EFFECTS OF SCHOOL-BASED COGNITIVE-BEHAVIORAL ANGER INTERVENTIONS: A META-ANALYSIS

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DEDICATION

With gratefulness to the generations before me and with love to the generations to come, I dedicate this dissertation to the memory of my grandparents, Henry and Rachel Livingstone and Louis and Yetta Mass, and to the promise of grandchildren and others yet unborn.
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ABSTRACT

EFFECTS OF SCHOOL-BASED COGNITIVE-BEHAVIORAL ANGER INTERVENTIONS: A META-ANALYSIS

Julia G. Lavenberg
Robert F. Boruch

Aggressive behavior continues to be a significant problem for youth in the school setting. This study systematically reviewed school-based cognitive-behavioral anger interventions to evaluate their impact on reducing child and adolescent aggressive behavior. A comprehensive multimodal approach was used to locate pertinent studies within education, crime and justice, psychology, and social welfare, including electronic database searches, hand searches of printed material, and use of informal channels of communication. Of more than 900 reports initially identified, 30 randomized and quasi-experimental studies, involving a total of 2904 participants, met the inclusion criteria. Descriptive analyses revealed that most interventions were implemented in public elementary schools in suburban areas. Bivariate correlations showed that published reports had significantly higher effect sizes than unpublished reports. Meta-analyses demonstrated little difference between fixed and random effects models, suggesting that variability between studies was minimal. Overall, cognitive-behavioral anger interventions significantly reduced aggressive behavior, with the average intervention participant experiencing a reduction of 62% compared to the average untreated control or placebo group participant. This effect was maintained at one-year follow-up. Cumulative
meta-analyses uncovered the fact that the effect size has been consistent and significant for over twenty years. Moderator analyses indicated that students attending schools in urban and suburban areas experienced significantly more reductions than students attending alternative or rural schools. Interventions with older elementary and middle school students were more effective than those implemented with younger elementary or high school students. Further, statistically significant effects were found for interventions delivered by counselors, researchers, and teachers. These findings support previous meta-analyses on the effectiveness of cognitive-behavioral interventions for anger and suggest that these interventions are useful in reducing child and adolescent aggressive behavior when delivered in the school setting. Utilization of school-based cognitive-behavioral interventions to address the issue of student aggression, therefore, should be considered by educators and policymakers. Future research attention should be directed to that of investigating and identifying the specific elements related to the effectiveness of the interventions for different populations.
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CHAPTER 1

Introduction

Aggressive behavior among youth continues to be a significant problem in schools. In 2004, 33% of students in grades 9 – 12 admitted to being involved in a physical fight within the past 12 months, with males more likely to be involved than females (41% and 25% respectively; DeVoe, Peter, Noonan, Snyder, & Baum, 2005). In 2005, the number of students who admitted to being involved in physical fights increased to 36%. Increases were reported by both male and female students, with the rates of fighting reported as 43% for males and 28% for females (Dinkes, Cataldi, Kena, & Baum, 2006).

Student fighting is but one form of aggressive behavior found in the school setting; biting, kicking, slapping, punching, pushing, pulling, throwing objects at another, beating, and choking are examples of other common forms of aggressive behavior (Tremblay, 2003). Attacks against teachers also occur and vary by geographic location of the school. Five percent of teachers in urban areas were attacked at school; suburban and rural area teachers were attacked less often (Dinkes, et al., 2006).

In addition to physical aggression, verbal aggression (e.g., disrespecting teachers, taunting classmates, issuing threats) is also problematic. In 2005, 8% of teachers in secondary schools and 6% of teachers in elementary schools reported being threatened by students. Rates of threatening student behavior differed by location, with urban teachers reporting the most threats (10%) and rural teachers reporting the least (5%; Dinkes, et al., 2006).
Aggressive children are at risk for personal injury by virtue of their antisocial actions. They are also at risk for other negative outcomes, including lower educational achievement (Fothergill & Ensminger, 2006), peer rejection (Bierman, Smoot, & Aumiller, 1993; Prinstein & La Greca, 2004), risky sexual behavior (Prinstein & La Greca, 2004), and substance use (Prinstein and La Greca, 2004). Moreover, longitudinal research has shown that childhood aggressive behavior problems are predictive of delinquency and adult antisocial disorders (Broidy, Nagin, Tremblay, Bates, Brame, Dodge, et al., 2003).

Cognitive Behavioral Interventions for Prevention

Anger may be a contributing factor in aggressive behavior for children and adolescents who have cognitive distortions or cognitive deficits (Dodge, 1991). Many cognitive-behavioral programs have been developed to assist youth in developing skills to address covert anger experiences, manage overt anger expression, and correct cognitive deficits and distortions related to aggressive behavior. The cognitive-behavioral theoretical framework considers the influence of affect, cognition, behavior, social factors, and environment in an interactional process (Henin, Warman, & Kendall, 2002).

School-based prevention programs have utilized the cognitive behavioral framework in a number of different programs for youth. Gottfredson, Gottfredson, Czeh, Cantor, Crosse, and Hantman (2000) produced a summary of problem behaviors (e.g., delinquency, drug use, violence) seen in schools across the United States and catalogued the types of prevention programs employed by the schools to address the problems. Prevention programs were broadly defined as interventions put in place with the intention of reducing problem behavior in a population. According to Gottfredson, et al. (2000),
programs could target the problems directly or indirectly (e.g., by addressing individual or social characteristics believed to be precursors of problem behavior).

Of 139 program descriptions that met the definition for prevention program, 18% used cognitive-behavioral training. Conducting a national probability survey of school principals (with 874 of 1278 schools responding), the researchers found that 80% of elementary schools, 77% of middle schools, and 66% of high schools reported using a curricular or training including the use of cognitive-behavioral methods of instruction (Gottfredson, et al., 2000). Clearly, interventions based on the cognitive-behavioral framework are in widespread use throughout schools in the United States.

*Interventions with Youth*

The scientific literature on aggressive behavior is voluminous (Tremblay, 2003). While this is impressive and beneficial to the educational and research communities, as well as to policymakers, it is daunting as well. How is one to make sense of so much information? How can one be sure that the information collected on a particular topic is representative of all studies? Systematic reviews and meta-analyses are particularly useful in this regard. For example, D. B. Wilson, Gottfredson, and Najaka (2001) conducted a review of 165 school-based prevention studies and found that cognitive-behavioral interventions with self-control or social competency instruction significantly reduced a variety of problem behaviors, including delinquency, substance use, school dropout and nonattendance, and conduct problems).

In another study, S. J. Wilson, Lipsey, and Derzon (2003) reviewed 221 school-based interventions aimed at reducing or preventing common forms of aggressive behavior to compare the rates of change in aggressive behavior over time between
intervention group participants and control group participants. A total of 56,000 students were evaluated. The researchers found that students who participated in intervention programs demonstrated significant reductions in aggressive behavior, while children in the control groups showed little change over the same period of time.

Reviews of psychologically-oriented interventions (e.g., cognitive-behavioral therapy) typically do not involve as many studies or participants as those conducted by D. B. Wilson, et al. (2001) or S. J. Wilson, et al. (2003), but they still contain a sizeable number. Durlak, Fuhrman, and Lampman (1991) reviewed 64 published and unpublished studies of cognitive-behavioral interventions for school-age children and early adolescents with behavioral or social maladjustment problems to determine the effectiveness of the cognitive-behavioral approach in that population. Overall, the researchers found that the interventions were effective. That is, school age children and early adolescents who participated in cognitive-behavioral interventions significantly reduced their maladaptive behaviors, as compared to control group participants.

Sukhodolsky, Kassinove, and Gorman (2004) conducted a systematic review and meta-analysis of 40 interventions conducted with children and adolescents in order to ascertain the effectiveness of the cognitive-behavioral approach for anger problems for youth. These interventions were carried out with youth in various settings (e.g., schools, outpatient clinics, inpatient psychiatric facilities, and correctional facilities). The researchers found that cognitive-behavioral interventions were effective in reducing anger-related problems for this population.
Systematic Reviews and Meta-Analyses

As illustrated by the previous reviews of interventions for reducing aggression and anger-related problems, meta-analysis was useful for making sense of large amounts of data. The study conducted by D. B. Wilson, et al. (2001) reviewed 165 intervention programs; the study by S.J. Wilson, et al. (2003) reviewed 221 interventions involving 56,000 participants. The study by Durlak, et al. (1991) reviewed a much smaller number of studies, but still involved nearly 3000 participants and the 40 studies reviewed by Sukhodolsky, et al. (2004) included almost 2000 youth. Such robust sample sizes allow for increased statistical precision of findings. The structure of the meta-analytic process also makes handling large amounts of data much more feasible than narrative reviews.

Chalmers, Hedges, and Cooper (2002) remark that science is cumulative, but scientists do not often cumulate knowledge scientifically. With meta-analysis, discipline is applied to the process of searching, retrieving, coding, analyzing, and summarizing research findings (Lipsey & Wilson, 2001). In this way, key study outcomes are represented in a more differentiated and sophisticated manner, allowing for sensitivity to findings of different strengths across studies (Hunter & Schmidt, 2004; Lipsey & Wilson, 2001). Additionally, by making comparisons across studies, interesting relationships that might otherwise be obscured can be identified (Lipsey & Wilson, 2001). These relationships highlight what is known about a particular topic and what is not known, thus providing ways to direct limited funding for the benefit of the public (Chalmers, et al., 2002; Hunt, 1997).
Research Questions

To contribute knowledge to the field of youth violence prevention, the following research questions were explored in this study:

1. Are school-based cognitive-behavioral anger interventions effective in reducing child and adolescent aggressive behavior in the school setting?

2. Are methodological issues such as random assignment related to effect size in school-based cognitive-behavioral anger interventions?

3. Are school-based cognitive-behavioral anger interventions more effective in one type of school (public, alternative) or geographic location (rural, suburban, and urban)?

4. How effective are teachers in delivering cognitive-behavioral anger interventions?

5. Are cognitive-behavioral interventions designed solely to address anger more effective than cognitive-behavioral interventions designed to address other problem behavior (but that include anger management as a topic within the curriculum)?

6. Are participant characteristics such as gender, age, and baseline level of aggression associated with larger effect sizes?

Definitions

The following definitions were adopted for use in this project:

*Aggression* is “a set of primarily interpersonal actions that consist of verbal or physical behaviors that are destructive or injurious to others or to objects” (Lochman, Whidby, & FitzGerald, 2000, p. 31).
Anger is "a negative phenomenological (or internal) feeling state associated with specific cognitive and perceptual distortions and deficiencies (e.g., misappraisals, errors, and attributions of blame, injustice, preventability, and/or intentionality), subjective labeling, physiological changes, and action tendencies to engage in socially constructed and reinforced organized behavioral scripts" (Kassinove & Sukhodolsky, 1995, p. 7).

Cognitive-behavioral theory posits that cognitions influence emotions and behavior; it seeks to alter one's thoughts and provide guidance for the development and practice of alternative behavioral scripts. As such, cognitive-behavioral interventions must be designed to change mental images, thought, and thought patterns in an overt, explicit manner. In addition, the intervention must make use of acceptable behavioral techniques (e.g., modeling, role-playing, reinforcement, self-instruction, etc.) when implementing the intervention.

Anger management interventions must be cognitive-behavioral in nature and must aim to increase skills for emotion regulation regarding the expression of feelings of anger. This can be achieved by targeting cognitive deficits, cognitive distortions, overt anger expression, or identification and management of anger arousal. Anger management interventions may be found either as stand alone programs (e.g., Anger Coping Program) or as components embedded within larger interventions directed toward the prevention of other negative behavior (e.g., aggression, antisocial behavior, substance abuse or violence).
CHAPTER 2

Literature Review

Issues surrounding aggressive behavior among youth have been extensively researched. The following section presents a broad overview of the literature in several areas related to cognitive-behavioral school-based anger management. First, concepts of aggression and anger will be discussed, along with a theoretical framework for connecting them. The value of systematic reviews for examining large amounts of information will be considered next, followed by pertinent systematic reviews and meta-analyses of scientific literature on aggression and cognitive-behavioral anger interventions.

Aggression

Definition and types of aggression. Aggression has variously been defined as “behavior by one individual that is intended to injure or irritate another individual” (Huesmann & Moise, 1999, p. 74) and “behavioral acts that inflict bodily harm or mental harm on others” (Loeber & Hay, 1997; Nelson & Finch, 2000). Berkowitz (1993) claims aggression “always refers to some kind of behavior, either physical or symbolic, that is carried out with the intention to harm someone.” (p. 11; italics in original) Although Berkowitz unequivocally emphasizes intent in his definition of aggression, the notion of intent is present (either explicitly or implicitly) in the definitions offered by other researchers. In fact, others have argued that aggression is a behavioral act performed by an aggressor rather than a mere an attitude (Huesmann & Moise, 1999; Loeber & Hay, 1997; Nelson & Finch, 2000). Deffenbacher, Richards and Lynch (2004) expand the definition of aggression even further, suggesting that it include the victim as well as the
aggressor. According to the researchers, aggression is “a behavior where the intent or goal of which is to harm, threaten, intimidate, or retaliate against a person or persons who do not seek such behavior.” This interpretation stresses the idea of aggression as an essentially social phenomenon.

