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The Prevention of Child and Adolescent Anxiety: A Meta-analytic Review

Brian J. Fisak Jr. · Dan Richard · Angela Mann

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Abstract The purpose of this study was to provide a comprehensive review of the effectiveness of child and adolescent anxiety prevention programs. Mean weighted effect sizes were calculated, and studies were encoded for potential moderator variables. A statistically significant effect size of .18 was obtained at post-intervention, which is consistent with effect sizes reported in reviews of depression, eating disorder, and substance abuse prevention programs. However, the effect sizes obtained at follow-up yielded mixed results. Significant moderators of program effectiveness were found including provider type (professional versus lay provider) and the use of the FRIENDS program. In contrast, program duration, participant age, gender, and program type (universal versus targeted) were not found to moderate program effectiveness. Clinical implications and directions for future research are discussed, including the need for more long-term follow-up, early prevention programs, and studies that systematically examine the impact of parent involvement on program effectiveness.

Keywords Anxiety · Prevention · Meta-analysis · Child · Adolescent

Anxiety disorders are among the most common psychiatric disorders, with recent 12 month prevalence estimates ranging from 5.6 to 18.1% (Baumeister and Härter 2007).

Onset often occurs at an early age, and the course is commonly chronic and recurrent (Cartwright-Hatton et al. 2006; Costello et al. 2003; Hirshfeld-Becker and Biederman 2002). Anxiety disorders typically have a negative impact on quality of life in a number of areas of functioning, including academic performance, social interactions, self-confidence, and ability to enjoy daily life experiences (Barrett and Pahl 2006; Langley et al. 2004). Further, comorbidity between anxiety and other psychological disorders is common, and there is evidence to suggest that anxiety disorders may precede the onset of other psychological disorders, including depression (Craske and Zucker 2002).

To address the detrimental effects of anxiety disorders, interest in the development of effective child and adolescent anxiety prevention programs has increased over the past decade, and there are a number of reasons for the increased focus on anxiety prevention over more traditional treatment approaches (Mrazek and Haggerty 1994; Rapee et al. 2005). In particular, research suggests that those who receive treatment may drop out or fail to respond, and it is not uncommon for treated children to experience recurrence of anxiety symptoms (Last et al. 1996; Rapee et al. 2005). In contrast, prevention programs may be effective in the reduction of the overall incidence of anxiety disorders, and these programs are typically implemented when behavior is more malleable, before the onset of rigid and treatment-resistant response patterns (Craske and Zucker 2002; Dadds et al. 1997). Another argument for prevention relates to treatment accessibility. Many children who suffer from anxiety disorders may not receive treatment, either because they are overlooked or because of limited access to treatment services. In response to this limitation, prevention programs may facilitate the identification of children who are at risk for developing anxiety disorders and may ease the shortage of treatment services

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(Barrett and Pahl 2006; Chavira et al. 2004). In addition, prevention programs may be more likely to reach underserved populations. Overall, there is strong rationale for the development and systematic evaluation of evidence-based anxiety prevention programs for children and adolescents. A report published by the Institute of Medicine categorized prevention programs based on the population targeted (Mrazek and Haggerty 1994). Specifically, universal prevention programs are applied to the general population, without focusing on the risk status. Selective programs target those who are identified as exhibiting an elevated risk for developing a disorder based on established risk factors, and indicated programs target those who exhibit initial symptoms of a disorder but who do not yet meet criteria for the disorder. Selective and indicated programs, both of which are administered to those who are at-risk for developing a psychological disorder, are often collectively referred to as targeted programs (Garber 2006; Gillham 2003). In general, the type of prevention program utilized (i.e., universal or targeted) may be a crucial methodological factor associated with program effectiveness (Donovan and Spence 2000).

Several studies have examined the effectiveness of universal anxiety programs in children and adolescents. A majority of the outcome research in this area has been conducted by Barrett and colleagues using the FRIENDS program, which has consistently been found to be effective in the reduction of anxiety symptoms in school-aged children (Barrett and Turner 2001; Barrett et al. 2005; Lock and Barrett 2003; Lowry-Webster et al. 2003). Further, initial research has indicated that the positive effects of this program are maintained at 3 year follow-up (Barrett et al. 2006). Universal prevention programs have also been found to be effective with preschool-aged children. In particular, utilizing a parent-based intervention program, referred to as the Reach for Resilience program, Dadds and Roth (2008) reported significant anxiety symptom reduction in preschool-aged children. An advantage to universal programs is that these programs may be most likely to reach children who have limited access to treatment services or who may not have been identified as being in need of services (Barrett and Pahl 2006). Further, these programs may decrease stigma associated with participation, as at-risk children are not singled-out for participation. Despite these advantages, there are a number of potential limitations to universal prevention programs (Donovan and Spence 2000; Spence and Shortt 2007). Specifically, universal programs tend to be costly to implement, as these programs are typically administered to a large number of participants regardless of risk status. Further, universal programs often yield small effect sizes relative to targeted programs (Horowitz and Garber 2006). In particular, changes may be minimal for many partic-

ipants, as participants at low risk for developing anxiety disorders are included in the program. Further, because universal programs are often administered to large groups, these programs may tend to be less intensive when compared to targeted programs.

