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The Prevention of Depressive Symptoms in Rural School Children: A Follow-up Study

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Introduction

Longitudinal studies indicate that 15-20% of children experience an episode of depression by the end of secondary school (Harrington *et al*, 1996; Kovacs, 1996) and that adolescent depression has a poor prognosis, increasing the risk for adult depressive disorders (Lewinsohn *et al*, 1999). Long-term follow-up is therefore crucial in depression prevention research with children. For prevention effects to emerge, it is important to follow children through the period of elevated risk to mid-adolescence at least. Few studies, however, have investigated the distal effects of prevention programmes for internalising problems such as depression and anxiety (Greenberg *et al*, 1999).

Gillham and colleagues (Gillham & Reivich, 1999; Gillham *et al*, 1995) reported on the long-term follow-up results of the Penn Prevention Program. Children (10–13 year olds) in these studies were assessed at six-monthly intervals for up to three years following the intervention, at which time 55% of children remained. The prevention effect was maintained at a 2-year follow-up, in comparison with the control group, and intervention group children were less likely to report moderate to severe symptoms of depression (Children's Depression Inventory (CDI): Kovacs, 1992) (Gillham *et al*, 1995). These effects, however, were no longer significant at a 3-year follow-up (Gillham & Reivich, 1999). The intervention group made fewer stable explanations for negative events than the control group at both 2- and 3-year follow-ups. In addition, explanatory style partly mediated the impact of the intervention in decreasing depressive symptoms at the 2-year follow-up.

A B S T R A C T

This study investigated the long-term effects of the Penn Prevention Program in preventing depressive and anxious symptoms in Australian rural school children with elevated levels of depressive symptoms, at 18- and 30-month follow-up. Seventh grade students from nine primary schools (n = 90) were randomly assigned to receive the programme and nine control schools (n = 99) received their usual health education classes and symptom monitoring. A no-intervention comparison group (n = 114) from 18 rural primary schools matched to the intervention and control group schools received their usual health education classes and were assessed at pre-intervention and 30-month follow-up. Students completed questionnaires on depression, anxiety, explanatory style and social skills. Parents completed the Child Behavior Checklist. No intervention effects were found for any child-report or parent-report variables at the 18-month follow-up. At the 30-month follow-up, intervention group children reported less anxiety than control or comparison groups. However, there were no effects for depression.

Clarke and colleagues (1995) found that 14–15 year-olds attending their Coping with Stress Course had half the incidence of major depression or dysthymia compared with the usual care group at a 12-month follow-up (intervention group 14.5%, control group 25.7%). However, on measures of depressive symptoms (Centre for Epidemiologic Studies – Depression Scale (CES-D); Radloff, 1977) the groups did not differ at the 12-month follow-up, when 73% of the sample remained. More recently, Spence *et al* (2003) found no effects at a 12-month follow-up for the Problem Solving for Life Program on depressive symptoms (Beck Depression Inventory (BDI); Beck *et al*, 1979) or depressive disorders in 12–14 year olds, after teachers implemented the 8-week universal depression prevention programme. Seventy-one percent of the sample were retained at this follow-up. High-risk intervention group adolescents (those with pre-intervention BDI scores of 13 or above) in this study did report significant reductions in the use of avoidant problem-solving strategies and negative problem-solving orientations at 12-month follow-up, compared with high-risk control group adolescents.

No previous studies have evaluated the long-term impact of a depression prevention programme on anxiety symptoms. However, one study has investigated the prevention of anxiety disorders (Dadds *et al*, 1997). This study found that a 10-week, school-based, child- and parent-focused, psychosocial intervention resulted in significant reductions in anxiety disorders and prevention of the onset of new anxiety disorders in children between seven and fourteen years at 6-month and 24-month follow-ups (Dadds *et al*, 1999). This research found no significant differences between intervention and control groups on child-reported anxiety symptoms (Revised Children's Manifest Anxiety Scale (RCMAS); Reynolds & Richmond, 1985) or parent-reported internalising symptoms on the Child Behaviour Checklist (CBCL; Achenbach, 1991). The researchers suggested that these measures might be less sensitive to intervention outcomes.

Using the same anxiety prevention intervention (FRIENDS; Barrett *et al*, 1999) implemented universally by teachers with 10–13 year olds, Lowry-Webster *et al* (2003) reported that the intervention group children maintained lower anxiety scores on the Spence Children's Anxiety Scale (SCAS; Spence, 1998) at 12-month follow-up. Children in the high-risk anxiety group maintained lower scores on self-reported anxiety (SCAS) and depression (CDI). In addition, 85% of intervention group children scoring above clinical cut-offs at pre-intervention were diagnosis-free at 12-month follow-up, compared with only [illegible]% of control group children. However, no effects were found for parent reports on the CBCL.

In 2003 we reported on the short-term effects of a controlled trial of the Penn Prevention Program (PPP) (Jaycox *et al*, 1994) conducted under normal service delivery conditions in rural schools in Western Australia (Roberts *et al*, 2003). No intervention effects were found for depressive symptoms at post-intervention or six-month follow-up, but intervention group children reported less anxiety than the control group at post-intervention and 6-months follow-up, and more optimistic explanations for positive events at post-intervention. Intervention group parents reported fewer child internalising and externalising symptoms at post-intervention. Analysis of subgroups of children with high and low levels of pre-intervention symptoms revealed a prevention effect for depression, anxiety and internalising problems for children with low levels of symptoms at post-intervention, but no significant symptom relief for children with high initial depressive symptoms. Intervention effects for anxiety were significant at six-month follow-up for all children. As anxiety symptoms are frequently co-morbid with depression, and anxiety often develops into depression if left untreated in childhood (Cole *et al*, 1998), it was hypothesised that anxiety might mediate the effects of the intervention programme on depressive symptoms at later follow-ups.