Previous definitions of aggression include both physical and verbal behavior. Kassinove and Sukhodolsky (1995) separate aggressive behavior into motor and verbal aspects. Motor behavior with a goal of contact (e.g., hitting, pushing, shoving, throwing an object, etc.) and the intent to harm is considered aggressive behavior, while expressions limited to verbal behavior are viewed simply as expressions of anger. While this distinction may be a useful heuristic for ascertaining the effects of a particular program intended to decrease physical aggression in the school setting, many educators would maintain that verbal aggression (e.g., yelling at teachers, issuing threats, etc.) is a very real, demonstrably aggressive, intentional behavior. Further, this type of behavior can be equally as harmful as physical aggression to students (Stainback, 1986).

The goal of this project is to evaluate the effectiveness of school-based programming on reducing aggressive behavior. Outcome measures used in many evaluation studies include both physical and verbal behaviors. Therefore, the following definition by Lochman, Whidby, and Fitzgerald (2000) is adopted for this project: aggression is “a set of primarily interpersonal actions that consist of verbal or physical behaviors that are destructive or injurious to others or to objects” (Lochman, Whidby, & FitzGerald, 2000, p. 31).

Beyond merely laying out definitions of aggression, various classifications have been devised in order to study it (Berkowitz, 1993). For example, aggression can be
examined in terms of motivation (i.e., the goal of aggressive behavior), nature (i.e., physical or verbal), direct or indirect behavior (i.e., direct physical aggression, direct verbal attack, or indirect verbal aggression), and the degree to which the behavior is consciously controlled or impulsive. The most widely utilized classification scheme found in the literature comes from the work of Ken Dodge and is related to this last point.

Dodge (1991) distinguishes between ‘proactive’ and ‘reactive’ aggression. Similar to Berkowitz’s term ‘instrumental’ aggression, ‘proactive’ aggression is premeditated, deliberate, often calmly carried out, and serves as a means to an end. Often seen in bullying, proactive aggression is chiefly employed in situations where an individual or group feels there is a good chance of getting away with the behavior (Meichenbaum, 2001). According to Dodge (1991), children learn to utilize these proactive aggressive behaviors through the coercive training practices used in their homes, as well as through observation and experience with successful aggressive tactics in their environment.

‘Reactive’ aggression, on the other hand, is impulsive (Dodge, 1991). Berkowitz (1993) labeled this type of behavior ‘emotional aggression’ for its emphasis on aggressive reactions occurring in response to unpleasant arousal and the accompanying desire to lash out and harm someone. Meichenbaum (2001) offers the following synopsis: reactive aggression is “unplanned, aggressive acts which are spontaneous in action: either unprovoked or out of proportion to the provocation...[it] involves retaliatory intent, often driven by frustration, biological impulses and relatively independent of premeditated cognitive processes” (p. 20, emphasis in original). Reactive
aggression is the type of aggressive behavior that was the outcome of interest in this project.

Theories of development of aggressive behavior. There are essentially three streams of thought on the etiology and development of aggressive behavior: drive reduction, bio-psycho-social influence, and cognitive-mediational functioning. These viewpoints roughly reflect the psychological zeitgeist of their time. Freud and other psychologists of the early 1900s viewed anger and aggression as instinctual responses to frustrated impulses (Averill, 1982). Frustration was conceptualized as a drive, in need of an outlet to attain homeostasis. Dollard, Doob, Miller, Mowrer, and Sears (1939) formally proposed the "frustration-aggression hypothesis" in which frustration is believed to occur as a result of interference in attainment of an expected goal and that "the existence of frustration always leads to some form of aggression" (p. 1). Though no one today subscribes to the hypothesis that frustration always leads to aggression, many scholars and graduate students alike view frustration as "a major, if not the major, source of aggression" (Averill, 1982, p. 128; Derezotes, Ashton, & Hoffman, 2004).

The bio-psycho-social view holds that genetics and early shared environment, coupled with personal characteristics (e.g., hyperactivity, lack of social awareness, anxiety) and negative parent-child interactions work together to promote the development of aggression in children (Scott, 1998). The cognitive-mediational view subscribes to the basic bio-psycho-social model, but posits a larger role for cognition and phenomenological interpretation (Larson & Lochman, 2002). The psychological theories of social learning and social information processing explain the emergence of aggressive...
behavior in this cognitive-mediational view (Jimerson, Morrison, Fletcher, & Furlong, 2006).

*Stability, continuity, and correlates of aggression.* The issue of stability and continuity is an important one. The idea that aggression is a relatively stable behavior and begins early in life is one of the most consistent findings in the literature on aggression and violence (Berkowitz, 1993; Broidy et al., 2003; Huesmann & Moise, 1999; Loeb, Wung, Keenan, Giroux, Stouthaer-Loeber, & Van Kammen, 1993; Tremblay & Nagin, 2005). Schools may inadvertently be contributing to the developmental trajectory of aggression. In a longitudinal study, Thomas, Bierman, and the Conduct Problems Prevention Research Group (2006) found cumulative effects for children whose early elementary classrooms were marked by highly aggressive behavior.

In addition to being at risk for continuing aggressive behavior due to the multiple influences of individual characteristics, poor parenting practices, and aggressive classmates, aggressive school children are at risk for peer rejection (Coie & Dodge, 1998; DeRosier, Kupersmidt, & Patterson, 1994; Fothergill et al., 2006) and poor academic achievement (Hinshaw & Lee, 2003). It is therefore imperative that schools play a role in reducing aggressive behavior among students.

**Anger**

This section presents the definition of anger, differentiates between state and trait anger, and briefly discusses school-based anger management programs.

*Definition of anger.* Anger is a normative human emotion, affecting individuals across the entire lifespan. Infants as young as two months of age exhibit facial expressions interpretable by others as expressions of angry feelings (Izard, Hembree, &
Huebner, 1987). By two and a half months of age, infants can respond differentially to
other’s anger (Izard, et al., 1995). A few months later, as they gain more control of their
limbs, infants incorporate them in motor functions and will hit and kick when angry
(Tremblay, Japel, Pérusse, McDuff, Boivin, Zoccolillo, & Montplaisir, 1999).

Anger varies in frequency, intensity, and duration. Some people report feeling
angry almost all the time, while others report rarely feeling angry (Kassinove &
Sukhodolsky, 1995). Research with adults reveals that typical adults experience anger a
few times a week (Kassinove, 1997; Tafrate, Kassinove, & Dundin, 2002) as do late
adolescents (Averill, 1982). Intensity of anger varies from mild feelings, such as
annoyance to stronger feelings, such as rage (Kassinove & Sukhodolsky, 1995; Smith,
Furlong, Jai, & Nakada, 2004). Anger episodes vary in duration from transient to
long-term (Kassinove & Sukhodolsky, 1995; Smith et al., 2004), with most bouts lasting
less than 30 minutes (Tafrate, Kassinove, & Dundin, 2002).

Even though anger varies in frequency and intensity within the population, few
differences exist between men and women on these dimensions (Potegal & Archer, 2004;
Tafrate, Kassinove, & Dundin, 2002). Neither gender has difficulty expressing anger
(Tavris, 1982), albeit differences exist in the manner in which angry feelings are
expressed. Studies show that males are more likely than females to become physically
aggressive (Averill, 1983; Potegal & Archer, 2004).

Kassinove and Sukhodolsky (1995) define anger as a “negative,
phenomenological (or internal) feeling state associated with specific cognitive and
perceptual distortions and deficiencies (e.g., misappraisals, errors, and attribution of
blame, injustice, preventability, and/or intentionality), subjective labeling, physiologic
changes, and action tendencies to engage in socially constructed and reinforced
behavioral scripts” (p. 7). For its explicitness and application to the cognitive-behavioral
interventions that are the focus of this review, this definition of anger is adopted for use
in this project.

Although this definition is being adopted here as a lens to view school-based
anger management interventions on individuals, it should be noted that the definition is
somewhat limited in focus. It does not, for example, take the larger context into account.
Research on anger, in general, does not address the socio-cultural context of anger
(Sharkin, 1996). Developmental theories exist, however, that conceptually link
phenomenology and context. Spencer’s Phenomenological Variant of Ecological Systems
Theory (PVEST; Spencer, Dupree, Cunningham, Harpalani, & Muñoz-Miller, 2003) is a
good example. This process-oriented theory is comprised of five bidirectional
components: (1) risk and protective factors, (2) stress engagement, (3) reactive coping
methods, (4) emergent identities, and (5) life stage outcomes.

Risk factors predispose individuals for adverse outcome. Poverty, socio-cultural
expectations with respect to race and gender, and socio-historical processes (e.g., racism)
are risk factors that have been associated with violence and aggression (Spencer, et al.,
2003). Protective factors such as cultural capital and racial socialization may offset some
of these risks (Stevenson, Davis, Herrero-Taylor, & Morris (2003). Stress engagement
refers to actual experiences that challenge an individual’s sense of self or well-being.
Experiences of discrimination and violence are often salient stressors for minority youth;
positive adult support can help moderate the stress.
Coping methods are employed in response to the stressors encountered and include both adaptive and maladaptive strategies. Responses deemed adaptive in one setting (e.g., neighborhood) may not be considered adaptive in another (e.g., school) (Spencer, Silver, Seaton, Tucker, Cunningham, & Harpalani, 2001). These coping strategies become, over time, stable and help to define one's identity. Stevenson (1997; Stevenson, et al., 2003) asserts that African American adolescent male identity development occurs as a coping strategy to manage the conflict caused by dissonance between external environmental messages and internal feelings of anger at being misrepresented, disrespected, and rejected since childhood by society, family, and peers. One's identity lays the foundation for future perception and behavior (Spencer, et al., 2003).

Though PVVEST was conceived as an adolescent developmental theory, its concepts can be applied at any point throughout the lifespan, as interpretation of how one thinks about oneself is a lifelong process (Spencer, 2006). The theory provides a contextual vantage point for thinking about anger and aggressive behavior.

State versus trait anger. An important aspect to consider in the discussion of anger is whether an angry episode occurs in response to a particular set of circumstances at a specific time or whether angry episodes are frequent and in response to a variety of seemingly unrelated circumstances. That is, a distinction must be made between anger as an emotional, time-limited experience and anger as a long-standing, personality trait. Spielberger, Reheiser & Sydeman (1995) offer us this distinction: state anger is “...a psychobiological state or condition consisting of subjective feelings that vary in intensity...with concomitant activation or arousal of the autonomic nervous system”
Trait anger, on the other hand, refers to "how often angry feelings [are] experienced over time" (p. 55). Fryxell (2000) notes that ten year old children who report high levels of anger in the school setting (often in response to being teased about their appearance, ability, or behavior), also characterize themselves as angry in various other aspects of their lives. It seems likely that the distinction between state anger and trait anger would be useful for school-based prevention and intervention programs.

Since anger is a subjective feeling, many different behaviors may be associated with this internal experience (Kassinove & Sukhodolsky, 1995). Anger is often expressed outwardly through aggressive motor and verbal behavior. It must be emphasized, however, that not all feelings of anger lead to aggressive behavior; conversely, not all aggressive behavior is due to anger (Averill, 1982; Berkowitz, 1993; Kassinove & Sukhodolsky, 1995; Novaco, 1975). As noted earlier, infants demonstrate a characteristic facial expression, kick, and hit when angry (Izard et al, 1987, Izard, Fantauzzo, Castle, Haynes, Rayias, & Putnam, 1995; Tremblay, 1999). Toddlers kick and hit, as well as bite, scream, cover their ears, and leave the room (Lemerise & Dodge, 2000). With increasing age and development, however, anger behavior repertoires increase and expressions of anger become relatively less physical and more verbal.

Angry feelings may be suppressed and held inside by individuals. This type of behavior is labeled "anger-in" (Spielberger, 1995). In contrast, verbal behavior such as threats, insults, or extreme use of profanity and motor behavior such as slamming a door, administering a punch or kick that is directed at other people or objects in the environment are labeled "anger-out" (Spielberger, 1995). This distinction makes intuitive sense and it is these two modes of anger expression that have been the focus of most
research (Spielberger, 1995). Anger-out behaviors are also the outcome of interest in this study.

Connecting anger and aggression: Cognitive-behavioral theory

Whereas anger is a particular set of feelings accompanied by physiological reactions and sensations and aggression is a behavior intended to inflict discomfort upon another (Averill, 1982; Berkowitz, 1993), both are also influenced by cognition (Berkowitz, 1993). But what is the relationship and how can it be explained? Cognitive-behavioral theory (CBT) posits a functional relationship between emotion, cognition, and behavior (Kendall, 1993; Kendall, Krain, & Henin, 2000). Further, CBT puts forward the notion that altering one (e.g., aggressive behavior) can lead to changes in another (e.g., dysfunctional thoughts) (Kendall et al., 2000).

Before discussing CBT with respect to anger and aggression, however, it is useful to briefly review the development of the general theory. CBT developed by incorporating cognitive constructs into behavioral learning theories (Goldfried, 2003). From the basic classical (stimulus-response) and operant (stimulus-response-consequence) conditioning models, CBT added the organism, such that the expanded the model became stimulus-organism-response-consequence (Goldfried, 2003). To address this new cognitive dimension, theorists adopted the information processing model from cognitive psychology (Goldfried, 2003), since the information processing theory offers the view that “thinking is information processing” (Siegler, 1998). Additionally, CBT holds that learning is cognitively mediated, thus “individuals respond to cognitive representations of environmental events rather than the events themselves” (Kendall, Krain, & Henin, 2000, p. 135). Consequently, what individuals ‘think’ is crucial.
Cognitive behavioral therapy has been effective in treating a variety of disorders among children and youth, including depression (Stark, Sander, Yancy, Bronik, & Hoke, 2000), anxiety (Kendall, Chu, Pimentel, & Choudhury, 2000), suicidal behavior (Spirito & Esposito-Smythers, 2006), and externalizing or conduct and oppositional disorders (Hinshaw & Lee, 2003). The use of CBT for addressing aggressive behavior problems will be discussed next.

