoms. Item scores are then added to produce a total score. The BDI, rather than a child depression scale, was selected as it is intended to follow up the sample over a 5-year period and

a measure that would be suitable for repeated measures across ages 12 to 18 years was required. Research involving the BDI with adolescents has shown internal consistency, factor structure, sensitivity, and specificity for detecting depression to be comparable to results with adult samples (Bennett et al., 1997; Byrne, Baron, & Campbell, 1993; Roberts, Lewinsohn, & Seeley, 1991). Although most studies using the BDI with adolescents have focused on the 15- to 18-year-old range, studies have demonstrated strong psychometric properties of the BDI with adolescents ages 12 years and above (Barrera & Garrison-Jones, 1988; Bennett et al., 1997; Kauth & Zettle, 1990).

For the purposes of this study, it was necessary to exclude the sexual activity item to gain ethics committee approval, due to the fear by some schools that the question would be regarded as inappropriate by parents. Second, the weight-loss question was reworded and converted from pounds to kilograms for an Australian population. The internal consistency of the modified BDI was high (alpha = .88, $N = 994$).

Given that much of the research relating to cognitive diathesis-stress models has focused on "hopelessness depression," the results were analyzed separately for the total BDI scores and the hopelessness depression items, as specified by Alloy and Clements (1998).

Problem solving. The Social Problem-Solving Inventory–Revised (SPSI–R) Short Form (D'Zurilla & Maydeu Olivares, 1995) was developed to assess both problem-solving orientation and interpersonal problem-solving skills. The SPSI–R Short Form is a 25-item self-report questionnaire on which participants are asked to rate how true each item is for them on a 5-point scale ranging from 0 (*not at all true of me*) to 4 (*extremely true of me*). Five subscales, each containing five items, are contained within the SPSI–R Short Form. These scales relate to positive problem solving orientation, NPSO, and avoidant, impulsive, and rational problem-solving styles. The variable of interest in this study was NPSO, a factor that has been shown to be associated with depression and suicidal ideation in previous research (D'Zurilla et al., 1998; Sadowski & Kelly, 1993). A high score on the NPSO subscale indicates a dysfunctional or inhibitive cognitive–emotional set. Alpha internal consistency reliability estimates for the negative problem solving subscale has been found to be good (alpha = .83), and test–retest reliability is good (.83; D'Zurilla, Nezu, & Maydeu Olivares, in press). In this study, coefficient alpha value for internal consistency of the NPSO subscale was .76.

AS. 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 subscales, allowing the de-

termination of internal, stable, and global 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 a choice of two alternatives. Each subscale contains four items with scores ranging from 0 to 4. A composite positive event score is calculated by adding together the internal, stable, and global scores for positive events. Similarly, a composite negative event score is calculated by adding together the internal, stable, and global scores for negative events. An overall composite score for AS may also be calculated by subtracting the composite negative event score from the composite positive event score, with lower scores indicating a more depressive AS. 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). In this study, scoring was based on the composite score (AS). Scores on this scale range from −12 to +12. The lower the value of AS, the more depressogenic/pessimistic is the AS. The internal consistency of this measure was found be relatively weak (alpha coefficient .67, $N = 733$) but consistent with the value reported by Thompson et al. Studies examining the moderating relation of NLEs and AS in predicting depression have varied as to their use of the overall composite score of the CASQ–R or the negative generality score (stable and global scores for negative events; e.g., Abramson et al., 1989; Joiner, 2000). In this study it was decided to use the overall AS score because the internal consistency of the negative generality score was lower (.48, $N = 733$) than that of the composite score.

NLEs (Coddington, 1972). A modified version of the Life Events Record for junior high students was used at baseline and 12-month follow-up to assess the NLEs experienced by the young person during the preceding year. The scale examines the occurrence of 22 NLEs relating to family, school, and relationship problems; major changes in life circumstances; self or other illness or injury; and bereavement. In addition, two blank spaces are available for students to record unlisted problem events that had occurred. Participants scored 1 if the event had occurred in the preceding year and 0 if it had not. This study scored only the 22 given events, with total NLE scores ranging from 0 to 22.

