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Reducing depression in 9–10 year old children in low SES schools: A longitudinal universal randomized controlled trial

Rosanna Rooney*, Sharinaz Hassan, Robert Kane, Clare M. Roberts, Monique Nesa

Department of Psychology and Speech Pathology, Curtin University, GPO Box U1987, Perth, WA 6845, Australia

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ABSTRACT

The Aussie Optimism: Positive Thinking Skills Program (AOP-PTS) is an innovative curriculum-based mental health promotion program based on cognitive and behavioural strategies. The program is aimed at preventing depressive and anxiety symptoms and disorders in middle primary school children aged 9–10 years. Students from 22 low SES primary schools ($N = 910$) were randomly assigned to an intervention or a control group and assessed at baseline, post-test, 6 months and 18 months. The intervention group received the program implemented by teachers and the control group received their regular Health Education curriculum. Students completed questionnaires on depression, anxiety, and attribution style. At risk students were further assessed with the computerised Diagnostic Interview for Children and Adolescents. Parents reported on their children's externalising and internalising problems at home. Children in the intervention condition reported a significant pre-post reduction in depressive symptoms, and there was a significant pre-post reduction in parent-reported emotional difficulties which was maintained at 6 month follow-up; no changes were evident in the control group. Both groups showed significant improvements in child-reported anxiety and attribution style, and significant improvements in parent-reported pro-social behaviours. For both groups, there were no significant post-baseline changes in incidence and recovery rates for depression, anxiety, or internalising symptoms. These findings suggest that AOP-PTS has the potential to treat depressive symptomatology in the immediate term but the effects were not sustained. There is also evidence of improved emotional resilience up to 6 months following the program. Further follow-up to investigate longer term effects is needed.

Introduction

Anxiety and depression are the most common mental health problems experienced by children and adolescents. A population-based study in Britain found that the 3-month prevalence rate in children and adolescence is approximately 3.8% for anxiety disorders, .9% for depressive disorders, and 13.4% for any disorder (Ford, Goodman, & Meltzer, 2003). While in the USA the prevalence decreases at 12 years of age, it rises again during adolescence (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). In Australia, a National Youth Mental Health survey in 2000 reported that 14% of children and adolescents experienced mental health problems (Sawyer et al., 2000). This is strong evidence that internalising problems, such as anxiety and depression, should be treated before adolescence and adulthood (Copeland, Miller-Johnson, Keeler, Angold, & Costello, 2007).

Anxiety problems in childhood are associated with depression in adolescence (Cole, Peeke, Martin, Truglio, & Seroczynski, 1998). If internalising disorders in children are not treated, they can cause problems in adolescence and create a significant burden for families; and there may also be social, physical health, and economic costs in adulthood (Fox, Halpern, & Forsyth, 2008; McCauley, Katon, Russo, Richardson, & Lozano, 2007). Conversely, the amelioration of such disorders can lead to social, educational, and economic benefits to the community (Copeland et al., 2007). In order to reduce the prevalence and incidence of mental health problems in our children, we require universal programs that enable all children to receive training in resilience skills without the social stigma of 'being selected' (Huggins, Davis, Rooney, & Kane, 2008; Roberts, Mazzucchelli, Taylor, & Reid, 2003).

There have been previous attempts to prevent depression and anxiety in childhood. Researchers have administered selective or indicated programs to children showing an elevated risk for internalising disorders, but have had mixed results (e.g. Dadds, Spence,

* Corresponding author. Tel.: +61 8 9266 3050; fax: +61 8 9266 2464.
E-mail addresses: r.rooney@psychology.curtin.edu.au, r.rooney@curtin.edu.au (R. Rooney).

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Barrett, & Laurens, 1997; Gillham, Reivich, Jaycox, & Seligman, 1995; Roberts, Kane, Bishop, Matthews, & Thomson, 2004). Selective and indicated programs have several disadvantages. Because they only target children who are at risk of developing an internalising disorder or already have such a disorder, they do not intervene with preventative inoculation for children in the general population. Selective and indicated programs may overlook children who are currently not at risk but might later need help (Barrett & Turner, 2001). In addition, being selected for an intervention can have a stigmatising effect on children (Roberts, Bishop, & Rooney, 2008). Previous studies have shown that medication, embarrassment, longer treatment course, and negative attitudes are some of the stigmatising factors that make people reluctant to seek help from the targeted intervention programs (Biddle, Gunnell, Donavan, & Sharp, 2006; Meltzer et al., 2000).

A number of studies have used universal programs in an attempt to prevent depression and anxiety in childhood (e.g. Dadds & Roth, 2008; Lock & Barrett, 2003; Rooney et al., 2006; Sheffield et al., 2006). Unlike the targeted interventions, universal programs involve inoculating children from the general population with skills that may prevent them from problems such as a depressive disorder (Mrazek & Haggerty, 1994). Universal prevention interventions are aimed at the general public who have not been screened for any risk factors. These programs enable all children, particularly those with anxiety and depression, to access intervention without the social stigma associated with being selected. Other advantages of universal programs are (i) they save the cost of screening, (ii) they offer help to a large number of people, and (iii) they offer help to children who are unwilling or unable to access traditional treatment (Issakidis & Andrews, 2002; Rapee, Abbott, Baillie, & Gaston, 2007).