A cognitive-behavioral model of anger and aggression

Consistent with the general CBT model, Novaco’s (1979) model of anger arousal contains cognitive, affective, and behavioral components. As shown in Figure 1, aversive events do not directly determine how a person feels or acts. Rather, there are bidirectional relationships between cognitive processing, anger arousal, and behavioral reaction. In this model, anger is determined by expectations and appraisals, which, according to Novaco (1979), are interrelated constructs. Expectations are subjective probabilities about events, based on previous appraisals of related circumstances. Appraisals of events are a function of the expectations one holds regarding oneself and others.

Although Novaco (1979) does not offer details with respect to the processes involved in changing expectations or appraisals (or for altering cognitive labeling and anger arousal or behavioral reactions), other researchers do. Crick and Dodge (1994) posit that cognitive distortions and cognitive deficiencies are responsible for an individual’s incorrect appraisal of events. Several school-based cognitive-behavioral interventions have been implemented to teach children and adolescents skills to address the appraisal process (e.g., Presley & Hughes, 2000; Whitfield, 1999), though the authors do not explicitly reference Novaco’s theory.
In addition to teaching skills to remedy cognitive deficits, school-based intervention programs also address the covert anger experience (i.e., the arousal and labeling component) through affective education or inappropriate behavioral reactions through instruction and demonstration of suitable reactions, along with opportunities for students to practice the behavior and receive correction and reinforcement (Kendall, Ronan, & Epps, 1991). All in all, cognitive-behavioral interventions aim to both alter the ways that children think about anger provoking situations and teach children alternative ways of responding to problems or stress (Nelson & Finch, 2000).

Owing to the fact that CBT combines cognitive and behavioral principles, a variety of strategies are used in interventions. In a review of 64 cognitive-behavioral interventions for children, Durlak, Fuhrman, and Lampman (1991) found 42 unique combinations of eight treatment components (task-oriented problem solving, social problem solving, self-instruction, role-playing, rewards, social cognition training, social skills training, and a miscellaneous category that included visualization and relaxation).

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However, because of the great assortment of combinations, the researchers were not able to conduct any analyses (Durlak, et al., 1991). It is important to empirically investigate how these combinations impact aggressive behaviors as part of a systematic review and meta-analysis, which is discussed next.

**Systematic reviews and meta-analyses**

Almost all research reports review relevant literature in order to provide a meaningful framework for the study. Oftentimes, it is brief and narrowly focused, designed to make the case for an additional study on a topic relevant to the literature review. There are, however, research reports whose reviews are more comprehensive. These reviews typically serve other purposes, such as a critical review, state-of-the-art review, or comprehensive review. Critical reviews examine a series of studies in order to highlight crucial issues. State-of-the-art reviews document advances made in dealing with a particular problem. Comprehensive reviews, such as those found in textbooks and governmental task force reports, cover a wide range of studies in order to address multiple related issues.

Two types of reviews are commonly found in the prevention literature: the ‘traditional’ or narrative review and the ‘systematic review.’ Narrative reviews identify the array of available literature in order to find a gap for new research (Davies, 2000). In these types of reviews, the variability between studies is explored descriptively (Petticrew & Roberts, 2006). Narrative reviews have been criticized as subjective, scientifically unsound, and an inefficient way to extract useful information, especially in situations where there are 30 or more studies (Hunt, 1997; Hunter & Schmidt, 2004; Light & Pillemer, 1984).
Systematic reviews, also known as 'research syntheses' and 'integrative research reviews' comprehensively identify, appraise, and synthesize all relevant studies (Cooper, 1998; Cooper & Hedges, 1994; Petticrew & Roberts, 2006). According to Davies (2000), this type of review seeks to generalize or accumulate knowledge from a group of studies in order to yield decisions about effective practice. Systematic reviews are carried out in an organized, methodical and semi-structured manner, using strategies to limit bias during each stage of the process (Boruch & Petrosino, 2005).

Although the authors of the different handbooks written to assist those interested in conducting a systematic review differ with respect to the number of steps involved in the process (Cooper & Hedges, 1994; Lipsey & Wilson, 2001), the same general sequence is endorsed. First, the research problem is defined and potential moderator variables identified. Next, a comprehensive literature search ensues, followed by retrieval and screening of all possibly relevant studies according to specific eligibility criteria. Then information related to study, intervention, and participant characteristics, as well as the outcomes of interest, are extracted and coded. Statistical analyses are subsequently conducted. Finally, the results are reported and discussed.

Although the expressions 'systematic review' and 'meta-analysis' are used frequently and interchangeably in much of the social science literature, the terms are not equivalent. Systematic reviews and meta-analyses both employ rigorous methods. In meta-analysis, however, specific statistical techniques are used to combine results of studies addressing the same question into a single quantitative summary effect size (Hunter & Schmidt, 2004; Petticrew & Roberts, 2006). This effect size is a standardized
Meta-analysis has much to offer. Large and small studies can both be accommodated, comparisons across and between studies can be made, group similarities and differences can be investigated, and summaries of what is known and not known can be produced. Combining a large number of studies and weighting each inversely by its sample size provides increased statistical power. This is especially important when effects are likely to be small (Hunter & Schmidt, 2004; Light & Pillemer, 1984; Lipsey & Wilson, 2001). Joining several smaller studies together increases the functional sample size, thus increasing the power to detect an effect that was not detectable in the individual study (Hunt, 1997; Lipsey & Wilson, 2001).

Comparisons across studies can yield knowledge not inferable from any individual study, as well as answer questions not posed in those studies (Hunter & Schmidt, 2004; Lipsey & Wilson, 2001). Looking across studies also encourages investigation and resolution of conflicting data. Variation can be examined to determine if sampling error alone is the source (Lipsey & Wilson, 2001; Petticrew & Roberts, 2006). Group contrasts can be made to determine important similarities and differences between studies (Hunter & Schmidt, 2004).

Summaries of the state of knowledge (i.e., what is known about the topic and what is not known) can be produced and are of use to researchers and policymakers alike (Chalmers, Hedges, & Cooper, 2002). A primary advantage is that meta-analytic summaries are unbiased and apolitical (Hunt, 1997). Through the reviews, gaps in the literature have become obvious thereby offering direction for research dollars (Petticrew,
Additionally, the meta-analytic findings of effective interventions suggest avenues for the best use of limited public funds (Chalmers, Hedges, & Cooper, 2002; Hunt, 1997; Hunter & Schmidt, 2004).

Despite the considerable strengths and usefulness of the technique, meta-analysis has been criticized. Essentially, there are two main criticisms; one relates to the procedure and the other relates to the methodology employed. The highly structured nature of the process and the lengthy list of activities required in each phase are construed by some as steps in a purely mechanical undertaking and, therefore, meta-analysis is considered to be insensitive to certain issues, such as theoretical influences and implications (Lipsey & Wilson, 2001). On the other hand, the explicit and systematic nature of the whole meta-analytic process, the very transparency and openness of it, is appreciated and interpreted as an asset by others.

The most frequent criticism leveled at meta-analysis, however, relates to methodological issues and is commonly referred to as the “apples and oranges” critique (Glass, 2000; Lipsey & Wilson, 2001). In this argument, a meta-analytic study seemingly mixes different primary studies together, either by including heterogeneous study findings (Eysenck, 1994) or by including studies of differing methodological quality, to produce a single estimate of treatment effect (Hunter & Schmidt, 2004). While there is relatively little agreement on what constitutes methodological quality, there have been advances in the manner in which these issues have been addressed. For example, recent high quality meta-analyses code methodological issues such as participant assignment and source of outcome measure as variables and examine them as potential moderators.
(Hunter & Schmidt, 2004; Wilson & Lipsey, 2001). However, this approach is viable only when a large number of studies are in the meta-analytic pool.

Studies are often grouped within subcategories for comparison (e.g., programs administered at the elementary versus middle school level) as this provides a more detailed evaluation of the effect of the intervention. Additionally, tests of homogeneity are regularly conducted to determine if the grouping of effect sizes from different studies is significantly different from what would be expected by chance or sampling error. The value of examining the group of studies from many different angles is much greater than merely combining a group of studies to determine an overall mean.

It should be noted that undertaking primary research in any context is an expensive proposition. Therefore, systematic reviewers make considerable effort to use as much research as possible and include as many relevant studies as feasible in a systematic review or meta-analysis. Careful consideration is given to issues of balance. Being too stringent with respect to methodological quality, for example, limits the number of studies in the pool and increases the internal validity of the review, but runs the risk of decreasing generalizability (Lipsey & Wilson, 2001).

Relevant systematic reviews and meta-analyses

Meta-analysis, as just discussed, is a systematic method of identifying, appraising and synthesizing information from a number of studies. The volume of research on aggressive behavior is substantial, with researchers in various fields (e.g., education, psychology, and criminology) involved in investigating the topic. Systematic reviews and meta-analyses of school-based aggression interventions, anger treatment, and school-
based anger management programs are reviewed next to provide background for this project.

Prior to presenting the review, a few comments regarding interpretation are necessary. Effect size statistics, as already noted, are standardized units that can be compared across studies and moderator variables. In studies where the desired outcome is an increase in some measurement, the effect size is positive in direction. In studies where the desired outcome is a decrease in some measurement (e.g., aggressive behavior), however, the effect size may be reported as either positive or negative. The choice of direction to indicate treatment effect is subjective. Thus, some authors use positive effect sizes to represent improvement in outcomes among intervention participants (e.g., less aggressive behavior among intervention participants at posttest), while other authors choose to represent the same improvement in outcomes as a negative effect size.

Authors of the meta-analyses presented in the next two sections rarely documented the choice of direction representing improvement (i.e., less aggression). It was, however, discernable from the text. Notations have been made in the accompanying tables to clarify the direction used by the authors.

**Meta-analyses related to aggression**

Combining studies in a meta-analysis increases the power to investigate questions in a way individual studies cannot. For example, S. J. Wilson, Lipsey, and Derzon (2003) conducted a meta-analysis of school-based interventions aimed at reducing or preventing common forms of aggressive behavior (e.g., acting out, aggressive behavior, conduct disorder, fighting, name-calling, bullying) to compare the growth rates of aggression between participants receiving interventions and untreated controls. More than
56,000 students from preschool to high school and all risk levels (i.e., not exhibiting aggressive behavior, considered at-risk by virtue of personal or SES characteristics, demonstrating aggressive behavior) were involved in 221 studies, 69% of which were published in journals or books.

The studies represented a variety of research designs, such as randomized controlled trials, non-equivalent control groups, one group pre-post test, and treatment versus treatment. Interventions included behavioral and classroom management, peer mediation, therapy and counseling, and social competence training— with and without cognitive-behavioral components, among others. The mean standardized change score effect sizes (in which larger values reflect less aggression) were significantly different for treatment and control group participants in all designs with group comparisons. However, the randomized controlled trial design mean effect size (0.32, \( p < .05 \)) was twice that of the non-randomized design mean effect size (0.16, \( p < .05 \)). Additionally, the change scores for intervention group participants were significant across grades.

On average, no naturally occurring change in aggressive behavior was noted among control group participants. S. J. Wilson, et al. concluded that school-based interventions designed to decrease aggressive behavior “reduce levels of aggressive behavior below the stable, higher levels that otherwise would have occurred over those same periods” (p. 142). This meta-analysis thus provides empirical evidence to support findings with respect to the stability of aggressive behavior (Berkowitz, 1993; Broidy et al., 2003; Huesmann & Moise, 1999; Loeber et al., 1993; Tremblay & Nagin, 2005) in addition to providing evidence for the effectiveness of school-based interventions.
A summary of relevant meta-analyses of school-based violence prevention programs is presented in Table 1. Mytton, DiGuiseppi, Gough, Taylor, and Logan (2002) conducted a systematic review of interventions specifically targeting children and adolescents identified as aggressive at present or at-risk of future violent behavior. Searching nine databases of published and unpublished literature (which spanned the fields of criminology, education, medicine, nursing, and psychology) and conducting manual reviews of bibliographies from all pertinent studies, as well as a page-by-page hand search of *Aggression and Violent Behavior*, they retrieved 274 reports for full text review. Ultimately, 44 studies were identified as relevant. Only authors of 28 studies provided the requisite information for effect size calculation, however. Despite the loss of studies for the meta-analysis, the total sample size was considerable (N = 2096).

Intervention approaches were classified as either ‘skills of non-response,’ which included such interventions as anger management and conflict resolution, or ‘interventions of social context,’ which included family or social relationships and peer mediation. Scores on standardized tests intended to assess aggressive behavior (e.g., Achenbach Child Behavior Checklist) or actual counts of observed aggressive behaviors (e.g., fights or bullying) were accepted as measures of the outcome of interest.