Results

After conducting correlation analyses, the data were examined separately for cross-sectional and longitudinal sets, using linear hierarchical regression analyses.

Correlations Between Depression Scores and Predictor Variables

Table 1 shows the mean values, standard deviations, and intercorrelations for depression scores and predictor variables. Baseline depression scores correlated significantly with NLE, AS, and NPSO (all $ps < .001$). Thus, cross-sectionally, adolescents who reported higher levels of depressive symptoms were more likely to have experienced a greater number of NLEs over the previous year, to hold a pessimistic AS, and to have negative or unconstructive attitudes and beliefs relating to problem solving. Sex was also significantly associated with depression scores on both occasions and with NPSO. Girls were more likely than boys to report higher depression and NPSO scores.

Regression Analyses

Age was not included as a predictor variable because the sample was selected from a very restricted age range within one school grade level and SES was not included as a control variable, as it was not significantly correlated with the dependent and independent variables. Sex was entered in the first step of each regression analysis, given that female gender has been shown to be a risk factor for depression in previous research (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). In addition, significant correlations were found in this study between sex and both baseline and follow-up depression scores and NPSO (see Table 1). NPSO was the component of problem solving of specific interest in this study. Analyses involving the remaining problem-solving subscales are not reported here, and these factors were not shown to be predictive of depression in the longitudinal analyses.

The data were analyzed separately for hopelessness depression symptoms, nonhopelessness depression symptoms, and total depression scores. The results indicated minimal differences in findings across these subtypes of depression. Thus, the results reported here use the total depression score. It is not surprising that a

minimal difference in outcome was found for these different indicators of depression, given the very high correlation between hopelessness, nonhopelessness, and total depression scores. In this study, the correlation between hopelessness depression and total BDI score was .96; hopelessness depression and nonhopelessness items, .74; and hopeless and nonhopelessness items, .89 ($N = 733$, all $ps < .001$). The data were also examined using different methods of scoring the AS questionnaire. The findings did not differ according to the method of scoring (e.g., negative generality score vs. overall AS composite).

Cross-Sectional Regression Analyses

The results of the hierarchical regression analysis predicting baseline BDI scores are shown in Table 2. Sex was entered into the equation first. Subsequent steps entered the NLE score, followed by AS, NPSO, and the interactions between NLE × AS and NLE × NPSO. Interaction terms were calculated using the product of predictor variables centered around the mean (Aiken & West, 1991). The final equation explained 46% of variance in baseline BDI scores and was highly significant, $F(12, 720) = 55.16$, $p < .001$. Sex was a significant predictor at each step, with girls being more likely to report higher depression scores than boys. The NLE score in the past year was also a strong predictor of BDI scores. AS had a significant direct relation with depression scores, as did NPSO. The interaction between NLE × AS significantly predicted depression scores at Step 5. At Step 6, the interaction between NLE and NPSO also significantly predicted baseline depression symptoms. However, when the interaction between NLE × NPSO was entered at Step 6, the interaction between NLE × AS ceased to be statistically significant. β values and significance levels are reported in Table 2.

Two- and three-way interaction terms involving sex were then examined. The two-way interactions between Sex × NLE ($\beta = -.22$, $p < .01$) and Sex × AS ($\beta = .27$, $p < .01$) were significant predictors of baseline de-

Table 1. *Correlations Between Depression Scores at Baseline and 1-Year Follow-Up and Predictor Variables*

	Sex	SES	BDI T1	BDI 1 year	NLE T1	NLE 1 year	AS T1	NPSO T1
Sex	1.00							
SES	.15***	1.00						
BDI T1	.22***	.10	1.00					
BDI 1 year	.17***	.09	.43***	1				
NLE T1	.03	.03	.37***	.24***	1			
NLE 1 year	.12	.12	.28***	.39***	.47***	1		
AS T1	.02	−.10	−.46***	−.30***	−.17***	−.15***	1	
NPSO T1	.18***	.09	.50***	.34***	.20***	.17***	.22***	1
M		3.89	7.07	7.31	3.97	3.43	1.97	6.38
SD		2.32	7.22	8.15	2.97	3.01	1.47	3.75

Note: SES= socioeconomic status; BDI = Beck Depression Inventory; NLE= negative life events; AS = attributional style; NPSO = negative problem-solving orientation.
***$p < .001$, two-tailed (733).