There are number of universal school-based programs being developed for school aged children, however some have been effective in reducing depressive and anxiety symptomatology. A meta–analysis of 47 trials on depression programs for children and adolescent has demonstrated mixed effects for the 13 universal prevention programs and the results of the review suggested the prevention programs needed to incorporate other strategic factors (e.g. cognitive age, student homework) to be effective (Stice, Bohon, Rohde, Shaw, & Marti, 2009). The FRIENDS program reduced anxiety symptomatology and had limited success at reducing depression although depressive disorders were not assessed (Barrett & Turner, 2001; Lock & Barrett, 2003; Lowry-Webster, Barrett, & Dadds, 2001), while the Penn Prevention Programme has been shown to reduce depressive symptomatology (Quayle, Dziurawiec, Roberts, Kane, & Ebsworthy, 2001). Both programs emphasise cognitive restructuring, but the FRIENDS program includes a fear hierarchy and exposure feature that is targeted at anxiety disorders, which could explain why effects were found for anxiety. Kendall, Kortlander, Chansky, and Brady (1992) have argued that the treatment of comorbid depressive and anxiety disorders requires enactive programming that includes a fear hierarchy (targeting anxiety) and the scheduling of pleasurable events (targeting depression). A fear hierarchy targets the reduction and prevention of anxiety symptoms while pleasurable events scheduling targets the reduction and prevention of depressive symptoms. The inclusion of both types of enactive programing in future programs will increase the likelihood of reducing and preventing both anxiety and depression symptoms and disorders. Another universal classroom intervention, the Good Behaviour Games (Vuijk, van Lier, Crijnen, & Huizink, 2007), has also been successful in reducing anxiety and depressive symptomatology. However enactive programming was not included, and clinical diagnoses were not targeted. REACH for RESILIENCE (Dadds & Roth, 2008) is a relatively new universal school-based intervention program developed to prevent anxiety related problems in children from 3 to 6 years of age. The program has produced positive effects, but effect sizes for anxiety were small. A recent large scale study by Sawyer et al. (2009), an Australian beyondblue universal school-based intervention focussing on coping and problem solving strategies as well as social and resilience skills, found no significant effects for depressive symptoms at post-test. The study did not target primary school children and no assessment of anxiety symptoms was undertaken.

Recent research has revealed that parental criticism and exposure to stressful life events can engender a learnt helplessness cognitive style in children and adolescence (Alloy, Abramson, Walshaw, & Neeren, 2006; Cole, Warren, Dallaire, Travis, & Ciesla, 2007). Research further indicates that children's cognitions are still developing around the age of 9–10 years (Nolan-Hoeksema, Girgus, & Seligman, 1992; Turner & Cole, 1994), and research findings suggest that this is a critical time at which to target children's negative explanatory and attribution styles. Researchers have found that between the age of 8 and 10 explanatory style becomes increasingly important in predicting depression (Nolan-Hoeksema et al., 1992). Supporting interventions targeting children's cognitions from as young as 9 years of age, a meta-analytic review by Joiner and Wagner (1995) concluded that depression and attribution style were strongly associated in children of this age and adolescents of different age groups, samples, and genders.

Rooney, Pike, and Roberts (2000) developed the Aussie Optimism Program-Positive Thinking Skills (AOP-PTS) as a universal program for preventing depressive disorders in 9–10 year olds. The 8-module program runs for 60 min each week. It uses cognitive and behavioural intervention strategies to target social, emotional, and cognitive risk and protective factors for anxiety and depression. The cognitive component teaches children to identify and challenge negative thoughts about self, current life circumstances, and anticipations about the future – all of which contribute to depressive and anxiety symptoms (Kendall, 2007). In addition, children are taught to accurately identify, label, and monitor their feelings (Stark, 1990). The social and behavioural component includes engagement in pleasurable events, practice with a fear hierarchy, as well as relaxation training.

Rooney et al. (2006) conducted a universal randomised controlled trial with four schools to assess the effects of the AOP-PTS Program. Compared to the control group, the intervention group reported fewer depressive symptoms and an increase in positive attributions at post-test. Compared to the control group, a smaller proportion of those in the intervention condition who were healthy at pre-test had developed a depressive disorder at the 9-month follow-up. The latter result indicated a prevention effect. Although the study was small, anxiety disorders were not targeted, and enactive programming was not included in the program, these results suggest that it is possible to prevent depressive disorders in children as young as 9–10 years of age using a universal intervention.

The AOP-PTS program has since been modified to be longer, lasting for 10, as opposed to 8, one hour modules and including enactive programming, and to be universally implemented by school teachers in Primary Schools rather than by psychologists. The current project will assess the efficacy of the revised AOP-PTS program in preventing anxiety and depressive disorders among children aged 9–10 years compared to a control group who receive their regular education program. We predicted that children who participate in the AOP-PTS program will show a reduction in depressive and anxiety symptoms, develop fewer depressive and anxiety disorders, and report less pessimistic attribution styles. We expected that these effects would be apparent at the post-test, 6-month, and 18-month follow-up.

Method

Participants

Eighty-nine percent ($N = 910$) of the available 1021, Year 4 students from 22 primary schools were given parental permission to be involved in the study and participated in the pre-test. The mean age of the students was 8.75 years ($SD = .36$); 51.4% ($n = 467$) were male and 48.6% ($n = 442$) were female; 85.6% ($n = 779$) were Australian with the remaining 14.4% ($n = 131$) classified as culturally and linguistically diverse (CALD). There were 467 students in the intervention group and 443 students in the control group. There were no significant between-group differences in student age, $F(1, 907) = .882$, $p = .348$, male/female ratio, χ^2 (1, $n = 909$) = .102, $p = .749$, or Australian/CALD ratio, χ^2 (1, $n = 909$) = 2.51, $p = .113$.

Measures

The Children's Depression Inventory (CDI; Kovacs, 1992) has been shown to have adequate psychometric properties across a range of populations. Kovacs reported that the measure has good internal consistency, with alpha reliability coefficients ranging from .71 to .89 (.89 in the present study), and 1-week and 6-month test–retest reliability coefficients of .87 and .54 respectively. The CDI has good convergent validity with other self-report measures of depression (Cole & Turner, 1993).

The suicide ideation item (Item 9) was removed from the scale as school principals in the pilot study (Rooney et al., 2006) voiced concerns about the use of this item with children as young as eight years. The total depression score in this study therefore ranged from 0 to 52, with higher scores indicating higher levels of depression symptoms. Rooney et al. (2006) reported a Cronbach's alpha coefficient of .87 for the abbreviated CDI. Hodges (1990) and Jaycox, Reivich, Gillham, and Seligman (1994) used a clinical cut-off of 15 on the CDI for age groups similar to the one used in this study.

