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EFFECTIVENESS OF PREVENTATIVE INTERVENTIONS FOR ANXIETY DISORDERS IN CHILDREN AND ADOLESCENTS: A META-ANALYSIS

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EFFECTIVENESS OF PREVENTATIVE INTERVENTIONS FOR ANXIETY DISORDERS IN CHILDREN AND ADOLESCENTS: A META-ANALYSIS

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ABSTRACT

Anxiety disorders are associated with a variety of negative social, emotional, and academic outcomes for children and adolescents. A variety of programs have been developed to prevent the development of anxiety disorders. This study meta-analyzed data from 14 prevention studies. The goal of the meta-analysis was to evaluate the effectiveness of the preventative programs and examine moderating variables that impact their effectiveness. Included studies were obtained through extensive literature searches in the PsycINFO, ERIC, and MEDLINE databases. Results indicated that preventative interventions have only a small impact on anxiety at post-intervention and follow-up times. Selective and indicated prevention programs were found to be more effective than universal programs. The length of the intervention and the age and gender of participants had an effect on the success of preventative interventions at post-intervention. Educational implications and future recommendations are discussed.

Keywords: anxiety, prevention, intervention, meta-analysis, children, adolescents, effectiveness

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Introduction

The purpose of this study was to evaluate the effectiveness of preventative interventions for anxiety disorders in children and adolescents. Specifically, this study evaluated whether psychosocial interventions have the potential to prevent the development of common anxiety disorders and symptoms in children and adolescents. A meta-analysis was used to determine the effectiveness of psychosocial preventative interventions. Data was obtained by conducting literature searches in the PsycINFO, ERIC, and MEDLINE databases. Reference lists of relevant articles and journals were also consulted. The following moderating variables that could impact the effectiveness of preventative interventions were examined in this study: age, gender, type of preventative intervention, length of intervention, length of follow-up, source of outcome data, and the type of prevention program.

Since a meta-analyses has the ability to statistically summarize findings by combining effect sizes from different studies with differing numbers of participants, precise conclusions can be drawn about the effectiveness of preventative interventions that have been implemented to date. As well, the examination of the moderating variables can advance knowledge with regard to the specific factors that impact the effectiveness of preventative interventions. For example, this meta-analysis may help identify when in the life course it is best to implement a preventative intervention, whether gender has an impact on the effectiveness of the intervention, and which type of prevention may be most successful. As well, examining the length of the intervention and the length of follow-up assessments can help identify whether longer or shorter interventions are more successful and what length of follow-up is necessary to determine

if the intervention is truly effective over the longer term. An investigation of the source of outcome data can help identify if disparities exist with regard to the effectiveness of the preventative interventions depending on the source of information. For example, it would be problematic if information obtained from parents indicated that an intervention was effective whereas the information obtained specifically from the child indicated the opposite. Lastly, the type of prevention program was examined to assess whether a recently endorsed intervention, the *FRIENDS for Life* (Barrett, 2004) program, is more effective than other types of preventative programs.

Ultimately, the goals of this meta-analysis are (a) to identify whether interventions are effective at preventing anxiety disorders and symptoms in children and adolescents and (b) distinguish the degree to which specific variables moderate the effectiveness of the preventative interventions. The following review of literature will further discuss anxiety disorders and the importance of preventing their development in children and adolescents.

Review of Literature

The category of anxiety disorders encompasses a range of specific disorders. According to the most recent edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR), the major anxiety disorders are separation anxiety disorder, generalized anxiety disorder, social phobia, specific phobia, panic disorder (with and without agoraphobia), agoraphobia without panic disorder, posttraumatic stress disorder, and obsessive compulsive disorder (American Academy of Child and Adolescent Psychiatry [AACAP] Official Action, 2007).

Anxiety disorders are typically found to have early onsets with a median age at onset of 11 years old, as found by the National Comorbidity Survey Replication (NCS-R) study (Kessler et al., 2005a). Generally, they are characterized by "an irrational fear of a situation or stimulus that is in excess of what would be considered reasonable and age appropriate" (McLoone, Hudson, & Rapee, 2006, p. 221). Specifically, the DSM-IV reported that anxiety disorders are characterized by excessive and persistent worry or distress (American Psychiatric Association [APA], 1994). The anxiety experienced may include restlessness, avoidance, sleep and eating disturbance, affected concentration, irritability, crying, or clinging (APA). The anxiety that children suffer from may result from an experience with an object or situation that caused them significant functional impairment (Tomb & Hunter, 2004). Symptoms that are common in children and adolescents with anxiety include restlessness, fatigue, difficulty concentrating, irritability, muscle tension, nausea, or sleep disturbances (McLoone et al.). For children to meet diagnostic criteria, they must show significant distress or interference in their daily functioning due to excessive worry, somatic symptoms, or anxious behaviours (APA). As well, the anxiety they experience should be consistently present and continue for a specified length of time when exposed to the feared stimulus or situation (McLoone et al.).

Prevalence of Anxiety Disorders

Currently, anxiety disorders are one of the most common mental health illnesses worldwide and represent one of the most common forms of psychopathology among children and adolescents (AACAP Official Action, 2007; Bienvenu & Ginsburg, 2007). A recent United States NCS-R study found that 18% of general population participants

met DSM-IV criteria for an anxiety disorder over their lifetimes (Kessler et al., 2005a; Kessler, Chiu, Merikangas, Demler, & Walters, 2005b). For children and adolescents, lifetime prevalence rates have been found between 8% and 27%, conservatively around 10% (Costello, Egger, & Angold, 2005; McLoone et al., 2006). More specifically, epidemiological research has found that 25.7% of 8-year-olds and 15.7% of 12-year-olds meet diagnostic criteria for an anxiety disorder (Kashani & Orvaschel, 1990). These prevalence rates may be higher when considering that children with internalizing disorders such as anxiety are not easily recognized (Tomb & Hunter, 2004). Teachers and parents are often unaware when a child is suffering from anxiety because of the compliant and non-disruptive nature of anxious children (Donovan & Spence, 2000). Even when parents and teachers are aware that a child is experiencing anxiety problems, they tend to minimize the severity of the child's difficulties, resulting in their symptoms and impairments not being addressed (Donovan & Spence; Tomb & Hunter). As a consequence, the majority of children with anxiety disorders do not receive the treatment they need (Donovan & Spence). Nonetheless, anxiety disorders remain one of the primary reasons children and adolescents are referred to mental health services (Tomb & Hunter). These high prevalence and low referral rates are distressing given the adverse affects associated with anxiety disorders in children and adolescents.

Effects of Childhood and Adolescent Anxiety

Given that there are a number of anxiety disorders, each child may show different symptoms and characteristics, resulting in differing effects. In general, however, children with anxiety share a variety of negative consequences due to their disorders. Research has shown that children and adolescents with anxiety problems experience a range of

debilitating emotional, academic, and social consequences (Donovan & Spence, 2000). Emotionally, children with anxiety problems tend to experience significant personal distress in the form of lower self-esteem and self-concept, and increased aggressive feelings (Ginsburg & Schlossberg, 2002; Tomb & Hunter, 2004). They may also experience heightened dependence and adult attention seeking behaviours and experience higher levels of family conflict (Ginsburg & Schlossberg; Tomb & Hunter). Academically, these children experience attention and concentration difficulties, deficiencies in learning and verbal and nonverbal problem solving, and generally show lower academic achievement (Ginsburg & Schlossberg; Tomb & Hunter; Wood, 2006). Socially, children and adolescents with anxiety disorders have difficulties with peer relationships and social behaviours, and as a result struggle making and maintaining friendships (Ginsburg & Schlossberg; McLoone et al., 2006; Wood).

Regrettably, these negative effects have been found to continue into adulthood. Research suggests that adolescents with anxiety disorders face an increased risk of experiencing anxiety, depression, illicit drug dependence, and educational underachievement in early adulthood (McLoone et al., 2006). Those who suffered from anxiety in childhood have been found to leave school earlier, marry earlier, and experience reduced employment (Donovan & Spence, 2000; Rapee, 2002). As well, if an individual experiences anxiety in childhood they are at increased risk of experiencing conduct problems, alcohol abuse and suicide, delays in the move to more independent living, and are more likely to use medical and psychiatric services (Last, Hanson, & Franco, 1997; Rapee).

In addition to these negative life consequences, anxiety disorders are often comorbid with each other and with other internalizing disorders, and generally appear to be chronic in nature if left untreated (Kessler et al., 2005a; Feldner et al., 2004; Hirshfeld-Becker & Biederman, 2002). Longitudinal studies have shown that 50-70% of children who meet criteria for an anxiety disorder will continue to maintain that diagnosis two years later (Dadds et al., 1999). Childhood anxiety disorders also appear to be linked to anxiety disorders in adulthood (Hirshfeld-Becker & Biederman). Both retrospective and prospective studies suggest that anxiety in childhood or adolescence frequently leads to or places individuals at greater risk of experiencing an anxiety disorder in adulthood (Hirshfeld-Becker & Biederman). Worse yet, a history of childhood anxiety disorders has been found to be associated with more severe cases of adult anxiety disorders and to precede depressive illnesses (Wittchen, Beesdo, Bittner, & Goodwin, 2008; Hirshfeld-Becker & Biederman). Thus, it is possible that the prevention of childhood and adolescent anxiety could prevent the development of more severe anxiety and depressive disorders in adulthood (Bienvenu & Ginsburg, 2007).

Costs of Anxiety for Individuals, Families, and Society

Beyond the short and long term suffering experienced by individuals and families, anxiety incurs enormous financial costs to individuals affected by the disorders, their families, and to society (Farrell & Barrett, 2007). The costs of clinic based and psychological interventions for internalizing disorders are high, even when conducted in groups, with one study estimating that treatment for child anxiety can cost as much as $2, 181.00 US dollars per client (Donovan & Spence, 2000; Farrell & Barrett). This is disheartening given that the long-term maintenance of treatment effects were found to be

only moderate for psychological treatments and poor for pharmacological interventions (Rapee, 2002). In fact, treatments have been found to be ineffective for many children, with evidence suggesting that 30-40% of children continue to meet diagnostic criteria for anxiety disorders following treatment (Donovan & Spence). These statistics aren't surprising when considering that by the time a child receives treatment, the disorder is already well established and the adverse effects associated with it may be well entrenched, causing the effects for the child to be difficult to reverse (Donovan & Spence). Additionally, if the anxiety persists into adulthood, other costs to society such as unemployment, days lost from work, hospitalization, medication, and pension payments must be considered (Donovan & Spence).

As a result of the many problems associated with the treatment of childhood anxiety disorders and the debilitating effects and costs of anxiety for individuals, families, and society, prevention has become a major priority for governments (Farrell & Barrett, 2007; Donovan & Spence, 2000). Prevention may be the most cost effective and efficient way of providing services to children and adolescents before the onset of a disorder (Farrell & Barrett). In fact, over the last few years prevention has been publicized as the most important direction researchers, clinicians, and community health organizations should be focusing with regard to minimizing the negative effects of childhood and adolescent anxiety (Donovan & Spence; Lowry-Webster et al., 2003).

Defining Prevention

Currently, there is a lack of clarity in the distinction between what constitutes 'prevention' and 'treatment' in the literature. In their meta-analysis examining programs designed to prevent the primary symptoms of oppositional defiant disorder and conduct

disorders, Grove, Evans, Pastor, and Mack (2008) stated that the "Committee on Prevention of Mental Disorders recommended that the term *prevention* be reserved for only those interventions that occur before the initial onset of a clinically diagnosable disorder" (p. 171). The authors specified that once a person meets criteria for a disorder then the interventions focusing on that disorder are no longer considered prevention, but rather, treatment (Grove et al.). Donovan and Spence (2000), in their review of literature on the prevention of anxiety disorders, suggested that "in order to prevent a disorder such as anxiety, preventative methods must be viewed as any attempt to prevent entry to, or progression along, the pathway towards a severe, debilitating psychological disorder" (p. 515). To stay in alignment with Grove et al.'s and Donovan and Spence's recommendations, for the purposes of this study, prevention will be defined as any intervention that "occurs before the onset of a clinically diagnosable disorder that aims to reduce the number of new cases of that disorder" (Donovan & Spence, p. 515).