Table 2. *Standardized Beta Values for Cross-Sectional Hierarchical Regression Analysis Examining Predictors of Depression Symptoms at Baseline*

	Step 1*** (R^2 Change, .05)	Step 2*** (R^2 Change, .13)	Step 3*** (R^2 Change, .17)	Step 4*** (R^2 Change, .09)	Step 5** (R^2 Change, .01)	Step 6*** (R^2 Change, .02)
Sex	.21***	.20***	.21***	.15***	.15***	.15***
NLE		.36***	.29***	.24***	.24***	.23***
AS			−.41***	−.32***	−.32***	−.32***
NPSO				.32***	.32***	.29***
NLE × AS					−.08	−.03
NLE × NPSO						.15***

Note: NLE = negative life events; AS = attributional style; NPSO = negative problem-solving orientation. Cumulative R^2 = .46, $F(6, 726)$ = 100.85, $p < .001$.
*$p < .05$. **$p < .01$. ***$p < .001$.

pression. The interaction between Sex × NPSO (β = −.17, p = .07) and the three-way interactions between Sex × NLE × AS (β = −.12, p = .19) and Sex × NLE × NPSO (β = −.02, p = .67) did not significantly predict depression scores.

Analyses were conducted separately for each sex to examine the nature of the significant interactions involving sex. The same variables significantly predicted depression scores for both boys and girls. The only differences between the sexes related to the percentage of variance explained by these predictors. For girls, NLE scores were strongly associated with depression scores, explaining 20% of the variance. For boys, NLE significantly predicted depression scores, but the percentage of variance explained was lower (10%). Similarly, for girls AS explained an additional 21% of the variance in depression scores, whereas, for boys, AS, although still a significant predictor, explained a lower percentage of variance (12%). In other respects, the pattern of results was similar for boys and girls, although the total percentage of variance in depression scores explained by the combined predictor variables was higher for girls (55%) than for boys (39%).

To interpret the significant interaction effects of NLE × AS and of NLE × NPSO in predicting baseline depression scores, these effects were examined graphically. First, depression scores were computed by inserting specific values of NLE and AS (1 *SD* above and 1 *SD* below the mean) into the regression equation as outlined by Cohen and Cohen (1983) and Aiken and West (1991). Figure 1 shows the interaction between AS and NLE in the prediction of depression scores. Cross-sectionally, high baseline levels of depressive symptoms were associated with a combination of high NLE and pessimistic AS. A high level of NLE was not associated with high depression if the young person showed optimistic AS. Similarly, a pessimistic AS, in the absence of high NLE, was not associated with high levels of depression. Second, this procedure was repeated for the interaction between NLE × NPSO and revealed that high baseline levels of depressive symptoms were associated with a combination of high NLE

and high NPSO, as shown in Figure 2. A high level of NLE was not associated with high depression if the young person showed low NPSO. Similarly, high NPSO, in the absence of high NLE, was not associated with high levels of depression. This pattern of results is consistent with a cognitive diathesis-stress model, in which NPSO and pessimistic AS are proposed to be diatheses in the presence of high NLEs in the development of depression.

Comparison of Retained Versus Drop-Outs From the Study at 1-Year Follow-Up

It was important to determine whether those individuals who participated in the study and completed the 1-year follow-up were representative of the original sample. Those who remained in the study (N = 733) were compared on baseline variables with those who had dropped out of the study by 1-year follow-up (N = 261). Multivariate analysis of variance revealed a significant difference between groups, Pillais $F(9, 983)$ = 5.32, $p < .001$. Those who dropped out of the study reported significantly higher baseline depression scores and more NLEs, compared to those who remained in the study. Groups did not differ statistically in terms of SES, AS, or NPSO.