Spence Children's Anxiety Scale (SCAS; Spence, 1998) is a self-report measure developed from community samples, but norms for clinical samples are also available. A clinical cut-off score of 42 was used for the present study. The measure has demonstrated high reliability, with Spence (1998) reporting an alpha coefficient of .92 (.90 in the current study) and Guttman split-half coefficient of .90 in a community sample of over 2000, 8–12 year old children. The internal consistencies of the subscales range between .60 and .82 and the 6-week test–retest reliability of the total measure was found to be .60 when calculated with a smaller sample of 344 children in Spence's study. The measure has also demonstrated concurrent validity as evidenced by high correlations with the Revised Children's Manifest Anxiety Scale.

The Children's Attributional Style Questionnaire (CASQ) was developed by Seligman et al. (1984) for children 8 years and older. The measure has 48 items, 24 relating to positive events (CASQ-P) and 24 to negative events (CASQ-N). The alpha reliabilities range from .53 to .60 for the CASQ-P and from .45 to .46 for the CASQ-N (Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998). Nolen-Hoeksema, Girgus, and Seligman (1986) reported test–retest reliabilities over periods of 3–12 months ranging from .61 to .35.

The Diagnostic Interview for Children and Adolescents, IV (DICA-IV; Reich, Cottler, McCallum, Corwin, & VanEerdewegh, 1995) is a psychiatric interview for children aged between 6 and 16 years. In the present study, children scored either one or both above the SCAS and CDI clinical cut-offs (42 or higher for the SCAS, and 15 or higher for the CDI) were interviewed with the DICA to check for internalising disorders. The user-friendly computerised interview was used in this. Trained post-graduate clinical psychology students administered the computer interviews. All items were read to the child, and the child was given assistance to type answers if required. Having an assistant in the room to answer questions and provide further explanations increased the reliability of the administration (Reich et al., 1995). In the present study, nine depression and anxiety disorder categories were administered. Administration took between half an hour to one and a half hours, depending on the presence and severity of psychopathology. Reich (2000) reported that studies have found high agreement between the DICA and other measures such as the Child Behaviour Checklist (Achenbach & Rescorla, 2001), and adequate agreement with clinical diagnosis. Welner, Reich, Herjanic, Jung, and Amando (1997) reported that the percentage of agreement between clinical interview and diagnosis is higher than 81%. Inter-rater reliability varies for particular anxiety and depressive diagnoses (Klein, Dougherty, & Olino, 2005; Silverman & Ollendick, 2005), but has been reported at .90 for MDD (Hodges, 1990). Test–retest reliability coefficients between .11 and .50 have been reported for the DICA-IV (Reich et al., 1995).

National Health and Medical Research Council Risk Assessment (National Health and Medical Research Council, 1997). This instrument measures suicidal ideation and behaviour. Children who endorsed any of the critical suicide items on the DICA-IV were administered this additional assessment which asks children to (i) rate their risk of harming themselves, (ii) state the strength of their desire to kill themselves, (iii) disclose recent events that may have led to these feelings, (iv) disclose any methods, plans, and previous attempts, (v) state what could stop them, (vi) list who they would like to support them, and (vii) state what they have to look forward to in the future.

The Strengths and Difficulties Questionnaire. The parent version of the Extended Strengths and Difficulties Questionnaire (SDQ-P; Goodman, 1999) measures internalising and externalising problems at home. It was designed for parents/caregivers of children between 4 and 16 years of age. The SDQ includes 25 items asking about positive and negative attributes. The items are divided into five subscales: Emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and pro-social behaviour. A total difficulties score is computed by summing across the first four subscales. Internal consistency coefficients range between .76 and .82 for the total difficulties score (.70 in the current study). Goodman (1999) reports 2-week test–retest reliability of .96 for the total score. The total score correlates well with the Rutter Parent Scale and the Child Behaviour Checklist (Goodman & Scott, 1999).

Research design

Twelve schools were randomly selected from the largest and poorest schools in the West Australian districts of Swan and Canning. Each of the 12 schools was matched to another school from the same districts in terms of SES, class size, and school size. Twenty-two schools (11 matched pairs) agreed to participate. One school from each pair was randomly allocated to the intervention condition, and the other was allocated to the control condition. Within schools, consenting Year 4 students were assessed on four occasions: Pre-test, post-test, 6-month, 18-month follow-ups. The research design therefore included two categorical random effects (school, student), one categorical fixed effect (group: intervention, control), and one ordinal fixed effect (time: pre-test, post-test, 6-months, 18-months).

Intervention

The Aussie Optimism: Positive Thinking Skills Program (AOP: PTS; Rooney et al., 2004) is designed to meet the developmental

needs of children in middle primary school, Years 4 and 5. The revised program includes ten weekly 60-min sessions based on cognitive and behavioural principles outlined by Seligman, Reivich, Jaycox, and Gillham (1995). The program presents developmentally appropriate adaptations of activities used for older children in the Aussie Optimism Program (Roberts, Kane, Thomson, Bishop, & Hart, 2003). The program included a facilitator's manual with learning outcomes, implementation notes, classroom activities, and all of the resources needed to conduct these activities, plus a student workbook with all the information and worksheets required by the students. The initial session focused on confidentiality and group rules. The remaining sessions focused on identifying thoughts and feelings, exploring the connection between thoughts, feelings and behaviours, evaluating and challenging thoughts, learning to think more accurately and positively, learning about relaxation and distraction along with the scheduling of pleasurable events, and constructing a fear hierarchy. Throughout the sessions, cognitive and behavioural skills were taught through games and activities. The weekly modules are listed in Table 1. The program outcomes and activities were all designed to fit with the learning outcomes of the Western Australian Curriculum Framework Health Curriculum, and emphasised learning areas relating to interpersonal and self-management skills. The intervention was implemented by classroom teachers, with all children in the classroom participating.

Procedure

Twelve schools were randomly selected from the largest (top 50%) and poorest (bottom 30%) schools in the WA Department of Education and Training Schools Database, which sampled schools from the districts of Swan and Canning. Each of the 12 schools was then matched to another school in the data base in terms of SES, class size, and school size. Informed consent was obtained from 22 of the 24 schools (11 matched pairs). Active and passive consent of children and parents was sought after the study was fully explained to them via information and consent forms. The first information and consent form required the active consent of participants, while those not responding to the first form were sent an additional information and consent form one week later seeking passive consent. This active–passive consent process was aimed at increasing participation rates. Moreover, past researchers (e.g. Henry, Smith, & Hopkins, 2002) have found that those children whose parents do not respond to active consent procedures may be more at risk of mental health problems than those who do return the forms, thus suggesting that the employment of an active consent only procedure may reduce the representativeness of the resulting sample. This active–passive consent process resulted in parental consent being refused for 111 children. The universal program was completed by all available consenting students within the classroom as part of their regular Health Education class.