In the Roberts *et al* (2003) study, the control group received the normal health education curriculum plus active monitoring of their symptoms. Parents of children experiencing significant distress at any assessment point were contacted, the results of the assessments were discussed, and parents were given advice on management or referral for treatment if requested. This protocol could be viewed as similar to interventions such as telephone counselling. As the children in the control group experienced reductions in their symptoms at the 6-months follow-up, this condition may have acted as a minimal intervention. One way of testing this explanation was to compare the long-term outcomes of the intervention and control groups with those of a comparison sample of children who had received neither monitoring nor the PPP intervention.

The research

The current study presents the long-term effects of the PPP programme with an indicated sample of Australian rural school children, followed up when the children were in the 9th and 10th grades of high school. It was expected that intervention group children would report fewer depressive and anxiety symptoms than the control group and no-inter-

vention comparison group, at both follow-ups. Assessments of risk factors, optimism and social skills, and parent reports of internalising and externalising problems were taken only at the 18-month follow-up. It was expected that intervention group children would report more optimism and social skills than the control group, and that their parents would report fewer internalising and externalising problems at the 18-month follow-up. In addition, the notion that anxiety may mediate the impact of the intervention on depressive symptoms at the 30-month follow-up was investigated.

Method

Participants

Two samples of 7th grade students were recruited to this study. The first sample comprised 341 students aged 11-13 years (M = 11.89, SD = 0.33) from 18 rural primary schools in Western Australia, recruited as part of the screening phase of the intervention study described in Roberts *et al* (2003). The second sample included 404 7th grade students aged 11–13 years (M = 11.95, SD = 0.31) recruited at the same time from an additional 18 rural primary schools that were part of a concurrent study of the prevalence of depression and anxiety in rural school children. The 18 schools in the second sample were matched to the schools in the intervention study, on geographical location, school size, distance from the nearest regional town and socio-economic status. Both samples completed the CDI (Kovacs, 1992) and the RCMAS (Reynolds & Richmond, 1985) at pre-intervention. However, Sample 1 students involved in the intervention study also completed the additional self-report and parent-report measures described below.

For the purpose of selecting a targeted sample with elevated depression scores, participating children in each class were ranked using their CDI scores, and the 13 children with the highest scores from each class were invited to participate. In rural classes with 13 or fewer students, all children were invited. Sixty-one per cent (n = 208) of children from Sample 1 with CDI scores ranging from 1 to 37 (M = 11.01, SD = 8.3) were invited to participate in the intervention phase in the second half of their 7th grade. Parents provided consent for 194 (93%) of these children. Fifty-eight percent (n = 234) of children from Sample 2 with CDI scores ranging from 1 to 41 (M = 12.17, SD = 8.24) were invited to participate in the current follow-up study. Parents of 114 (49%) of these children consented to their child's participation at the 30-month follow-up, and for the use of pre-intervention depression and anxiety scores.

For the 18 Sample 1 schools, pairs of schools matched for geographical location, school size, distance from the nearest regional town and socio-economic status were randomly assigned to intervention or control conditions at pre-intervention. Five children relocated before the study started, so the final Sample 1 consisted of 189 children: 90 children (46 females) in the intervention group and 99 children (48 females) in the control group. At the 18-month follow-up, 83.33% (n = 75) of the intervention and 85.85% (n = 85) of the control group participated in the study. At the 30-month follow-up, 44.55% (n = 41) of the intervention and 51.15% (n = 51) of the control group remained. Sample 2 comprised 114 children (55 females) and formed a no-intervention comparison group, with a participation rate of 48.72% at the 30-month follow-up. There were no significant group differences in the proportions of students who completed either the 18-month or the 30-month follow-up assessments. The reasons for this attrition included families relocating, students unavailable for testing and families that could not be contacted. Parental CBCL questionnaires for intervention and control groups were available for 73 (81.11%) and 78 (78.79%) students at pre-intervention and for 51 (68%) and 57 (67.06%) students at 18-month follow-up.

Table 1, opposite, shows the demographic details for the intervention and control group children from Sample 1, and the no-intervention comparison group from Sample 2. There were no significant differences between intervention, control and no-intervention comparison groups on pre-intervention outcome variables or demographic variables. However, ***Table 1*** shows that the proportion of children from intact original families was lower in the intervention group children (66%) than in the control (78%) and no-intervention groups (84%), because of the number of non-stated responses.

Measures and intervention

The Child Depression Inventory (CDI) measured depressive symptoms (Kovacs, 1992). This 27-item scale assessed depressed affect, somatic symptoms, depressive behaviour, low self-esteem and anhedonia, with a total score range of 0-54 (Cronbach's α = .86). Higher scores indicate more severe symptom levels, and a cut-off score of 15 recommended by Kovacs as indicating moderate to severe levels of depressive symptoms was used in this study. This cut-off was used in the study of short-term effects by Roberts *et al* (2003) to differentiate students into high and low risk groups for depression at pre-intervention. The mean pre-

TABLE 1 *Descriptive Data for Intervention, Control and No-intervention Comparison Group Children*