Longitudinal Analyses

A true test of the cognitive diathesis-stress model of depression must demonstrate that the interaction between NLEs and a cognitive diathesis predicts future changes in depressive symptoms. Longitudinal, hierarchical linear regression analyses were conducted using a residual change score method as outlined by Steketee and Chambless (1992). Depression scores at 1-year follow-up were predicted by sex at Step 1 and pretest depression scores at Step 2, followed by predictor variables as outlined in Table 3.

The total equation was statistically significant, $F(8, 720)$ = 38.80, $p < .001$, explaining 30% of variance in
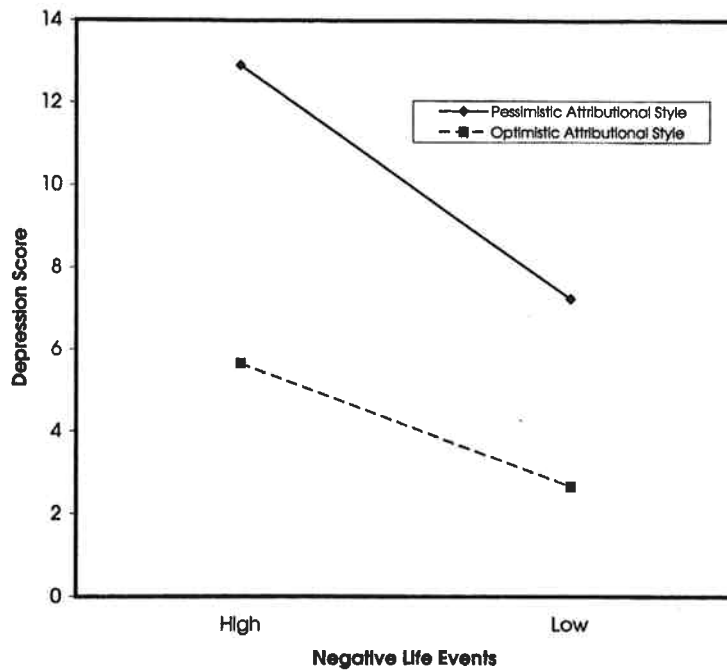
Figure 1.   Depression scores as a function of AS × NLEs interaction.
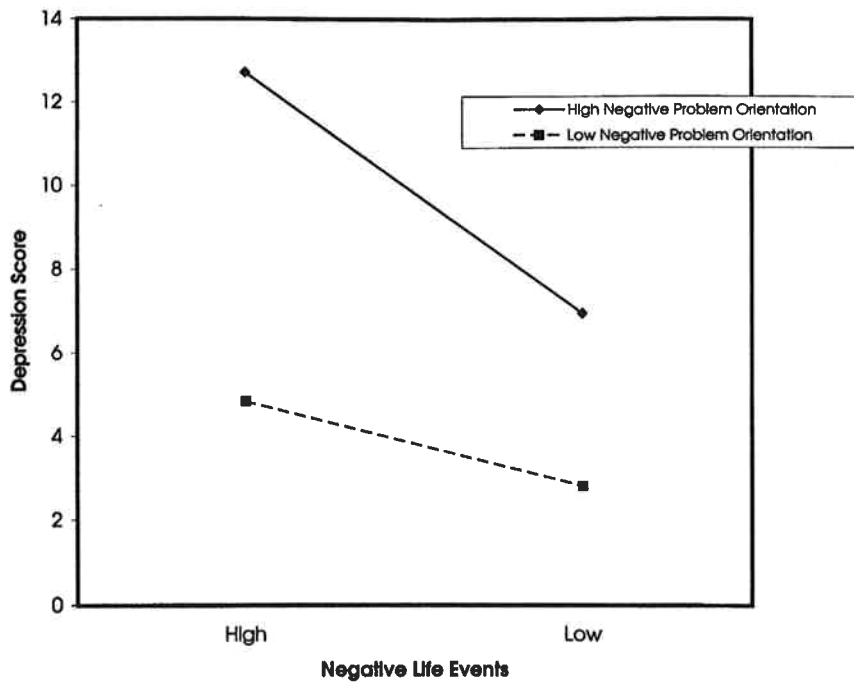