Table 1
Content of positive thinking program.

Module	Title
Module 1	Introduction and planning for fun activities
Module 2	Identifying feelings and being BRAVE
Module 3	Feelings, situations and thoughts
Module 4	The thought feeling connection
Module 5	Helpful and unhelpful thinking
Module 6	Looking for evidence and thinking positively – Brave Hierarchy steps begin
Module 7	Think before you sink
Module 8	Challenging situations and thinking the worst
Module 9	Best, worst and most likely outcomes
Module 10	Being positive

A teacher remained present to ensure duty of care for the children while they completed the assessment battery with trained research assistants in class groups. A standardised protocol was used to introduce the testing procedure to all groups. Children were informed that they could withdraw at any time without penalty and that their information would be kept private unless their responses indicated that they were currently distressed. It was explained that in these cases parents would be confidentially informed in order to get help for them. Completion of the assessment battery, which involved the research assistants reading the questions aloud to the class, took 30–45 min.

Confidential follow-up DICA-IV interviews were organised during normal school time. Children were told prior to completing the assessment battery that some children in the class would be interviewed at a later stage, as the researchers wanted to find out how some children thought and felt in Year 4. This method was employed to avoid stigmatising the children who participated in the follow-up interview. For cases where depression, anxiety, or suicidal ideation was identified, caregivers were contacted confidentially, the results of the assessments were discussed and written reports and referrals to children's mental health organisations were offered where appropriate. The same procedure was repeated at post-test, and at the 6-month, and 18-month follow-up.

Each group was run by a facilitator who had received eight hours of training in a workshop run by the Aussie Optimism Team. The workshop covered information about anxiety and depression in children. Facilitators were Year 4 classroom teachers who received detailed resources that included the content and rationale for the activities, a demonstration of the program activities, and an opportunity for them to practise implementation skills through guided practice and feedback. Teachers implementing the program received supervision and support from the program developers. Weekly intervention sessions were run over a 10-week period with the whole class in their usual classroom, and at designated times that were convenient to the schools.

The integrity of the teachers' implementation of the program was assessed by teacher logs. In addition, a random selection of 25% of each teacher's sessions was observed by trained research assistants and a random sample of student workbooks and interviews were assessed at the end of the program implementation. The teacher logs included checklists to monitor program integrity (88.46% completed the checks). According to the integrity check data, the mean percentages of content covered for the 10 sessions were 97, 99, 98, 96, 98, 96, 94, 94, 92, and 92 ($M = 95.60\%$, $SD = 5.31\%$). Attendance rates indicated that each student completed an average of nine sessions ($M = 9.03$, $SD = 2.143$).

Data analysis

The research design included two categorical random effects (school, student), one categorical fixed effect (group: intervention, control), and one ordinal fixed effect (time: pre-test, post-test, 6-months, 18-months).

The design generated a hierarchical data structure in which time was nested within student, and student was nested within school. The intra-class correlations (ICCs) for the school effect ranged between .00 and .02 across the student and parent outcomes at pre-test (mean = .01), between .00 and .03 at post-test (mean = .01), between .00 and .02 at 6 months (mean = .01), and between .00 and .03 at 18 months (mean = .01). The non-zero ICCs indicate intra-school dependencies in the data. A multi-level statistical model was adopted to accommodate these dependencies.

The psychometric data (CDI, SCAS, CASQ-P, CASQ-N, CASQ-TOT, SDQP total difficulties, SDQP social skills) were analysed with multi-level mixed effects linear regression models (Bryk &

Raudenbush, 1987) as implemented through SPSS's Generalised Linear Mixed Models (GLMM: SPSS Version 19) procedure. In order to optimise the likelihood of convergence, a separate GLMM analysis was run for each outcome using a per-test alpha-level of .05. In each analysis, GLMM assumed a normal probability distribution for the outcome and linked it to the fixed effects (group, time, Group × Time) with an identity function. If the outcome did not have a normal distribution, then the parameter estimates of the covariance matrix were computed with robust statistics.

DICA assessments were conducted at pre-test, post-test, 6-month follow-up and 18 month-follow-up. The DICA data (incidence: yes, no; recovery: yes, no) were analysed with multi-level mixed effects binary logistic regression as implemented through SPSS's Generalised Linear Mixed Models (GLMM: SPSS Version 19). In order to test the relationships between the fixed effects (group, time, Group × Time) and the binary outcomes, GLMM used a binomial probability distribution for the outcomes and linked them to the fixed effects with a logit function. Once again, in order to optimise the likelihood of convergence, a separate GLMM analysis was run for each outcome using a per-test alpha-level of .05.

Unlike repeated measures ANOVA (or ANCOVA), the multi-level mixed effects regression model does not rely on participants providing data at every assessment point; GLMM uses all the data present at each assessment point thereby reducing the impact of subject attrition on statistical power. Moreover, GLMM is robust to unequal group sizes, can deal with unequally spaced data collection points, does not require equal variances at each time point or equal covariances between all pairs of time points (i.e., sphericity), and is able to account for correlations among repeated measurements.

Results

Student attrition

The student cohort comprised 910 students at pre-test, of which 888 responded at post-test (a 2.42% attrition rate), 851 at the 6-month follow-up (a 6.48% attrition rate), and 782 at the 18-month follow-up (a 14.07% attrition rate). Fig. 1 provides a CONSORT (Consolidated Standards of Reporting Trials) diagram of student progress through the phases of the randomised control trial.

At post-test, 6-months, and 18-months there were no significant differences on the pre-test outcomes between those students who were retained and those who dropped out. Attrition rates did not differ significantly between the intervention and control groups.