Types of Prevention

Approaches to prevention that occur before the initial onset of a disorder include *universal*, *selective*, and *indicated* interventions (Farrell & Barrett, 2007). The definitions of each of these interventions are based on the degree of risk associated with the target population.

Universal interventions are those that are applied to whole populations, regardless of the risk status of individuals (Farrell & Barrett, 2007). Universal interventions can be designed to enhance general mental health or to build resiliency, or they can be targeted toward a specific disorder (Farrell & Barrett).

Selective prevention programs target individuals or subgroups who are assumed to have a higher than average lifetime or imminent risk of developing a mental disorder as a result of exposure to some biological, psychological, or social risk factor(s) (Donovan & Spence, 2000; Farrell & Barrett, 2007). These interventions are generally aimed at individuals who are at high risk for anxiety based on a specific 'known' risk factor (Bienvenu & Ginsburg, 2007). For example, these interventions might target known risk factors such as inhibited behaviour/temperament, parental history of anxiety disorder, and pessimistic attitude (Bienvenu & Ginsburg). These preventative interventions would also target traumatic and stressful events in an individual's life (Donovan & Spence). For example, traumatic events may include medical procedures, catastrophic events, or experiencing violence. More commonly, children and adolescents might experience stressful life events such as parental separation, divorce, death of a family member, family conflict, and repeated moves of school (Donovan & Spence).

Finally, *indicated prevention* approaches are offered to individuals who are experiencing mild symptomatology causing them to be classified as being at high risk for the development of a full-blown mental health disorder (Farrell & Barrett, 2007). Essentially, these preventative interventions target individuals who have begun to show early signs of the disorders (Beinvenu & Ginsburg, 2007).

Given the importance of prevention which has been emphasized by many researchers, it would be valuable to examine the effectiveness of preventative interventions for anxiety disorders that have been implemented to date. This is because the identification of interventions that are successful can result in enhanced performance

of these practices when applied in the field (Farmer, Compton, Burns, & Robertson, 2002).

Research Methodology

Thus far, there have been a couple of qualitative reviews that have summarized and synthesized findings from a variety of intervention studies that were aimed at preventing anxiety in children and adolescents (e.g. Feldner, Zvolensky, & Schmidt, 2004; Donovan & Spence, 2000). However, these reviews did not provide a quantitative summary of the literature, and therefore, did not address inquiries about effect size. This is important to address because differences in sample sizes can affect the significance of results by making similar effect sizes significant in some cases but nonsignificant in others (Horowitz & Garber, 2006). Furthermore, the reliability of the effect sizes may be considerably different among those studies that find significant results due to the differences in sample sizes (Horowitz & Garber). Other variables such as the type of intervention, outcome measures, and the sample of participants can also impact effect sizes.

A meta-analysis provides a statistical summary across a given area of research through the compilation and comparison of findings from different research studies (Lipsey & Wilson, 2001). In this approach, results from different studies are converted to standardized values, called effect sizes, which can be averaged to determine an estimate of the overall effect size (Lipsey & Wilson). In this way, a meta-analysis is capable of combining effect sizes from different studies with differing numbers of participants to allow more precise conclusions to be drawn (Horowitz & Garber, 2006). As a result, meta-analyses have become a valuable research method used in prevention research.

Meta-analyses have been used to summarize data on prevention programs for a variety of childhood and adolescent problems such as substance abuse (e.g. Cuipers, 2002; Gottfredson & Wilson, 2003), conduct and oppositional defiant disorder (e.g. Grove et al., 2008), and depression (e.g. Horowitz & Garber, 2006). There have been a few meta-analyses that have included anxiety prevention programs in their studies. Two of these meta-analyses, however, broadly examined the prevention of mental disorders, and as a result also included other prevention studies for disorders such as depression and conduct disorder (e.g. Cuipers, Van Straten, & Smit, 2005; Waddell, Hua, Garlan, Peters, & McEwan, 2007). Another meta-analysis examined the effectiveness of exercise in the prevention and treatment of anxiety and depression (e.g. Larun, Nordheim, Ekeland, Hagen, & Heian, 2006).

Other meta-analytic research on anxiety has examined the effectiveness of self-administered treatment interventions (e.g. Hirai & Clum, 2006; Mechola, Arkowitz, & Burke, 2007) and the effectiveness of cognitive behavioural therapy (e.g. Bados, Balaguer, & Saldana, 2007; Deacon & Abramowitz, 2004; Segool & Carlson, 2008). With regards to meta-analyses that examined interventions that were self-administered, Harai and Clum (2006) included only adult participants. Similarly, Mechola et al. (2007) included only adolescent and adult participants, and participants had to meet a clinical level of symptom severity to be included in the meta-analysis. As for the cognitive behavioural meta-analyses, though studies included children and adolescents in their samples, participants had to have a principle diagnosis of an anxiety disorder to be eligible to participate in the studies. Therefore, based on the definition of prevention previously mentioned, the studies used in these meta-analyses would be considered

treatment studies, because the intervention occurred after the onset of a disorder. This justified the need for a meta-analysis to be conducted that investigated the effectiveness of psychosocial interventions that occurred prior to the onset of an anxiety disorder.

Finally, another meta-analysis examined the effects of interventions on anxiety symptoms. Spek et al. (2007) investigated the effects of Internet-Based Cognitive Behavioural Interventions for anxiety and depressive symptoms. Though this meta-analysis included mostly studies on anxiety, a majority of the studies examined the treatment of panic disorder, which is more typical in adulthood. As well, only one of the studies focused on prevention, affirming the need for a meta-analytic study to be conducted specifically focusing on the prevention of anxiety.

Based on the review of meta-analytic research regarding anxiety, it is evident that no meta-analysis has examined the effectiveness of psychosocial preventative interventions for the development of anxiety disorders in children and adolescents. As a result, the purpose of this meta-analysis was to evaluate the effectiveness of psychosocial preventative interventions for anxiety disorders in children and adolescents. Only the most common forms of anxiety during these life periods were examined. Younger children tend to report higher levels of separation anxiety, whereas older children tend to report more social and generalized fears (McLoone et al., 2006). Therefore, separation anxiety disorder, generalized anxiety disorder, and social phobia were the focus of this meta-analysis, as they are most common anxiety disorders during childhood and adolescents, and have the earliest onsets.

Most Common Types of Anxiety in Children and Adolescence

Separation anxiety disorder. Children with separation anxiety disorder demonstrate excessive levels of anxiety when separated or threatened with separation from a place or major attachment figure, most commonly their parents (McLoone et al., 2006). These children typically worry that something bad will happen to their parents or to themselves during the time they are apart that will cause them not to see their parents again (APA, 1994). For example, they may worry that their parents will become ill or get into a car accident, or that they will get lost or be kidnapped (APA). Children with separation anxiety disorder may show their distress by crying, misbehaving, or experiencing symptoms such as nausea, headaches, stomach aches, and vomiting (McLoone et al.). For a diagnosis to occur, the symptoms must be excessive with respect to the developmental stages, as some of these symptoms are expected in young children (APA; McLoone et al.).

An average of 4% of children and adolescents suffer from separation anxiety disorder (APA, 1994). According to the NCS-R, the median age of onset for separation anxiety disorder was 7 years of age; however, onset can be as early as preschool age or at any time before age 18 (Kessler et al., 2005a; APA). Research has shown that after onset, symptoms may last for many years (APA).

Generalized anxiety disorder. Generalized anxiety disorder is characterized by excessive worry concerning numerous events and areas in one's life (APA, 1994). Common areas of worry for individuals with generalized anxiety include school performance, punctuality, new and unfamiliar situations, catastrophic events, health concerns, family issues, or social concerns (APA; McLoone et al., 2006). Children with

generalized anxiety disorder will find it difficult to control their worries and will experience somatic symptoms such as restlessness, fatigue, difficulties concentrating, irritability, muscle tension, or sleep disturbances (McLoone et al.; APA). They may also be overly conforming, perfectionist, and unsure about themselves (APA). In school, these children may be exceptionally punctual, well-behaved and compliant, in order to avoid reprimand (McLoone et al.). Children with generalized anxiety disorder will commonly seek reassurance from their teachers, parents and peers (Masi, Mucci, Favilla, Romano, & Poli, 1999). They may also avoid new or unfamiliar situations such as sleepovers and camps or other age appropriate events (McLoone et al.). Worries should be pervasive for at least six months for a diagnosis of generalized anxiety disorder (APA).

Most research shows that generalized anxiety disorder has an onset in childhood and adolescence; however, onset after 20 years of age is not uncommon (APA, 1994). It is found to have lifetime prevalence rates of 5% in a community sample and 12% in anxiety disorder clinic (APA). Sadly, the course of generalized anxiety disorder is chronic, though it can fluctuate depending on stress levels (APA).

Social phobia (also known as social anxiety disorder). Social phobia, sometimes referred to as social anxiety disorder, is currently defined in the DSM-IV as a 'marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others' (APA, 1994, p. 416). Children and adolescents with social phobia fear social situations, particularly situations that involve interacting with others or situations where they may become the object of scrutiny (McLoone et al., 2006). These social situations provoke anxiety for the child because of their belief that they will behave in a way that is embarrassing or humiliating

(McLoone et al.). As a result, social situations will be avoided to prevent embarrassment (McLoone et al.). Some common symptoms of this disorder are crying, tantrums, freezing, clinging or staying close to a familiar person, and reticent behaviour in unfamiliar situations (APA). Onset of the disorder generally peaks in early adolescence, with the median age of onset for social phobia being found as 13 years of age (Kessler et al., 2005a; Rapee & Spence, 2004). The course of the disorder is often continuous, stable, and the duration can be lifelong (Rapee & Spence; Tomb & Hunter, 2004). Social phobia is the most prevalent of anxiety disorders and is found to have lifetime prevalence rates of 3-13% (APA; Elizabeth, King, & Ollendick, 2004).

Moderating Variables

In addition to identifying the effectiveness of preventative interventions for anxiety disorders in children and adolescents, there is other valuable information that can be gained by conducting a meta-analysis on this topic. A meta-analysis can provide information about which type of prevention is most effective (i.e. universal, selected, indicated), when in the life course it is best to implement interventions, and which delivery formats have the greatest outcomes. Though most prevention scientists agree that offering preventative interventions early in the life course will have the greatest impact, how early in the life course has not yet been determined (Bienvenu & Ginsburg, 2007). Furthermore, the age at which prevention would be most beneficial is highly affected by both the sample of individuals the intervention is targeted towards and the specific strategies used (Bienvenu & Ginsburg).