Overall, aggressive behavior was significantly reduced among students in intervention groups as compared to students in control groups (ES -0.36; 95% CI -0.54, -0.19). Six studies reported a one-year follow-up, with an almost identical effect size (-0.35), but the effect was no longer statistically significant (95% CI -0.79, 0.09). Significant heterogeneity (p < .001) was present at both posttest and follow-up. Mytton and colleagues noted that investigation of the source(s) of
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Literature Search</th>
<th>N studies in analysis (N subjects)</th>
<th>Research designs</th>
<th>Target Population (Grades)</th>
<th>Outcomes measured</th>
<th>Effect size</th>
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<td>Published Unpublished Hand search Informal networks (variable start dates - 1998)</td>
<td>28 (2096)</td>
<td>Random assignment</td>
<td>Kindergarten – 12th</td>
<td>Aggressive + at-risk</td>
<td>Aggressive behavior, school response to aggressive behavior, violent injuries</td>
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<tr>
<td>Mytton, DiGuiseppi, Gough, Taylor, Logan (2006)</td>
<td>Published Unpublished Hand search Informal networks (variable start dates - 2003)</td>
<td>34 (2939)</td>
<td>Random assignment</td>
<td>Kindergarten – 12th</td>
<td>Aggressive + at-risk</td>
<td>Aggressive behavior, school response to aggressive or violent behavior, violent injuries</td>
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<td>D.B. Wilson, Gottfredson, &amp; Najaka (2001)</td>
<td>Published Manual Informal networks</td>
<td>165 (not reported)</td>
<td>Random and non-random assignment</td>
<td>Pre-Kindergarten – 12th</td>
<td>All risk levels</td>
<td>Crime and delinquency, substance use, dropout, problem behaviors</td>
</tr>
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</table>

Note: <sup>a</sup> Negative effect size reflects decrease in negative behaviors.  
<sup>b</sup> Positive effect size reflects decrease in negative behaviors.
heterogeneity could not be investigated through planned meta-regressions of variables related to study quality due to a lack of adequate reporting in the primary study.

The effect size for the skills of non-response category of interventions (ES -0.38; 95% CI -0.65, -0.11) was essentially the same as the overall effect size and statistically significant, again with significant heterogeneity ($p = .001$). The effect size for the social interventions category, however, was much larger (ES -0.65; 95% CI -1.05, -0.25, without heterogeneity, $p = .24$) and statistically significant. Data was analyzed by school level to investigate the differential impact of age. The researchers found significant effects at both the primary (ES -0.33; 95% CI -0.54, -0.12) and secondary (ES -0.43; 95% CI -0.75, -0.11) levels. But, once again, statistically significant heterogeneity was present ($p < .001$). In light of these findings and the inability to conduct investigations into the sources of heterogeneity, Mytton, et al. (2002) recommended the implementation of large, high quality trials.

Mytton, DiGiuseppi, Gough, Taylor, & Logan conducted an updated meta-analysis of school-based interventions for children and adolescents identified as aggressive or at-risk of future violent behavior in 2006. Re-executing their previous broad search and expanding it to include a specialized register (Cochrane Injuries Group), a national database of ongoing research in the U.K. (National Research Register), and an international database of randomized and possibly randomized trials (C2-SPECTR), they ultimately identified 56 randomized controlled trials as eligible for the review. Of these, 34 provided data suitable for inclusion in the meta-analysis. No changes were made to either classification of intervention or type of outcome.
Overall, aggressive behavior was significantly reduced among students in intervention groups as compared to students in control groups (ES -0.41; 95% CI -0.56, 0.26, with significant heterogeneity, $\chi^2 = 98.84, \ p < .000; \ I^2 = 66.6$). The effect size for the skills of non-response category was -0.39 (95% CI -0.61, -0.16) and statistically significant, with significant heterogeneity as well ($\chi^2 = 44.10, \ p < .000; \ I^2 = 61.5$%). These findings have essentially the same magnitude of effect as the overall effect size and skills of non-response effect size noted in the earlier review, along with notable and consistent heterogeneity. As with the previous meta-analysis Mytton, et al. (2002), the researchers report that the poor level of reporting in the primary studies precluded meta-regressions to explore heterogeneity on the basis of methodology.

Mytton, et al. (2006) observed that the large majority of studies included in the review were implemented in the United States. Given the extensive search conducted to locate studies for this review, and the fact that no restriction was put on language of publication, this finding is very interesting. It raises the question of how to best identify reports of school-based interventions to reduce aggressive behavior conducted in non-U.S. sites.

Additionally, Mytton, et al. noted, that sample sizes were generally small; 65% of the studies had less than 60 participants. Meta-analysis, as pointed out previously, has the ability to combine several small studies in order to increase the functional sample size (albeit with statistical weighting procedures) and increase the power to detect an effect. Overall, the two reviews conducted by Mytton, et al. (2002, 2006) suggest that aggressive and at-risk children and adolescents significantly reduce their aggressive behavior as a result of participating in school-based violence prevention programs.
In another study, D. B. Wilson, Gottfredson, and Najaka (2001) reviewed school-based problem behavior prevention studies in order to examine features of effective programs. Specifically, they sought to determine the types of programs that best reduce delinquency, substance use, school dropout, and conduct problems among children and adolescents. Three databases indexing reports related to education (ERIC), psychology (PsycLIT), and sociology (Sociological Abstracts) were searched, as were the reference lists of reviews known to the authors. Doctoral dissertations were not included because of limited financial resources. Through the search efforts, 165 studies were identified as eligible for inclusion. No total number of participants was documented.

Treatments ranged from individually focused interventions (e.g., counseling, self-control using cognitive-behavioral instructional methods) to environmentally focused interventions (e.g., establishing norms, classroom management). Most interventions were presented to general school populations (i.e., not identified as being high risk) at the late-elementary and middle school levels and delivered by classroom teachers. Effect sizes were generated for four categories of outcomes: criminal behavior, substance use, school dropout, and other problem behaviors. The ‘other problem behaviors’ category was the outcome of particular interest. This large category included such outcome behaviors as rebelliousness, aggressiveness, defiance and disrespect, and school suspension or expulsion.

Overall, the effect size was 0.17 (95% CI 0.09, 0.25; no p value reported). The researchers caution that while the programs were, on average, beneficial, there was a great deal of heterogeneity present across studies (no statistics presented). Randomized
designs \((d = 0.25; \, 95\% \, Cl \, 0.17, \, 0.33, \, p < .05; \, n = 42)\) had significantly larger mean effects than nonrandomized designs \((d = 0.08, \, 95\% \, Cl \, 0.05, \, 0.10; \, n = 174)\).

Self-control or social competence interventions delivered with cognitive-behavioral or behavioral instructional methods \((32\% \, of \, all \, studies)\) were significantly more effective than individually focused interventions that did not use cognitive behavioral or behavioral methods \((17\% \, of \, studies)\). The magnitude of effect was 0.18 (no CI given; \(p < .05; \, n = 38\)). While this effect size is seemingly small, interventions utilizing cognitive-behavioral methods were three times more effective than those not utilizing them \((0.06)\). Additionally, Wilson and colleagues \((2001)\) found that other individually focused interventions utilizing cognitive-behavioral interventions, behavioral modeling, or behavior modification \((14\% \, of \, studies)\) were statistically significant, with an effect size of 0.32 (no CI given; \(p < .05; \, n = 25\)). These findings suggest that school-based cognitive-behavioral interventions are effective for reducing conduct problems among children and adolescents.

Durlak, Fuhrman, and Lampman \((1991)\) showed cognitive-behavioral therapy \((CBT)\) to be an effective treatment technique for children with behavioral or social maladjustment. In a review of 49 published and 15 unpublished studies, conducted in a variety of settings \((e.g., \, schools, \, residential \, centers, \, outpatient \, treatment \, centers, \, etc.)\), the researchers found an overall effect size of 0.56 \((95\% \, CI \, 0.46, \, 0.66; \, p < .05)\).

Furthermore, levels of cognitive development did not hinder younger children, with less organized thought processes, from realizing benefits from the intervention. The effect size for children in the concrete operational stage of cognitive development
Older children in the formal operational stage (i.e., between the ages of 11 and 13) appeared to receive greater benefit, however (ES 0.92; 95% CI 0.61, 1.23; \( p < .05; n = 9 \)).

Despite that observed difference in the magnitude of the effect size, the groups were not statistically different from one another. This finding suggests that school-age children and early adolescents significantly improve behavior and social functioning through participation in cognitive-behavioral interventions that use an overt, active manner to address thoughts.

In addition to investigating the general effectiveness of CBT, Durlak, et al. identified eight treatment components of CBT: task-oriented problem solving, social problem solving, self-instruction, role playing, rewards, social cognition training, social skills training, and other cognitive-behavioral therapy elements (e.g., imagery and attribution retraining). However, there were 42 unique combinations among the 64 studies, so the researchers did not attempt to interpret the data.

**Meta-analyses related to anger.**

Observing that the cognitive-behavioral approach has been used in the majority of anger treatment outcome studies, Beck and Fernandez (1998) meta-analyzed 50 studies carried out with a variety of participants (e.g., prison inmates, abusive spouses, juvenile delinquents, college students, adolescents in residential treatment, and children with aggressive classroom behavior (Table 2). Outcome measures were confined to self reported anger with the older populations and behavioral ratings of anger and aggressive behavior for the younger. The overall mean (weighted) effect size was significant at 0.70.
(no confidence interval supplied). An unweighted effect size of 0.81 was also calculated with a 95% CI 0.69, 0.93.

No search for moderator variables was undertaken, as there was no significant heterogeneity. Although this effect size fell within the range found by Durlak, et al. (1991), it should be noted that Beck and Fernandez (1998) included both treatment-control and single group, repeated measures designs together in the analysis. Di Guiseppe and Tafrate (2003) criticized the Beck and Fernandez study on methodological grounds. Combining studies with different populations and dispensing with moderators analyses overlooks potential detection of differential intervention effects on children and adults. Combining studies with between-group and single-subject designs and omitting further analyses ignores the different variances present within those designs (i.e., within-group participants tend to have less variance in the outcome measures than between-group participants). Study level variables, including design, are now routinely coded and analyzed separately (Hunter & Schmidt, 2004; Lipsey & Wilson, 2001).

Smith, Larson, DeBaryshe, & Salzman (2000) conducted a meta-analysis of anger programs specifically targeting youth. Searching the psychology literature by means of the PsychInfo database, they located 37 eligible studies. Experimental, quasi-experimental, and single subject designs were all included. Outcome measures were varied, as well, and included aggressive and prosocial behaviors, reasoning about emotions, self-perception, feelings of anger, and peer evaluations.

Of the studies that were eligible, approximately half (n =19) had enough information to calculate an effect size. The reported overall effect size was 0.63, indicating that treatment outcomes were better than control or pretest levels. The
<table>
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<tr>
<th>Author(s)</th>
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<th>Target Population</th>
<th>Outcomes measured</th>
<th>Effect size</th>
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<td>Smith, Larson, DeBaryshe, &amp; Salzman (2000)</td>
<td>Published (1980-2000)</td>
<td>19 (1911)</td>
<td>Experimental, quasi-experimental, non-experimental, single subject</td>
<td>Children and adolescents: 6 – 18 years</td>
<td>Negative behavior, positive behavior, cognitions, anger</td>
<td>Overall: $d = .63^a$ (no CI or sd reported)</td>
</tr>
<tr>
<td>Gansle (2005)</td>
<td>Published (not reported)</td>
<td>20 (not reported)</td>
<td>Random and non-random assignment</td>
<td>Children and adolescents: 5 – 18 years</td>
<td>Externalizing; internalizing; social skills; academics; beliefs and attitudes</td>
<td>Overall: $d = .31^a$ (sd = .49)</td>
</tr>
</tbody>
</table>

Note. $^a$ Positive effect size reflects a decrease in negative behaviors.
researchers offer no standard errors or confidence intervals, however. Other results are
presented in descriptive format, without any statistical documentation, so there is no
way to compare these findings with other meta-analyses. Since the researchers address a
number of important moderators, this is disappointing.

It should be noted that the lack of detail presented in the report may be due to the
publication venue; the report was a book chapter. The authors stated purpose was to
provide school counselors with an overview of anger management programs described in
the professional literature (Smith, et al, 2000). However, a search of the bibliography
yielded no publications with meta-analysis or systematic review in the title by any of the
authors. Despite the lack of statistical documentation, the study found that inclusion of
cognitive-behavioral components in anger management interventions was nearly
universal.

Sukhodolsky, Kassinove and Gorman (2004) performed a meta-analysis to
evaluate the overall effectiveness of CBT for anger problems in children and adolescents.
Searching the published psychological and medical literature, as well as unpublished
dissertations, the researchers identified 40 eligible studies (21 published and 19
unpublished). A total of 1953 children and adolescents participated in treatment-control
group interventions conducted in schools, outpatient and inpatient settings, and
correctional facilities. Findings revealed an overall effect size of 0.67 (sd = 0.37), with
significant heterogeneity ($Q = 250, p < .001; df = 172$), indicating that cognitive-
behavioral interventions in this population significantly reduced anger-related problems,
though the effect sizes varied more than what was expected due to chance.
Further, Sukhodolsky, et al., (2001) divided intervention approaches into four categories that correspond to different aspects of the cognitive-behavioral theoretical framework. Skills development interventions targeted overt anger expression and utilized modeling, behavioral rehearsal, etc. to improve social behavior. Affective education interventions targeted the covert anger experience and involved emotion identification, self-monitoring of anger arousal and relaxation. Problem solving type interventions targeted cognitive distortions and deficits and employed attribution training, self-instruction, and consequential thinking. Multimodal interventions contained elements from two or more of the components of anger and involved several different techniques. This categorization endeavored to determine the effectiveness of various components of CBT.