Parent attrition

The parent sample at pre-test comprised 617 parents, of which 550 responded at post-test (a 10.86% attrition rate), 524 at the 6-month follow-up (a 15.07% attrition rate), and 485 at the 18-month follow-up (a 21.39% attrition rate). Attrition rates did not differ significantly between groups. Compared to the children of completing parents (i.e., parents who responded on all four occasions), children of non-completing parents (i.e., parents who failed to respond on at least one occasion) had significantly higher CDI and CASQ_NEG scores across all assessments (F[1,2946] = 17.40, $p < .001$; F[1,2946] = 11.27, $p = .001$).

Student-reported primary outcomes

CDI. The Group × Time interaction was significant (F[3, 3443] = 6.16, $p < .001$). LSD post-hoc comparisons indicated that the intervention group showed significant decreases in depressive symptoms from pre-test to post-test ($p < .001$), from post-test to the 6-month follow-up ($p < .001$), and from the 6-month follow-up to the 18-month follow-up ($p = .041$). The control group showed similar significant decreases between post-test and the 6-month follow-up, and between the 6-month and 18-month follow-ups ($ps < .001$); however, the control group showed no significant change between pre-test and post-test ($p = .142$).

SCAS. The Group × Time interaction was not significant (F[3, 3443] = .86, $p = .459$). The significant main effect for Time (F[3, 3443] = 58.06, $p < .001$) therefore indicates that anxiety symptoms decreased across assessments at the same rate for both groups. The significant group effect (F[1, 3443] = 5.51, $p = .019$) indicates that the control group were less anxious than the intervention group at pre-test, and that this difference was more or less maintained throughout the study.

Student-reported secondary outcomes

CASQ. The Group × Time interaction was not significant for CASQ-N (F[3, 3443] = .32, $p = .811$), CASQ-P (F[3, 3443] = .39, $p = .698$), and CASQ-TOT (F[3, 3443] = .23, $p = .877$). The group main effect was also not significant (CASQ-N: F[1, 3443] = .65, $p = .422$; CASQ-P: F[1, 3443] = .56, $p = .455$; CASQ-TOT: F[1, 3443] = 1.03, $p = .309$) indicating that the two groups were equivalent on each outcome at each of the four assessments. The main effect for Time, which was significant for all three outcomes (CASQ-N: F[3, 3443] = 47.28, $p < .001$; CASQ-P: F[3, 3443] = 22.56, $p < .001$; CASQ-TOT: F[3, 3443] = 49.56, $p < .001$), indicates that each of the three outcomes changed in the same manner for both groups. LSD post-hoc contrasts indicated that CASQ-TOT (optimism) increased significantly for both groups from pre-test to post-test ($p = .014$), from post-test to 6-month follow-up ($p < .001$), and from 6-month follow-up to 18-month follow-up ($p = .007$). A similar pattern of results was observed for CASQ-N (negative attributions) and CASQ-P (positive attributions). For both groups, CASQ-N showed no change between 6 months and 18 months ($p = .056$), but decreased significantly from pre-test to post-test ($p = .004$) and from posttest to 6 months ($p = .001$); for both groups, CASQ-P showed no change between pre-test and post-test ($p = .321$), but decreased significantly from post-test to 6 months ($p < .001$) and from 6 months to 18 months ($p = .046$).

At risk analysis

A binary 'at risk' variable was created by assigning a '0' to students who scored below 15 on the CDI (not at risk), and a '1' to the students who scored at or above 15 (at risk). A significant Group × Time interaction indicates an intervention effect. The At Risk × Group × Time interaction was not significant for any of the student-reported outcomes. This indicates that the 'at risk' factor did not moderate the previously reported intervention effects. The previously reported intervention effects therefore apply to both the 'at risk' and the 'not at risk' subsamples.

Parent-reported outcome

SDQP Prosocial. The Group × Time interaction and the group main effect were not significant (F[3, 2179] = .21, $p = .889$; F[1, 2179] = .88, $p = .247$). The main effect for time, however, was significant (F[3, 2179] = 5.077, $p = .002$). LSD post-hoc comparisons indicated that both groups showed a significant increase in prosocial behaviour from pretest to 6-month follow-up ($p = .037$) and from 6-month follow-up to 18-month follow-up ($p = .013$).

SDQP Total difficulties. The Group × Time interaction was significant (F[3, 2168] = 2.95, $p = .031$). LSD post-hoc comparisons indicated that the intervention group showed a significant decrease in total difficulties from pretest to posttest ($p < .001$); the effect was