A majority of targeted prevention programs identify at-risk children based on either inhibited temperament or elevated scores on anxiety measures. Among the most commonly utilized strategies to identify at-risk children for inclusion in targeted programs is the use of elevated scores on the Revised Children's Manifest Anxiety Scale (RCMAS), a self-report measure of child anxiety (Reynolds and Richmond 1985). Seminal research in this area was conducted by Dadds and colleagues, in which school-aged children with elevated scores on the RCMAS were recruited (Dadds et al. 1997). Using the FRIENDS program, the authors found lower levels of anxiety symptoms in the intervention group, in contrast to the comparison group, at post-intervention, and the positive effects of the program were maintained at 24-month follow-up (Dadds et al. 1999). More recent studies have also found support for targeted anxiety prevention in school-aged children (Cooley et al. 2004; Gillham et al. 2006; Mifsud and Rapee 2005; Siu 2007). Other targeted programs have recruited parents of preschool-aged children who exhibit an inhibited-withdrawn temperament (LaFreniere and Capuano 1997; Rapee et al. 2005). Specifically, LaFreniere and Capuano (1997) examined the effectiveness of a parent-based anxiety prevention program for inhibited-withdrawn children between the ages of 2 and 6. The program consisted of 20 sessions of intensive parent skills training and behavior modification. In contrast to the comparison group, lower levels of parental control and increased levels of child social competence were found in the intervention group. However, there were no significant differences in the level of anxious-withdrawn behavior at post-intervention. Rapee et al. (2005) administered a relatively brief prevention program to the parents of inhibited children, between the ages of 3 and 5, and significant symptom reduction was found at the completion of the program. These results have recently been replicated by Rapee and colleagues (Kennedy et al. 2009).

As with universal programs, targeted programs have a number of relative strengths and weaknesses. A particular advantage is that, because targeted programs focus on individuals at elevated risk for developing an anxiety disorder, these programs may be more cost effective and may yield larger effect sizes (Barrett and Pahl 2006; Donovan and Spence 2000; Rapee et al. 2005). However, a potential disadvantage is that success of these programs depends on the implementation of reliable, valid, and efficient selection strategies, which may be a challenge in particular settings, including school settings (Barrett and Pahl 2006). Overall, although the type of program is an

important methodological decision for prevention researchers, little is known about the relative effectiveness of universal anxiety prevention programs in contrast to targeted programs.

Another important methodological consideration that may moderate the effectiveness of anxiety prevention programs is the developmental stage (i.e., age or timing) in which programs are implemented (Craske and Zucker 2002; Donovan and Spence 2000; Farrell and Barrett 2007). Interestingly, there has been considerable variability in age groups targeted by anxiety prevention programs. Whereas some programs have targeted preschool-aged children, a majority of programs have focused on children or adolescents (e.g., Rapee et al. 2005; Barrett et al. 2005). In the only study to systematically examine the role of developmental differences on program effectiveness, Barrett et al. (2005) compared the effectiveness of a universal prevention program in primary versus secondary school-aged children. Greater reductions in anxiety were found for primary school children at post-intervention; however, no differences were evident at 12-month follow-up. Overall, although developmental timing is an important consideration, little is known about the influence of developmental timing on the effectiveness of anxiety intervention programs at this time (Donovan and Spence 2000; Hirshfeld-Becker and Biederman 2002).

Focus of the Current Study

Meta-analysis has been a commonly utilized strategy to examine the effectiveness of prevention programs for psychiatric disorders in youth, including depression, eating disorders, and substance abuse (Gottfredson and Wilson 2003; Horowitz and Garber 2006; Stice and Shaw 2004). Although several qualitative reviews of anxiety prevention programs have been conducted, the current study is among the first comprehensive meta-analytic reviews focused exclusively on child and adolescent anxiety prevention programs (e.g., Barrett and Pahl 2006; Craske and Zucker 2002; Feldner et al. 2004). Consequently, the primary goal of the current review was to synthesize the current child and adolescent anxiety prevention research literature and to provide an estimate of the general effectiveness of these programs. Further, because the examination of moderators is an important consideration in prevention research and may inform decisions related to the implementation of specific prevention strategies, another goal of the current study was to identify potential moderators of program effectiveness (Gillham et al. 2001). It is noteworthy that, in order to isolate and quantify the specific effects of anxiety prevention programs, only programs in which anxiety prevention was a primary goal of the study were included in this review. Consequently, programs focused on the

prevention of other psychiatric disorders and general stress symptoms were excluded from the current review.

In order to highlight the unique contributions of the current review to the research literature, it is relevant to provide a summary of the distinctions between this review and the only other comprehensive meta-analytic review of child and adolescent anxiety prevention programs (i.e., Neil and Christensen 2009). First, in addition to prevention programs, Neil and Christensen (2009) included early intervention programs in their review. A number of these programs can be classified as treatment rather than prevention, as the programs were designed to reduce symptoms in those who have already been diagnosed with an anxiety disorder (e.g., Ginsburg & Drake, 2002; Masia-Warner et al., 2005). In contrast, in order to isolate the unique effects of anxiety prevention programs, the current review excluded early intervention/treatment programs. Second, Neil and Christensen limited inclusion to school-based programs. In contrast, the current study included studies conducted outside of the school setting, including anxiety prevention programs for preschool-aged children and programs that recruited the children of anxious parents (e.g., Ginsburg 2009; Rapee et al. 2005). Third, as discussed above, a primary goal of the current review was to quantify the effectiveness of studies designed to prevent anxiety disorders (i.e., programs in which anxiety prevention was the primary goal). In contrast, Neil and Christensen included studies in which anxiety was included as an outcome variable but the prevention of other psychiatric disorders or stress was the primary goal or focus of the study.

Overall, the intent of the current study is to "isolate" the effects of anxiety prevention, by excluding early treatment programs, excluding programs in which anxiety prevention was not the primary focus of the study, and by including child and adolescent anxiety prevention programs regardless of setting. Further, this is the first known meta-analytic review of child and adolescent prevention programs to provide mean effect sizes, as this data was not provided in the review conducted by Neil and Christensen.