Multimodal and skills development were both more effective in reducing physical aggression (effect sizes 0.75, sd = 0.37 and 0.67, sd = 0.28, respectively) than problem solving (d = 0.57, sd 0.33) or affective education (d = 0.36, sd 0.32). Furthermore, the researchers found a significant and positive relationship between the overall effect size and the specific behavioral techniques of modeling, feedback, and homework. No relationship between age and the magnitude of the effect size was found.

Meta-analyses related to school-based anger interventions

To date, there has been only one systematic review and meta-analysis specifically conducted to evaluate school-based cognitive-behavioral interventions targeting anger. Gansle (2005) conducted a meta-analysis of 20 published studies to determine the effectiveness of these interventions among children and adolescents in the school setting. In addition to examining the studies to obtain an overall effect size, she compared
programs utilizing cognitive-behavior therapy and social skills training and measured five distinct outcome constructs: externalizing and anger, internalizing, social skills, beliefs and attitudes, and academic achievement. The majority of interventions (75%; n = 15) took place in the public school setting, with 50% (n = 10) occurring at the middle and high school levels. Overall, the mean effect size was 0.31 (sd = .49). Looking specifically at the externalizing behavior and anger outcome construct (which included such items as deviant behavior, disruptive behavior, aggressive behavior, off-task disruptive, conduct problems, state and trait anger, anger expression, general anger, and anger toward specific people), the effect size was 0.54 (sd = .55).

Statistical significance and heterogeneity were not reported by Gansle (2005), but it can be assumed that the findings were not statistically significant because the reported standard deviations indicate the range of effect sizes would include zero. Even with a statistically non-significant difference between intervention and control groups, however, both the overall mean effect size and the effect size for aggressive behavior were lower than that reported by Beck and Fernandez (1998) and Sukhodolsky et al. (2004).

Several explanations for Gansle’s (2005) finding are possible. One explanation is that this result is due to the smaller number of studies included in the review. Another explanation, also related to the sample of included studies, is the publication status. Gansle only included 20 peer-reviewed, published studies in her review, while the other reviews included approximately twice as many published and unpublished studies.

Yet another possible explanation is related to the different outcomes measured in the studies. Beck and Fernandez (1998) combined both reported feelings of anger and observable aggressive behavior in calculating their effect size. Sukhodolsky et al (2004)
combined five anger related outcomes in calculating their overall effect size, but also
analyzed them separately (thereby discerning that the effect sizes for multimodal and
skills development instruction were greater than the effect sizes for problem solving or
affective education in reducing physical aggression). All outcome measures used in the
Sukhodolsky, et al. (2004) study, however, are related to the cognitive-behavioral
theoretical framework. The outcome variables measured in Gansle (2005), on the other
hand, contained a mixture of those directly related to the cognitive-behavioral theory of
anger (e.g., externalizing and anger, thought problems, social skills), as well as unrelated
measures (e.g., measures of academic achievement and engagement).

A final possible explanation is related to the setting. Gansle (2005) was the first to
evaluate school-based cognitive-behavioral anger management interventions. Perhaps,
anger management programs are less effective in the school setting than in clinical or
other settings (e.g., prisons, detention centers). Gansle (2005) acknowledges the small
sample size and publication status as limitations of her study. She also recognized the
possibility that different outcomes may have been measured. Gansle’s (2005) review is a
good beginning. What is needed to further this line of research is a systematic review
that incorporates the theoretical framework described earlier, lessons from the literature
review, lessons from the umbrella review just described, and an updated systematic
review that incorporates the state-of-the-art techniques emerging from the literature
(Rothstein, Sutton, & Borenstein, 2005; Hedges, 2005) and organizations such as the
Campbell Collaboration, Cochrane Collaboration, and the What Works Clearinghouse.
Contributions of the present study

The existing meta-analysis most closely related to the research questions proposed for this study is the Gansle (2005) review. It is the only known systematic review of the effectiveness of school-based anger programs, yet it suffers from some important limitations. This study was designed to address those limitations. First, a comprehensive literature search across the disciplines of education, psychology, criminology, and medicine was undertaken. Electronic searches of nine databases were conducted, along with hand searches of four relevant journals and utilization of organizational and professional networks. Second, the study included both published and unpublished literature. Third, this study included experimental and high quality quasi-experimental studies. Fourth, only aggressive behavior was addressed as an outcome measure to avoid confounding of differing, yet theoretically related, constructs. Fifth, this study compared the effectiveness of stand-alone anger programs to those with anger programming embedded within their curricula. Lastly, this study investigated the differential impact of interventions in public and alternative schools, as well as among interventions implemented in rural, suburban, and urban settings.

This study endeavored to make several contributions. An important goal was to enable policymakers to make evidence-based decisions about how to best allocate limited funding dollars for violence prevention efforts. For educators and others making decisions about implementation of school-based anger and aggression prevention programs, this review intended to provide valuable information with regard to intervention types found to be most effective. Moreover, for researchers, it was hoped
that findings from this review would contribute to continued discourse regarding methodological issues such as randomization and reporting.
CHAPTER 3
Methodology

Overview

During the past fifteen years, several books have been written for those interested in conducting systematic reviews and meta-analyses (Cooper & Hedges, 1994; Hunter & Schmidt, 2004; Lipsey & Wilson, 2001; Petticrew & Roberts, 2006). Three served as a foundation for this study: *Systematic Reviews in the Social Sciences: A Practical Guide* (Petticrew & Roberts, 2006), *Practical Meta-Analysis* (Lipsey & Wilson, 2001), and *The Handbook of Research Synthesis* (Cooper & Hedges, 1994). In addition, policy and technical documents from other sources (e.g., the U. S. Department of Education’s What Works Clearinghouse, the Campbell Collaboration, and the Cochrane Collaboration) were consulted, as were guidelines established to encourage standardized reporting of meta-analyses (i.e., the QUality Of Reporting Of Meta-analyses – QUOROM statement; Moher, Cook, Eastwood, Olkin, Rennie, & Stroup, 1999). Though the guidelines were originally developed for meta-analyses conducted in health care, the format and suggestions are applicable to social science as well, and were used here.

This chapter presents the methods used to carry out this systematic review and meta-analysis. Specifically, the processes and procedures for searching the literature, selecting the studies, abstracting the relevant information from each study, and synthesizing the quantitative data are described.

Searching

Searching for studies in order to conduct a comprehensive systematic review is a critical aspect of performing any meta-analysis, as it circumscribes the population of
studies that will be examined. It is important to develop the most appropriate search in order to accurately represent the field of interest and identify as many relevant studies as possible. According to Rothstein, Sutton & Borenstein (2005), "...if the sample of studies retrieved for a review is biased, then the validity of the results...no matter how systematic and thorough in other respects, is suspect" (p. 2). While an unbiased sample of studies is the ultimate goal, a more obtainable one--from a practical perspective--is a sample of studies retrieved through a search that minimizes bias.

Research on anger and aggressive child and adolescent behavior within the school setting, however, is found in several disciplines and thus presents challenges to locating pertinent studies. For example, studies have been published in educational journals such as *Remedial and Special Education* (Larson, 1989), psychological journals such as *The Journal of Counseling Psychology* (Deffenbacher, Lynch, Oetting, & Kemper 1996), and criminological journals such as the *Journal of Quantitative Criminology* (Wilson, et al., 2001). Additionally, anger management interventions have been implemented in schools as masters’ or doctoral projects (Petit, 1999) and the results published as theses in what Hopewell, Clarke, and Mallett (2005) refer to as the “grey literature.” Grey literature is a large category which includes such diverse information as technical reports, governmental reports, policy documents, organizational reports, progress reports, unpublished data, conference proceedings, and papers presented at professional meetings (Hopewell, et al., 2005).

To identify relevant studies across disciplines and the various types of literature, then, a multimodal search was executed. This included electronic searches, hand searches, and informal communication through the invisible college. Since use of
cognitive behavioral techniques for anger were first described by Novaco in 1975, the systematic search for studies began with the year 1975 and continued through July 2006. No restrictions were placed on geographic location of the study. Due to resource limitations, however, only studies published in English were considered.

Electronic searches: Sources

No hard and fast rules exist to determine the number of electronic database searches required to produce a high-quality systematic review and meta-analysis. A few recommendations are offered by experienced meta-analysts. Petticrew & Roberts (2006) recommend a minimum of two databases, although they note that the actual number will vary by review topic. Lipsey and Wilson (2001) put forward a general suggestion for ‘multiple databases.’ Hopewell, Clarke, and Mallett (2005) advocate searching multiple types of databases to especially tap into the unpublished literature. Acknowledging constraints faced by those undertaking systematic reviews, Petticrew and Roberts (2006) proffer the sensible suggestion that time and available resources ultimately dictate the number of sources searched.

The Cochrane Collaboration and the Campbell Collaboration, two international organizations dedicated to promoting the production and use of systematic reviews and meta-analyses, have undertaken the task of minimizing the burden of searching for randomized or possibly randomized trials by developing trials registers. The Campbell Collaboration’s Sociological, Psychological, Educational, and Criminological Trials Register (C2-SPECTR) concentrates on trials in the social sciences and is free and easily accessible (http://campbellcollaboration.org/spectr.asp). The Cochrane Collaboration offers a searchable trials register (CENTRAL) targeting issues related to health care
through the Cochrane Library (www.cochrane.org). Depending on the geographic location or institutional affiliation of the researcher, however, there may be a cost associated with use of the Cochrane resource.

Of the seven most relevant systematic reviews and meta-analyses used to frame this study, the number of electronic databases searched varied widely. Durlak, et al. (1991) searched one electronic database while Mytton, et al. searched fourteen for the 2006 update and nine for the original 2002 review. Aside from these extremes, an average of three databases was searched per review. The most commonly cited database was PsycINFO (or its CD version, PsycLIT). Educational Resources Information Center (ERIC) was the second most commonly cited, while Dissertation Abstracts and MEDLINE were third.

In an attempt to address the challenge of locating relevant studies for this topic in the published and unpublished literature, the following nine databases were searched: PsycINFO, ERIC, MEDLINE, Dissertation Abstracts International, C2-SPECTR, CENTRAL, NCJRS (National Criminal Justice Reference Service), Sociological Abstracts, and Index to Theses. Appendix A contains a short description of each database and its contents.

*Electronic searches: The search strategy*

Due to challenges posed by attempting to search comprehensively, persons interested in conducting a systematic review are encouraged to seek the assistance of

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1 It should be noted that while Durlak, et al. (1991) searched only one database electronically, fifteen relevant journals were manually searched. Mytton, et al. (2006), on the other hand, searched 14 databases electronically, but only one relevant journal manually. One reason for this difference may be the tremendous advances made in the availability and quality/capacity of electronic databases over the past 15 years.
those with expert skills in information retrieval strategies (White, 1994; Rothstein, Turner, & Lavenberg, 2004; Petticrew & Roberts, 2006). With this in mind, professional librarians P. Lynn (Education) and G. Kuntz (Biomedical) at the University of Pennsylvania and J. Dennis and J. Abbott of the Cochrane Developmental Psychosocial Learning Problems Group) were consulted for advice regarding the planned sources of studies (as listed above), as well as for advice regarding the development of advanced search strategies.

After the sources were decided upon, the development of the search strategy was undertaken. One method of initiating a bibliographic database search is to examine the keywords associated with reports known to be relevant and useful (Lipsey and Wilson (2001). Accordingly, the search for studies for this project began with keywords associated with pertinent studies first identified through Wilson, Lipsey & Derzon’s (2003) meta-analysis of school-based interventions to reduce aggressive behavior.

Petticrew and Roberts (2006) maintain that all search strategies are basically similar in that they make use of the name of the intervention or synonyms for the intervention, the population of interest, and the outcome—all combined with the AND, OR and NOT connectors—to retrieve the most relevant studies. Once appropriate keywords were identified for cognitive-behavioral anger management interventions, they were combined with terms related to the school population (e.g., children, adolescents) and outcomes (e.g., aggressive behavior, fighting). Terms related to the research design of the study were utilized in only in databases which indexed those items. For example, MEDLINE employs a high level of research design specificity and indexes entries with descriptors such as “randomized controlled trial.” The search strategy used for each
database is documented in Appendix B, in an effort to be as transparent as possible should other researchers want to replicate the search in order to extend this review.

**Hand searches**

In addition to electronic searches, hand searches of selected journals (Petticrew & Roberts, 2006) and reference lists (Petticrew & Roberts, 2006; Lipsey & Wilson, 2001; Cooper, 1998) are recommended. Hand searches have been shown to be more effective than electronic searches in identifying randomized controlled trials in the social sciences (Turner, 2002). The Cochrane and Campbell Collaborations draw on volunteer efforts to conduct hand searches of journals to add trials to their registers. The hand searches are highly dependent upon ease of access to journals and volunteer interest (E. Glatman, personal communication). Each organization maintains a list of journals that are currently being hand searched, however, in order to assist systematic reviewers in locating studies and also minimize duplication of effort and wasting valuable resources.

The Master List of Handsearched Journals of the Cochrane Collaboration (http://www.cochrane.us/search/srchjnm.asp) was consulted, as was the Campbell Collaboration’s list (personal communication), prior to selecting journals for hand searching for this project. Use of cognitive-behavioral techniques to address anger management was first described by Novaco in 1975. Therefore, the hand search began with journal volumes published in 1975 -- unless the journal began publication after that date (in which case, the hand search started with the first year of publication) or previous hand searches of that journal had been conducted (in which case, the hand search took up where the previous hand search left off).
The following journals (and years) were selected as appropriate and hand searched: *Aggressive Behavior* (1975-2005), *Behavior Therapy* (1997-2005), *Cognitive Therapy and Research* (2000-2005), and *Journal of School Health* (1975-2005). The result of the hand search effort was submitted to the current manager of the C2-SPECTR database so that any reports deemed relevant could be added to C2-SPECTR.