Descriptive characteristics	Intervention		Control		No-intervention comparison		Group differences
Average age of child (*SD*)	11.92 (0.34)		11.87 (0.32)		11.95 (0.32)		$F(2,292) = 1.70$, $p > .05$
Ethnic origin							
Australian	62	(87%)	80	(92%)	87	(84%)	$X^2(4,N=261) = 2.68$, $p > .05$
Other English-speaking	4	(6%)	4	(5%)	8	(8%)	
Other non-English-speaking	5	(7%)	3	(3%)	8	(8%)	
Not stated	19	(21%)	12	(12%)	11	(10%)	
Gender of child							
Male	44	(49%)	51	(52%)	51	(45%)	$X^2(2, N = 293) = 0.904$, $p > .05$
Female	46	(51%)	48	(48%)	63	(55%)	
Family status							
Original two parent	60	(66%)	77	(78%)	96	(84%)	$X^2(4, N = 292) = 5.54$, $p > .05$
Blended two parent	5	(6%)	7	(7%)	8	(7%)	
Single parent/other	16	(17%)	13	(13%)	10	(9%)	
Not stated	12	(13%)	2	(2%)	0	(0%)	
Mother's education							
Less than grade 10	8	(9%)	9	(6%)	6	(5%)	$X^2(10, N = 289) = 10.33$, $p > .05$
Grade 10–12	34	(48%)	65	(44%)	48	(42%)	
Grade 12	16	(18%)	19	(19%)	21	(19%)	
Vocational college	18	(20%)	20	(20%)	24	(21%)	
University	6	(7%)	4	(4%)	14	(12%)	
Not stated	8	(9%)	2	(2%)	1	(1%)	
Father's education							
Less than grade 10	10	(11%)	10	(10%)	8	(7%)	$X^2(8, N = 278) = 6.16$, $p > .05$
Grade 10–12	30	(33%)	45	(45%)	47	(42%)	
Grade 12	15	(17%)	18	(18%)	21	(19%)	
Vocational college	17	(19%)	14	(14%)	21	(19%)	
University	6	(7%)	5	(5%)	14	(13%)	
Not stated	12	(13%)	7	(7%)	3	(3%)	
Parental history of mental health problems							
Mother – none	76	(84%)	90	(90%)	101	(89%)	$X^2(2, N = 284) = 2.53$, $p > .05$
Mother – problems	3	(4%)	6	(6%)	11	(10%)	
Father – none	64	(71%)	92	(93%)	103	(90%)	$X^2(2, N = 272) = 2.24$, $p > .05$
Father – problems	4	(4%)	2	(2%)	2	(2%)	
Child history of problems							
No problems	64	(71%)	86	(89%)	104	(91%)	$X^2(2, N = 283) = 3.19$, $p > .05$
Any mental health problems	11	(12%)	8	(8%)	8	(7%)	
Not stated	15	(17%)	3	(3%)	2	(2%)	

$p < .05$ two tailed

intervention score for the combined Samples 1 and 2, 11.46 ($SD = 8.31$), was slightly higher than that of the normative sample ($M = 10.5$, $SD = 7.3$) for children of 12 years and younger. The reliability and validity of the CDI have been extensively studied and are excellent for this age group (Kovacs).

The Reynolds Children's Manifest Anxiety Scale (RCMAS) measured anxiety (Reynolds & Richmond, 1985). This 37-item scale assessed physiological symptoms, worry, over-sensitivity, and social and concentration concerns (Cronbach's $\alpha = .87$). Total scores range from 0 to 28. High scores indicate more severe symptoms, and a cut-off score of 16 was used to delineate moderate to severe levels of anxiety. This cut-off was determined by examination of age norms for both girls and boys (Reynolds & Richmond, 1985). The mean pre-intervention total score for the combined Samples 1 and 2 was $M = 11.44$ ($SD = 6.98$), similar to the normative sample ($M = 11.42$, $SD = 5.75$). Reliability and validity of this scale for this age group are well established (Reynolds & Richmond).

The Children's Attributional Style Questionnaire (CASQ) assessed explanatory style for positive and negative events (Seligman *et al*, 1984). The 48 items assess explanations as stable/unstable, global/specific and internal/external. The composite positive (CP) and composite negative (CN) scores were used in this study, higher scores indicating more internal, stable and global explanations. High CN scores (Cronbach $\alpha = .62$) and low CP scores (Cronbach $\alpha = .57$) indicate pessimistic explanations. The

stable/unstable dimension of CN was used to compare results with the Gillham *et al* (1995), Gillham & Reivich (1999) and Roberts *et al* (2003) studies. Seligman and colleagues have found adequate reliability and validity for these scores.

The Matson Evaluation of Social Skills with Youngsters (MESSY) measured social skills (Matson *et al*, 1983). The 22-item appropriate social skills (AS) (Cronbach $\alpha = .90$) with a range of 22-110, and 16-item inappropriate assertiveness (IA) (Cronbach $\alpha = .88$) with a range of 16-80 subscales were used. Higher scores for AS indicate social competence while higher scores on IA indicate poor social skills. These two subscales are the most reliable and valid subscales (Matson *et al*, 1985).

The Child Behaviour Checklist (CBCL) measured parents' perceptions of children's behaviour at home (Achenbach, 1991). The 119 items assess internalising problems (range 0-62) such as social withdrawal, somatic complaints and anxious/depressed symptoms, and externalising problems (range 0-66) such as aggressive and delinquent behaviour. Raw scores (high scores indicating more problems) were used for all analyses as they were distributed more normally. Reliability and validity have been established in many studies cross-culturally (Achenbach, 1991). Parents also completed a demographic questionnaire.

Intervention, control and comparison conditions were as follows. The 12 two-hour weekly PPP intervention programme, described by Jaycox *et al* (1994), was used, with minor changes to include Australian spelling and place names. The theoretical basis and content of this intervention, and the fidelity of its implementation (mean percentage of programme implemented = 74.11%, range 41-97%) by school psychologists and nurses, have been described previously by Roberts *et al* (2003). The programme was implemented in the second half of the 7th grade, and small groups of students were withdrawn from classes to attend the sessions during school time in a similar manner to students withdrawn for other extra-curricular activities. Control group students and students in the no-intervention comparison group participated in their usual health education classes.

For the intervention and control group students only, an active monitoring protocol was used at all assessment points. At both follow-ups parents were informed that they would be contacted by the researchers and provided with advice if their child's scores indicated significant clinical levels of distress (CDI total score greater than 19 and/or a score of greater than 1 on the suicide item, as recommended by Kovacs, 1992). Students in the no-intervention comparison group received active monitoring of symptoms at the 30-month follow-up only.

Procedure

Primary and high school principals gave their permission for schools to participate. At pre-intervention, parents of students in the intervention and control groups were sent information and consent forms relating to an intervention study with 6- and 18-month follow-ups. Parents in the no-intervention control group were sent information and consent forms relating to a single assessment prevalence study. Additional consent to participate in the 30-month follow-up was requested from parents of students in all three conditions.