Therefore, in addition to developing the overall effect size that establishes the effectiveness of preventative interventions that have been implemented to date, this meta-

analysis compared the effectiveness of the aforementioned kinds of preventative interventions: (a) universal (b) selective, and (c) indicated. It also examined other moderating variables associated with the effectiveness of the preventative interventions. The effect of age was investigated because children of different ages may respond to the preventative interventions differently (Horowitz & Garber, 2006). Following the lead of Horowitz and Garber, only samples with participants below the age of 20 were included. Similarly, because Horowitz and Garber suggested that there is evidence that boys and girls respond differently to interventions, the current meta-analysis examined the effects of gender with regard to the effectiveness of the preventative interventions. Horowitz and Garber also suggested that some prevention programs may be more effective if they continued for a longer period of time and that the effects of the program may only become apparent after a sufficiently long follow-up period, during which changes in anxiety would be expected to occur. As a result, both the length of the preventative intervention and the length of follow-ups were examined in this meta-analysis. Grove and colleagues (2008) suggested that there may be significant differences in the effectiveness of an intervention based on methods used for measuring outcomes. They suggested this because previous research had shown that child or adolescent self-reports of disruptive or delinquent behaviour were not as reliable as other reports. As a result, the source of outcome data was examined in this meta-analysis as a moderating variable for the effectiveness of preventative interventions for anxiety disorders in children and adolescents. Finally, the type of prevention program was investigated to identify whether one particular program, the *FRIENDS for Life* (Barrett, 2004) program, is more effective than other types of preventative interventions (See Appendix for details on this program).

This particular prevention program was of interest because it has recently been endorsed by the World Health Organization as an effective early intervention and prevention program for anxiety and depression (Mostert & Loxton, 2008).

Method

Eligibility Criteria

This study is a meta-analysis, wherein a collection of statistics from published articles were extracted and summarized as effect sizes to establish the overall effectiveness of preventative interventions for the development of anxiety disorders in children and adolescents. To accomplish the research objectives discussed in the review of literature, articles were selected from PsycINFO, ERIC, and MEDLINE databases. Following the lead of Grove et al. (2008), only peer reviewed and English language studies were chosen. Given that this meta-analysis was designed to test the effectiveness of psychosocial - as opposed to pharmacological - interventions for children and adolescents, studies using a combination of medication and psychosocial prevention were excluded. Additionally, studies had to include a control or comparison group, include at total of at least 10 participants, and include enough statistical information to calculate an effect size. Only studies with individuals below the age of 20 years were included. Finally, the samples in each study had to consist of participants who had not yet been clinically diagnosed with an anxiety disorder. However, if a study had a sample that consisted of both children with diagnoses and those without, then the study was included because the intervention used could still act as prevention for those children not yet diagnosed. The following list summarizes the inclusion criteria for the meta-analysis:

1) The study was reported in English and was peer reviewed.
2) The study was published between 1995 and 2008.

3) The study had sufficient statistical information reported to permit the calculation or estimation of an effect size. Therefore, the study had to report quantitative information such as means, standard deviations, t-values, and sample sizes.
4) The study included participants who were under the age of 20 years at the time of the intervention.
5) The study used a psychosocial intervention.
6) The study had to assess the effects of a preventative intervention for anxiety disorders or anxiety related symptoms. Any study that evaluated the effectiveness of anxiety disorders in general was included, however studies that assessed the effects of an intervention on panic disorder, agoraphobia, posttraumatic stress disorder, obsessive compulsive disorder, specific phobias, or medical, sport and test anxiety were not included. This was because the most common anxiety disorders in childhood and adolescence are separation anxiety disorder, generalized anxiety disorder, and social phobia as mentioned in the review of literature.
7) The sample in each study had to include at least 10 children or adolescents who did not have a clinical diagnosis of an anxiety disorder. Studies that had samples including both subclinical and clinically diagnosable children and adolescents were included in this meta-analysis.
8) The study used an experimental or quasi-experimental design that compared subject groups receiving one or more specific interventions with one or more control conditions, and presented post-test outcome measures.

Preliminary Literature Search

Searching for meta-analyses. Before beginning the literature search for articles meeting the eligibility criteria, it was necessary to determine if a meta-analysis on the topic of the effectiveness of preventative interventions for anxiety disorders in children or adolescents had not already been conducted. Thus, a preliminary literature search was undertaken. A list of keywords that represented the type of intervention, sample, and research methodology was developed. As a result, any words that represented preventative interventions were added to the word search list, as well as any words that represented children and adolescents, at-risk children and adolescents, or anxiety. Additionally, the type of research the study sought was a meta-analysis, and therefore, 'meta-analysis' or any words that represented this type of research were added to this word search list.

Combinations of the keywords were created using the Boolian operators 'AND,' 'OR,' '*,' and quotation marks. The following word search combination was used in the advanced search option in the PsycINFO database: "*anxiety*" AND "*intervention**" OR "*prevention**" AND "*meta**" OR "*research synthesis*." The search for this word combination was classified as a 'Keyword' search, and was sorted by date, with articles between 1995 and 2008 being included. In the PsycINFO database, a total of 207 articles were found, 152 of which were peer reviewed. All 207 peer reviewed titles were screened, and abstracts of 18 articles were reviewed. Although some were meta-analyses which focused on the effectiveness of interventions (e.g. cognitive behavioural, self-administered, internet-based), none specifically examined the effectiveness of preventative interventions for anxiety disorders in children and adolescents.

To ensure that a meta-analyses on this topic had not been missed in the search, another keyword combination was used in PsycINFO's advanced search option, but with the search classified as 'Anywhere' (i.e. the keywords listed in the combination could be found anywhere in a publication). Again, the search was sorted by date, with articles between 1995 and 2008 being included. The following keyword combination was used: "anxiety" AND "prevention*" OR "intervention*" AND "meta-analysis" OR "meta analysis" OR "research synthesis." A total of 12422 articles were found, 8,974 of which were peer reviewed. The peer reviewed articles were then sorted by relevancy, which is determined by using the first eight terms in the descriptor field. Any records containing the search term within the descriptor field would be listed first, and therefore, considered more relevant. After sorting by relevancy, the 500 most relevant titles were screened. Of the 500 most relevant titles screened, 19 abstracts were printed and reviewed. Again, no meta-analysis on this topic was located.

After consulting the PsycINFO database, the ERIC Plus Text database was searched in a similar manner. The same keyword combination was used: "*anxiety*" AND "*intervention**" OR "*prevention**" AND "*meta**" OR "*research synthesis*." Using this word search combination, 25 articles were found, none of which were a meta-analysis on this topic. Again, to ensure that a meta-analysis had not been missed in this database, some keywords were removed to broaden the search. The resulting word search combination was "*anxiety*" AND "*meta**" OR "*research synthesis**." This word search combination found 215 articles, none of which were meta-analyses specifically on this topic.

Finally, the MEDLINE database was consulted. Again, the word combination used to search the MEDLINE database was "*anxiety*" AND "*intervention**" OR "*prevention**" AND "*meta**" OR "*research synthesis.*" Using this combination, 456 articles were found. Again, none of the articles were a meta-analysis specifically on this topic.

Although some meta-analyses were found that focused on the effectiveness of interventions such as cognitive behavioural, self-help/administered, and internet-based, none of the meta-analyses specifically examined the effectiveness of preventative intervention programs for anxiety disorders in children and adolescents. Therefore, it was concluded that no recent meta-analysis had been conducted on this topic.

Search for existing literature. Once it was established that a meta-analysis had not been conducted specifically on this topic, it was necessary to determine if there was sufficient literature to meet the previously defined eligibility criteria. Similar to the initial search for a meta-analysis, a word search list was developed using words that represented the type of sample, intervention, and research. Again, a combination of the keywords was created using the same Boolian operators mentioned previously. The following word search combination was used in PyscINFO's advanced search option to locate articles on this topic: "*anxiety" OR "social phobia*" AND "*intervention**" OR "*prevention**" AND "child*" OR "adolescen*." This word search combination resulted in 2132 publications, of which 1301 were peer reviewed. The results were then sorted by relevancy, and the first 500 most relevant articles (according to the PSYCInfo relevancy search option) were screened. After reviewing the titles, 94 abstracts were selected for review. From the 94 abstracts reviewed, 47 studies were printed and read for further

review. Finally, a total of 15 studies were found that fit the study criteria, however four of those studies were follow up studies; therefore, the preliminary study and the follow-up study only counted as one study towards the meta-analysis, as they were both based on the same sample. This resulted in 11 studies that were counted towards the meta-analysis.

The reference lists of the 15 articles were then screened for other relevant studies. An additional 13 articles were printed and reviewed, two of which met eligibility criteria. Thus, given that 13 articles were obtained after reviewing only 500 of the 1301 abstracts available in PSYCInfo it was assumed that sufficient data existed in the literature to allow for a meaningful meta-analysis to be conducted.

Literature Search Procedure

To conduct the formal literature search for the articles that would be used in the meta-analysis, a similar procedure to the preliminary search was carried out. First, a list of keywords that represented the type of sample, intervention, and research was developed. Once the list of keywords was created, a combination was developed using the same Boolian operators previously mentioned (i.e. 'AND,' 'OR,' '*,' and quotation marks). The keyword combination used was the same one used for the preliminary literature search ("*anxiety" OR "social phobia*" AND "*intervention**" OR "*prevention**" AND "child*" OR "adoles*)." This keyword combination was used for all databases to ensure consistency. The searches were also limited to English and peer reviewed articles only, and had to be published between 1995 to 2008. Table 1 shows the search limitations and results for each database.

Table 1

Search Limitations and Results for Each Database in the Meta-Analysis as of April 24, 2009

Key words		PsycINFO	ERIC	MEDLINE
1.	Anxiety OR social phobia	1101559	11623	106184
2.	Prevention* OR intervention*	180169	59951	594109
3.	Child* OR adolescen*	492173	284851	2191288
4.	1 AND 2 AND 3	2697	501	3056
5.	Limit 4 to peer reviewed journals and between 1995-2008	1326	321	2418
6.	Limit 5 to English only	1165	312	2232

As each database was searched, all of the resulting publication titles of the literature searches were screened for relevancy. Of the articles whose titles appeared to be relevant, abstracts were printed and screened for further review. If the abstract of an article was considered to have potential to meet the eligibility criteria, then the article was printed and read. Articles that did not meet all the eligibility criteria were discarded.

Database searches. As previously mentioned, the following word search combination was used in each database: "*anxiety*" AND "*intervention**" OR "*prevention**" AND "*meta**" OR "*research synthesis*." To begin data collection, the PsycINFO database was consulted. Even though this keyword search had already been used in this database during the preliminary search, it was re-used and some of the same resulting publications were reviewed. This was done to ensure that no other relevant articles had been missed during the preliminary search. Again, the above keyword combination was used in PsycINFO's advanced search option. The search for this word combination was classified as a 'Keyword' search, with the additional limitations of peer review articles, English, and published within the years of 1995 and 2008. In the PsycINFO database, a total of 1165 articles were found that fit the search criteria. Of the 1165 titles that were screened for relevancy, 130 studies appeared to potentially meet inclusion criteria. The abstracts of these articles were printed for further review. Upon reviewing the 130 abstracts, only 56 were considered to have the potential to meet all inclusion criteria. Seventeen were found to be relevant for use in the meta-analysis. However, some were follow-up studies of other previous studies. As a result, the preliminary study and the follow-up study were counted as only one study towards the meta-analysis, as they were based on the same sample. Therefore, from the PsycINFO

database, 13 articles were found that met all eligibility criteria and could be used in the meta-analysis.

The same procedure was carried out in the ERIC database. However, the search for this word combination was classified as a 'Citation and Abstract' search, because the keyword search was not an option in the ERIC database. The search was also limited to English articles only and had to be published within the years of 1995 and 2008. In the ERIC database, a total of 312 articles were found that fit the search criteria. These 312 article titles were screened for relevancy. From the titles screened, 25 studies were found to be potentially relevant. These articles abstracts were printed and reviewed. Based on the reviews of the abstracts, 13 articles were printed to identify if they met all inclusion criteria. From the ERIC database search six articles were found to meet all criteria. However, one study was a follow-up study to a previous one, and as a result was counted as only one study; therefore, leaving five studies that could be included in the meta-analysis from the ERIC database.