Method

Search Procedures and Inclusion Criteria

Computer searches were conducted using the following databases: Nursing and Allied Health Collection, Medline, PILOTS Database (Post-traumatic stress disorder (PTSD) and other mental-health sequelae of traumatic events), PsychINFO, Social Sciences Full Text, and Social Services Abstracts. Studies consisting of the keywords "anxiety and prevention" and "anxiety and early intervention" were screened. Further, only studies that met the following

criteria were included in the analysis. First, the prevention of anxiety was stated as primary goal of the study. For example, programs in which depression or general stress management was the primary goal, and in which anxiety was measured as a secondary variable, were excluded. Second, programs that include children or adolescents who had developed anxiety disorders before the implementation of the intervention, were considered to be treatment programs rather than prevention programs, and were excluded from the review. Finally, for inclusion, programs were required to target children and/or adolescents below the age of 18. Both published and unpublished studies (e.g., doctoral dissertations) were included.

Following the initial search, secondary searches were conducted. Specifically, the reference sections of the articles that met inclusion criteria were reviewed for additional relevant articles. Further, the reference sections of previously published reviews of child and adolescent anxiety prevention programs were examined. Finally, hand searches were conducted for journals that published identified anxiety prevention studies. In particular, the following journals were reviewed from 1970 through the end of 2009: *Journal of Clinical Child and Adolescent Psychology*, *Behaviour Change*, *Clinical Child Psychology and Psychiatry*, *British Journal of Clinical Psychology*, *The Journal of Primary Prevention*, *Cognitive Therapy and Research*, *Journal of Consulting and Clinical Psychology*, *Professional Psychology*, *School Psychology Quarterly*, *Psychology in the Schools*, *Development and Psychopathology*, *Child Abuse and Neglect*, *Journal of Pediatric Psychology*, *Journal of Child Psychology and Psychiatry*.

Thirty-five studies meeting inclusion criteria were located. Of these studies, 30 included a comparison group and 5 studies included pretest-posttest data only. Four of the studies provided follow-up data to previously published studies (see Table 1). It is noteworthy that 10 of 35 studies included in the current meta-analysis were also included in Neil and Christensen's (2009) review, and 21 of the studies identified in Neil & Christensen's review did not meet criteria for the current study. Consequently, it appears that differences in inclusion criteria led to minimal overlap between the two reviews (approximately 15%).

Study Coding

Studies meeting inclusion criteria were coded on several variables, including the type of prevention program (targeted or universal), age, gender, number of sessions, and type of provider (lay provider or mental health professional). Variables were coded independently by three undergraduate students. Reliability estimates ranged from .82 to .99, and discrepancies were reviewed and resolved through consensus by the primary authors.

Computation of Effect Sizes

Effect sizes were measured by utilizing Cohen's d values, calculated as the difference between the intervention group mean and the comparison group mean divided by the pooled standard deviation (Cohen 1988). Consistent with Hedges' (1981) recommendation, d was corrected for bias, resulting in an unbiased estimate of the population standardized mean difference. The mean effect sizes at post-intervention and follow-up were calculated based on the difference between intervention groups and comparison groups, and consistent with the procedures outlined by Gleser and Olkin (1994), multiple estimates of effect size from the same study were aggregated for the primary analyses. This strategy minimizes bias associated with overrepresentation of samples with multiple measures of anxiety and bias associated with interdependence among effect sizes. The resulting standardized mean differences were combined by weighting each effect size by the inverse of its (fixed-effects) variance, making effect estimates with smaller variances (and larger sample sizes) more influential in the computation of overall effect sizes (Borenstein et al. 2007).

Results

Post-intervention Effect Sizes

Table 1 contains aggregated effect sizes at post-intervention for each study in the analysis along with relevant study characteristics. A total of 27 effect sizes (ranging from 1.65 to -.22) were included in analysis at post-intervention.¹ Positive effect sizes indicate that the intervention group mean is lower in anxiety scores relative to mean of the comparison group. The weighted overall effect size was .18 (95% CI of 0.23 to 0.13), indicating that intervention groups at post-intervention scored .18 standard deviations lower on anxiety outcome measures relative to comparison groups. This effect size was significantly different from zero, $Z=7.31$, $p<.001$. According to Cohen (1988), the obtained effect size is considered small; however, the effect size compares well to effect size obtained in a review of depression prevention programs ($d=.16$; Horowitz and Garber 2006). The distribution of effect sizes

¹ Studies using a single-group pretest-post design were excluded from overall effect size estimates. However, five pretest-post test effect sizes were available. Sufficient information to compute an estimate of the sampling variance was available for only two of these effect size estimates; therefore, a weighted mean effect size using the inverse of the sample variance was not computed. The five effects were weighted by sample size and produced a weighted mean effect size of .41. One study (Cooley et al. 2004) reported an unusually large effect size ($d=2.92$). When this effect size was removed from the analysis, the effect size weighted by sample size produced a d of .33.