All students and parents completed pre-intervention assessments half way through the 7th grade. Intervention and control group students completed the full battery of self-report measures, while the no-intervention comparison group completed the CDI and RCMAS only. All student assessments were read aloud to small groups during school time. All parents were sent a demographic questionnaire, and parents of intervention and control group parents were sent the CBCL, to complete and return in pre-paid envelopes. At the 18-month follow up, half way through 9th grade, the intervention and control group students completed the full battery of questionnaires comprising the CDI, RCMAS, CASQ and the MESSY. The questionnaires were administered to small groups in school time using standardised instructions. Parents were mailed the CBCL and a demographic questionnaire to complete and return in pre-paid envelopes.

As the 30-month follow-up was not part of the original study, questionnaires were mailed separately to all students and parents in the middle of 10th grade. They were requested to complete them independently and return them in separate pre-paid envelopes. Students and parents in the intervention and control groups were mailed the same battery of questionnaires that they received at the 18-month follow-up. Students in the no-intervention comparison group were mailed the CDI and RCMAS only, and their parents were mailed the demographic questionnaire only.

Results

Design and analysis

Nested analyses of covariance (ANCOVA) using pre-intervention scores as the covariate, group as the fixed factor and school as the random nested factor, were conducted for each dependent variable at 18-month and 30-month follow-ups. In all analyses, one-tailed *p*-values are report-

purposes with the Roberts *et al* (2003) study of short-term effects, analyses of outcomes for subgroups of students with high and low pre-intervention depression and anxiety scores were conducted at both follow-ups. However, because of attrition at the 30-month follow-up, there is limited power to determine effects, particularly for the high-risk group.

Drop-out analyses

There were no significant group differences between the proportions of students who remained in the study at the 18-month follow-up ($\chi^2(1, N = 190) < 1$), or the 30-month follow-up ($\chi^2(2, N = 296) < 1$). Students who dropped out at the 18-month follow-up were on average two months older than students who remained in the study ($t(182) = 2.50$, $p < .05$) and more pessimistic about negative events ($M_{dropout} = 9.42$, $SD = 4.76$; $M_{remain} = 7.82$, $SD = 3.16$; $F(1, 184) = 5.08$, $p < .05$), and reported lower levels of social skills ($M_{dropout} = 148.79$, $SD = 35.05$; $M_{remain} = 132.89$, $SD = 26.54$; $F(1, 184) = 7.65$, $p < .01$) at pre-intervention than students who remained in the study. Students who dropped out at the 30-month follow-up also reported lower levels of social skills at pre-intervention than those who remained ($M_{dropout} = 140.31$, $SD = 30.26$; $M_{remain} = 130.10$, $SD = 26.21$; $F(1,188) = 6.15$, $p < .05$). There were no other significant group differences on pre-intervention outcome variables between students who remained and those who dropped out at either follow-up.

Symptom monitoring analyses

Differences between groups on the proportion of students who received parent contact as part of the active monitoring protocol were investigated at both follow-ups. At 18-month follow-up, 7 (9.33%) intervention and 8 (9.41%) control group students' parents were contacted, while at the 30-month follow-up, 2 (4.7%) intervention, 2 (4%) control and 12 (10.6%) no-intervention comparison group parents were contacted. These proportions were not significantly different at either 18-month ($\chi^2(1, N = 158) < 1$) or 30-month follow-up ($\chi^2(2, N = 206) = 2.86$ $p < .05$). Nor were the differences in proportions of students who received help for mental health problems in the year before the 18-month follow-up (intervention group n =15 (23.4%); control group n = 10 (14.1%) ($\chi^2(1, N = 135) < 1$) or the year before the 30-month follow-up (intervention group n = 4 (9.3%); control group n = 5 (10.4%); no-intervention control n = 15 (13.2%) ($\chi^2(21, N = 205) < 1$) statistically significant.

Eighteen-month follow-up

No significant between-group differences were observed in depressive symptoms ($F(1, 15) < 1$) or anxiety symptoms ($F(1, 15) < 1$). The mean depression and anxiety scores for both groups declined over time (***Table 2***, below). Additional analyses were conducted on subgroups of children with pre-intervention scores above and below the clinical cut-offs for depression (***Table 3***, overleaf), and on subgroups of children with pre-intervention scores above and below the clinical cut-offs for anxiety (***Table 4***, page 11). No significant subgroup differences were found at 18-months on depression or anxiety symptoms.

There were no significant group differences for parent reports of internalising ($F(1, 14) < 1$) or externalising problems ($F(1, 14) = 1.42$, $p > .05$). Internalising and externalising scores declined over time for the intervention group (Internalising $t(50) = 3.68$, $p < .01$; Externalising $t(50) = 4.22$, $p < .01$), but not for the control group (Internalising

TABLE 2 ***Means (Standard Deviations) and Group Differences in Symptoms at Pre-intervention, 18-months Follow-up and 30-months Follow-up***

Measure/group	Pre-intervention Mean (*SD*)	18-month follow-up Mean (*SD*)	30-month follow-up Mean (*SD*)
Children's Depression Index			
Intervention	10.20 (8.55) (n = 75)	8.42 (7.49) (n = 75)	5.98 (7.06) (n = 41)
Control	9.58 (9.75) (n = 85)	7.55 (7.18) (n = 85)	6.94 (6.31) (n = 50)
Comparison	12.19 (8.28) (n = 113)		9.10 (7.26) (n = 113)
Revised Children's Manifest Anxiety Scale			
Intervention	10.57 (7.39) (n = 75)	7.79 (7.95) (n = 75)	5.67 (6.10)** (n = 41)
Control	10.17 (7.94) (n = 84)	7.71 (6.88) (n = 84)	6.78 (5.89)$^+$ (n = 51)
Comparison	12.10 (6.77) (n = 114)		8.98 (6.35)$^+$ (n = 114)
Internalising Behaviour Problems			
Intervention	8.94 (7.12) (n = 51)	6.10 (6.55) (n = 51)	5.76 (6.53) (n = 41)
Control	6.25 (6.25) (n = 57)	5.58 (4.97) (n = 57)	5.95 (5.81) (n = 42)
Externalising Behaviour Problems			
Intervention	9.31 (7.65) (n = 51)	6.43 (6.64) (n = 51)	6.07 (6.66) (n = 41)
Control	8.40 (6.96) (n = 57)	7.02 (6.05) (n = 57)	6.60 (6.66) (n = 42)