Finally, the MEDLINE database was consulted. Again, the following word search combination was used in the MEDLINE database: "*anxiety*" AND "*intervention**" OR "*prevention**" AND "*meta**" OR "*research synthesis*." The search for this word combination was classified as a 'Keyword' search, with the additional limitations of English, and published within the years of 1995 and 2008. Using these search limitations, the MEDLINE database turned up 2232 articles. All 2232 article titles were screened for relevancy. Based on the titles, 108 abstracts were selected to be printed for further review. From the abstracts reviewed, 34 articles were printed and read. Overall, nine articles were found in the MEDLINE database that fit all inclusion criteria, however

two articles were follow-up studies of previous ones, resulting in seven studies being found in this database that were included in the meta-analysis. Table 2 provides a summary of the data collection procedure and the results for each database.

In addition to some articles being follow-up studies of previous ones, there was also a great deal of overlap between the databases. Therefore, the results in table 2 are not indicative of the number of studies counting towards the meta-analysis. Some of the articles that met inclusion criteria were found in all of the databases. Once this repetition was accounted for, 13 studies were left that could be included.

To further ensure that all relevant articles had been found, the reference lists of the 13 eligible articles were again screened to identify any additional articles that might meet inclusion criteria. From the reference lists, 10 articles were found to be potentially relevant. These articles were located and their abstracts were screened. Following the review of the abstracts, only 3 articles were printed and read for further review. Unfortunately, none of the other articles that were found from the references lists met all inclusion criteria.

Additionally, relevant journals were consulted to further ensure that no relevant articles had been missed. As each article was collected, the journals that each study was published in were documented. Table 3 lists the journals that relevant articles were found in. It also indicates the number of articles found within each relevant journal, including the follow-up studies. From this table, it is evident that *Behaviour Change* and the *Journal of the American Academy of Child and Adolescent Psychiatry* contributed the highest number of studies to this meta-analysis. Therefore, the tables of contents and all volumes falling within the timelines of the eligibility criteria of these journals were

Table 2

Results of the Database Searches

Database	Peer reviewed resulting publications	Titles screened	Abstracts reviewed	Articles printed	Articles found to be relevant	Studies counting toward the meta-analysis
PsycINFO	1165	1165	130	56	17	13
ERIC	312	312	25	13	6	5
MEDLINE	2232	2232	108	34	9	7

Table 3

Relevant Journals and the Number of Relevant Articles Found Within Them

Journal title	Number of relevant articles
Behaviour Change	5
Journal of Consulting and Clinical Psychology	2
Journal of Clinical Child and Adolescent Psychology	1
Journal of Child and Family Studies	1
School Psychology Quarterly	1
Journal of the American Academy of Child and Adolescent Psychiatry	3
Clinical Child Psychology and Psychiatry	2
Development and Psychology	1
British Journal of Clinical Psychology	1

screened for more articles. The holdings at the University of Western Ontario for *Behaviour Change* were only available from the year 2000 and beyond. Thus, all titles within the year 2000 and 2008 were screened. Four articles were printed for further review, of which one was found to meet the inclusion criteria. The *Journal of the American Academy of Child and Adolescent Psychiatry* was available for all years included in the study. The titles of studies in volumes and issues between the years 1995 and 2008 were screened for relevancy. A total of 11 abstracts were found to be potentially relevant. Of those 11 abstracts, only two articles were printed for further review. Neither of the two articles that were printed met inclusion criteria.

Following the manual search of these journals, the reference list of the additional selected article was reviewed. No other articles were found. Therefore, from the online database searches in PsychINFO, ERIC, and MEDLINE, and the manual searches of *Behaviour Change* and the *Journal of the American Academy of Child and Adolescent Psychiatry*, a total of 14 studies were included in this meta-analysis.

Independent and Dependent Measures

For this meta-analysis, the dependent variables of interest are the effect sizes measuring the effectiveness of the preventative interventions used in each study. These effect sizes were calculated based on the overall effectiveness of the intervention, as measured by a variety of outcome measures. The independent variables (or moderating variables) of interest were age, gender, length of the intervention, type of prevention, length of follow-up, source of outcome data, and the type of prevention program.

Coding of Studies

All studies were coded for type of prevention (universal, selective, indicated), age of participants, percentage of female participants, source of outcome data, length of the intervention, length of follow-up, and the type of prevention program (FRIENDS, other). For all of the studies, the age of participants, the length of follow-up, and the type of prevention program were explicitly stated and extracted from the articles. However, for some of the other moderating variables to be coded, information had to be interpreted from each article. When the type of prevention wasn't explicitly stated in an article, the risk status of the participants and the corresponding definition of the preventative interventions were used. As well, the percentage of female participants was based on the percentage at pre-test. This percentage was chosen because a majority of studies did not record the number of participants of each gender at each time they were measured for anxious symptomalogy; generally, authors stated the percentage or number of each gender at the beginning of the study. The source of outcome data was coded as either 'self report' or 'other-report'. Most studies used self-report measures, with some parent, teacher, or clinician measures. Therefore, all measures other than self-report were grouped together as 'other-report.' The length of the intervention was generally explicitly stated in the article; however, when it wasn't stated the information about the intervention components and timeline for the components were used to calculate the length of the intervention. For example, if a study was based on an intervention that involved 10 weekly sessions, but due to time constraints, the ninth and tenth session were combined, than it was assumed that the length of the intervention was nine weeks, with nine sessions taking place.

Computation of Effect Sizes

Meta-analyses provide a statistical summary across a given area of research through the compilation and comparison of findings from different research studies (Lipsey & Wilson, 2001). To be able to determine an estimate of the overall effect size for the effectiveness of preventative interventions, the results from different studies were converted to standardized values, called effect sizes (Lipsey & Wilson). These effect sizes were calculated once all of the studies in the meta-analysis were gathered and coded.

Experimental and quasi-experimental group contrast studies. Experimental and quasi-experimental designs involve measuring a variable on two or more groups of participants and then comparing the results across groups (Lipsey & Wilson, 2001). For example, these types of studies would show a comparison between an experimental group and a control group on one or more variables. Means, standard deviations, and sample sizes for each group with regard to each variable are the descriptive statistics that typically characterize these situations (Lipsey & Wilson).

When the same operationalization of a variable of interest is used in all experimental and quasi-experimental research findings that are to be meta-analyzed, the effect size statistic can be determined directly from the difference between the group means (Lipsey & Wilson, 2001). Therefore, the unstandardized mean difference effect size can be determined by,

$$ES_{um} = \bar{x}_{G1} - \bar{x}_{G2}, \quad (1)$$

$$SE_{um} = s_p\sqrt{\frac{1}{n_{G1}} + \frac{1}{n_{G2}}}, \quad (2)$$

$$w_{um} = \frac{n_{G1}n_{G2}}{s_p^2(n_{G1}+n_{G2})}, \quad (3)$$

where, $\bar{x}_{G1}$ is the mean for Group 1, $\bar{x}_{G2}$ is the mean for Group 2, SE_{um} is the standard error, n_{G1} and n_{G2} are the number of subjects in Group 1 and 2, respectively, w_{um} is the inverse variance weight, and s_p is the pooled standard deviation (Wilson & Lipsey).

However, when the operationalization of the variable of interest is different for research findings in different experimental and quasi-experimental studies that are to be meta-analyzed, the standardized mean difference statistic must be used. This statistic must be used because when operationalizations of the variable are not the same from study to study and from research finding to research finding, the results that each study yields may not be numerically comparable, even though they all deal with the same construct (effectiveness of the intervention) (Lipsey & Wilson, 2001). According to Lipsey and Wilson, the most common situation where these types of comparisons occur is with treatment effectiveness research. Not surprisingly, this meta-analysis encountered this type of comparison because each study used a different combination of outcome measures to determine the effectiveness of the preventative intervention. Therefore, to be able to meta-analyze and compare the findings from each of the studies, the values from the original measures had to be standardized in a way that made them comparable. The effect size statistic capable of standardizing these values is the standardized mean difference which is calculated by,

$$ES_{sm} = \frac{\bar{X}_{G1} - \bar{X}_{G2}}{s_p}, \quad (4)$$

where, $\bar{x}_{G1}$ is the mean for Group 1, $\bar{x}_{G2}$ is the mean for Group 2, and s_p is the pooled standard deviation (Lipsey & Wilson). However, Grove et al. (2008) and Horowitz and Garber (2006) suggested that because the standard deviation of the treatment group is likely to be affected by the treatment itself, it is preferable to use the standard deviation of the control group as opposed to the pooled standard deviation in the effect size calculation. This is because the standard deviation of the control group is most likely not affected by the intervention and, therefore, is a better estimate of the population variance of interest (Lipsey & Wilson). Therefore, following the lead of Grove et al. and Horowitz and Garber, a modified version of the standard formula known as Glass' delta was used to calculate effect sizes in this meta-analysis. Glass' delta is defined as:

$$ES_{sm} = \frac{\bar{X}_{G1} - \bar{X}_{G2}}{SD_{G2}}, \quad (5)$$

where $\bar{x}_{G1}$ is the mean for the intervention group 1, $\bar{x}_{G2}$ is the mean for the comparison group, and SD_{G2} is the standard deviation of the comparison group (Grove et al., Horowitz & Garber; Lipsey & Wilson). This statistic was used to calculate effect sizes for each outcome measure used in each study at both post-intervention, and any follow-up time. For this statistic, an effect size of .2 or less was considered small, .5 was considered moderate, and .8 or higher was considered large (Lipsey & Wilson). It is also important to note that for this meta-analysis, a positive effect size reflected a positive effect of the

intervention (Lipsey & Wilson). Therefore, if a smaller score on an outcome measure indicated success relative to a larger score, the direction of the subtraction in the numerator was reversed, resulting in the following equation (Lipsey & Wilson):

$$ES_{sm} = \frac{\bar{X}_{G2} - \bar{X}_{G1}}{SD_{G2}}, \quad (6)$$

where $\bar{x}_{G1}$ is the mean for the intervention group 1, $\bar{x}_{G2}$ is the mean for the comparison group, and SD_{G2} is the standard deviation of the comparison group.

To calculate the effect sizes for each outcome measure and each study, the necessary data for the above equation had to be available. In circumstances where the necessary data was not included in the printed articles, data was requested from the authors. This occurred for two studies (Dadds & Roth, 2008; Barrett, Sonderegger, & Xenos, 2003); however, information was only obtained for one study (Dadds & Roth). As a result, the Barrett et al. study only contributed post-intervention information, as the necessary follow-up information could not be obtained.

After the data from each study was extracted and effects sizes had been statistically determined, their distributions were analyzed. The procedures for analyzing the distributions were obtained from Lipsey and Wilson's (2001) text *Practical Meta-Analysis*. Therefore, the following steps were taken: (1) create an independent set of effect sizes, (2) compute the weighted mean effect size, (3) determine the confidence interval for the mean, and (4) test for homogeneity of the distribution.

Independent Set of Effect Sizes

For an effect size to be considered statistically independent, no more than one effect size can come from any sample for a given distribution (Lipsey & Wilson, 2001). To accomplish this, the effect sizes in each study were first separated based on the constructs that they represented because analyses over dissimilar constructs are not generally meaningful. In this way, the effect size distribution was constructed and analyzed for each construct (independent variables) using one effect size from each study for each construct. If a study had more than one effect size per construct, they were not all included in the same analysis, rather they were reduced to a single effect size. To reduce multiple effect sizes into a single effect size, all effect sizes from a given study representing a specific construct were averaged to contribute only the average effect size for the distribution.

For this meta-analysis, two studies (Barrett & Turner, 2001; Bernstein, Layne, Egan, & Tennison, 2005; Bernstein, Bernat, Victor, & Layne, 2008) included two intervention groups in their comparisons. For example Barrett and Turner included one intervention group that was led by a psychologist and another intervention group that was led by a teacher. In these cases, the means and standard deviations of the two intervention groups were combined. One study (Barrett, Lock, & Farrell, 2005) broke the results into subgroups based on the risk status of the participants, wherein different effects of the intervention were determined for low, medium and highly anxious individuals. Therefore, the means and standard deviations of the different risk status groups were combined to produce one overall intervention and monitoring group which included all participants.