Figure 2.   Depression scores as a function of the NPSO × NLEs interaction.

depression scores at 1-year follow-up. As can be seen from Table 3, baseline depression scores strongly predicted depression 1 year later, accounting for 16% of the variance in scores. NLEs during the intervening year also significantly predicted depression scores at 1-year follow-up, explaining 8% of variance in depres-

sion scores at follow-up. AS at baseline was found to show a direct effect on depression scores 1 year later (controlling for baseline depression), accounting for around 1.3% of unique variance in future depression scores. NPSO at baseline also significantly predicted change in depression scores, explaining a further 1.4%

Table 3. *Standardized Beta Values for Longitudinal Hierarchical Regression Analysis Examining Predictors of Depression Symptoms at 1-Year Follow-Up*

	Step 1*** (R^2 Change, .03)	Step 2*** (R^2 Change, .16)	Step 3*** (R^2 Change, .08)	Step 4*** (R^2 Change, .013)	Step 5** (R^2 Change, .014)	Step 6 (R^2 Change, .003)	Step 7* (R^2 Change, .004)
Sex	.17***	.08*	.06	.08*	.06	.06	.07
Baseline (T1) BDI		.41***	.33***	.27***	.21***	.21***	.20***
NLE 1 year			.29***	.29***	.29***	.28***	.27***
AS T1				−.13***	−.11**	−.11**	−.12***
NPSO T1					.14***	.14***	.14***
NLE 1 year × AS T1						−.06	−.04
NLE 1 year × NPSO T1							.07*

Note: NLE = negative life events; AS = attributional style; NPSO = negative problem-solving orientation. Cumulative R^2 = .30, F (7, 721) = 44.40, $p < .001$.

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

of variance. The interaction between NLE and AS was not a significant predictor of future depression scores. In the final step, the interaction between NLE and NPSO was found to be a significant predictor of change in depression scores but explained a very small fraction of variance as shown in Table 3.

Sex interaction effects were then examined. No significant effects were evident for the two-way interactions of NLE × Sex ($\beta = -.04$, $p = .71$), AS × Sex ($\beta = -.00$, $p = .98$), or NPO × Sex ($\beta = -.03$, $p = .77$) in the prediction of depression at follow-up (controlling for baseline depression). When three-way interactions involving sex were examined, a significant effect was found for the interaction of NLE × AS × Sex in predicting depression scores at 1-year follow-up ($\beta = .08$, $p < .05$). The step examining three-way interactions between NLE × NPSO × Sex was not statistically significant ($\beta = -.18$, $p = .10$). When boys and girls were examined separately, however, the interaction between NLE × AS did not significantly predict future depression for either boys or girls. Thus, this interaction was not examined further. The absence of a significant interaction between NLE and AS in the prediction of changes in depression scores for both boys and girls, and the combined samples, was not consistent with the cognitive diathesis-stress model. Rather, the significant direct effect of AS showed that individuals who held a pessimistic AS at baseline were more likely to report increases in depression scores at 1-year follow-up, irrespective of the number of NLEs experienced by the young person.

Given that the interaction between NLE and NPSO did not interact with sex in the prediction of depression scores, the significant interaction effect for NLE × NPSO was interpreted for boys and girls combined. Interpretation was conducted using residual change scores (see Cohen & Cohen, 1983; Steketie & Chambless, 1992). Pretest depression scores were entered into the prediction equation before the predictors of

interest, in the prediction of depression scores at 12-month follow-up. Residual change in depression scores were then computed by inserting specific values of NLEs over the 1-year follow-up and pretest AS and NPSO (i.e., 1 *SD* above and 1 *SD* below the mean) into the regression equation predicting BDI changes. Further details regarding this procedure can be found in Joiner (2000) and Hilsman and Garber (1995).