In addition to the systematic searching of the above journals, all reference lists from relevant studies—whether identified via electronic or hand searches—were manually reviewed for possible studies.

*The invisible college*

Cooper (1998) divides channels of communication scientific information methods into two basic categories: formal and informal. Formal channels of communication are defined as those that “have explicit rules that primary researchers must follow to enter information into the channel. These rules...place restrictions on the kind or quality of information that is admitted to the system” (p. 51). Conference presentations, electronic journals, and research report reference lists are included in this category. The electronic and hand searching methods already described address these formal channels of communication.

Informal channels of communication, on the other hand, are “distinguished by a lack of explicit rules governing the contact between the primary researcher and the literature searcher. There are no restrictions on the kinds of information that can be exchanged...” (Cooper, 1998, p. 43). The invisible college, the World Wide Web (www), and personal solicitation are examples of informal channels. Rosenthal (1994) succinctly describes the invisible college as “…a research-area community, circle, or network in
which scientists appear to develop patterns of communication and a reliance on a membership group of colleagues involved in research and similar interests..." (p.93). Listservs and mailing lists are examples of the electronic invisible college.

For this project, both the traditional and electronic invisible colleges were exploited. Requests for information related to ongoing or completed (and published or unpublished) trials were made via organizational listservs. Specifically, COGAPAGS, the listserv for cognitive psychology graduate students and sponsored by the American Psychological Association, and the listserv for the Society for Prevention Research were targeted. Both organizations have members who are either actively involved with or informed about school-based programming related to anger control.

Exploratory searches of the worldwide web were undertaken using the widely available search engines Google.com and Yahoo.com. The meta-search engine ez2find.com was also used, since it purports to link to less well known search engines (e.g., Teoma, Wisenut) as well as over 1000 databases. Lastly, personal requests for information were made through informal conversations with colleagues.

Study Selection

The What Works Clearinghouse (WWC) has been active in conducting systematic reviews of the literature in an effort to provide educators and educational decision-makers with high quality information regarding programs, products, practices and policies that impact student achievement (http://w-w-c.org). Through collaboration with the American Institute for Research and the Campbell Collaboration, as well as expert methodologists, the WWC has developed extensive and detailed procedures for identifying studies and selecting studies for review (http://w-w-c.org/reviewprocess/lit.html and
A multi-stage review process is employed. At first, trained researchers screen studies (that have been collected through procedures similar to those noted in the previous section) for topical relevance then for basic methodology. This is followed by a more rigorous methodology screening and finally, information about other characteristics (e.g., settings, subgroups, etc.) is collected.

Given that the WWC process is transparent, has been rigorously vetted, has standards that are consistent with those of the Campbell and Cochrane Collaborations, is relevant, and is among the best in the United States, the screening procedures and materials for this project were designed following the WWC guidelines. Overall, studies from the initial pool of all studies identified (via electronic searches, hand searches, and the invisible college) were selected for further examination if they were topically related and met the eligibility criteria with respect to population, intervention, outcome, and design. The next two sections describe the selection process and specify the inclusion and exclusion criteria.

Selection process

Decisions regarding the relevance of primary studies identified in the course of the literature search were made on a hierarchical and iterative basis in a two-phase review process. The goal of Phase I was to differentiate potential studies from clearly inappropriate studies. Thus, in the first phase, the topical relevance, setting, participants, and general design of the study were evaluated. This was accomplished by reading the title alone or by reading both the title and abstract. The purpose of Phase II was to increase the specificity (i.e., precision) of the search. As such, the questions on this
screening form delved deeper into aspects of the intervention, design, and outcome. The title rarely contained enough information to make a clear determination, so it was necessary to read further. On occasion, the abstract contained adequate detail for a study to pass this level. More commonly, however, a reading of the methods section was required (Turner, et al., 2003) in order for a study to pass this level. Appendix C contains a copy of the Phase I and Phase II screening forms and manual.

Reading the method sections meant that full-text versions of the study were required. Articles were downloaded electronically, whenever available, or photocopied from existing sources at the University of Pennsylvania libraries. Articles not available through the Penn libraries, electronic databases, or websites were requested through the Interlibrary Loan Service.

*Eligibility criteria*

Explicit descriptions of the eligibility criteria for a systematic review or meta-analysis serve two main purposes. First, it gives readers of the study an idea of the research domain of interest (Halvorsen, 1994; Lipsey & Wilson, 2001). Secondly, specific descriptions aid the systematic reviewer in applying consistent and objective standards throughout the selection process (Lipsey & Wilson, 2001; Wortman, 1994). This section presents the eligibility criteria used in this project.

Though specific eligibility criteria depends on the review topic (Light & Pillemer, 1984; Petticrew & Roberts, 2006), Lipsey & Wilson (2001) suggest the reviewer consider the following categories: (a) distinguishing features, (b) participants, (c) key variables, (d) research design, (e) cultural and linguistic range, (f) time frame, and (g) publication type. These categories were used to frame the selection criteria, referred to more
explicitly as the “inclusion and exclusion” criteria in some texts on meta-analyses (e.g., Petticrew & Roberts, 2006).

**Distinguishing features.** Eligible studies utilized the cognitive-behavioral theoretical framework as the foundation of the intervention to address anger or emotional literacy. The intervention could have anger control as its main focus or include anger management within curriculum targeting another issue (e.g., youth violence). The studies had to have taken place in the school setting.

Use of cognitive-behavioral theory was identified in one of three ways: author labeling, author description of the overall program, or author description of program elements. Etscheidt (1991) exemplified author labeling by descriptively dubbing the title of her study - “Reducing aggressive behavior and improving self-control: A cognitive-behavioral training program for behaviorally disordered adolescents.” Pepler, King, Craig, Byrd, & Bream (1995) did not employ such explicit terms but instead described their program by its purpose (e.g., it “…was implemented to improve two domains of children’s functioning (behavioral and social-cognitive)…” in order to address children’s aggressive behavior from a multidisciplinary perspective) (p. 300). At times, however, authors did not describe the theoretical foundation or the overall program framework but did illustrate elements of the intervention that targeted both cognitive dimensions (e.g., cognitive restructuring or problem-solving) and behavioral dimensions (e.g., role-plays or relaxation techniques).

Similarly, anger or emotional literacy was identified by explicit author statements, author description of program or intervention, or tables that presented the curriculum outline.
School setting referred to both school type and traditional academic year. Eligible types of schools included public, private, parochial (i.e., religiously oriented), charter (e.g., focused on the arts), vocational (e.g., auto mechanic training) and alternative (e.g. schools that followed the traditional academic calendar and hours of operation, but were set up for a specific population – such as academically and socially at-risk students). Interventions that took place in a correctional facility or psychiatric institution were not eligible. Meta-analyses of cognitive-behavioral techniques for anger management have been conducted with this population (Beck & Fernandez, 1998; Sukhodolsky, et al., 2004). Interventions must have been implemented either during the school day or after school as a supplemental program held Monday through Friday during the course of the traditional academic year. Interventions delivered on the weekend or during the summer months (e.g., as part of a summer camp or enrichment program) were not eligible.

Children and adolescents become angry for a variety of reasons. Identification of the source of angry feelings was not the focus of this project. Rather the behavioral manifestation of child and adolescent anger in terms of aggressive behavior was the focal point of interest. Interventions beyond those normally expected to measure aggressive behavior (e.g., violence prevention programs) were investigated for relevance before being ruled out (e.g., Pedro-Carroll & Cowan (1985) implemented a cognitive-behavioral intervention with children angry about their parents' divorce). Thus, determination of study eligibility was not based on the primary focus of the intervention.

Interventions that aimed to alter student attitudes, beliefs, or knowledge (i.e., cognitive aspects) alone, however, were not included.
**Research participants.** Eligible studies were those in which school-age students were the target population. That is, program participants and comparison students had to be currently enrolled in school. Typically, school-age students are between the ages of 5 and 18 years. Although, some children may begin their academic studies earlier (e.g., beginning kindergarten at age 4 because of locally-set entrance rules), others may begin later or repeat a grade and consequently still be enrolled in school at the age of 19 or 20. Therefore, the age range of eligible participants was set at 4 years to 20 years. Children identified as attending ‘preschool’ or adolescents identified as attending ‘college’ --even if they fell within the acceptable age range-- were not included.

At times, authors describe their samples in terms of grade level rather than age. In such cases, acceptable grades will be kindergarten through twelfth grade, ‘primary’ and ‘secondary’ levels of education, or the international equivalents. It was assumed that students participating in school-based interventions attended the schools in which the intervention takes place.

Eligible studies were not restricted to those involving students with aggressive behavior at baseline. In fact, baseline level of behavior was not considered in determining study eligibility. Since baseline behavior is an important participant characteristic, however, it is addressed in the data abstraction phase.

**Key variables.** Eligible studies had to report at least one quantitative measure of aggressive behavior as an outcome and provide enough statistical information to permit calculation of an effect size. The expression of anger could be displayed as physical or verbal aggressive behavior and directed either at the source of provocation or persons (or objects) associated with the root cause (Spielberger, et al., 1995). Examples of child and
adolescent aggressive physical behavior in response to feelings of anger displayed in the school setting include pushing, shoving, hitting, breaking objects, fighting and acting out. Examples of verbal behavior include yelling at teachers or administrators and issuing threats.

Behavior could be measured directly (e.g., through classroom observation) or indirectly (e.g., referrals to the principal’s office). The use of either standardized measures (e.g., the Child Behavior Checklist - Teacher Report Form) or unstandardized measures with adequate face validity (e.g., self-report measures that ask students “how often, in the past 30 days, they…pushed slapped, shoved, or kicked other students; threatened to hurt or hit another student,” etc., as employed in Bosworth, Espelage, DuBay, & Daytner, 2000, and local administrative records) were considered acceptable. For this study, measures reported in the Buros Institute of Mental Measurements Yearbook(s) were considered standardized measures; all others were classified as unstandardized measures.

Research design. As this project entails an evaluation of the effectiveness of cognitive-behavioral interventions, eligible studies were those that evaluated the impact of an intervention by distinguishing between an intervention or treatment group and a comparison or control group, using a randomized controlled trial or quasi-experimental design. Experimental designs in which participants are randomly assigned to conditions create probabilistically equivalent groups at baseline, i.e., equivalent in terms of both measured and unmeasured characteristics (Shadish, Cook & Campbell, 2002). These designs offer the best control for major threats to the internal validity of a study. That is, randomized controlled designs best reveal whether observed changes are due to the
effects of the intervention rather than the effects of history, maturation, testing, instrumentation, regression, selection, mortality or some interaction of these elements (Campbell & Stanley, 1963/1966).

Other researchers also give preference to randomized controlled trials in situations where one desires to learn about the effectiveness of a particular intervention (Boruch, 1997; Rossi, Freeman & Lipsey, 1999; Mosteller & Boruch, 2004, Bloom, 2005; Petticrew & Roberts, 2006). Therefore, studies in which participants were randomly assigned to condition, either as individuals or as clusters of individuals (e.g., classrooms or schools), were eligible for inclusion and were prioritized. While the randomized controlled trial design is ideal from a scientific perspective, there is, at times, some reluctance on the part of principals and other stakeholders in instituting them in the educational setting (Cook & Payne, 2002; Mosteller & Boruch, 2004).

Quasi-experimental design is another category of research design commonly found in educational and other types of social science research. Within this category are several different designs, e.g., time series, non-equivalent control group, and regression discontinuity (Campbell & Stanley, 1963/1966). Though each design has its own strengths, weaknesses, and uses, the quasi-experimental design of interest for this project was the non-equivalent control group design.

The difference between the non-equivalent control group design and the randomized control design lies in how participants are assigned to condition. As noted above, participants are randomly allocated to condition in the truly experimental, randomized control group design. In the non-equivalent control group design, however, participants are assigned by some other mechanism. For example, assignment may be
determined by participant selection (e.g., volunteering), administrator selection (e.g.,
teacher or counselor) or researcher selection (Shadish, Cook, & Campbell, 2002). By
virtue of assignment to condition, then, intervention and comparison groups may be quite
dissimilar at baseline. This difference could significantly impact the outcome. In an effort
to exert more control, researchers employ strategies to minimize this difference.
Matching treatment and control group participants on relevant characteristics or using
statistical adjustments are two common methods of equating groups (Rossi, Freeman &
Lipsey, 1999).

If steps were taken to equate groups, either by matching on relevant
caracteristics or using statistical controls, and the study met all other criteria for
inclusion, the studies were eligible for further review and data abstraction. Acceptable
relevant characteristics for matching with respect to this project included age, gender,
geographic setting (e.g., rural schools), and scores on measures of aggression at pretest.

The following common research designs were not eligible for this review and
were screened out during the study selection process: one group pretest-posttest designs
and case studies. Additionally, epidemiologic surveys conducted to determine the
prevalence or severity of aggressive behavior in school settings were also not eligible for
inclusion.

Cultural and linguistic range. The challenges presented by aggressive behavior
within school classrooms are universal, as are the experiences and expressions of anger.
The University of Pennsylvania offers extensive resources related to searching for and
obtaining studies, therefore, no a priori limitation was placed on geographic location of
the study. As resources for conducting this project were limited, however, studies had
to have been reported in the English language.