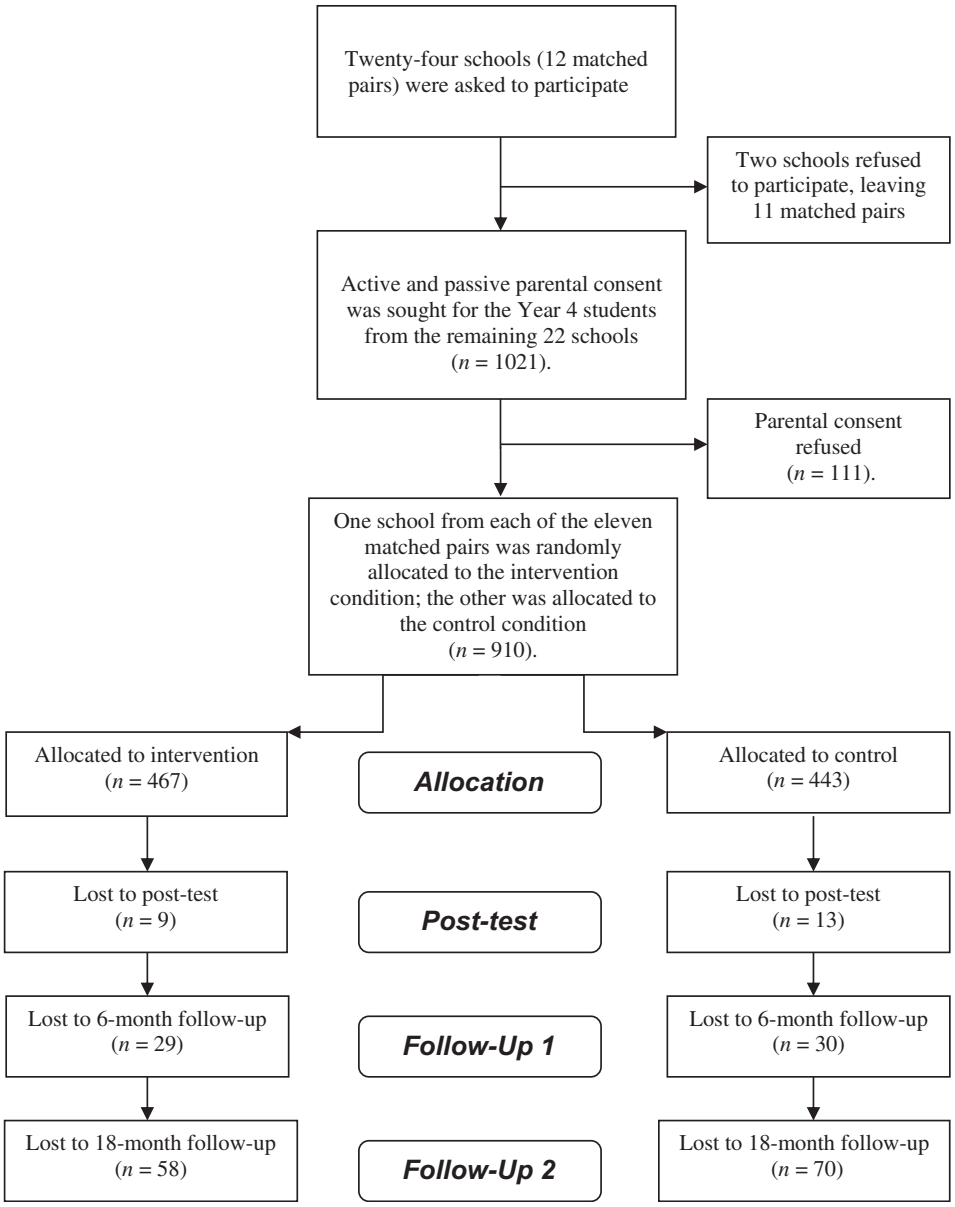

Fig. 1. Flow diagram of the progress through the phases of the randomised control trail.

maintained at the 6-month follow-up and decreased further at the 18-month follow-up ($p < .001$). The control group, in contrast, showed no change in total difficulties until the 18-month follow-up when a significant decrease was observed ($p = .001$). Table 2 provides the means and standard deviations for the parent-reported outcome in the intervention and control conditions.

Gender differences

Compared to males, females reported significantly lower levels of depression at pre-test ($p = .007$); significantly higher levels of positive attributions at post-test ($p = .008$); significantly lower levels of negative attributions at pre-test ($p < .001$), post-test ($p < .001$), 6-months ($p = .029$), and 18-months ($p = .041$); and significantly higher levels of optimism at pre-test ($p = .001$), post-test ($p < .001$), 6-months ($p = .013$), and 18-months ($p = .043$). In contrast, females reported significantly higher levels of anxiety at pre-test ($p = .008$), post-test ($p < .001$), 6-months ($p < .001$), and 18-months ($p < .001$).

A significant Group × Time interaction indicates an intervention effect. The Gender × Group × Time interaction was not significant for any of the student-reported outcomes. This indicates that gender did not moderate the previously reported intervention effects. The previously reported intervention effects therefore apply to both males and females.

Incidence and recovery

Incidence (yes, no) and Recovery (yes, no) were treated as binary outcomes. Incidence was coded 0 for students who were healthy at pre-test and remained healthy at the post-intervention assessment, and 1 for students who were healthy at pre-test but became clinical at the post-intervention assessment. Recovery was coded 0 for students who were clinical at pre-test and remained clinical at the post-intervention assessment, and 1 for students who were clinical at pre-test but became healthy at the post-intervention assessment. Incidence and recovery were assessed at post-test, 6-month follow-up, and 18-month follow-up in relation to depression (MD or

Table 2
Means (adjusted means) and standard deviations for the child-reported and parent-reported outcomes in the intervention and control conditions (N = 910).

Outcome	Intervention group (N = 467)		Control group (N = 443)	
	Mean	*SD*	*Mean*	*SD*
Pretest CDI	12.21 (12.30)	9.83	11.72 (11.78)	8.39
Posttest CDI	9.75 (9.86)*	8.10	10.92 (10.89)	8.53
6-mth CDI	8.45 (8.55)	8.10	8.97 (8.78)	7.81
18-mth CDI	7.58 (7.88)	7.61	7.20 (7.13)	7.16
Pretest SCAS	32.62 (32.72)	20.99	30.19 (30.44)	17.47
Posttest SCAS	28.73 (28.52)	18.27	25.64 (25.70)	16.20
6-mth SCAS	24.34 (24.49)	16.27	23.82 (23.47)	16.07
18-mth SCAS	21.60 (21.64)	15.56	20.17 (19.82)	14.30
Pretest CASQ-P	13.90 (13.91)	3.01	13.75 (13.76)	2.98
Posttest CASQ-P	14.05 (14.06)	3.28	13.83 (13.82)	2.99
6-mth CASQ-P	14.27 (14.27)	3.36	14.18 (14.19)	3.39
18-mth CASQ-P	14.56 (14.52)	3.97	14.42 (14.40)	3.72
Pretest CASQ-N	8.45 (8.45)	3.17	8.38 (8.40)	3.19
Posttest CASQ-N	7.81 (7.82)	3.31	8.06 (8.04)	3.06
6-mth CASQ-N	7.19 (7.23)	3.25	7.49 (7.51)	3.07
18-mth CASQ-N	6.90 (6.97)	3.11	7.11 (7.16)	3.02
Pretest CASQ-T	5.45 (5.47)	4.91	5.38 (5.38)	4.95
Posttest CASQ-T	6.24 (6.24)	5.21	5.77 (5.76)	4.74
6-mth CASQ-T	7.08 (7.03)	5.39	6.69 (6.67)	5.20
18-mth CASQ-T	6.90 (7.14)	3.11	7.11 (7.25)	3.02
Pretest SDQP Social	7.73 (7.76)	1.83	7.67 (7.71)	1.85
Posttest SDQP Social	7.91 (7.87)	1.77	7.82 (7.75)	1.81
6-mth SDQP Social	8.09 (7.99)	1.68	7.82 (7.81)	1.77
18-mth SDQP Social	8.16 (8.12)	1.72	8.02 (7.98)	1.85
Pretest SDQP TotDiff	10.88 (11.07)	6.30	10.27 (10.62)	6.30
Posttest SDQP TotDiff	9.87 (10.27)*	6.39	10.18 (10.40)	6.39
6-mth SDQP TotDiff	9.31 (9.81)*	6.23	10.23 (10.22)	6.58
18-mth SDQP TotDiff	8.53 (9.04)	6.05	9.16 (9.35)	6.23