Residual change in depression scores for high versus low levels of NPSO and high versus low number of NLEs are shown in Figure 3. Consistent with a cognitive diathesis-stress model, a combination of high NLE and high NPSO was associated with strong increases in depression over the 1-year follow-up. High NPSO in the absence of high NLE was not associated with increases in depressive symptoms. Indeed, low NLE over the 1-year follow-up period predicted reductions in depression symptoms, irrespective of NPSO. Similarly, a high level of NLE accompanied by low NPSO was not associated with increases in depression over time.

Onset or Exacerbation of Depressive Symptoms?

In line with procedures recommended by Joiner (1994, 2000), the data were examined to determine whether the significant predictive relations apply equally to the onset, exacerbation, or remission of depression. These relations were examined by determining whether baseline depression scores (the covariate) interacted with any predictor variables in the prediction of follow-up depression scores. If baseline depression scores interact significantly with other predictors to predict depression at follow-up, then this suggests that the predictors have their influence only at certain levels of initial depression. For example, if the predictors are only significant at low levels of depression, then this suggests that they influence only the initial development of depression, rather than symptom exac-
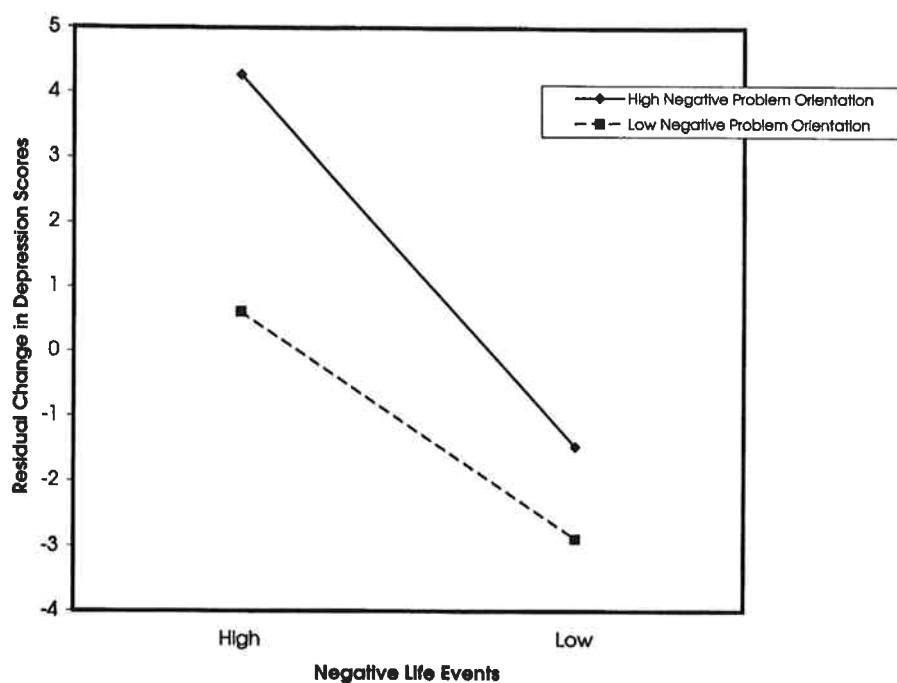
Figure 3. Residual change for depression scores as a function of the NPSO × NLEs interaction.

erbation or remission. Thus, a regression analysis was conducted to predict depression scores at 12 months from baseline depression score, NLE, AS, NPSO, and the interaction between these predictors and baseline depression scores. The interaction terms were not statistically significant in the prediction of follow-up depression scores (NLE × Baseline Depression, $\beta = .04$, $p = .28$; AS × Baseline Depression, $\beta = -.05$, $p = .24$; NPSO × Baseline Depression, $\beta = .001$, $p = .97$). Thus, it can be concluded that the significant predictive effects influence changes in depression, irrespective of initial levels of depression, and the effects are equally relevant to the onset and change (exacerbation or remission) of depressive symptoms.