Table 1 Summary of descriptive characteristics and results of included studies^a

Study	Type of Intv	Mean Age	Sessions	Outcome Measures	Rater	Post Intv. N	D at Post Intv.	D at LFU	Time of LFU (mos)	% Female	Study Design	Program Description
Aune and Stiles (2010)	T	12.60	NA	SCARED SPAIC	S S	190	.32	NA	NA	51.2	RA	Cognitive-behavioral program designed to prevent social phobia in Norwegian adolescents (Norwegian Universal Preventative Program for Social Anxiety–NUPP-SA). The program included the education of students, parents, teachers/school staff, and county health workers. Rather than session-based approach, a systems approach was utilized and implemented in general stages
Barrett et al. (2005)*	U	12.67	10	SCAS	S	530	-.05	.25	12	NR	RA	Cognitive-behavioral program focused on the (FRIENDS Program)prevention of general anxiety pathology in Australia
Barrett and Turner (2001) *	U	10.75	10	RCMAS SCAS	S S	489	.32	NA	NA	49.5	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (FRIENDS Program)
Barrett et al. (2000)	T	16.30	10	SCAS	S	20	.38	NA	NA	100	NE	Cognitive-behavioral program focused on the prevention of general anxiety pathology in a mixed ethnic group of immigrants in Australia (FRIENDS program).
Barrett et al. (2001)	U	12.50	10	RCMAS TSCL	S	201	.32	NA	NA	47.6	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology and trauma symptoms in a mixed ethnic group of immigrants in Australia (FRIENDS program).
Barrett et al. (2003)	U	12.28	10	RCMAS TSCL	S S	320	.51	.49	6	47.8	RA	Cognitive-behavioral program focused on the Prevention of general anxiety pathology and trauma Symptoms in a mixed ethnic group of immigrants in Australia (FRIENDS program).
Callear et al. (2009)	U	14.34	5	RCMAS	S	1189	.15	.17	6	63.1	RA	A self-directed, internet-based cognitive behavioral therapy program focused on the prevention of general anxiety symptoms- conducted in Australia (MoodGYM program).
Cooley et al. (2004)	T	10.20	11	RCMAS MASC	S S	10*	1.55	NA	NA	80.0	PP	Cognitive-behavioral program focused on the prevention of general anxiety pathology in minority children exposed to community violence in the United States (FRIENDS program).
Craddock et al. (1978)	T	14.50	6	Timed Behavior Checklist	R	152	.04	NA	NA	100	RA	A program that included two treatment groups (cognitive or behavioral) to prevent fears of public speaking; conducted in the United States.
Dadds et al. (1997); (1999)**	T	9.40	10	RCMAS Clinician Severity Rating	S R	128	.22	.22	6	72.7	RA	Parent-based cognitive-behavioral program focused on the prevention of general anxiety pathology- conducted in Australia (FRIENDS program).
Dadds and Roth (2008)	U	5.00	6	SCBE	T	396	.30	.15	6	47.0	RA	Parent-based cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (REACH for REESILIENCE program).

Table 1 (continued)

Study	Type of Intv	Mean Age	Sessions	Outcome Measures	Rater	Post Intv. N	D at Post Intv.	D at LFU	Time of LFU (mos)	% Female	Study Design	Program Description
Drake (2007)	T	13.95	1	MASC PAQR	S S	15	.56	NA	NA	42.1	NE	A single-session Panic Prevention Workshop (PPW) designed to prevent the onset of panic disorder in at risk adolescents in the United States. Unpublished doctoral dissertation.
Felner et al. (1981)	T	NR	16	STAIC	S	41*	.36	NA	NA	Not	PP	Problem-solving & coping skills training program focused on the prevention of general anxiety pathology in children exposed to high levels of stress in the United States (Primary Mental Health Project).
Gallegos, J (2009)	U	9.89	12	SCAS	S	686	.15	.19	6	52.6	NE	Cognitive-behavioral program focused on the prevention of general anxiety pathology in Mexico (FRIENDS program). Unpublished doctoral dissertation.
Gillham et al. (2006)	T	11.50	14	RCMAS	S	40	.07	.84	12	72.7	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in the United States (Penn Resiliency Program for Children & Adolescents).
Ginsburg (2009)	T	8.94	8	SCARED	S,P	37	.15	.15	12	45.0	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in the children of parents who have been diagnosed with an anxiety disorder—conducted in the United States (Coping and Promoting Strength Program- CAPS).
Kennedy et al. (2009)	T	3.92	8	PAS	P	63	.41	NA	6#	54.8	RA	Parent-based cognitive-behavioral program focused on preventing general pathology in Australia (Preschool Intervention Project-PIP)
Kiselica et al. (1994)*	T	13.70	8	STAI	S	48	.91	NA	NA	35.8	RA	Stress inoculation training program designed to prevent general anxiety and stress-related symptoms in the United States.
LaFreniere and Capuano (1997)	T	4.45	17	SCBE	T	43	1.03	NA	NA	53.5		Parent-based skills training program focused on the prevention of anxiety in Canada.
Lock and Barrett (2003); Barrett et al. (2006)**	U	12.00	10	RCMAS, SCAS	S	835	.30	-.05	36	50.3	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (FRIENDS program).
Lowery-Webster et al. (2001); (2003)**	T,U	11.50	13	RCMAS SCAL	S	413	.45	.53	12	52.0	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (FRIENDS program).
Misud and Rapee (2005)*	T	9.50	10	SCAS	S,P	91	.53	.64	6	59.0	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (Cool Kids Program)
McLaughlin (2008)	U	12.50	31	MASC, SPAIC, PSWQ	S	713	-.08	NA	NA	48.8	NE	Cognitive-behavioral program focused on the prevention of general anxiety pathology in the United States. The intervention was administered as part of the school curriculum. Unpublished doctoral dissertation.

Rapee et al. (2005)	T	3.90	6	TABC-R/ CTQ-S	P	99	.08	NA	12#	49.0	RA	Parent-based cognitive-behavioral program focused on the prevention of general anxiety pathology in Australia (Preschool Intervention Project- PIP).
Roberts et al. (2010)	U	11.99	8	RCMAS	S	428	-.19	-.17	12	54.4	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology & depression- conducted in Australia (Aussie Optimism Program)
Rose et al. (2010)	U	8.50	10	MASC	S	52	-.22	NA	NA	NR	NE	Cognitive-behavioral program focused on the prevention of general anxiety pathology- conducted in Canada (FRIENDS program)
Simpson (2007)	U	9.02	12	MASC	S, P	41	.10	NA	NA	37.8	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology, along with negative affect and anger- conducted in Canada (Feelings Club CBT program). Unpublished doctoral dissertation.
Siu (2007)	T	8.40	10	SCARED	S	47	1.65	NA	NA	47.0	RA	Cognitive-behavioral program focused on the prevention of general anxiety pathology- conducted in Hong Kong (FRIENDS program).
Stallard et al. (2005)	U	9.50	10	SCAS	S	197*	.31	NA	NA	NR	PP	Cognitive-behavioral program focused on the prevention of general anxiety pathology, conducted in England (FRIENDS program)
Stallard et al. (2007); Stallard et al. (2008)	U	9.50	10	SCAS	S	89*	.39	.46	12	43.0	PP	Cognitive-behavioral program focused on the prevention of general anxiety pathology, conducted in England (FRIENDS program).
Stallard et al. (2006)	T	15.20	3	RCMAS	S	132	.08	NA	NA	80.0	RA	Psychosocial debriefing program focused on the prevention of trauma & distress in children involved in traffic accidents, conducted in England.