With regard to age as a construct, two studies included data for different age groups (Barrett et al., 2001; Barrett et al., 2003). In these cases, the effect sizes for each outcome measure were averaged to determine an overall effect size for each specific age group. For example, in Barrett et al. (2001) outcome measure scores were recorded for children (7-13 years of age) and adolescents (11-19 years of age). For this study, all outcome measure effect sizes for the primary age group and for the adolescent age group were averaged to determine one independent effect size value for each group. This allowed one independent effect size value from each age group to be included in the calculation of the mean weighted effect size when age was further analyzed.

Almost all studies used some kind of self-report measure of anxious symptoms. Others used parent, teacher, or clinician report measures. Since fewer studies included other types of reporting, the sources of outcome data that were analyzed were self-report measures versus other-report measures. In this way, all self-report measure effect sizes for each study were averaged to determine the overall effect size for self-report measures for a study. Similarly, all other report measure effect sizes including parent, teacher, or clinician reports, were grouped together and averaged to determine the overall 'other' report measure effect size for a study.

Studies varied in length of time that passed between the assessments of outcome variables. Some studies measured outcome variables only immediately post-intervention, while others included follow-up assessments. Studies that included only post-intervention outcome data were included in the analysis at post-intervention, but not in any of the follow-up analyses. With regard to follow-up assessments, the length of time between follow-up measures varied considerably and ranged from three months to three

years (36 months). Following the lead of Horowitz and Garber (2006), the present meta-analyses involved two approaches for analyzing the data. First, for each study an effect size value was computed for the follow-up that was closest to six months (range = 4 to 12 months). This was done because Horowitz and Garber suggested that this allowed for a comparison of the different intervention effects without biasing the results by the length of follow-up. Secondly, effect sizes were computed at the last conducted follow-up for each study. This allowed as much longitudinal information to be incorporated as possible, and provided the opportunity for the effects of prevention to be assessed overtime (Horowitz & Garber).

Mean Weighted Effect Size

Once all effect sizes were determined, the mean effect sizes were computed by weighting each independent effect size by the inverse of its variance. Because sample sizes varied across studies, effect size values were based on different sample sizes. This was problematic because effect size values based on larger samples are more accurate estimates of the corresponding population value compared with those based on smaller samples (Lipsey & Wilson, 2001). As a result, the effect size values were not equal with regard to the reliability of the information they carried, and therefore could result in skewed or inaccurate overall effect size values. The inverse variance weight statistic compensated for the unequal sample sizes by not allowing studies with smaller sample sizes to overly contribute to the effect size (Lipsey & Wilson). The weighted mean effect size was determined by multiplying each effect size value by its respective weight, then summing and dividing them by the sum of the weights (Lipsey & Wilson). This was determined by,

$$w_{sm} = \frac{2n_{G1}n_{G2}(n_{G1}+n_{G2})}{2(n_{G1}+n_{G2})^2+n_{G1}n_{G2}(ES_{sm})^2}, \quad (7)$$

$$\overline{ES} = \Sigma\frac{(w_i ES_i)}{\Sigma w_i}, \quad (8)$$

where, $n_{G1}$and n_{G2} are the number of subjects in Group 1 and 2, respectively, ES_i are the values of the effect size statistic used, w_i is the inverse variance weight for effect sizes *i*, and *i* is equal to 1 to *k*, where *k* is the number of effect sizes. In situations where the sample size in each group was different when scores were averaged to determine an independent set of effect sizes, the average number of participants in the intervention and control group were used to calculate the inverse variance.

Determining Confidence Intervals

Confidence intervals indicate the range within which the population mean is likely to be, given the observed data (Lipsey & Wilson, 2001). They indicate the accuracy of the estimate of the mean effect size. Confidence intervals for the mean effect size are based on the standard error of the mean and a critical value from the z-distribution. In this study a critical value of 1.96 was used for $\alpha = .05$. To determine the confidence intervals, the standard error of the mean was calculated by taking the square root of the sum of the inverse variance weights, as shown by,

$$SE_{\overline{ES}} = \sqrt{\frac{1}{\Sigma w_i}}, \quad (9)$$

where $SE_{\overline{ES}}$ is the standard error of the effect size mean, w_i is the inverse variance weight associated with effect size *i* with *i* = 1 to *k* effect sizes included in the mean.

The standard error of the mean was multiplied by the critical z-value of 1.96 ($\alpha =$ .05) for a 95% confidence interval (Lipsey & Wilson, 2001). This product was then added to the mean effect size for the upper limit, and subtracted from the mean effect size for the lower limit, as shown by

$$\overline{ES}_L = \overline{ES} - z_{(1-\alpha)}(SE_{ES}) \quad (10)$$

$$\overline{ES}_u = \overline{ES} + z_{(1-\alpha)}(SE_{ES}) \quad (11)$$

where $\overline{ES}$ is the mean effect size, $z_{(1-\alpha)}$ is the critical value for the z-distribution, and SE_{ES} is the standard error of the mean effect size. A direct test of significance of the mean effect size was calculated by computing a z-test shown by,

$$z = \frac{|\overline{ES}|}{SE_{\overline{ES}}}, \quad (12)$$

where $|\overline{ES}|$ is the absolute value of the mean effect size and $SE_{\overline{ES}}$ is the standard error of the mean effect size. The result of this equation was distributed as the standard normal variate. Therefore, if the z-test value was above 1.96, it was statistically significant with $p \leq .05$ for a two-tailed test.

Testing for Homogeneity

To assess whether the mean effect size adequately represented the entire distribution of effects a test for homogeneity was conducted. This test examined whether the effect sizes that were averaged into a mean effect size value all estimated the same

population effect size (Lipsey & Wilson, 2001). If the distribution was homogenous the individual effect sizes would differ from the population mean only by sampling error (i.e. the dispersion of effect sizes around their mean is no greater than that expected from sampling error alone). To test for homogeneity, the Q statistic was used. The Q statistic was distributed as a chi-square with k – 1 degrees of freedom where k is the number of effect sizes. The formula used was $Q = \Sigma w_i(ES_i - \overline{ES})^2$, where ES_i is the individual effect size for $i = 1$ to k (the number of effect sizes), $\overline{ES}$ is the weighted mean effect size over the k effect sizes, and w_i is the individual weight for ES_i (Lipsey & Wilson, 2001). If Q exceeded the critical value for a chi-square with k-1 degrees of freedom according to a chi-square table of critical values, then the null hypothesis of homogeneity was rejected. A statistical test that rejects the null hypothesis of homogeneity indicates that the variability of effect sizes is larger than would be expected from sampling error, and therefore, each effect size does not estimate a common population mean (Lipsey & Wilson). Therefore, there are differences among the effect sizes that result from some source other than sampling error.

Weighted Least Squares Regression Analysis

In addition to analyzing the distribution of the mean weighted effect sizes and conducting a test of homogeneity, weighted least squares regression analyses were also conducted to explore the relationships between effect sizes and some of the independent or moderating variables. Following the lead of other meta-analyses (e.g. Horowitz & Garber, 2006), the weighted least squares regression analysis was selected for use because each effect size does not carry equally precise information about the parameter estimates. The use of the weighted least squares regression analysis is able to account for

inequalities in effect size values by weighting each effect size by the inverse of its variance, as done for the mean and confidence interval formulas previously mentioned. In these cases, the size of the weight indicates the precision of the information contained in the associated observation. Therefore, the weights determine the contribution of each observation to the final parameter estimates; thus, yielding the most precise parameter estimates possible.

The weighted least squares regression analyses assisted with identifying whether the independent variables were related to the variability in the observed effect size values. In this way, information could be obtained that would explain excess variability in heterogeneous distributions. Specifically, the dependent variables of interest were the effect sizes at post-intervention, follow-up closest to six months, and at last conducted follow-up; the independent variables were age, gender, length of the intervention, number of sessions in the intervention, and the length of the follow-up; and the weight was the inverse variance for each study effect size at each assessment point (post-intervention or follow-up). The weighted least squares regression analyses were conducted using the *Statistical Package for Social Sciences version 17.0* (SPSS) software.

Results

Selected Studies and Participants

This meta-analysis involved the compilation and comparison of 14 studies that included a total of 3750 participants (based on post-intervention sample sizes) and yielded 178 effect sizes (94 from post-test assessments, and 84 from follow-up assessments). A summary of the descriptive characteristics and unweighted effect sizes for each study are presented in Table 4. Positive effect sizes represent lower levels of anxious symptoms for participants in the intervention group compared to control or comparison groups. Note that the sample sizes for universal preventative interventions tend to be larger than sample size for other types of prevention. This is because the number of participants required to show a significant statistical effect of a universal intervention is very large (Horowitz & Garber, 2006). The age of participants varied, with some studies having participants as young as two years and seven months (Lafreniere & Capuano, 1997) and others having participants as old as 19 years (Barrett et al., 2003; Barrett et al., 2001; Barrett et al., 2000). Of note is that only two studies included preschool age participants in their sample (Dadds & Roth, 2008; Lafreniere & Capuano). Across studies, samples included roughly equal percentages of each gender. However, some studies included more female participants (Bernstein et al., 2005; Bernstein et al., 2008; Dadds et al., 1997; Dadds et al., 1999), with one having an entirely female sample (Barrett et al., 2000). Also of note is that a majority of studies used the *FRIENDS for Life* program (Barrett, 2004) as the preventative intervention (see Appendix for details on this program). These studies all had similar intervention lengths as far as the number of weeks that the intervention spanned and the number of sessions

Table 4

Summary of Descriptive Characteristics and Results of Studies

Study	Type of prevention	*N*	Age of participants (years/ month)	Percentage of female participants	Length of intervention (name of intervention)	Post-intervention effect size	Effect size at follow-up closest to six months	Effect size at last conducted follow-up
Barrett et al. (2005)	U	430	9-16	NR	10 weekly 1-hour group sessions; two booster sessions 1 and 3 months after the intervention; four 2-hour parent session (FRIENDS)	-.10	.14 (12 month)	.14 (12 month)
Barrett et al. (2003)	S	320	6-13 (elementary) 11-19 (adolescents)	47.8	10 weekly 1-hour group sessions (FRIENDS)	.7	NA	NA
Barrett et al. (2001)	S	204	7-13 (primary) 11-19 (high school)	47.6	10 weekly 1-hour group sessions (FRIENDS)	.14	NC	NC
Barrett & Turner (2001)	U	489	10-12	49.5	10 weekly 1-hour group sessions; two booster sessions 1 and 3 months after the intervention; four 2-hour parent session (FRIENDS)	.12	NC	NC
Barrett et al. (2000)	S	17	14-19	100	10 weekly 1-hour group sessions (FRIENDS)	.97	NC	NC

Bernstein et al. (2005); Bernstein et al. (2008)	I/T	56	7-11	65.6	9 weekly 1-hour group sessions (FRIENDS)	.25	.38 (6 month)	.15 (12 month)
Dadds et al. (1997); Dadds et al. (1999)	I/T	128	7-14	72.7	10 weekly 1-2 hour group sessions (The Coping Koala)	.44	.2 (6 month)	.26 (24 month)
Dadds & Roth (2008)	U	695	3-6	47.0	Six sessions spread across 13 weeks with groups meeting every second week (Reach for Resilience)	.15	.00 (7 month)	.00 (7 month)
Gillham et al. (2006)	S	40	10-12 (grade 6 & 7 students)	29.6	8 weekly 90 minute sessions; six 90 minute parent sessions (Penn Resiliency Program)	.07	.59 (6 month)	.54 (12 month)
Lafreniere & Capuano (1997)	I	42	2/7- 5/10	46.5	20 sessions, divided into four phases, spread over a 27 weeks period	.75	NC	NC
Lock & Barrett (2003); Barrett et al. (2006)	U	737	9-16	50.3	10 weekly 1-hour group sessions (FRIENDS)	.09	.07 (12 month)	.26 (36 month)
Lowry-Webster et al. (2001); Lowry-Webster et al. (2003)	U	470	10-13	52.9	10 weekly 1-hour group sessions; two booster sessions 1 and 3 months after the intervention (FRIENDS)	.01	.16 (12 month)	.16 (12 month)

Misfud & Rapee (2005)	I	76	8-11	59.0	8 weekly 1-hour sessions; two parent sessions for 2 hours (Cool kids)	.30	.30 (4 month)	.3 (4 month)
Mostert & Loxton (2008)	S	46	12	37.0	10 weekly 1-hour group sessions (FRIENDS)	.05	.13 (6 month)	.13 (6 month)

Note. U = universal; S = selective; I = indicated; T = treatment; *N* = number of participants in sample at post-intervention; NR = not reported; NC = follow-up was not conducted; NA = not available

that occurred. However, the effect sizes for studies using the FRIENDS program varied widely, particularly at post-intervention. The effect sizes at follow-up changed from post-intervention; however, the amount and direction of change varied between studies.