Note: CDI = The Children's Depressive Inventory; SCAS = Spence Children's Anxiety Scale; CASQ-P = The Children's Attributional Questionnaire-Positive; CASQ-N = The Children's Attributional Questionnaire-Negative; CASQ-T = The Children's Attributional Total; SDQP Social = Strength and Difficulties Parent Questionnaire-Social Skills; SDQP-T = Strength and Difficulties Parent Questionnaire-Total Difficulties.
*$p < .001$.
Student-reported outcomes.

dysthymia), anxiety (at least one anxiety disorder present), and internalising (at least one DICA disorder present). The results are reported in Tables 3 and 4. The mixed effects binary logistic regression analyses yielded no Group × Time interactions, no Group main effects, or Time main effects ($p > .1$ for all analyses).

Discussion

The results of this universal randomised control trial indicated that the Aussie Optimism: Positive Thinking Skills Program (AOP-PTS: Rooney et al.., 2004) is associated with a significant pre-post reduction in depressive symptoms, and a significant pre-post reduction in parent-reported emotional difficulties which was maintained at six month follow-up. The AOP-PTS did not significantly impact on anxiety, attribution style, parent-reported pro-social behaviours, or incidence and recovery rates for depression, anxiety, or internalising symptoms. There were trends in both groups for anxiety, attribution style, and parent-reported pro-social behaviours, to improve over time.

Table 3
Incidence at pre-test, 6-month, and 18-month follow-ups: proportions of intervention and control students who changed their pre-test diagnosis from healthy to clinical.

Pre-test diagnosis by condition	Positive diagnosis at post-test	Positive diagnosis at 6-month follow-up	Positive diagnosis at 18-month follow-up
Free from depression at pre-test			
Intervention (n = 91)	2 (2.2%)	3 (3.3%)	7 (7.7%)
Control (n = 78)	8 (10.8%)	4 (5.1%)	6 (7.7%)
Free from anxiety at pre-test			
Intervention (n = 93)	12 (12.9%)	11 (11.8%)	10 (10.8%)
Control (n = 72)	9 (12.5%)	8 (11.1%)	7 (9.7%)
Free from internalising at pre-test			
Intervention (n = 75)	9 (12.0%)	9 (12.0%)	9 (12.0%)
Control (n = 60)	7 (11.7%)	6 (10.0%)	4 (6.7%)

Table 4
Recovery at pre-test, 6-month, and 18-month follow-ups: proportions of training, training and coaching, and control students who changed their pretest diagnosis from clinical to healthy.

Pre-test diagnosis by condition	Negative diagnosis at post-test	Negative diagnosis at 6-month follow-up	Negative diagnosis at 18-month follow-up
Depressed at pre-test:			
Intervention (n = 37)	30 (61.5%)	34 (91.9%)	33 (89.2%)
Control (n = 27)	23 (65.7%)	25 (92.6%)	23 (58.9%)
Anxious at pre-test:			
Intervention (n = 34)	25 (73.5%)	30 (88.2%)	30 (88.2%)
Control (n = 33)	25 (75.8%)	27 (81.8%)	27 (81.8%)
Internalising at pre-test:			
Intervention (n = 52)	37 (71.2%)	43 (82.7%)	43 (82.7%)
Control (n = 45)	28 (62.2%)	34 (75.6%)	33 (73.3%)

The findings for depressive symptomatology are partially consistent with the post-test results of Rooney et al.'s (2006) pilot study, which showed that the intervention reduced depressive symptomatology for children from low socio-economic backgrounds at post-test. This result provides support that participating in the Aussie Optimism Positive Thinking Program is able to provide a significant reduction in depressive symptomatology in the immediate term for 9–10 year old children. The present findings are consistent with those of Jaycox et al. (1994) and Clarke et al. (1995), who found positive intervention effects for depressive symptomatology at post-test. In contrast to the present findings, however, Quayle et al. (2001) and Jaycox et al. (1994) found positive intervention effects for depressive symptoms at 6-months and Gillham et al. (1995) found intervention effects at a 2-year follow-up. Unlike the pilot study which showed a prevention effect for depressive diagnoses at the 9 month follow-up, no significant effects for clinical diagnoses of depression were found in the current study suggesting that further investigation is required to determine whether the program is able to provide a reduction in diagnoses of depressive disorders.

The significant pre-post reduction in parent-reported emotional difficulties for the intervention group, which was maintained at the 6-month follow-up, was contrary to the findings in Jaycox et al. (1994). The total difficulties scale involves a composite score of emotional symptoms, conduct problems, hyperactivity/inattention and peer relationship problems that parents perceive in their children. This finding suggests that participation in the Aussie Optimism Positive Thinking Program can help to reduce a range of perceived internalising and externalising problems that parents perceive in their children up to six months following participation in the program.