Notes (Table 1). ^a Effect sizes were computed from means and standard deviations reported by researchers in the selected primary articles. In some instances, effect-sizes were computed from other reported data (e.g., results of statistical tests) according to computational estimates outlined in Rosenthal (1994). In instances where multiple measures or multiple treatment groups were included within one study, effect sizes were combined while correcting for interdependence according to procedures outlined in Gleser and Olkin (1994). In these instances, multiple study characteristics were reported in the table and the Post-Intervention *N* of the effect-size (*d*) with the greatest stability (i.e., the lowest variance) was recorded.

^b For studies in which mean age was not reported, age was estimated based on age range and typical age corresponding with the grade of participants

Abbreviations: *Intv* Intervention, *Sessions* Number of Sessions, *LFU* last follow-up, *NA* Not Applicable

Type of Intervention: *U* Universal, *T* Targeted (i.e., Selected or Indicated), *NR* Not Reported

Measures: *CTQ-S* Child Temperament Questionnaire, *RCMAS* Revised Children's Manifest Anxiety Scale, *SCARED* Self-Report for Childhood Anxiety Related Disorders, *SCAS* Spence Children's Anxiety Scale, *SCBE* Social Competence and Behavior Evaluation- Anxiety-Withdrawal Subscale, *SPAI*C Social Phobia and Anxiety Inventory for Children, *STAI* State-Trait Anxiety Inventory, *STAI*C State-Trait Anxiety Inventory for Children, *TABC-R* Temperament Assessment Battery- Revised, *TSCL* Trauma Symptom Checklist for Children, *MASC* Multidimensional Anxiety Scale for Children, *PAS* Preschool Anxiety Scale, *PSWQ* Penn State Worry Questionnaire

Rater: *S* Self-Report, *P* Parent-Report, *T* Teacher-Report

Study Design: *RA* Random Assignment, *NE* Nonequivalent Control Group, *PP* Pretest-Post Design

#Post-intervention assessment taken at 6-months or 12-months after intervention

*Denotes studies also included in Neil & Christensen's (2009) review

exhibited significant heterogeneity, $Q_{within}(26)=108.23$, $p<.001$, suggesting potential moderators of effect size.²

Publication Bias

Studies that demonstrate null results or results in the opposite direction of experimenter predictions often go unpublished, which can lead to a publication bias in meta-analysis (see Egger et al. 1997). To assess the potential presence and impact of publication bias, a funnel plot of the effect sizes at post-intervention was created (see Fig. 1). The asymmetric pattern shown in Fig. 1, especially in the region represented by studies with smaller sample sizes, indicates the presence of publication bias. Further, the largest effects were reported by studies with smaller sample sizes, portending an upward bias in the computed effect. However, the effects of studies with the largest sample sizes tended to cluster around the computed mean effect size of .18, suggesting that publication bias was successfully managed with the use of weighted effect sizes.

To address the potential that publication bias would nullify the current findings (see Rosenthal 1979), we calculated a fail-safe N . In particular, the fail-safe N is the number of studies with a mean effect size of zero needed to reduce an effect size to non-significance. The fail-safe N for the current meta-analysis is 348, indicating that 348 unpublished studies would need to exist to influence the statistical significance of above mentioned effect size. Consequently, it is unlikely that publication bias has a significant impact on the estimates of the overall effect size.

Effect Size at Follow-Up

Several of the studies provided follow-up data at 6 months and 12 months. The effect sizes at 6-month follow-up ($d=.23$, 95% CI of 0.30 to 0.15, $Z=6.10$, $p<.001$) were relatively consistent with the effect size at post-intervention, suggesting the initial response to prevention programs is maintained at 6-month follow-up. Effect sizes at 12-month follow-up ($d=.05$, 95% CI of 0.14 to $-.04$, $Z=1.13$, $p=.26$) were generally smaller. However, it is noteworthy that studies reporting 6-month follow-up were not necessarily the same studies that included a 12-month follow-up data. These

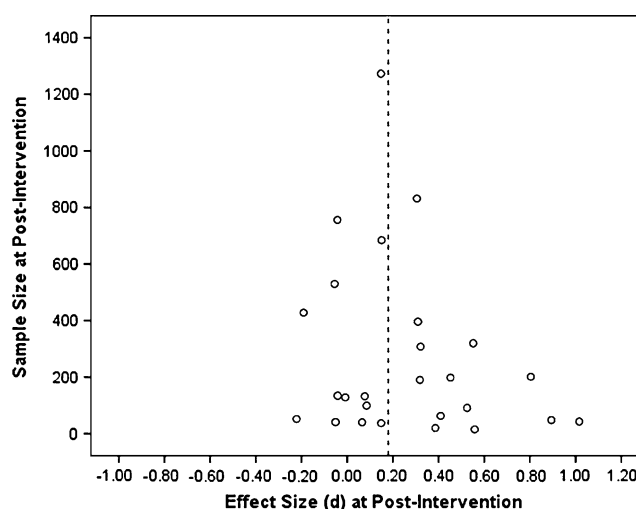


Fig. 1 Funnel Plot of Effect Size (d) and Sample Size at Post-Intervention. *Note.* Asymmetry in the pattern suggests publication bias. Dashed line represents the overall weighted mean effect size $d=.18$

sampling differences may, in part, account for differences in effect size at 6 and 12 months.