$p < .05$, ** $p < .01$

$^+$ *Intervention group is significantly different from this group*

TABLE 3 *Means (Standard Deviations) and Group Differences in Symptoms for High and Low Depression Subgroups at Pre-Intervention, 18-months and 30-months Follow-up*

	Pre-intervention		18-month follow-up		30-month follow-up	
	Mean (*SD*)		Mean (*SD*)		Mean (*SD*)	
Measure and group	High CDI	Low CDI	High CDI	Low CDI	High CDI	Low CDI
Children's Depression Index						
Intervention	22.47 (5.69) (n = 19)	6.04 (4.25) (n = 56)	13.96 (8.98) (n = 19)	6.54 (5.91) (n = 56)	8.30 (7.67) (n = 10)	5.23 (6.81) (n = 31)
Control	23.20 (8.00) (n = 22)	4.83 (4.27) (n = 63)	13.59 (9.46) (n = 22)	5.44 (4.70) (n = 63)	9.37 (7.49) (n = 16)	5.92 (5.32) (n = 36)
Comparison	21.02 (6.07) (n = 41)	7.16 (4.07) (n = 72)			11.75 (7.59) (n = 48)	7.17 (6.26) (n = 72)
Revised Children's Manifest Anxiety Scale						
Intervention	18.16 (6.73) (n = 19)	8.00 (5.66) (n = 56)	10.54 (8.56) (n = 19)	6.86 (7.59) (n = 56)	8.70 (6.94) (n = 10)	4.68 (5.57)* (n = 31)
Control	18.79 (6.12) (n = 22)	7.11 (6.05) (n = 62)	11.82 (7.48) (n = 22)	6.25 (6.08) (n = 62)	8.31 (5.40) (n = 16)	6.24(5.98)$^{+}$ (n = 37)
Comparison	17.86 (5.27) (n = 41)	8.87 (5.19) (n = 73)			11.24 (6.62) (n = 41)	7.71(5.87)$^{+}$ (n = 73)
Internalising Behaviour Problems						
Intervention	9.69 (6.87) (n = 13)	8.68 (7.28) (n =38)	6.38 (6.81) (n = 13)	6.00 (6.55) (n = 38)	4.54 (4.98) (n = 13)	6.32 (7.15) (n = 28)
Control	7.55 (7.20) (n = 11)	5.93 (6.05) (n = 46)	7.55 (6.15) (n = 11)(	5.11 (4.61) n = 46)	7.75 (6.88) (n = 8)	5.53 (5.56) (n = 43)
Externalising Behaviour Problems						
Intervention	9.62 (6.09) (n = 13)	9.21 (8.19) (n = 38)	6.38 (6.25) (n = 13)	6.45 (6.85) (n = 38)	5.46 (4.79) (n = 13)	6.36 (8.50) (n = 28)
Control	7.91 (6.25) (n = 11)	8.83 (7.21) (n = 48)	8.45 (6.85) (n = 11)	6.67 (5.87) (n = 46)	8.63 (8.33) (n = 8)	6.11 (6.26) (n = 34)

*p < .05, ** p < .01

$^{+}$ *Intervention group is significantly different from this group*

$t(56) = 1.21$, $p > .05$; Externalising ($t(56) = 1.75$, $p > .05$) (***Table 2***). Subgroup analyses revealed no significant group differences on internalising or externalising problems for the high or low depression subgroups (***Table 3***), or the low anxiety subgroups (***Table 4***). There were no significant between-group differences on internalising problems for the high anxiety children. However, parents of intervention group children with high anxiety reported significantly lower levels of externalising problems at 18-months follow-up than the parents of high anxiety control group children ($F(1,7) = 6.70$, $p < .05$, *Cohen's d* = .95).

No significant group effects were found for explanatory style for positive ($F(1,15) = 1.67$, $p > .05$) or negative events ($F(1,15) = 2.11$, $p > .05$) (***Table 5***, page 12). In addition, the groups did not differ on the stable/unstable dimension of the *negative* events scale ($F(1,15) < 1$). Similarly, no group differences were observed for appropriate social skills ($F(1,15) = 1.20$, $p > .05$) or inappropriate assertiveness ($F(1,15) < 1$). However, the school effect for inappropriate assertiveness was significant at the 18-month follow-up ($F(16, 140) = 3.47$, $p < .01$), which might have obscured a group effect on this outcome measure.

Thirty-month follow-up

No significant differences between intervention, control and no-intervention groups were observed on depressive symptoms ($F(2, 31) = 1.89$, $p > .05$). The school effect for depressive symptoms was significant at the 30-month follow-up ($F(32,170) = 1.77$, $p < .05$). This might have obscured a group effect on this outcome measure. Mean depression scores for all three groups decreased over time (***Table 2***). A significant group effect was observed for anxiety symptoms ($F(2, 31) = 6.69$, $p < .01$). Investigations of contrasts revealed that intervention group children reported significantly lower levels of anxiety at 30-month follow-up than control group children ($F(1,14) = 3.72$, $p < .05$, d = .23) and the no-intervention comparison group children

TABLE 4 *Means (Standard Deviations) and Group Differences in Symptoms for High and Low Anxiety Subgroups at Pre-Intervention, 18-months and 30-months Follow-up*