**Time frame.** Recognition of the contribution of cognitive factors to individual
behavior occurred in the early 1970s. Novaco's landmark study utilizing cognitive
control accompanied by behavioral techniques to address anger was published in 1975.
Thus, a logical timeframe to begin including studies for this project would be 1975.
Oftentimes, there is a delay between time an article is published in a journal and the time
it appears in an electronic database. To align hand searches and electronic searches, July
2006 was selected as an end point for study consideration (i.e., a study had to be
published between 1975 and July, 2006 to be considered for this project).

**Publication type.** Publication bias, defined as “...what occurs whenever the
research that appears in the published literature is systematically unrepresentative of the
population of completed studies” (Rothstein, Sutton & Borenstein, 2005, p.1) is a major
concern in accruing studies for review. Published research is often biased toward
statistically significant findings: primary researchers are more likely to write up and
submit their findings to a journal if they obtain a statistically significant result and peer
reviewers are more likely to recommend publication if the study findings are statistically
significant (Cooper, 1998).

But what about the other possibilities (e.g., where reports of statistically
significant findings are produced but not submitted for publication or where reports with
statistically insignificant or negative findings are submitted and rejected or where reports
of statistically insignificant or negative findings are never even written up and placed in a
"file drawer")? Identification of these types of reports or studies may be made by searching the grey literature, as was addressed earlier in the section.

A recent study by McLeod and Weisz (2004) compared effect sizes of dissertations and published studies of child and adolescent psychotherapy in order to investigate publication bias. They found that the effect sizes of dissertations were less than half the magnitude of those reported in meta-analyses of published literature. Nye, Turner, & Schwartz (2005) found similar results in their review on parent involvement for the Campbell Collaboration. These findings underscore the need to consider studies beyond those in the published literature. Indeed, Cooper (1998) warns “…peer reviewed journal articles should not be used as the sole source of information for a research synthesis…” (p. 55).

In sum, then, while the search for studies was broad and had a relatively low threshold for inclusion into the pool of studies for consideration, the preceding criteria were applied systematically to each study and recorded on screening forms in a two-phased process.

**Data Abstraction**

Data abstraction, the overall process of extracting relevant data from each eligible study, addresses both study characteristics and study findings (Lipsey & Wilson, 2001). One study may well result in multiple reports or publications. Alternatively, one report or publication might present the results of several studies. Study characteristics may be considered analogous to the independent variable(s) of primary research, whereas study findings would be analogous to the dependent variable(s). Both are necessary to investigate the research questions.
Data abstraction (also called data extraction) is carried out in a systematic and standardized manner by means of completing a coding form for each study meeting all inclusion criteria (Petticrew & Roberts, 2006), using guidelines described in an accompanying coding manual. In order to develop a coding manual, Lipsey & Wilson (2001) recommend that the systematic reviewer (a) indicate what information each item is attempting to capture, (b) provide complete definitions for each response option, and (c) offer guidelines for dealing with vague documentation. A coding form and manual was developed for this project, following these suggestions. Elements reflected participant characteristics (e.g., gender, age, race/ethnicity, baseline level of aggressive behavior, etc.), intervention characteristics (e.g., primary focus of program, delivery personnel, method of delivery, etc.), study design (e.g., assignment to condition, unit of analysis, etc.), and outcomes (e.g., aggression, outcome informant, measures employed, etc.). Development of the coding form and accompanying manual was an iterative process (i.e., development and pilot testing, revising and retesting), which ultimately required twelve revisions. Appendix D contains a copy of the final coding form and related manual.

To avoid potential bias that may be introduced by the coder, it is recommended that more than one person carry out the data abstraction process. Scher (2004) conducted a systematic review and meta-analysis as part of her dissertation in the Graduate School of Education at the University of Pennsylvania. Replicating her model for data abstraction, here, a plan was devised such that five studies would be coded by two persons together (J. Lavenberg and S. J. Wilson, an experienced meta-analyst). Working together to extract the data from the first five studies allowed for discussion and
clarification of the decision making process. This process was critical for the improvement of the coding form and manual so that the data abstraction process was streamlined. The collaborative effort between Lavenberg and Wilson was conducted by means of telephone meetings and electronic correspondence.

Once final revisions were made to the form and manual, independent data abstraction was planned as follows: Lavenberg would abstract data on 100 percent of the studies. S. J. Wilson would abstract data from a random sample of 20 percent of the studies that met all inclusion criteria. Discrepancies on coding decisions were discussed between them and differences resolved.

Quantitative Data Synthesis

Once the data abstraction was completed, three types of analyses ensued. First, a descriptive analysis was conducted to provide an overview of the experimental and quasi-experimental studies related to this topic and also to circumscribe all subsequent analyses. Second, correlations were calculated to examine the relationship of potential moderators. Lastly, a meta-analysis was performed to determine the magnitude of effect and an investigation of heterogeneity was undertaken. SPSS 13.0 for Windows was used to conduct the descriptive and correlational analyses and CMA 2.2.021 (Biostat) was used to conduct the meta-analyses and moderator analyses.

The descriptive analysis addressed a number of issues, including methodological (e.g., design, publication status) intervention (e.g., program focus), and participant (e.g., baseline aggressive behavior) characteristics. General patterns and trends were examined first, and more detailed examination followed. Additionally, descriptive analyses were
performed to address the cognitive elements and behavioral techniques employed in the interventions.

Bivariate correlations were calculated in an effort to statistically examine the relationship of important variables to each other and to the effect size. Again, selected variables reflected methodological, intervention, and participant concerns raised by theory or previous research (e.g., random assignment), outcome informant (e.g., self, teacher, parent, etc.), intervention delivery personnel (e.g., teacher, researcher), total length of intervention (i.e., the ‘dose’), gender, and grade level.

Since the variables of interest were a combination of continuous, ordinal, and nominal, data was transformed where necessary and different formulas were used to obtain the correlations. For relationships between two continuous variables, a Pearson $r$ was calculated. For relationships in which one variable was dichotomous and the other variable was continuous, the point biserial correlation ($r_{pb}$) was calculated. In cases with one continuous variable and one artificially-created dichotomous variable (created by dummy-coding using the values 0 and 1), the point-biserial ($r_{pb}$) correlation was calculated using same statistical formula as the Pearson $r$ (Rosnow & Rosenthal, 1999). For relationships in which both variables were dichotomous, the phi coefficient ($\phi$) was calculated. For relationships where both variables were reported in rank order (e.g., school level and research sophistication of intervention delivery person), a Spearman rho ($r_s$) was calculated. If one variable was in rank order and the other variable was either dichotomous or continuous, $r_s$ was calculated to take the ranking into account.
The final type of analysis conducted was the meta-analysis. The following section offers details with respect to its execution.

**Software.** Comprehensive Meta-Analysis (CMA) version 2.2.021 (Biostat) was used to conduct the statistical meta-analyses and moderator analyses. This software, though relatively new, was developed by an international team of expert methodologists and statisticians with extensive experience conducting meta-analyses. It has several notable features. A very useful feature is the ability of the program to accept data in different formats (Borenstein, 2005b) and transform it to a common effect size and variance (which is then used in the meta-analysis). For example, some studies report results as means and standard deviations, while others report \(t\)-values, or Cohen’s \(d\). All original results are entered under the appropriate selection for data entry format (e.g., ‘means, standard deviation for each group, \(n\)’ or ‘means, \(n\), \(t\)-value’) and calculations are performed automatically.

Armed with a basic knowledge of computer spreadsheets and the manual accompanying the software, then, one may easily navigate the program. In addition, technical support is offered via the developer’s website and by phone. Personnel were prompt in responding to all inquiries.

Although powerful and easy to navigate, CMA does not currently have the ability to calculate corrections for studies where groups of participants were randomly assigned to condition (e.g., schools) but results analyzed at the individual level. This “mismatch” between the unit of assignment and the unit of analysis ignores the dependence of participants making up the cluster, resulting in standard errors that are underestimated --
and leading to overestimated statistical significance (Hedges, 2005; WWC Technical Details of WWC-Conducted Computations, 9.12.2006).

Corrections for mismatch errors were conducted using WWC guidelines (c.f., Hedges, 2004; Hedges, 2005). These guidelines were available in the Technical Working Papers section of the public website (www.whatworks.ed.gov). In addition, WWC personnel were available for questions. The same cluster correction formula applied equally to randomized and quasi-experimental designs (J. Hitchcock, personal communication, 1/29/07). The intraclass correlation used in the formulas was 0.10, the behavioral intraclass correlation recommended by the WWC (Technical Details of WWC-Conducted Computations, 9.12.2006). In order for clustering corrections to be made, however, two or more clusters must be assigned to each condition. So, for example, if one school with one hundred students is randomly assigned to the intervention condition and another school with a hundred students assigned to the control condition and results are analyzed and reported at the individual level for all two hundred students, clustering corrections cannot be calculated. Even though the sample size is large, intervention effects are confounded with school effects in this case. While school effects could theoretically be zero, it is highly implausible.

Measure of effect. As in other meta-analyses, the effect size was the principal measure of effect used. The effect size statistic is a standardized measure and, as such, can be interpreted across all variables and measures involved in a meta-analysis (Lipsey & Wilson, 2001). There are a number of different effect size calculations from which to choose (e.g., Cohen’s $d$, Hedges’ $g$, odds ratio) in order to present estimates of the
magnitude of program effect. The size of the sample, the scale of the outcome
measure, and the type of data available dictate which effect size calculation to select.

The outcome data reported in the primary studies utilized measurements on a
continuous scale, e.g. behavioral rating scales. In addition, there were a variety of
measures used to assess aggressive behavior, e.g., Achenbach’s Child Behavior
Checklist, Pediatric Anger Expression Scale, classroom observations, disciplinary
reports, etc. In situations where all dependent variables are measured on a continuous
scale and studies use different measures, Lipsey & Wilson (2001) recommend using the
standardized mean difference effect size. This statistic, however, can be upwardly biased
for studies with sample sizes less than 20. Hedges’ g corrects for small sample sizes.
Given that (a) cognitive-behavioral educational interventions often have small sizes,
(b) the WWC recommends use of Hedges’ g to calculate effect size, and (c) Turner &
Bernard (2006) explicitly advocate the use of Hedges’ g in systematic reviews, Hedges’ g
was selected as the effect size statistic used in this study

Method of combining results. In order to determine whether school-based
cognitive-behavioral anger interventions are effective in reducing child and adolescent
aggressive behavior, it was is necessary to combine the effect sizes from all included
studies. Combining the studies generates information about the direction of the effect as
well as the magnitude of the effect.

To combine the results, each effect size was multiplied by its weight (i.e., the
inverse of its variance), then summed and divided by the sum of the weights (Lipsey &
Wilson, 2001). A 95% confidence interval was also calculated to provide an estimate of
the range within which the population mean is likely to occur.
Although more than one effect size may be calculated for a single study (e.g., separate effect sizes for physical aggression and verbal aggression), only one effect size per study can properly be used in the analysis in order to maintain the assumption of statistical independence of data points. If two or more effect sizes per study are used, the effect sizes are not independent of one another, thus the assumption of independence is violated. Additionally, including more than one effect size per study gives more weight to a study with several effect sizes.

In order to determine how to select one effect size value that best represents a study, Lipsey & Wilson (2001) suggest the following: (a) random selection, (b) selection on specific criteria, or (c) averaging all effect sizes from the study. The decision as to which effect size best represented each study in this project was made on a study-by-study basis. For some studies, all calculated effect sizes for a single study were averaged together (e.g., teacher report and student self-report) and the mean effect size was used to represent the study in the final analysis. For other studies, selection was made by prioritizing effect sizes based on sample size and theoretical features (e.g., less attrition among teacher response than parent response; majority of teacher-reported outcomes among studies in the sample). Specific effect sizes were chosen to represent each study in order to match pre-selected criteria for the moderator analyses, however (e.g., length of time between intervention completion and assessment).

Another determination required when combining effect sizes is that of selection of the analysis model. Both fixed and random effects models can be used in meta-analyses. Fixed effect models assume that the observed variation in effect size is due solely to random error (i.e., sampling error); in contrast, random effects models assume that the
observed variation in effect sizes is due to the random error within studies (i.e., sampling error, the same as the fixed effect model) as well as true variation between studies (Borenstein, 2005a). Thus, when effect sizes are combined under the fixed effect model, the overall effect size is an estimate of the ‘true’ effect (i.e., since all studies are assumed to originate in a common population) and when effect sizes are combined under the random effects model, the overall effect size is the average of a series of values.

It is most likely that the populations from which the studies for this review were drawn differed from one another in ways that cannot be determined (e.g., studies span a 25-year time span, involve different geographic regions, etc.). The random effects model, therefore, is the most appropriate model for analysis. While appropriate, however, assumptions inherent in the random effects model preclude an investigation of heterogeneity. Thus, effect sizes under the fixed effect model were also calculated.

**Missing data.** Researchers conducting meta-analyses are dependent upon the reporting practices of the primary authors. As such, missing data is an important issue. One strategy to deal with missing data is to merely exclude studies with any data missing. If data is missing from only a few studies, the impact on the overall analyses (assuming an adequate number of studies in the pool) will be small or insignificant. However, if data is missing on a large number of studies, the impact may be large. Another strategy for dealing with missing data is the process of multiple imputation (Allison, 2002; Turner & Bernard, 2006).