To clarify the maintenance of the initial intervention response over time, we used a procedure outlined by Horowitz and Garber (2006), in which the mean weighted effect size across all studies at the last reported follow-up interval was examined (see Table 1). The effect size at last follow-up interval was similar to the effect size reported at post-intervention ($d=.17$, 95% CI of 0.22 to 0.12, $Z=6.78$, $p<.001$), suggesting that the response to the prevention programs is maintained at follow-up.

Moderator Analyses

Moderator analyses were conducted utilizing disaggregated effect size data at post-intervention. Results of the moderator analyses are summarized below and the associated statistical data is provided in Table 2.

Program Type (Universal versus Targeted Prevention) A regression analysis was conducted to determine if the type of program, universal versus targeted, moderated the magnitude of effect size. There was no significant difference between universal and targeted programs, $Q_{between}(1)=1.56$, $p=.21$. The weighted mean effect size for universal programs was .17 ($Z=6.42$, $p<.001$), and the weighted mean effect size for targeted programs was .26 ($Z=4.24$, $p<.001$).

Age Age as a continuous variable was not found to moderate program effect size, $R=.26$, $k=33$, $p=.13$. However, it is noteworthy that the variation of age among studies was considerably large, $Q_{within}=146.99$, $p<.001$.

² One study (Siu 2007) demonstrated substantial departure (well over two standard deviations) from the other effects in terms of its overall magnitude ($d=1.65$). The analyses were recomputed with this outlier removed. Removal of this unusually large effect and recalculation did not substantively affect the primary interpretation of the overall effect size, $d=.18$ (95% CI of 0.22 to .13), $Z=7.06$, $p<.001$. The distribution of effect sizes continued to demonstrate heterogeneity, $Q(25)=89.86$, $p<.001$. To prevent the effect size estimate from the Sui (2007) article from having undue influence on the moderator analyses, the value was removed from subsequent analyses.

Table 2 Categorical moderator analyses for effects at post-intervention

Category	<i>k</i>	<i>d</i>	95% <i>CI</i>		<i>Q</i> _{between}	<i>Q</i> _{within}
			High	Low		
Overall	27	.18***	.13	.23		108.23***
Program Type					1.56	
Universal	13	.17				74.46***
Targeted	14	.26				19.22
Provider Credentials					6.44**	
Mental Health Professionals	14	.31***	.23	.39		45.90***
Lay Providers	8	.05	-.03	.13		21.21**
Type of Manual					8.91***	
FRIENDS	10	.25***	.18	.32		41.08***
Other	15	.11***	.04	.18		39.87***
Australia-based Programs					8.39***	
FRIENDS	8	.30***	.22	.38		35.32***
Other	7	.12**	.03	.21		17.99**
Study Location					4.72*	
Australia	15	.21***	.15	.27		61.70***
Other	11	.10*	.01	.19		23.44**
Rater					.13	
Parent		.21	-.05	.47		1.21
Child		.16***	.11	.21		78.04***

Note. The number of studies (*k*) included in an analysis vary based on disaggregation of effect sizes within studies or because of missing information for moderator variables. * $p < .05$, ** $p < .01$, *** $p < .001$

Provider Credentials Provider credentials was found to be a significant moderator of effect size, $Q_{\text{between}}(1)=6.44$, $p < .01$. The effect size of programs that employ mental health providers as delivery professionals was significantly greater than zero ($d = .31$, $Z = 7.71$, $p < .001$). In contrast, the effect size of programs that employ lay providers was smaller and no different from zero ($d = .05$, $Z = 1.24$, $p = .21$).

Gender The percent of female participants did not significantly moderate the magnitude of intervention effects, $R = -.26$, $k = 22$, $p = .22$. Effect sizes tended to be smaller for programs that included more girls, but the pattern was not consistent across all studies and the relationship was not significantly different from zero.

FRIENDS Program Due to the common use of the program among studies included in this meta-analysis, the use of the FRIENDS program was examined as a potential moderator of effect size. Programs using the FRIENDS manual demonstrated larger effects ($d = .25$, $Z = 6.90$, $p < .001$) than programs not using the Friends manual ($d = .11$, $Z = 3.24$, $p < .001$). This effect was statistically significant, $Q_{\text{between}}(1)=8.91$, $p < .001$.

To provide additional information about the relative effectiveness of the FRIENDS program, a follow-up analysis was conducted in which the effectiveness of Australian-based studies utilizing FRIENDS were compared to Australian-based studies not utilizing FRIENDS. Amongst Australian studies, the use of the FRIENDS

program was found to moderate intervention effects, $Q_{\text{between}}(1)=8.39$, $p < .001$, as programs using FRIENDS ($d = .30$, $Z = 7.21$, $p < .001$) were found to be more effective than programs not using Friends ($d = .12$, $Z = 2.75$, $p < .01$).

Australian Versus Non-Australian Programs Because a significant percentage of the prevention studies included in this review were based in Australia, a moderator analysis was conducted to determine the degree to which the effectiveness of Australian programs was consistent with the effectiveness of programs conducted in other countries. The difference between Australian and Non-Australian studies was significant, $Q_{\text{between}}(1)=4.72$, $p = .03$). In particular, Australian-based programs demonstrated larger effects ($d = .21$, $Z = 6.98$, $p < .001$) than programs conducted outside of Australia ($d = .10$, $Z = 2.29$, $p < .05$).

Number of Sessions The majority of programs contained from 8 to 12 sessions. One program provided 31 sessions (McLaughlin 2008), and to keep this outlier from influencing the results, it was removed from this moderator analysis. The resulting pattern indicated that, as the number of sessions increased, the magnitude of the effect increased, however, this relationship was not significant, $R = .22$, $k = 22$, $p = .31$.