	Pre-intervention		18-month follow-up		30-month follow-up	
	Mean (*SD*)		Mean (*SD*)		Mean (*SD*)	
Measure and group	High RCMAS	Low RCMAS	High RCMAS	Low RCMAS	High RCMAS	Low RCMAS
Children's Depression Index						
Intervention	18.56 (6.83) (*n* = 19)	7.36 (7.12) (*n* = 56)	11.01 (8.09) (n = 19)	7.54 (7.14) (n = 56)	7.69 (7.05) (n = 13)	5.00 (6.77) (*n* = 31)
Control	21.27 (9.86) (*n* = 22)	5.41 (5.51) (n = 62)	13.72 (8.87) (n = 23)	5.24 (4.76) (n = 63)	7.94 (7.57) (n = 16)	6.30 (5.52) (*n* = 37)
Comparison	19.81 (7.92) (*n* = 34)	8.69 (5.88) (n = 77)			11.71 (8.40) (n = 34)	7.86 (6.40) (*n* = 77)
Revised Children's Manifest Anxiety Scale						
Intervention	20.74 (3.32) (*n* = 23)	7.07 (4.51) (n = 56)	9.49 (7.84) (n = 19)	7.21 (7.97) (n = 56)	7.85 (6.24) (*n* = 13)	4.48(5.59)** (n = 31)
Control	20.40 (3.93) (*n* = 22)	6.40 (5.35) (n = 61)	12.70 (7.34) (n = 23)	5.80 (5.67) (n = 62)	8.62 (5.81) (*n* = 16)	6.23 (5.71) (*n* = 38)
Comparison	20.56 (2.99) (*n* = 34)	8.33 (4.14) (n = 78)			11.38 (6.41) (*n* = 34)	7.78(5.83)+ (*n* = 78)
Internalising Behaviour Problems						
Intervention	10.18 (7.48) (*n* = 11)	8.60 (7.08) (n =40)	5.64 (5.97) (n = 11)	6.22 (6.77) (*n* = 40)	5.42 (6.47) (n = 12)	5.90 (6.66) (*n* = 29)
Control	9.17 (6.74) (*n* = 6)	6.02 (6.17) (*n* = 50)	8.86 (5.67) (n = 7)	5.12 (4.71) (*n* = 51)	11.27 (6.79) (n = 6)	4.97 (5.21) (*n* = 37)
Externalising Behaviour Problems						
Intervention	10.45(10.44) (*n* = 11)	9.00 (6.83) (*n* = 40)	6.18(8.15)* (n = 11)	6.50 (6.28) (n = 40)	6.17 (7.79) (n = 12)	6.03 (7.48) (*n* = 29)
Control	8.17 (7.33) (*n* = 6)	8.34 (7.03) (n = 50)	8.86(6.28)+ (n = 7)	6.84 (6.00) (n = 51)	12.00 (6.07) (n = 6)	5.78 (5.33) (*n* = 37)

* $p < .05$, ** $p < .01$

+ *Intervention group is significantly different from this group*

($F(1, 23) = 10.96$, $p < .01$, $d = .25$). In addition, the control group reported significantly lower levels of anxiety than the no-intervention comparison group ($F(1, 24) = 5.33$, $p < .05$, $d = .30$). Significant declines in anxiety from pre-intervention to 30-month follow-up occurred for all three groups (intervention, $t(40) = 5.72$, $p < .001$; control, $t(50) = 3.71$, $p < .01$; comparison, $t(113) = 4.07$, $p < .001$) (***Table 2***).

Additional analyses were conducted on subgroups of children at high and low risk for depression (***Table 3***), and on subgroups of children at high and low risk for anxiety (***Table 4***). A significant group effect was found for the low depression children on anxiety symptoms ($F(2, 29) = 4.20$, $p < .05$), the intervention group reporting lower levels of anxiety than the control group ($F(1, 14) = 3.68$, $p < .05$, $d = .35$) and no-intervention comparison group children ($F(1, 21) = 8.54$, $p < .01$, $d = .54$), but no significant differences between control and comparison groups. A significant group effect on anxiety symptoms was also observed for the low anxiety children ($F(2,30) = 4.26$, $p < .05$). Contrasts indicated that the intervention group children reported significantly lower levels of anxiety than the no-intervention comparison group children ($F(1,22) = 9.48$, $p < .01$, $d = .51$), but no other contrasts were significant.

There were no significant group differences for parent reports of internalising or externalising problems for intervention and control group children at the 30-month follow-up (***Table 2***). However, there were significant effects for school for internalising ($F(15, 65) = 2.22$, $p < .05$) and externalising problems ($F(15, 65) = 1.93$, $p < .05$), indicating that the mean scores differed between schools. Mean scores on internalising and externalising problems declined for both groups over time. Subgroup analysis for children with high and low pre-intervention depression or anxiety revealed no significant group differences for either internalising or externalising problems.

No significant group effects were found for explanatory style for negative events ($F(1,9) < 1$) or for positive events

TABLE 5 *Means (Standard Deviations) and Group Differences in Competencies at Pre-intervention, 18-months Follow-up and 30-months Follow-up*

Measure/group	Pre-intervention Mean (*SD*)	18-month follow-up Mean (*SD*)	30-month follow-up Mean (*SD*)
Explanatory Style for Negative Events			
Intervention	7.68 (3.01) (n = 75)	7.10 (3.26) (n = 75)	6.95 (3.58) (n = 44)
Control	7.95 (3.29) (n = 84)	7.90 (2.62) (n = 84)	7.78 (2.21) (n = 50)
Explanatory Style for Positive Events			
Intervention	12.69 (3.29) (n = 75)	13.88 (4.27) (n = 75)	14.66 (4.62) (n = 44)
Control	12.00 (3.36) (n = 84)	13.24 (3.11) (n = 84)	13.56 (4.12) (n = 50)
Appropriate Social Skills[a]			
Intervention	50.80 (11.68) (n = 75)	49.30 (14.08) (n = 75)	44.61 (9.93) (n = 43)
Control	50.36 (14.29) (n = 84)	46.81 (11.97) (n = 84)	46.66 (13.26)* (n = 50)
Inappropriate Assertiveness[b]			
Intervention	32.86 (9.12) (n = 75)	33.62 (10.41) (n = 75)	29.92 (8.37) (n = 43)
Control	32.39 (9.67) (n = 84)	32.37 (8.63) (n = 84)	32.28 (8.99) (n = 50)

a High scores indicate higher levels of social competence
b High scores indicate lower levels of social competence
** $p < .05$*