Distribution of Effect Sizes

Mean Weighted Effect Sizes

Mean weighted effect sizes were calculated for post-intervention, follow-up at closest to six months, last conducted follow-up, type of prevention (universal, selected, and indicated), age of participants (preschool/school age children and adolescent), type of intervention, and source of outcome measure data (self-report and other-report). A summary of these weighted effect sizes and the results of homogeneity tests are available in Table 5.

Post-intervention. Effect sizes at post-intervention ranged from -.10 to .97. As previously mentioned, an effect size of .2 or less is considered small, .5 was considered moderate, and .8 or higher was considered large (Lipsey & Wilson, 2001). Only one study reported a negative effect size (Barrett et al., 2005). This study used only two outcome measures (Child Depression Inventory and Spence Children's Anxiety Scale) and found negative effect sizes for both. In contrast, the majority of studies included in the meta-analysis used more than two outcome measures, and no others reported negative effect size values for all measures used. The weighted overall mean effect size for all studies at post-intervention was .15, indicating that preventative programs had a small impact on anxiety at post-intervention. The distribution was significantly heterogeneous ($Q = 34.17, p < .005$), indicating that the variance in this sample is greater than what would be expected from the sampling error, and therefore, each effect size may not

Table 5

Summary of Weighted Effect Sizes and Results of Homogeneity Tests

Effect size type	N	Weighted					Significance test of between study variance		
		Mean	SE	95% CI		*z*	*Q*	*df*	*p*
				Lower bound	Upper bound				
Post Test	14	.15	.04	.08	.22	4.08	34.17	13	<.05
First Follow-up	9	.11	.04	.03	.19	2.68	6.11	8	n.s.
Last Follow-up	9	.13	.05	.04	.22	2.77	5.48	8	n.s.
Type of Prevention									
Universal	5	.06	.04	-.02	.14	1.70	4.97	4	n.s.
Selected	5	.47	.10	.28	.66	4.80	6.89	4	n.s.
Indicated	4	.41	.12	.18	.64	3.42	1.72	3	n.s.
Age of Participants									
Preschool/ School Age Children	10	.23	.48	.14	.32	.481	27.86	9	<.005
Adolescent	6	.08	.05	-.02	.18	1.57	13.01	5	<.05
Source of outcome data									
Self-report	12	.10	.03	.02	.18	2.55	28.02	11	<.005
Other-report	6	.19	.06	.08	.30	3.35	10.48	5	n.s.
Type of Prevention Program									
FRIENDS	9	.11	.04	.05	.21	2.70	26.86	8	<.001
Other	5	.22	.07	.06	.32	3.37	5.38	4	n.s.
FRIENDS at follow-up closest to six months	5	.12	.05	.03	.23	2.51	1.52	4	n.s.
FRIENDS at last conducted follow-up	5	.16	.06	.05	.29	2.70	.407	4	n.s.

Note. n.s. = not significant

estimate a common population mean. Essentially, some studies produced post-test effect sizes that were much larger than the corresponding mean across studies, whereas others produced effects that were much smaller.

Follow-up. At follow-up closest to six months, effect size values ranged from .00 to .59. No studies reported a negative effect size. The mean weighted overall effect size was .11, indicating that preventative programs had a small effect on the prevention of anxiety in children and adolescents at follow-up. This distribution was found to be homogeneous ($Q = 6.11, p > .5$), indicating that the variance in this set of effect sizes is not demonstrably greater than would be expected from sampling error alone.

Similar to the mean weighted effect size at closest to six months, the mean weighted effect size at the last conducted follow-up was also small at .13, with effect size values ranging from .00 to .54. This distribution was also found to be homogenous ($Q = 5.48, p > .5$).

Type of Prevention. All studies were coded for type of prevention: universal, selective, or indicated. Mean weighted effect sizes at post-intervention were calculated for each type of prevention to allow for comparisons of their effectiveness. Mean weighted effect sizes for each type of prevention at follow-up were not calculated because too few studies reported follow-up data. Both universal and selective programs were used in five studies, whereas only four studies used indicated prevention programs. The effect size values for universal prevention programs ranged from -.10 to .15, with a mean weighted effect size of .06. This low effect size value indicated that universal prevention programs had a very small effect on anxiety. This distribution was found to be homogenous ($Q = 4.97, p > .25$). In comparison, selective and indicated prevention

programs were found to have a greater impact on anxiety in children and adolescents. The mean weighted effect size for selective and indicated prevention programs were .47 and .41, respectively. These effect size statistics show that these preventative interventions have a moderate ability to prevent anxious symptomology. As well, both distributions were found to be homogenous (selective: $Q = 6.89, p > .1$, indicated: $Q = 1.72, p > .5$).

Age of participants. To analyze the impact that the age of participants had on the effectiveness of preventative interventions, the effect size values were grouped into two separate age groups: preschool/school age children and adolescents. To establish distinct age categories that could be compared, the midpoint age in years of the sample for the study was used. In this way, the effect size values for any study that included a sample or subsample with a midpoint age of 11.5 years or below were included in the mean weighted effect size for the preschool/school age children group. In contrast, effect size values for any study that included a sample or subsample with a midpoint age above 11.5 years was included in the calculation for the mean weighted effect size for the adolescent age group. The midpoint age of 11.5 years was used as the cut-off between the two age groups because adolescence is generally thought to begin at approximately 12 years of age (Papalia, Olds, Feldman, & Kruk, 2004). The midpoint ages and unweighted effect size values reported for each age group from each study are presented in Table 6.

With regards to the preschool/school age children group, effect size values ranged from .01 to .95. The mean weighted effect size for the preschool/school age children group was .23, indicating that prevention programs implemented earlier in the life span have a small to moderate effect on anxiety. The distribution of effect sizes for the

Table 6

Midpoint Ages and Effect Size Values for Each Age Group in Each Study

Study	Midpoint age of sample or subsample (years)	Post-intervention effect size
	Preschool/school age children	
Barrett et al., (2003)	9.5	.95
Barrett et al., (2001)	10	.62
Barrett & Turner, (2001)	11	.12
Bernstein et al. (2005); Bernstein et al. (2008)	9	.25
Dadds & Roth, (2008)	4.5	.15
Dadds et al. (1997); Dadds et al. (1999)	10.5	.44
Gillham et al., (2006)	11	.07
Lafreniere & Capuano, (1997)	3	.75
Lowry-Webster et al., (2001); Lowry-Webster et al., (2003)	11.5	.01
Misfud & Rapee, (2005)	9.5	.30
	Adolescents	
Barrett et al., (2005)	12.5	-.10
Barrett et al., (2003)	15	.45
Barrett et al., (2001)	15	.10
Barrett et al., (2000)	16.5	.97
Lock & Barrett., (2003); Barrett et al., (2006)	12.5	.09
Mostert & Loxton, (2008)	12	.05

preschool/school age children age group was found to be heterogeneous ($Q = 27.86, p < .005$). In contrast, the mean weighted effect size for the adolescent age group was .08, with effect size values ranging from -.1 to .97. These mean weighted effect sizes suggest that prevention programs targeted towards older children have a small impact on anxiety and may be less effective. Similarly, the distribution of effect sizes for the adolescent age group was also found to be hetergenous ($Q = 13.01, p < .05$).

Source of outcome data. All studies were coded for the source of outcome data reported. The source of outcome data was considered self-report if the child reported information about themselves for an outcome measure, and as other-report if teachers, parents, or clinicians reported information about the child. A summary of the unweighted effect size are presented in Table 7. A total of 12 studies used some kind of self-report outcome measure, while only six studies used other-report. The effect size values for the self-report measures ranged from -.1 to .97. The mean weighted effect size was .1, indicating that preventative interventions had a small impact on anxiety, as measured by self-report assessments. The effect size distribution was found to be heterogeneous ($Q = 28.02, p > .005$).

With regard to the other-report outcome measures, effect size values ranged from .02 to .75. The mean weighted effect size was .19, indicating that the effectiveness of preventative programs increased slightly according to other sources of outcome data (e.g. teachers, parents, clinicians). This distribution was found to be homogeneous ($Q = 10.48, p > .5$). Both self-report and other-report effect size values suggested that preventative interventions have a small impact on anxiety.

Table 7

Summary of Effect Size Values for Self-report and Other-report Outcome Measures for Each Study

Studies using self-report measures	Post-intervention effect size	Studies using other-report measures	Post-intervention effect size
Barrett et al., (2005)	-.10	Bernstein et al., (2005); Bernstein et al., (2008)	.29
Barrett et al., (2003)	.70	Dadds et al., (1997); Dadds et al., (1999)	.50
Barrett et al., (2001)	.41	Gillham et al., (2006)	.15
Barrett & Turner, (2001)	.12	Lafreniere & Capuano, (1997)	.75
Barrett et al., (2000)	.97	Lowry-Webster et al., (2001); Lowry-Webster et al., (2003)	.02
Bernstein et al., (2005); Bernstein et al., (2008)	.18	Misfud & Rapee, (2005)	.46
Dadds et al., (1997); Dadds et al., (1999)	.00		
Gillham et al., (2006)	.07		
Lock & Barrett, (2003); Barrett et al., (2006)	.09		
Lowry-Webster et al., (2001); Lowry-Webster et al., (2003)	.01		
Misfud & Rapee, (2005)	.21		
Mostert & Loxton, (2008)	.05		

Type of prevention program. Because the *FRIENDS for Life* program had recently been endorsed by the World Health Organization as an effective early intervention and prevention program for anxiety and depression, its effectiveness was assessed in comparison with the other types of prevention programs. Nine studies included in this meta-analysis used the FRIENDS program. Effect size values for this program ranged from -.1 to .97. The mean weighted effect size for the FRIENDS program was .11. This distribution was found to be heterogeneous ($Q = 26.86, p < .001$). A mean weighted effect size was calculated for the other five types of prevention programs. The mean weighted effect size for these programs was .22, with effect size values ranging from .07 to .75. However, this distribution was found to be homogeneous ($Q = 5.38, p > .25$). These mean weighted effect size values indicate that the FRIENDS program has no greater effect on anxiety than other types of interventions at post-intervention.