Rater The source of the outcome data (i.e., parent versus child self-report) was not found to moderate effect size,

$Q_{\text{between}}(1) = .13, p = .72$. In particular, effect sizes based on parent report data ($d = .21, Z = 1.59, p = .11$) were similar to effect sizes based on child self-report data ($d = .16, Z = 6.14, p < .001$).

Discussion

The mean weighted effect sizes obtained in this review provide support for the general effectiveness of child and adolescent anxiety prevention programs. Although, the obtained effect size at post-intervention of .18 is considered small based on Cohen's (1988) guidelines, this effect size compares favorably to other child and adolescent prevention programs. More specifically, based on previous meta-analyses, the effect size for eating disorder prevention programs has been found to range from .17 to .21, and the effect size for depression prevention programs has been found to range from .16 to .22 (Fingeret et al. 2006; Horowitz and Garber 2006; Jane-Llopis et al. 2003). The results also compare favorably to substance abuse prevention programs, in which effect sizes have found to range from .05 to .20 (see Gottfredson and Wilson 2003). In addition, small effect sizes at post-intervention may be meaningful, as prevention programs have the potential to direct intervention groups into positive developmental trajectories (Spoth et al. 2009). These positive trajectories may lead to increases in the differences between intervention and non-intervention groups over time.

It is noteworthy that the effect sizes in the current study appear to be smaller than the effect sizes obtained by Neil and Christensen (2009) in their review of anxiety prevention and early intervention programs. In particular, Neil and Christensen reported median effect sizes of .57 and .32 for child and adolescent programs, respectively. The discrepancy between the current review and Neil and Christensen review can be explained by a number of methodological differences. First, the current study included unpublished studies, many of which yielded small or non-significant effect sizes. In contrast, only published studies were included in the Neil and Christensen review. Second, differences existed in the calculation of effect sizes. The current study utilized mean weighted effect sizes. In contrast, Neil and Christensen used median effect sizes, which were not weighted. Finally, differences may be related to inclusion criteria. The current study included only prevention programs, and in prevention research, post-intervention effect sizes may be relatively small due to the fact that many participants have not yet developed anxiety-related symptoms. Consequently, change from pre to post-intervention may be minimal, and long-term follow-up may be needed to accurately assess program effectiveness. In

contrast, Neil and Christensen included early intervention (i.e., treatment programs) in their meta-analysis. These programs may yield larger effect sizes at post-intervention, as participants meet criteria for anxiety disorders before implementation of the program and symptom reduction is typically expected at post-intervention.

The long-term effectiveness of prevention programs is of particular interest to prevention researchers (Gillham The long-term effectiveness of prevention programs is of particular interest to prevention 2001), and based on the current review, the most common follow-up intervals reported were 6 months and 12 months. The mean effect size at 6 months was consistent with the effect size at post-intervention, suggesting that the effectiveness of anxiety prevention programs is maintained over this time period. However, the effect size at 12-month follow-up was smaller ($d = .05$). Although these findings suggest a potential reduction in program effectiveness at 12 months, it is relevant that a significant portion of studies did not provide data at post-intervention and even fewer studies provide data at 12-month follow-up. Further, only two studies provide follow-up data beyond 12 months (Barrett et al. 2006; Dadds et al. 1999). As a result, the long-term effectiveness of anxiety prevention programs is currently unclear, and consequently, more longitudinal studies are needed to assess the effectiveness of these programs over time.

Program Type

An important methodological decision that may impact program effectiveness, relates to the type or target of the prevention program (Donovan and Spence 2000). Because targeted programs are administered to at-risk children and adolescents, larger effect sizes are often anticipated. However, there was no significant difference was found between universal and targeted anxiety prevention programs. Interestingly, these results are inconsistent with the findings from meta-analyses of prevention programs for other disorders, including depression and eating disorders (Horowitz and Garber 2006; Stice and Shaw 2004). It appears that this inconsistency can be explained by the particularly robust effect size of universal anxiety prevention programs when compared to universal prevention programs for other disorders. Specifically, the effect size of universal anxiety prevention programs of .17 is larger than the obtained effect sizes for universal depression, eating disorder, and substance abuse programs, which have yielded effect sizes of .12, .08, .05, respectively (Fingeret et al. 2006; Gottfredson and Wilson 2003; Horowitz and Garber 2006). One explanation for this finding is that, unlike prevention programs for other disorders, children and adolescents may benefit from universal anxiety prevention regardless of risk status. Specifically, anxiety, fear, and stress responses are

often considered normative experiences, and as a result, a majority of participants may benefit from the skills covered in these programs. Overall, these findings provide particularly strong support for the relative effectiveness of universal anxiety prevention programs. Further, the obtained effect size, along with the advantages inherent in universal prevention, including accessibility, ease of implementation, and the non-stigmatizing nature of these programs, provide strong rationale for the continued dissemination of these programs (Barrett and Pahl 2006).

Targeted programs were also found to be effective, as these programs yielded a mean weighted effect size of .26 at post-intervention. However, the non-significant difference between targeted and universal programs may indicate that there is room to enhance the effectiveness of targeted anxiety prevention programs relative universal programs. For example, it is possible that targeted anxiety prevention programs that focus on the on the identification and reduction of disorder-specific anxiety symptoms may be particularly effective. To illustrate, successful targeted programs, designed to identify and prevent the onset of panic disorder, have been developed and implemented in young adult populations (Zvolensky 2006). The long-term effectiveness of prevention programs is of particular interest to prevention (2006), and although it is possible that these programs can be successfully applied to at-risk adolescents, only one study has examined the effectiveness of panic prevention in adolescent samples (Drake 2007).

Provider Background

The role of the provider background/training is also an important consideration in prevention research (Gillham et al. 2001), and results of the current study indicated that provider background was a significant moderator of effect size. Specifically, larger effect sizes were found for mental health providers when compared to lay providers. Further, the effect size of programs led by lay providers was non-significant. Due to the extensive training that mental health providers receive, it is not surprising that mental health professionals are more effective in the implementation of prevention programs.