The lack of intervention effects for anxiety symptoms, attribution style, and anxiety and depressive (internalising) disorders at post-test, 6 and 18 months, might be due to the cognitive component of the program being too complex for eight and nine year olds. A possible future revision to the program might involve simplifying the cognitive component, while emphasising the development of skills to deal with feelings and empathy. Such skills appear to be important for this age group. Research findings have revealed that

emotional competence is essential to the social and affective development of children (Buckley, Storino, & Saarni, 2003; Cole et al., 2007; Halberstadt, Denham, & Dunsmore, 2001). Social and affective competence is a function of emotional awareness, affective-cognitive control, and social-cognitive understanding (Denham & Weissberg, 2004; Kam, Greenberg, & Kusché, 2004). Similarly, Buckley et al. (2003) proposed that affective competence involves emotional awareness, expression, complexity of feelings, emotional self-efficacy, and emotional regulation, as well as identifying feelings in others. In light of these findings, future revisions of the AOP-PTS program could place a greater emphasis on the identification, awareness, and general management of feelings in self and others.

Previous studies have shown that attribution style can be precursors of depressive symptoms (Calvete, Villardon, & Estevez, 2008; Seligman et al., 1984); however, this does not appear to be the case in the present study. While the intervention reduced depressive symptoms, it had no impact on attribution style. The lack of an intervention effect on attribution style might be due to the children's age. When the children were assessed at post-test (mean age = 8.75 years), they were just entering the concrete operational stage of cognitive development where children begin to apply logic and mental operations to comprehend how things works (Inhelder & Piaget, 1958). Thus, it can be argued that the children's explanations for their successes and failures in life are not yet stable and this affects how they attribute good and bad events (see also Vygotsky, 1962). Attribution styles may become more coherent, and more able to influence psychological well-being, at the longer term follow-ups when the children have a greater understanding of abstract concepts.

The lack of significant findings for anxiety symptoms might have been a lack of sufficient emphasis on anxiety prevention in the fear hierarchy, as it did not appear in the program until Session 6, and it was not individualised for students. Future versions of the AOP-PTS could incorporate a more individualised fear hierarchy. In addition, earlier sessions could place a greater emphasis on social-emotional skills with children identifying the experience of fear in themselves and others. It has been shown that social-emotional skills are important in the reduction of anxiety as well as depression (Buckley et al., 2003).

Gender has not been found to have a direct effect on the intervention outcomes and females reported lower levels of depression at pre-test. Female participants at this stage had not yet reached adolescence which is the suggested time period for girls to report greater depressive symptoms and higher rates of major depression than adolescent boys (Hankin et al., 1998).

It is important to determine the long-term benefits of the AOP-PTS program. To this end, 30-, 42-, and 54-month follow-ups will be conducted with the same cohort of children. Past studies have typically examined only the short or medium-term effects of such interventions with few publishing the results of longer-term follow-ups.

The present study had a large sample size, random allocation of matched schools to intervention or usual care conditions, and relatively low levels of attrition (2.42% at post-test, 6.48% at 6-month follow-up, and 14.07% at 18-month follow-up). Attrition was due to student absenteeism or relocation. Every effort was made to follow-up students; however, truancy was common in the participating schools. Students were followed up at their relocated school or, in the case of movement between states, over the telephone. In some instances, however, student relocation was overseas or unknown. The DICA-IV was used as the main diagnostic assessment in the present study. The DICA-IV was chosen for ease of use and user friendliness. The children used the computer for data entry and appeared to find it a 'safer' way of reporting their thoughts and feelings than face-to-face with the research assistant. The children could type in their answers, providing a more confidential assessment in the school environment where other school members might be in ear shot.

For ethical reasons, the postgraduate clinicians were blind to the school conditions and they were not aware of the intervention effects on the students. The parents or caregivers of all children receiving a clinical diagnosis were contacted and provided with the details of appropriate services for their child. Psychological reports were written for parents who requested them, which involved the services of case workers and health professionals. It may be that informing parents of their child's clinical diagnosis has a therapeutic effect on the children. Furthermore the psychological reports written to parents of students who did not receive the Aussie Optimism Positive Thinking Program, which is the control group, would had caused a contaminated effect on the efficacy of the intervention program. The effects from receiving external help may have explained the significant reduction in depressive symptomatology in 6 and 18-month for the control group. Future research should track the uptake of referrals for these children and assess the outcomes.

A limitation of the study is the lack of parental or teacher data to triangulate with the DICA-IV data from the children. The DICA-IV does offer a parent version; however, due to a high number of children scoring in the clinical range on the CDI or SCAS, the present study did not have the resources to conduct additional assessments with parents. Past researchers have reported that young children do provide accurate reports of internalising disorders (Cantwell, 1996; Krueger, Caspi, Moffit, & Silva, 1998). Cicchetti and Toth (1998), however, stated that "developmental constraints on cognition, language, memory, and self-understanding may compromise the accuracy of the assessment on MDD in children" (p.223). Reich (2000) reported that DICA studies indicated poor parent-child agreement, but she goes on to add that "...there are no sources that really do agree. Teacher–parent agreement is usually low, as in youth–teacher agreement." (pp. 60–61). However, future research should aim to collect data to triangulate with that of the child in order to determine areas of disagreement.

Another limitation of this study is that the incidence and recovery analyses of the DICA data had much less power than the analyses of the psychometric outcomes (refer to the sample sizes in Tables 3 and 4) – which might explain why no intervention effects were found for clinical depression, or anxiety and internalising problems. A final limitation relates to the lack of an attention placebo group. While the present results suggest that the *components* of AOP-PTS program were producing the positive short-term effects, the argument that the intervention children were merely responding positively to the attention that they received cannot be completely ruled out.

Unlike repeated measures ANOVA (or ANCOVA), the generalised linear mixed model does not rely on parents providing data at every assessment point; GLMM uses all the data present at each assessment point allowing the results to be generalised to parents (e.g. parents of children with high depression scores) who failed to return questionnaires at all four assessments. Consequently, the missing data from parents of children in the study is not likely to have seriously compromised the results.

It appears that universal cognitive-behavioural strategies delivered by classroom teachers for middle Primary School students from low SES backgrounds might decrease depressive symptoms in the short term and emotional difficulties in the short to medium term, although the effects may not be sustainable in the longer term. Longer term follow-up assessments are needed as it may take time for the resilience strategies that have been acquired in the program to provide a buffer from internalising and

externalising symptoms in longer term prevention effects. Further research is required to determine strategies for increasing and prolonging these therapeutic effects, and for preventing anxiety symptomatology and disorders in this age-group.

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