Discussion

This study examined the role of environmental stressors and individual characteristics of AS and life problem-solving skills in the development of depressive symptoms among young adolescents. Specifically, the study examined a cognitive diathesis-stress model of the development of depression in which it was proposed that depressogenic AS and NPSO (the cognitive diatheses) are variables that operate in the presence, but not absence, of NLEs (the stress) to influence the development of depressive symptoms (Abramson et al., 1989).

Both the cross-sectional and longitudinal results provided support for a cognitive diathesis-stress model of depression involving NPSO as a diathesis. A NPSO in combination with a high number of NLEs was associ-

ated with higher levels of depression in the present and increases in depression in the future. NPSO on its own, in the absence of a high level of NLEs, was not associated with elevated depression scores cross-sectionally or with increases in depression longitudinally. Similarly, a high number of NLEs in the absence of a NPSO was not associated with increasing levels of depression over time.

Although the interaction between AS and NLEs was found to predict current depression levels, contrary to predictions this interaction did not predict future change in depression scores. Rather, AS had a direct effect in predicting future increases in depression, explaining a small but significant percentage of variance in changes in depression scores. Adolescents who held a pessimistic AS were more likely to report higher levels of depression and were at greater risk of showing increases in depression over the 1-year follow-up, irrespective of level of NLEs. This finding is consistent with the conclusions of a meta-analytic review of the literature reported by Joiner and Wagner (1995).

It is interesting to discuss these findings in relation to other research in this area. Joiner (2000) noted the conflicting results emerging from studies examining the cognitive diathesis-stress model of depression with children and adolescents. The findings of this study, with respect to AS, are inconsistent with the results of Joiner, who found AS moderated the relation between NLEs and future depression in a clinical sample. Similarly, Hilsman and Garber (1995) provided supportive evidence for the model in that depressive symptoms 5 days later were predicted by the interaction between

negative AS and occurrence of an academic stressor, even after controlling for initial depression scores. As mentioned in the introduction, however, other studies have produced results that do not support a cognitive diathesis-stress model involving AS. Given the marked variation in methodology used across different studies, such as sample size, sample characteristics (age, clinical vs. community samples), duration of follow-up, brief versus persistent stressors, and measures used to assess cognitive styles and life events, it is perhaps not surprising to find such variation in results. Alloy, Abramson, Metalsky, and Hartlage (1988) also noted that the relatively low base rates of depression, negative AS, and NLEs in the sample may make it difficult to examine cognitive diathesis-stress effects in the development of depression. However, the finding of a significant effect for the interaction between NPSO and NLEs mitigates against low base rates as a likely explanation for the failure to find a significant moderating effect for AS and NLEs in the prediction of depression. It must also be pointed out that failure to find support for the cognitive diathesis-stress role of AS cannot be attributed to the focus on total depression scores, rather than the hopelessness depression cluster of symptoms. No differences in findings were evident if the hopelessness depression symptoms were examined separately.

There are several methodological issues that should be considered when interpreting these findings. For example, the study relied on self-reports of the young people, leaving open the possibilities of common method variance and reporter bias. It would be preferable in future research to include information from parents or teachers in the assessment of depression.

The representativeness of the community sample should also be considered. As with any community study requiring written informed consent from adolescents and parents, those returning their consent forms may not be representative of the total school population. The ethics approval process did not permit collection of data regarding individuals who did not provide written, informed consent. Thus, it is not possible to determine whether participants were different from those who declined to participate, in terms of psychosocial variables. There is also an issue of drop-out over time. Comparison of drop-outs with those remaining in the study at 1-year follow-up indicated that drop-outs tended to have significantly higher depression scores, experience more NLEs, and have lower school performance and weaker relationships with family and peers. Clearly, these young people are at greater risk of developing depression over time and yet are no longer in the sample at follow-up. On a related point, it is not clear whether the results of this study can be generalized to older adolescents. This is an important issue given that the rate of emergence of depression increases in later adolescence. Future research should focus on examining the cognitive diathesis-stress model of depression in this older age group.