The above findings have important implications for the dissemination of anxiety prevention programs, as a commonly discussed advantage of prevention programs is that these programs can be implemented by lay providers. In particular, the use of lay providers is cost effective and may facilitate the widespread dissemination of prevention programs, including areas underserved by mental health professionals. In addition, the use of lay providers may facilitate the incorporation of anxiety prevention into the educational system, as staff members (e.g., teachers or

school nurses) may be able to effectively implement established programs as part of the curriculum.

Due to the relevance of the use of lay providers in the dissemination of anxiety prevention programs, more research is needed to systematically examine the degree to which anxiety prevention programs can be successfully implemented by lay providers and to examine the possible conditions under which lay providers can successfully implement these programs. For example, it is possible that a number of factors may influence the degree to which provider background relates to program effectiveness, including the structure and standardization of the program, the amount of training provided, and individual variables (e.g., the provider's previous experience with children). Interestingly, the only study to directly examine provider background as an outcome variable found teacher-led and psychologist-led groups found to be equally effective (Barrett and Turner 2001).

Age/Developmental Timing

Developmental timing is another important methodological consideration in the implementation of prevention programs (Craske and Zucker 2002; Donovan and Spence 2000). Interestingly, no significant differences were found for the effectiveness of programs based on age of participants. Interestingly, in the only known study to directly compare the effectiveness of anxiety prevention for primary versus secondary school-aged children, Barrett et al. (2005) found greater reductions in anxiety for primary school children at post-intervention; however, no differences were found at 12-month follow-up.

Overall, it is clear that more research is needed to systematically examine the degree to which participant age or developmental level influences the effectiveness of anxiety prevention programs. This line of research may be of particular relevance, as the impact of certain risk factors may vary based on the child's developmental stage (Donovan and Spence 2000). Also relevant to the timing of program implementation, a particularly promising direction for future research relates to the development and evaluation of early prevention programs (i.e., programs for preschool-aged children). Specifically, these programs have the potential to be particularly effective, as implementation may precede the development of acute symptoms and the onset of rigid, maladaptive behavioral patterns (Barrett et al. 2005; Cartwright-Hatton et al. 2006; Hirshfeld-Becker and Biederman 2002).

The FRIENDS Program

It is noteworthy that a substantial number of studies identified in this review utilized Paula Barrett's FRIENDS program (Barrett et al. 1999), and it is clear that this

program is a particularly well-established and effective program for the prevention of general anxiety symptoms. Further, based on moderator analyses, studies utilizing the FRIENDS program were found to be more effective than programs not utilizing FRIENDS. Particular strengths of this program include the fact that program is manualized, well-structured, and can be easily integrated into school curriculums. However, despite the strengths of the program, more research is needed to determine the degree to which the effectiveness of the program is generalizable to nations other than Australia.

Summary & Directions for Future Research

Overall, based on the current review, anxiety prevention appears to be a promising strategy to reduce the incidence rates of anxiety disorders. Almost all of the prevention programs in the current review were either behavioral or cognitive-behavioral, and Barrett's manualized FRIENDS program has received particularly strong and consistent support. Australian programs were found to be more effective than non-Australian programs; however, this effect may be related to the use of the FRIENDS program in Australia. Further mental health providers were found to be more effective than lay providers. In contrast, program type (i.e., universal versus targeted), participant age, participant gender, rater (i.e., child versus parent), and the number of sessions were not found to moderate intervention effectiveness. Although the current findings provide initial insight into moderators of program effectiveness, more research is needed to systematically examine these potential moderators (Feldner et al. 2004; Gillham et al. 2001).

Despite the progress made in the development of successful child and adolescent anxiety prevention programs, this current review highlights a number of limitations of the current research and viable directions for future research. In particular, it is surprising that, in contrast to the number of prevention studies for other disorders including depression, eating disorders, and substance abuse, relatively few child and adolescent anxiety prevention studies have been conducted. Considering the relatively high prevalence rate of anxiety disorders in youth, it is clear that more anxiety prevention research is warranted. Another substantial limitation is that little is known about the long-term effectiveness of anxiety prevention programs (Gillham et al. 2001).

Other limitations relate to the development and implementation of targeted prevention programs. In particular, there has been considerable discussion regarding the identification of risk factors that can be utilized to recruit participants for targeted programs (Donovan and Spence 2000). However, aside from elevated scores on anxiety measures and behavioral inhibition measures, few studies

have used other well-established risk factors to recruit participants (Ginsburg 2009). As a result, a viable direction for future research is the use of additional empirically-based risk factors to identify and recruit at-risk children and adolescents (e.g., parental anxiety, parenting behavior, and children experiencing stressful life events). In addition, although a number of targeted programs have focused on the prevention of general anxiety pathology (i.e., non-specific anxiety psychopathology), relatively few well-controlled studies have focused on the prevention of specific anxiety disorders (Feldner et al. 2004). Consequently the development and evaluation of disorder-specific anxiety prevention programs (e.g., programs to prevent panic disorder, social phobia, or PTSD) may be a viable direction for future research.

Another direction for future research relates to the examination of the role of parent involvement in anxiety prevention programs. In particular, it is possible that parents may enhance the effectiveness of anxiety prevention programs, as they may be able to facilitate the child's use of skills addressed in the program (e.g., exposure and use of coping skills). Further, the inclusion of strategies to reduce parent anxiety may also have substantial preventative effects (Donovan and Spence 2000). Interestingly, although parent involvement may be beneficial, the effectiveness of parent involvement has not been systematically examined. Consequently, research is needed to examine the effectiveness of parental involvement, including parental anxiety reduction, in the prevention of child and adolescent anxiety.

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