To further analyze the effectiveness of the FRIENDS program, mean weighted effect sizes were determined for follow-up times. At follow-up closest to six months, the FRIENDS program had a mean weighted effect size of .12, with effect size values ranging from .07 to .38. Similarly, at the last conducted follow-up the FRIENDS program had a mean weighted effect size of .16, with effect size values ranging from .13 to .26. These effect size values show that the FRIENDS program does not have a significant impact on anxiety even after longer follow-up periods. Both the mean weighted effect sizes for follow-up closest to six months and last conducted follow-up were found to be homogenous, with $Q = 1.52, p > .750$ and $Q = .41, p > .975$, respectively. However, the mean weighted effect sizes for the other types of prevention

programs were not calculated at each follow-up time due to too few studies reporting follow-up effect data to allow for a meaningful comparison.

Weighted Least Squares Regression Analysis

Weighted least squares regression analyses were used to further examine the effect of independent (moderating) variables. The dependent variables of interest were the effect sizes at post-intervention, follow-up closest to six months, and at last conducted follow-up; the independent variables were age, gender, length of the intervention (weeks), number of sessions in the intervention, and the length of the follow-up; and the weight was the inverse variance for each study effect size at each assessment point (post-intervention or follow-up). Table 8 provides the operational definition of each independent variable and Table 9 presents a summary of the regression analysis statistics and significance levels for each variable.

Effect sizes at post-intervention. At post-intervention, all independent variables were analyzed with the exception of the length of the follow-up. The length of the follow-up would not have any effect on the post-intervention effect sizes because these measures were taken right after the intervention.

Weighted least squares regression analysis revealed that the percentage of female participants was significant ($\beta = .939$, $t = 7.969$, $p = .000$) at post-intervention. This indicates that, after adjusting for the other explanatory variables, studies with a greater percentage of female participants had greater effect sizes. As can be seen in Table 9, the percentage of female participants had the greatest effect on preventative interventions at post-intervention. Likewise, both the number of weeks that the intervention spanned ($\beta = .336$, $t = 2.362$, $p = .046$) and the number of sessions that took place ($\beta = .326$, $t = 2.567$,

Table 8

Operational Definitions for Independent Variables Included in the Weighted Least Squares Regression

Independent variable	Operational definition
Age of Participants	Midpoint age of the entire sample for each study.
Gender of Participants	Percentage of female participants in the sample at pre-intervention.
Length of Intervention	Number of weeks that the intervention ran and the number of sessions that took place.
Length of Follow-up	Number of months that had passed before the follow-up assessment was conducted.

Table 9

Summary of Weighted Least Squares Regression Output Data and Significance Levels

Dependent variable	Independent variables	Standardized coefficients			
		Beta	Standard error	*t*	Significance level
Effect size at post intervention (M = .28, SD = .32)	Percentage of female participants	.939	.118	7.969	.000
	Age of participants	.313	.142	2.202	n.s.
	Length of the intervention (weeks)	.336	.142	2.362	.046
	Number of sessions in the intervention	.326	.127	2.567	.033
Effect size at follow-up closest to six months (M = .15, SD = .09)	Percentage of female participants	.277	.078	3.544	n.s.
	Age of participants	-1.635	.993	-1.646	n.s.
	Length of the intervention (weeks)	-1.755	.446	-3.931	n.s.
	Number of session in the intervention	-.890	.720	-1.236	n.s.
	Length of follow-up (months)	-.231	.352	-.604	n.s.
Effect size at last conducted follow-up (M = .22, SD = .15)	Percentage of female participants	-.072	.133	-.545	n.s.
	Age of participants	-1.717	1.314	-1.307	n.s.
	Length of the intervention (weeks)	-1.387	.483	-2.873	n.s.
	Number of session in the intervention	.980	1.008	.973	n.s.
	Length of follow-up (months)	.582	.285	2.045	n.s.

Note. M = mean, SD = standard deviation, n.s. = not significant

$p = .033$) were significant. In contrast, the age of participants was not significant ($\beta = .313$, $t = 2.202$, $p = .059$). Therefore, indicating that when adjusting for the other explanatory variables (i.e. gender of participants, the length of the interventions, the number of sessions in the intervention, and the length of follow-up), the age of participants did not account for the variability in the observed effect sizes at post-intervention.

Effect sizes at follow-up closest to six months. All independent variables were included in the weighted least squares regression analysis at follow-up closest to six months. The length of the follow-up was included as a variable because the length of the follow-up time may have an impact on effect sizes. However, the analysis revealed that none of the independent variables (age, gender, length of the intervention, number of sessions, and length of follow-up) were significant (refer to Table 9). Therefore, these variables did not affect the variability among observed effect sizes at follow-up closest to six months.

Effect sizes at last conducted follow-up. Similar to the analysis at follow-up closest to six months, all independent variables were included in the weighted least squares analysis at last conducted follow-up. Again, the weighted least squares regression analysis found none of the independent variables to be significant (refer to Table 9).

Discussion

The purpose of this meta-analysis was to determine the effectiveness of interventions aimed at preventing anxiety disorders and symptoms in children and adolescents. The examination of 14 studies showed a wide range in the degree of success of preventative interventions. At post-intervention, although some studies reported a high degree of success, the majority of effect sizes showed preventative interventions to have a small to moderate impact on anxiety. The mean weighted effect size indicated that interventions had only a small impact on the prevention of anxiety for children and adolescents at post-intervention ($\overline{ES}$= .15). At follow-up, preventative interventions were not found to be any more successful, with the mean weighted effect sizes of .11 at follow-up closest to six months and .13 at the last conducted follow-up. This suggested that preventative interventions do not have any lasting effects, nor do they show improvements over time when compared to post-intervention assessments.

At post-intervention, a significant Q statistic revealed that effect sizes demonstrated a wide range of variability. Some effect sizes were found to be much larger than the corresponding mean, and others much smaller, suggesting that the effect sizes included in the analysis may not estimate a common population mean. Weighted least squares regression analysis for the post-intervention effect sizes revealed that the variability in the observed effect sizes could be attributed to the percentage of female participants and the length of the intervention. In these cases, studies with a greater number of female participants were found to have greater effect sizes. Likewise, studies with interventions that spanned a greater number of weeks and involved more sessions also had greater effect sizes. In contrast, for follow-up effect sizes, weighted least

squares regression analysis found no significant effects for any of the moderating variables (gender, age, length of the intervention, or length of follow-up). However, due to smaller number of effect sizes at follow-up, we cannot be certain about the impact that the moderating variables would have on the observed effect sizes over the longer term. More follow-up data needs to be obtained to allow firmer conclusions to be drawn, especially when considering that gender and the length of intervention were associated with the effect sizes at post-intervention.

Type of Prevention

The type of prevention was also examined with regard to its effect on post-intervention effect sizes. Mean weighted effects sizes for each type of prevention revealed universal programs had only a small effect on anxiety and selective and indicated prevention programs had a moderate effect. Therefore, selective and indicated preventative interventions may be better than universal interventions. However, because the type of prevention could not be analyzed with regard to its effect at follow-up (due to too few effect sizes to allow for comparison), it is difficult to conclude whether universal prevention might be more effective over the longer term. It is also possible that universal prevention may be a more cost-effective method of prevention as compared to selective and indicated programs. This is because universal programs avoid the initial step of screening for risk and they involve the delivery of the intervention to a large number of individuals based on a comparatively lower need (Horowitz & Garber, 2006). Therefore, even though universal programs had smaller effect sizes, if they are able to prevent a small number of cases of anxiety at a comparatively lower cost to other types of prevention than they may be a more cost-effective method (Horowitz & Garber).

However, appropriate research evaluating the costs and benefits of the different types of prevention programs needs to be conducted (Horowitz & Garber). Again, more follow-up data needs to be obtained to be able to compare the effectiveness of prevention types over longer time spans (Horowitz & Garber).

Age of Participants

The effect of participants' age on post-interventions effect sizes was also investigated. The mean weighted effect sizes for the preschool/school age children and adolescent age groups revealed that preventative interventions targeted toward younger children show greater effectiveness. This could mean that preventative interventions should be provided earlier in the life span. However, a majority of the participants in the preschool/school age children group received either indicated or selective prevention programs which were found to be more effective according to the mean weighted effect sizes for the types of prevention. Therefore, it is difficult to determine whether it was the age of the participants or the type of prevention that actually contributed to the effectiveness of the preventative intervention. Further complicating matters, the weighted least squares regression analysis found the age of participants to not have a significant association with the variability of effect sizes at post-intervention or at either follow-up time. Further research will need to be conducted to determine the impact of the age of participants on the effectiveness of preventative interventions when controlling for other moderating variables such as the type of prevention.

Gender of Participants

At post-intervention studies that included a greater number of female participants were found to have greater effect sizes. This may suggest that preventative interventions

are more effective for female populations, as opposed to male; thus, warranting the need for further research to be conducted investigating the effects of gender. In particular, research should focus on why interventions may be more effective for females and identify what kind of intervention components are better suited to male participants. Future studies will need to provide means and standard deviations of the scores on outcome measures for each gender at each assessment point to allow further statistical analyses to be conducted.

Length of Intervention and Length of Follow-up

As mentioned, the current meta-analysis found neither the length of the intervention nor the length of the follow-up to be significant. This null finding may be the result of a lack of variability in the number of weeks that the intervention spanned and the number of sessions that took place. The number of weeks that interventions ran ranged from eight weeks to 27 weeks, with the great majority spanning 10 weeks. The number of sessions used in the intervention had an even smaller range from eight to 20 sessions, with the great majority using close to 10. Studies will need to be conducted that include longer interventions, perhaps year long interventions, and that include more than 20 sessions. The use of these kinds of interventions may provide a greater understanding of the effect that the length of the intervention has on successful outcomes of preventative interventions.

With regard to the length of the follow-up, there were great differences across studies. Whereas some studies conducted follow-ups at only three months, others continued for as long as 36 months. Since it takes time for the control group to show an increase in symptoms, even if a prevention program is effective, it might not be evident at

only three months (Horowitz & Garber, 2006). This is especially true for universal programs where more time is needed for change to be seen because these participants may not have been showing any symptoms to begin with. As well, interventions may appear to be more effective than they actually are without long-term follow-up assessments (Horowitz & Garber). This is because interventions may quickly lose their positive effects after the short-term assessment, but the results will not be seen without another follow-up assessment (Horowitz & Garber). This warrants the need for further research to be conducted that examines the impact of the length of follow-up assessments on the effectiveness of interventions aimed at preventing anxiety. Future prevention studies should follow the example of Dadds et al. (1997) and Dadds et al. (1999) who conducted follow-up assessments at 6, 12 and 24 months, or Lock and Barrett (2003) and Barrett et al. (2006) who collected outcome data every 12 months for three years.

Source of Outcome Data

Although other studies have reported differences in the effectiveness of interventions based on the source of outcome data, this analysis revealed that the source of outcome data did not impact the effectiveness of the preventative intervention (self report $\overline{ES}$ = .10, other-report $\overline{ES}$ = .19). A significant Q statistic revealed that there was significant variability in the observed effect sizes for self-report measures at post-intervention. This variability could be the result of the wide range of self-report measures used in each study to evaluate the effectiveness of the prevention program. A total of 16 self-report measures were used among the 14 studies included in the meta-analysis. Of those 16 outcome measures, the Spence Children's Anxiety Scale (SCAS), Children's Depression Inventory (CDI), and Revised Children's Manifest Anxiety Scale (RCMAS)

were used most often. All other measures were used in only one or two studies. For example, the Clinical Global Impressions scale (CGI), Youth Self Report (YSR), Children's Automatic Thoughts Scale (CATS), Screen for Child Anxiety Related Emotional Disorders (SCARED), Multidimensional Anxiety Scale for Children (MASC), and the Anxiety Disorders Interview Schedule (ADIS) were used only once among the studies included. This limits the standardization of self-report measures. Additionally, other moderating variables such as the age of participants, gender of participants, the length of the intervention, and the type of prevention may have impacted these effect sizes.