($F(1,9) = 1.81$, $p > .05$) (***Table 5***). Nor were there any group effects on the stable/unstable dimension of the *negative* events scale ($F(1,9) = 2.37$, $p > .05$). No significant group differences were found for inappropriate assertiveness ($F(1,9) < 1$). However, intervention group children reported lower levels of appropriate social skills at 30-month follow-up than control group children ($F(1,9) = 4.38$, $p < .05$, $d = .18$) (***Table 5***). Paired t-tests revealed that self-reports of control group children remained stable from pre-intervention to 30-month follow-up ($t(49) < 1$), while intervention group children reported a decline in their social skills during the same period ($t(42) = 4.40$, $p < .001$). To investigate this unexpected decline in child-reported social skills in the intervention group, the parent-reported total competence scale of the CBCL was investigated. Significant group effects were found ($F(1,9) = 6.15$, $p < .05$, $d = .03$). However, contrary to the child report of social competence, parents of control group children reported declines in competence from pre-intervention to 30-month follow-up ($M_{pre\ test} = 19.68$, $SD = 2.75$; $M_{30\text{-}months} = 18.37$, $SD = 2.98$; $t(38) = 2.39$, $p < .05$), while intervention group parents reported stable levels of competence ($M_{pre\text{-}test} = 18.26$, $SD = 3.73$; $M_{30\text{-}months} = 18.28$, $SD = 3.42$; $t(37) < 1$).

Mediation effects

After controlling for pre-intervention levels of depression and anxiety symptoms (***Table 6***, below), significant associations were observed at the 30-month follow-up between group membership and anxiety ($sr(n = 206) = .145$, $p < .05$), between anxiety and depression ($sr(n = 204) = .63$, $p = .001$), and between group membership and depression ($sr(n = 204) = .13$, $p = .05$). On the basis of these associa-

TABLE 6 *Analysis of the Mediator Role of 30-months Anxiety Symptoms on the Effects of Intervention on Depressive Symptoms at 30-months Follow-up*

Requirement 1. Intervention condition predicts 30-month anxiety symptoms+

Predictor variable	Dependent variable	ß	*SE B*	R^2	R^2 *change*	*F*	*df*	*p**
Intervention condition	30-month anxiety	1.09	0.49	0.145	0.021	4.83	1,202	0.029*

Requirement 2. Intervention condition predicts 30-month depressive symptoms+

Predictor variable	Dependent variable	ß	*SE B*	R^2	R^2 *change*	*F*	*df*	*p**
Intervention condition	30-month depression	1.10	0.56	0.13	0.59	3.87	1,200	0.05*

Requirement 3. 30-month anxiety symptoms+ predicts 30-month depressive symptoms+ when controlling for intervention condition

Predictor variable	Dependent variable	ß	*SE B*	R^2	R^2 *change*	*F*	*df*	*p**
30-month anxiety	30-months Depression	0.739	0.06	0.66	0.38	154.49	1,199	0.000***
	Intervention condition	1.10	0.56	0.13	0.017	3.87	1,200	0.05*

**Two-sided p values*
+Controlling for pre-test depression and anxiety symptoms

tions, a causal model in which the group effect on depressive symptoms at 30-month follow-up is mediated by a reduction in anxiety symptoms at 30-month follow-up was proposed. A hierarchical regression analysis was conducted to test this model. With depressive symptoms at 30-month follow-up as the criterion variable, pre-intervention levels of depression and anxiety were entered on Step 1. Group was entered on Step 2 and was found to be a significant predictor of depression at 30 months ($sr(n = 204) = .13$, $p = .05$). After controlling for anxiety at 30-month follow-up on Step 3, however, the association between group and depression became non-significant ($sr(n = 204) = .037$, $p > .05$). These results support the proposed mediator model.

Discussion

The results of this study provide partial support for the long-term effectiveness of the PPP programme. The intervention programme was associated with lower levels of anxiety symptoms at the 30-month follow-up. However, as with the previous study of the short-term effects of this intervention, the results for the primary outcome variable – depressive symptoms – were disappointing (Roberts *et al*, 2003). The impact of the intervention programme on depressive symptoms was mediated by the level of anxiety symptoms two and a half years after the programme, but there were no significant intervention effects for depression at either follow-up, after the school effect had been controlled. Finally, parents noted little impact of the programme on student's internalising or externalising problems at home, but did report an impact upon students' overall competence at the 30-month follow-up. This report of stability in competence for intervention group students compared with declines in control group students was in contrast to the students' self-report of social skills, which showed the opposite effect.

The results relating to anxiety symptoms are consistent with the short-term impact of the intervention (Roberts *et al*, 2003). This effect was apparent for the whole sample, but was particularly strong for students with low initial levels of depression and anxiety, indicating an important prevention effect. Healthy intervention group students maintained their mental health, as indicated in declining levels of anxiety symptoms, as they moved into the adolescent years, while the declines in anxiety symptoms were not as large for control and no-intervention students. Except for the 18-month follow-up, significant intervention effects have been apparent for anxiety symptoms at all assessment points. Thirty months after the intervention, it is apparent that the intervention group children reported lower levels of anxiety than the monitored control group and the non-intervention comparison group. While the monitored control group had lower levels than the comparison group, the results clearly indicate that the intervention impact had a stronger and more lasting effect than a minimal intervention such as monitoring. This result is similar to the findings of Lowry-Webster *et al* (2003), which reported that the FRIENDS intervention group children maintained lower anxiety scores at a 12-month follow-up.

While the current study found some sustainability of impact up to two years following the intervention for anxiety, the results contrast with the original PPP trial (Gillham *et al*, 1995) in finding no significant group differences for depressive symptoms at any assessment point. This lack of effect was apparent even when the intervention was compared with a no-intervention comparison group. The current results for depressive symptoms are closer to those of Gillham & Reivich's (1999) 3-year follow-up of the PPP intervention. However, there were no significant long-term effects for explanatory style at any follow-up, and no evidence that explanatory style mediated intervention effects.