A further methodological issue concerns the measures used in this study. To obtain ethical approval, it was necessary to drop the question about loss of interest in sex from the BDI and to make minor wording changes for the Australian sample (e.g., pounds to kilograms). Although such changes may have produced minor variation in the psychometric properties of the measure in relation to other studies, the scale retained high internal consistency. A further limitation was the use of the 24-item version of the CASQ to assess AS, whereas Joiner (2000) and Hilsman and Garber (1995) used the 48-item form. Such differences in measurement could potentially explain the apparent variation in findings across studies. The internal consistency of the 24-item CASQ used in this study, although in keeping with the findings of Thompson et al. (1998), was weak and may have limited the potential to find moderating effects of AS. Similarly, questions may be raised regarding the most appropriate method of assessing the occurrence of NLEs. This study asked students to recall the occurrence of adverse life events over the previous year from a list of 22 events. This method does not allow determination of the exact timing of events in relation to the occurrence of changes in depressive symptoms. To provide a more rigorous examination of acute stressors and their impact on depressive symptoms, it would be valuable to examine more extensive time series data in future studies. This would clarify whether recent increases in depressive symptoms are truly a consequence of recent NLEs, in interaction with a cognitive diathesis, or are simply an outcome of chronic social adversities.

Nevertheless, the finding that NPSO may represent a cognitive diathesis, interacting with NLEs to increase the risk of developing symptoms of depression, is an interesting one. There are various theoretical interpretations that may explain this finding. D'Zurilla et al. (1998) stressed the importance of cognitive and emotional components of problem solving, particularly with regard to a person's appraisals, beliefs, and expectancies relating to the occurrence of problems and his or her ability to solve them. These authors also discuss the self-efficacy component of problem-solving orientation and the association between hopelessness and low self-efficacy expectations for problem solving. A NPSO could also be hypothesized to fit within the hopelessness theory of depression. In their early article outlining the hopelessness theory of depression, Abramson et al. (1989) proposed a range of attributions, inferences, and expectancies relating to the occurrence of a NLE that are suggested to lead to hopelessness and thereby to hopelessness depression. These variables include inferences relating to negative consequences of the NLE and negative characteristics about the self,

given the NLE. Variables such as low self-efficacy or low self-confidence expectations for problem solving could fit within this model. Unfortunately, this study did not include a measure of hopelessness to examine the mediating role of hopelessness in the development of depressive symptoms. However, problem solving self-confidence was significantly related to hopelessness in a study reported by Dixon, Heppner, and Anderson (1991) with college students.

The construct of NPSO also included items relating to negative emotions (feeling unsure, frustrated, and upset) in the presence of problems. It is not clear how this component of NPSO might impact on the development of depression. Given that baseline depression levels were controlled for in the regression analyses, it is unlikely that the effect of NPSO is purely a reflection of negative affectivity in the presence of problems.

This study was also limited in that it restricted the investigation to depressive symptoms. Therefore, conclusions cannot be drawn as to the specificity of the findings in relation to depression versus other forms of psychopathology, such as anxiety. In line with Joiner (2000), it would be valuable in future studies to examine whether the cognitive diathesis-stress effect of NPSO is specific to depression or is also relevant in the development of anxiety and externalizing problems. In retrospect, it would have been preferable to obtain diagnostic information about different disorders, to address the issue of symptom specificity.

In summary, a pessimistic explanatory style that attributes negative events to internal, stable, and global causes and positive events to external, unstable, and specific causes was found to predict future increases in depressive symptoms over a 1-year period, even after controlling for baseline levels of depression. This effect occurred irrespective of the level of NLEs, and the findings did not support the proposition that AS acts as a cognitive diathesis in interaction with life stressors in the development of depression. In contrast, support was found for a cognitive diathesis-stress role of NPSO. In the presence, but not absence, of a high number of NLEs, NPSO predicted high current levels of depression and future increases in depression by 1-year follow-up. The findings are consistent with a cognitive vulnerability model of depression in adolescence and have implications for preventive interventions. The results suggest that, in addition to enhancing attributional style, it is important that attention is paid to problem-solving orientation as a component of programs designed to prevent depression in young people.

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