Type of Prevention Program

Given that the *FRIENDS for Life* (Barrett, 2004) program had recently been endorsed by the World Health Organization as an effective early intervention and prevention program for anxiety and depression, it was of interest to assess this particular preventative intervention in comparison to other types of programs (Mostert & Loxton, 2008). To analyze this program mean weighted effect size values were determined for this intervention at post-intervention, and both follow-up times. Analysis revealed that the FRIENDS intervention was no more effective than other types of programs at post-intervention, and that it had only a small effect on anxiety. These results are in contrast to literature reporting that the FRIENDS program is effective at reducing self-reported symptoms of anxiety at post-intervention and over the longer term (Stallard, Simpson, Anderson, & Goddard, 2008). These results raise questions about whether this program should in fact be endorsed by the World Health Organization, especially when considering that the majority of the research on the FRIENDS program has been

undertaken in Australia making it difficult to conclude that this program would have the same positive effects in other countries where the method of delivery and the educational context might be different (Stallard et al.).

Limitations

The greatest limitation of this meta-analysis was the limited number of studies available on the prevention of anxiety disorders in children and adolescents. Only 14 studies were found to meet inclusion criteria, causing there to be fewer effect sizes contributing to the mean weighted effect sizes. With fewer studies it becomes more difficult to draw firm conclusions, because the larger the sample of studies included in the meta-analysis, the more representative the information is of the population. Additionally, few studies reported follow-up data, again, making it difficult to draw conclusions about the longer term success of the preventative interventions, and the variables that may impact their effectiveness.

A second limitation of this study resulted from vague or ambiguous reporting by some of the studies. This made it difficult to code variables precisely. For example, the gender of participants was not listed throughout each assessment phase; it was only listed for the pre-intervention sample. This caused conclusions about the effect of gender at post-intervention and follow-up to be questionable because the exact amount of participants of each gender was not reported. Similarly, for some studies the type of prevention was not explicitly stated, it had to be determined based on the type of sample and the definitions of each type of prevention (universal, selective, indicated). This left room for error on the part of the meta-analyst.

Finally, different outcome measures were used in each study. Though almost all studies reported information on the reliability and validity of each measure, a great degree of variation existed with regard to the type of outcome measures used. For example, included studies used clinician ratings (e.g. Dadds et al., 1997; Dadds et al., 1999), observational scales (e.g. Lafreniere & Capuano, 1997), and standardized measures (e.g. Barrett et al., 2000; Barrett & Turner, 2001; Lock & Barrett , 2003; Barrett et al., 2005). As well, the constructs that instruments measured ranged among studies. Whereas most studies used instruments such as the Spence Children's Anxiety Scale (SCAS) or the Revised Children's Manifest Anxiety Scale (RCMAS) which directly measure anxiety or anxious symptoms, others used instruments that measured indirect symptoms of anxiety. For example, some studies used the Children's Depression Inventory (CDI) (e.g. Barrett & Turner, 2001; Lowry-Webster et al., 2001; Lowry-Webster et al., 2003; Lock & Barrett, 2003; Barrett et al., 2006; Barrett et al., 2005) to measure childhood depressive symptoms, while others used the Kazdin and Beck Hopelessness Scales (e.g. Barrett et al., 2001; Barrett et al., 2003) to measure hopelessness and pessimistic expectations. Other constructs that were measured were reticent behaviour using the Preschool Play Behaviour Scale (PPBS) (e.g. Dadds & Roth, 2008), children's threat beliefs using the Children's Automatic Thoughts Scale (CATS) (e.g. Misfud & Rapee, 2005) and the coping style and preferences of children using the Coping Scale for Children and Youth (CSCY) (e.g. Barrett et al., 2001; Barrett et al., 2003; Lock & Barrett, 2001). This variety of constructs indicates little standardization among outcome measures.

Additionally, the number of outcome measures used in studies also varied, with some studies using only one outcome measure (Mostert & Loxton, 2008), and other studies using six or more measures (Barrett et al., 2001, Barrett et al., 2003). This variability further contributed to the lack of standardization among outcome assessments, potentially affecting the validity of the results.

Recommendations for Future Research

The prevention of anxiety disorders is a relatively recent field of research. As a result, there is a great deal of research that still needs to be conducted before anxiety disorders and their prevention can be understood. One area of research that would greatly contribute to enhancing prevention programs is the investigation of risk and protective factors. Thus far, most research has focused on risk factors, with little investigation of protective factors. The developers of prevention studies should consider research that is currently available and use it to develop prevention programs aimed toward targeting risk factors and capitalizing on protective factors. Additionally, given that most research on the prevention of anxiety has been conducted in Australia and within the school setting, it would be worthwhile for researchers to conduct preventative interventions in a variety of settings in many different countries.

Given the ambiguous reporting of information about variables in some of the studies, future prevention studies should be reported with enough detail to eliminate the possibility of misinterpretation. As well, they should report necessary statistics (means, standard deviations, sample sizes) for a variety of variables. For example, studies should provide means and standard deviations of outcome measure scores at each assessment time for each gender, and for different age groups. This would allow further analyses to

be conducted that could help researchers and clinicians understand the effects of age and gender on the effectiveness of preventative interventions. Studies should also provide more follow-up information to allow for the identification of the long term effects of the preventative intervention. The presentation of more information with greater clarity can contribute to the improvement of prevention techniques, which can ultimately lead to more successful and efficient applications of interventions to target populations.

With regard to meta-analytic research on the prevention of anxiety, it would be worthwhile to calculate pre-post-test effect sizes for intervention and control groups. This is because this type of analysis could yield results that might not otherwise be evident with a meta-analysis such as this one. This approach, which was used by Wilson, Lipsey, and Derzon (2003), allowed for the estimation of effects sizes for the intervention versus the control group as differences between the individual mean pre-post-test effect sizes. In addition, the pre-post-test effect sizes may provide information about the nature of the changes in anxious symptomalogy that took place during the period of the intervention for both the intervention and control groups (Wilson et al.). It is in this way that the degree of stability of anxious symptomalogy among the control group and the role of the intervention in reducing anxious symptoms in the intervention group can be distinguished (Wilson et al.).

Educational Implications

Given that preventative interventions were found to be only minimally effective, children who have difficulties with anxiety may continue to suffer from its negative consequences. These negative social, emotional, and academic consequences can affect the school environment (Tomb & Hunter, 2004). For example, the attention and

concentration difficulties and deficiencies in learning experienced by some anxious children may result in the teacher providing that child with extra academic help and support, potentially taking educational time away from the other students (Ginsburg & Schlossberg; Tomb & Hunter). Similarly, the heightened dependence and adult attention seeking behaviours of anxious children may result in other students feeling jealous about the attention that child is receiving (Ginsburg & Schlossberg; Tomb & Hunter). Furthermore, given the chronic and stable nature of anxiety, without prevention, these problems will persist throughout the school years, continuing to impact the school environment (Hirshfeld-Becker & Biederman, 2002).

As a result, the prevention of anxiety is important for the educational system. However, further research needs to be conducted for prevention programs to become more effective. School systems are one of the primary mechanisms for conducting prevention research. In fact, in recent years there has been a move towards using schools as a resource to aid in the treatment and prevention of anxiety disorders in children and adolescents because of the many advantages of providing preventative interventions within the school system (McLoone et al., 2006). First, providing programs in schools can avoid the many barriers associated with accessing and receiving out-of-school services at mental health units. For example, providing interventions in schools can avoid referral barriers, long wait-lists, and barriers associated with the costs of services (McLoone et al.). Secondly, providing services to all children at school can help to eliminate labels, wherein the stigma and shame that children feel as a result of seeking mental health services may be minimized (McLoone et al.). School-wide interventions can also benefit students not at risk of anxiety by fostering their resiliency. Third, since

the school environment is capable of providing real-life scenarios that would elicit anxiety in children, the management and coping strategies that children learn can be directly applied to their real-life situations (McLoone et al.). Finally, school personnel are in an excellent position to identify and monitor children who may be having difficulties with anxiety (McLoone et al.; Tomb & Hunter, 2004). As a result, they can intervene and potentially prevent the development of a disorder. In these ways, school systems and school personnel can assist in the prevention and intervention of anxiety disorders in children and adolescents. The school setting is one of the most important places to address anxiety and an ideal location for preventative interventions (Tomb & Hunter).

However, conducting prevention studies using the school system can be challenging. For example, schools may not have the capacity to release staff for the training of these interventions or to hire more personnel (McLoone et al., 2006). As well, the school district, school administration, and parents will need to provide consent and full support for the implementation of interventions (Tomb & Hunter, 2004). On top of that, school personnel and researchers must consider school variables that may impact the feasibility of implementing interventions such as academics, school schedules, and the time and resources available (Tomb & Hunter, 2004).

These challenges may hinder the ability to conduct research on the prevention of anxiety, resulting in preventative interventions continuing to be minimally effective. This, in turn, may cause the cycle of negative consequences for children and schools to continue. Therefore, it is important that politicians and school administrators evaluate the

potential costs and benefits of participating in prevention research and implementing prevention programs within the school system (McLoone et al., 2006).

Summary/Conclusions

The results of this meta-analysis suggest that interventions aimed at preventing anxiety disorders in children and adolescents are minimally effective. Though selective and indicated prevention programs, and those targeted toward younger participants were found to have the best outcomes, results found these programs to have only a small to moderate impact on anxiety. This leaves a great deal of room for the improvement of preventative interventions and the advancement of knowledge in this area. Research should focus on risk and protective factors, and examining variables that moderate the effectiveness of preventative interventions.

In addition, given the contradictory findings of this meta-analysis regarding the effectiveness of the FRIENDS program, school systems, researchers, and clinicians should exercise caution when considering the use of the program. Further research should be conducted to validate the effectiveness of this preventative intervention.

Overall, the prevention of anxiety disorders must remain a priority for governments, researchers, community health organizations, and school systems. This is because the enhancement of preventative interventions can result in fewer children and adolescents being identified with anxiety disorders and can alleviate some of the costs of trying to treat a disorder after it is well established.

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Appendix

FRIENDS for Life Prevention Program

The *FRIENDS for Life* program is a cognitive-behavioural, group-based early-intervention program for children and adolescents (Barrett et al., 2001; Barrett et al., 2000). The program originated from the *Coping Koala* programme, which was an Australian adaptation of the Coping Cat programme (Barrett & Turner, 2001). The aim of the program is to build resilience and develop skills to help individuals cope with and manage anxiety (Barrett & Turner).

The program consists of 10 structured 1-hour sessions, featuring parallel versions for primary school children aged seven to 11 years and high school adolescents aged 12 to 16 years (Barrett et al., 2005). Group leader manuals clearly explain the activities and rationale for their use, and all information needed for facilitators to implement each session (Barrett et al., 2001; Barrett et al., 2003). During the sessions participants engage in group discussions, team activities, and individual activities which are featured in the accompanying workbooks that children and adolescents are given (Barrett et al., 2001). Group discussions focus on strategies for combating anxiety using experiential learning and peer learning models, identifying the relationship between thoughts and feelings, learning to cope with worries, encouraging positive behaviours, and promoting positive family skills (Barrett et al., 2000). The workbooks detail coping strategies and homework activities that correspond with the session objectives (Barrett et al., 2001).

In addition, the program includes two booster sessions, which are conducted one and three months following completion of the intervention and a family skills component,

consisting of four, two-hour parent workshops with content matched to what the children's sessions cover each week (Barrett & Turner, 2001).

The word FRIENDS is an acronym that is used to help participants with remembering the coping steps; F, for am I *F*eeling worried? R, for learning to *R*elax and feel good, I for *I*nner thoughts, E for *E*xplore plans of action, N for *N*ice work, reward yourself, D for *D*on't forget to practice, and S, for *S*tay cool and calm!