One explanation for the lack of significant differences in depression between the intervention, control and no-intervention comparison group at the 30-month follow-up was the presence of a significant school effect. This effect indicated that there were differences between schools in the mean depression scores. Once this effect was controlled for, the group effect for depression was non-significant ($p = .083$). An additional explanation for the lack of effects at 18-month and 30-month follow-ups may be participant attrition. While there were no between-group differences in attrition, or differences in students who remained or dropped out on depression, students who dropped out at the follow-ups did self-report more risk factors, such as pessimism and lower social skills. This differential attrition may have reduced the sample variability in depressive symptoms at follow-up.

As hypothesised in our previous study (Roberts *et al*, 2003), the intervention impact on depressive symptoms at 30-month follow-up was mediated by students' levels of anxiety at 30 months. This result is in keeping with research on the co-morbidity of anxiety and depression in children and adolescents, and with research that indicates that anxiety problems can develop into depression problems (Cole *et al*, 1998). Many of the strategies taught in PPP are equally relevant to the management of anxiety and depressive symptoms, for example challenging negative thoughts, emotional regulation strategies, coping skills, and social problem solving. This is important, in that prevention programmes that are able to affect more than one mental health

problem will be more valuable in reducing the incidence of mental health disorders, and more cost-effective.

Unlike the short-term results presented in Roberts *et al* (2003), these long-term results indicate more prevention effects for students with low initial levels of anxiety (lower levels of anxiety at 30 months) and depressive symptoms (lower levels of anxiety at 30 months), rather than sustained relief from symptoms for children with high initial levels of anxiety or depression. Such effects are important in reducing the incidence of mental health problems, rather than the prevalence of adolescents with elevated levels of symptomology. It is important to note that this effect could not be explained by differential monitoring processes between groups or differential access to help outside the study for mental health problems. The only intervention effect for children with high initial anxiety scores relates to parent reports of lower levels of externalising problems in the home at the 18-month follow-up. As this effect is not apparent at any other data collection, it is unlikely to represent a significant trend. One explanation for the lack of significant subgroup effects for the 30-month follow-up, particularly in the subgroups with high initial symptom levels, is low power. With only 50% of the original sample available at the 30-month follow-up and significant declines in both anxiety and depressive symptoms over time for the whole sample, there were few children with moderate to severe levels of depression in either the intervention or control groups, making it difficult to detect even large effect sizes.

There were no significant group effects for parent reports of internalising or externalising problems at either follow-up, in keeping with the short-term results, which indicated no group effects after post-intervention. While neither group returned to pre-intervention symptom levels, the control group maintained similar levels to the intervention group for all follow-up assessments. Interestingly, parents of intervention group students reported higher levels of competence at the 30-month follow-up, but the effect size is minimal.

Unexpectedly, the intervention group students reported lower levels of appropriate social skills at the 30-month follow-up than the control group. It is difficult to explain this result, as there were no significant differences between groups on inappropriate social skills or on social skill variables at previous assessments. Attrition may be related, as students who dropped out reported lower levels of pre-intervention social skills than those who remained at both 18- and 30-month follow-ups. However there was no differential attrition between groups at these assessment points. Alternatively, as they reached middle adolescence, the intervention group participants may have altered their standards for social skills. Based on information learned in the intervention programme, they may have expected more from themselves socially. This explanation would be in keeping with the significant group effect for parent report of competencies and the lack of effects for inappropriate assertiveness. The lack of effects on competencies directly targeted by the programme, such as optimistic explanatory style and social skills, indicates that alternative mechanisms not measured in this study may be responsible for the long-term outcomes.

The current study has a number of methodological limitations that affect the results. First, while random allocation to intervention and control groups was conducted, the no-intervention group condition was not subject to such a rigorous process. Hence, despite matching of schools, there may be subtle differences between these schools and the schools recruited to the intervention study that affect outcomes. Attrition at the 30-month follow-up was high. Although comparable to the 55% of participants that remained in Gillham & Reivich's (1999) final follow-up, and equally affecting all groups, students who remained in the sample did report less pessimism and better social skills than those who dropped out. They may have biased the sample as a whole by reducing the variability in the mental health outcome variables. Power to detect effects at the 30-month follow-up was also limited, particularly for the subgroup analysis.

The results of this study and the effect sizes apparent for the long-term outcomes indicate that, when implemented as part of a regular school service, the impact of the PPP programme is diluted. The implementation of the programme differed from the original PPP trial in using facilitators with lower levels of qualification, the programme was run in school time and therefore was subject to timetabling changes and disruptions in the same way as other school classes, and more children with low levels of depression were included in the current sample. Further, while attendance at the programme was high (87-99%) and an average of 74% of the programme was implemented, Roberts *et al* (2003) noted that there were subtle qualitative differences in the quality of implementation that were hard to quantify. The current study compared PPP with a usual care intervention, the Western Australian Health Education curriculum and student monitoring. This curriculum has many of the same student learning outcomes as the PPP intervention, which may explain the significant reductions in anxiety symptoms over time for all groups. It is apparent that the monitoring protocol used in the control group also had an impact on anxiety symptoms at the 30-month fol-

low-up. Hence, small effect sizes for the PPP intervention group are to be expected. However, the results for anxiety also indicate that the intervention is stronger than a monitoring condition and that an impact on depression can occur through the mediation of anxiety symptoms.

These results support the use of the PPP programme as a mental illness prevention programme for children, albeit with a different mental health problem from that originally predicted. Outcomes may be bolstered by providing more support and coaching for programme facilitators during implementation, implementing the programme in shorter sessions over a longer period of time to make it more compatible with school timetables, and adding components to promote mental health more generally in the whole school, for example components for teachers and parents.

In conclusion, this study provides support for the long-term effectiveness of PPP in preventing anxiety symptoms and for a mediation effect on depressive symptoms. The programme had a significant impact on rural children up to two and a half years after their initial exposure to the programme. While the outcomes are not as promising as initial research would suggest, it is expected that interventions that become part of the regular service delivery conditions will be subject to dilution of effects. Future research on effectiveness trials with larger and more diverse sample sizes, and universal applications of this intervention programme would be beneficial.

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