In addition, there is a differential impact depending on the type of missing data. If the missing data is related to effect size calculation, (e.g., mean, SD, sample size), it is a critical problem. If the missing data is related to subgroup analyses, (e.g., school type,
setting, etc), it is not such a critical problem for addressing the question of efficacy, but it will definitely impact the more specific questions of efficacy for specific populations. The overall goal is to salvage as much data as possible from the primary studies.

If a study did not contain the information necessary to calculate the effect size directly (that is, if the study does not contain information related to the group means, standard deviation, and sample size) or it was not possible to derive values from the presented information (e.g., perform calculations from \( t \), \( F \), or chi-square) or the study did not present data in formats accepted by CMA, the study was excluded from the meta-analysis.

If the study contained sufficient information to calculate the effect size, but did not contain information related to the moderators under consideration (e.g., setting, age), the study was included in the overall analysis, but excluded from the moderator analyses. Anticipating that there would be missing data on some important variables (e.g., age), the coding form was designed to capture data in several formats. In the case of age, the coding form contained questions regarding mean age, age range, and school level (i.e., elementary, middle school, high school).

Statistical heterogeneity. In any meta-analysis, it is important to investigate the distribution of variation in study outcomes. One must determine if the variation observed between studies is due to what would normally be expected by sampling error. \( Q \) tests for heterogeneity are conducted to determine the extent to which individual effect sizes vary from the overall effect size (i.e., the grand mean effect size). A significant \( Q \) test indicates that variability across effect sizes is due to something other than sampling error alone. In the presence of significant \( Q \) statistics, one must conduct further analyses to
investigate potential moderators. Additionally, an $P$ statistic should be calculated to quantify the amount of heterogeneity and assess the impact (Higgins & Thompson, 2002). The $Q$ test was conducted and the $P$ statistic was calculated.

*A priori sensitivity analyses and subgroup analyses.* Sensitivity analyses are conducted in order to assess the impact removing certain studies from the overall analyses. Sensitivity analyses can be conducted to evaluate the effects of removing one study from the overall analysis, as well as removing a group of studies. A sensitivity analysis was conducted to evaluate the impact of removing one study at a time from the sample in order to determine if any individual study was 'pulling' the effect size. A second sensitivity analysis was conducted to evaluate the impact of removing the quasi-experimental designs. Moderator analyses were conducted to evaluate groups of studies.

Subgroup analyses are conducted in an attempt to move beyond the general question of whether an intervention works. In subgroup analyses, one can begin to investigate the differential effects of the intervention, i.e., one begins to identify 'for whom' the program works. Decisions are based upon theory, previous research, and information typically reported in primary studies (e.g., gender, age, ethnicity). Analyses were conducted on interesting methodological (e.g., randomized and non-randomized designs), intervention (e.g., delivery personnel), and participant (e.g., school level) characteristics.

To date, the effectiveness of school-based cognitive-behavioral interventions targeting anger in order to reduce aggressive student behavior has not been investigated in different settings (i.e., rural, suburban, urban). Environmental contexts influence child and adolescent development, thus the school setting should be considered as a potentially
important moderator. For example, urban children are exposed to higher levels of violence and aggressive behavior than rural children (DeVoe et al., 2005) and low-income, urban African American children are more likely to be exposed to high-aggression classrooms (Thomas, Bierman, Conduct Problems Prevention Research Group, 2006). Therefore, the impact of school setting was investigated.

Anger control can be offered as a stand-alone intervention (e.g., Anger Coping Program; Larson & Lochman, 2002) or embedded within the curriculum of a program designed to address another focus (e.g., coping with divorce; Pedro-Carroll & Cowan, 1985). As the effectiveness of stand-alone programs versus embedded programs has not been evaluated to date, it was investigated in this study.

Assessment of publication bias. Bias may be introduced into the analyses by virtue of publication status. Studies with significant results are more likely to be published in peer-review journals than are studies with null or non-significant results. One must evaluate whether publication bias has affected the sample of studies obtained. Three methods were employed to detect publication bias: creation of a funnel plot, calculation of the fail-safe N, and application of the trim and fill procedure.

First, a funnel plot—a graph containing a plot of the effect size versus precision—was constructed and visually examined. If these graphs reveal a broad spread of points at the bottom with a decreasing spread as one moves towards the top (i.e., creating a “funnel” with a spout pointing to the top), no publication bias exists. If, on the other hand, the data points are spread widely, without the characteristic funnel shape, or there is notable asymmetry in the shape of the funnel, it is likely that publication bias exists (Borenstein, 2005a ).
Second, the fail-safe N was calculated. The fail-safe N provides an estimate of the number of not-located-as-yet studies reporting null findings that are needed in order to nullify the observed effect (Lipsey & Wilson, 2001). If the fail-safe N is large, one can have a reasonable amount of confidence that the effect size obtained is not due to publication bias.

Lastly, the trim and fill procedure was conducted. This procedure (Duval, 2005) evaluates the impact of missing studies by assessing the funnel plot for asymmetry, imputing missing studies, and recalculating the effect size with the imputed studies included. One is then able to clearly see how the effect size would change if the missing studies were located and included in the analysis.
CHAPTER 4

Results

This chapter presents the results of the search and retrieval activities associated with identifying and retrieving relevant reports of studies, a descriptive analysis of the studies included in the final pool, the results of effect size, correlational, and moderator analyses, and finally, the results of an exploration of the cognitive components and behavioral techniques employed in the interventions.

The search for relevant studies

A search of nine electronic databases, manual examination of reference lists and bibliographies, as well as page-by-page visual scans of four journals, requests for information posted on organizational list servs, and informal communication with professionals yielded more than 900 reports of potentially relevant studies. An exact figure was not obtained due to the fact that a number of reports were reviewed during exploratory searches conducted prior to formal initiation of this project. Of the reports obtained during the formal search, 154 appeared relevant and were selected for further review; 30 studies described in 42 reports were included in the final analyses. Figure 2 summarizes the formal search and retrieval process.

Electronic searches accounted for 43% (n=13) of the included studies. The search strategy for each database was adapted to match the indexing terms by referencing the associated thesaurus prior to implementation of the systematic search. Appendix B contains the strategy employed for each database. Development of the search strategy was an iterative process, was done in consultation with two librarians at the University of Pennsylvania (P. Lynn and G. Kuntz) and two professional information specialists.
Figure 2 Selection process for including reports in the meta-analysis

- Potentially relevant reports identified (n > 900)
- Reports retrieved for further review (n = 154)
- Reports progressing to next level (n = 108)
- Reports excluded by title and abstract review (n ≈ 750)
- Reports excluded at Phase I screening (n = 46)
- Reports excluded at Phase II screening (n = 59)
- Reports used to code studies for inclusion (n = 49)
- Reports excluded after coding completed (n = 7)
- Reports used to conduct meta-analysis (n = 42*)
  * 30 studies + 12 supplemental reports

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associated with the Cochrane Collaboration's Developmental Psychosocial Learning Problems Group (CCDPLPG; J. Abbott and J. Dennis), took place over several sessions, and required a total of approximately 60 hours.

Once each strategy was developed, the time it took to conduct the database search and download the results was brief. Reviewing the downloaded information, in contrast, required a great deal of time. Approximately 160 hours were spent reviewing the information and following related links.

The exploratory searches (conducted in the spring and summer of 2005) using Google, Yahoo, and ez2find yielded more than 4000 hits, but these were not useful for this project. Items such as non-academic presentations by individuals, news articles supporting the need for anger management programs, personal anecdotes, and school district reports without identification of the program used, for example, were often listed in the first several pages. These search engines were therefore not utilized for generalized searching during the formal search and retrieval process. Google was used, however, to search for additional information on specific authors and programs identified as applicable in the literature.

Manual searches accounted for the identification of 50% (n=15) of the included studies. Reference lists of related meta-analyses and bibliographies of relevant studies were the most lucrative sources of reports, with fully 87% of the studies identified manually discovered using this approach. The remaining 13% of studies identified through hand searches were discovered in a more serendipitous manner; they were found by searching the personal webpage of a university-affiliated researcher and browsing through articles in an electronic journal.
Although the page-by-page hand search of four journals (Aggressive Behavior, Behavior Therapy, Cognitive Therapy and Research, and Journal of School Health) failed to produce any additional studies related to this topic and took 63 hours to complete, 280 randomized-or possibly randomized-trials were identified. These references were given to the current manager of the Campbell Collaboration's Sociological, Psychological, Educational, and Criminological Trials Register (C2-SPECTR) for verification and entry into the database. Documentation of the hand search results (by journal) is located in Appendix E.

Response to postings on organizational listservs fluctuated. A request posted to COGAPAGS, a listserv for graduate students studying cognitive psychology and sponsored by the American Psychological Association of Graduate Students, generated no responses. A request posted to the Society for Prevention, on the other hand, produced three responses within two days and included two attached articles, a summary of two randomized trials with citations, and a reference list containing 24 studies.

Telephone communication with program developers (Ms. K. Romstad and Dr. M. Hirschstein at the Committee for Children, developers of Second Step, a violence prevention curriculum), while positive in nature, did not yield any usable reports. The majority of evaluations -of which these developers were aware- involved experimental designs that did not meet the eligibility requirement for this project. A subset of studies identified in a literature search for a review of aggression programs in the U.K. (made available by J. Dennis and J. Abbott of the CCDPLPG) also yielded no additional studies.
The source of the remaining 7% (n=2) reports of studies included in the final meta-analysis and not identified via the above mechanisms could not be determined, as these reports were obtained prior to the systematic recording of source information.

Study retrieval and exclusions

Once studies were identified as potentially relevant by title (and abstract when available), reports were downloaded electronically. Reports unavailable electronically were requested from the Penn library, using the interlibrary loan service. Penn librarians were able to obtain all but six of the requested items.

Table 3 presents the results of the two-phase screening process carried out with the 154 reports retrieved for full-text review and described more fully in the methodology section. In brief, Phase I screenings primarily assessed the appropriateness of setting, participant, focus, and design (if possible). Phase II screenings were more nuanced and required a closer reading of the report. Screeners were asked to confirm the classification of the intervention as a cognitive-behavioral treatment, classify the comparison treatment, note whether a relevant outcome was included, and assess the adequacy of data for effect size calculation.

Overall, the results of the screening process reflected the intentions of each screening phase. The majority of reports of studies containing ineligible designs, taking place in non-school settings, or involving populations other than school children were rejected in Phase I and the majority of reports of studies containing non-cognitive-behavioral interventions, ineligible outcomes, and inadequate data for effect size calculation rejected in Phase II. Decisions regarding the inclusion of anger in the intervention curriculum were made equally in Phase I and II. This variability was due
Of the 24 unacceptable designs rejected in Phase I, 79% (n = 19) were literature reviews or meta-analyses. The bibliographies of these reports were used in the manual search and as background material. In Phase II, unacceptable outcomes and inadequate presentation of data for effect size calculation represented 71% (n = 42) of the reports rejected. Unacceptable outcomes included such items as scores on a “feelings vocabulary” assessment, student description of physiologic cues to recognize anger, rating of angry feelings when presented with hypothetical scenarios, and teacher ratings of student ability to “get along.” Reports rejected on the basis of inadequate data presented results in a variety of ways, e.g., mean scores or change scores without
accompanying standard deviations and F-ratios with adjustments for covariates (Lipsey & Wilson, 2001).

In addition to the 105 reports excluded through these screenings, an additional seven reports were excluded at the analysis stage. Six reports described studies in which the assignment was done at the group level (e.g., school), but where there was only one group (school) per condition. In situations such as these, the effects of intervention are confounded with the effects of the particular grouping and it is impossible to distinguish the contribution of each. It was, therefore, deemed most conservative to exclude studies in which there was an n of 1 per condition. The seventh report excluded from this meta-analysis did not suffer from an n of 1 per condition, but rather utilized a large number of schools. For a period of three years, 11 schools were randomly assigned to one of three conditions every semester. Given the small sample size over this length of time (intervention = 28; control = 23), the fact that a school could participate in more than one intervention condition, and the vagueness of author description, it was difficult to determine how many students participated at each school at each time point. Due to this shortcoming, corrections for randomization at the group level with analysis at the individual level could not be applied. Appendix F contains a list of excluded reports of studies, organized by reason for exclusion.

Data extraction and inter-rater reliability

Extracting data from the study reports was a time-consuming process, dependent largely upon the clarity of writing and comprehensiveness of documentation by the primary author(s). It took approximately two and one half hours to read and code the most explicitly written and meticulously detailed reports. At the other extreme, it required
approximately eight hours to read, understand, and code loosely written and
imprecisely documented reports. Overall, approximately 160 hours were spent on the
data extraction aspect of the project.

As described in the methodology section, the coding form and manual underwent
several revisions during this project. J. Lavenberg developed and revised all forms and
coded all studies. Independent double coding of a randomly selected subset of studies (n
= 5) was performed on a volunteer basis by Dr. S. J. Wilson at the Center for Evaluation
Research and Methodology at Vanderbilt University. This was carried out at two points
in time (early November, 2006; late December 2006). In November, Dr. Wilson coded
two studies. Overall agreement between Wilson and Lavenberg for these two studies was
only 60%, with the most problematic areas related to methodological and outcome
characteristics. Through follow-up discussions, it was determined that a number of the
differences were minor and related to coding questions open to multiple interpretation, as
well as the related issue of insufficient background information and definitions in the
manual.

Subsequent to this discussion, final coding form and manual revisions were made
and Dr. Wilson coded an additional three studies. Agreement between Lavenberg and
Wilson on these studies was 88% overall. Importantly, there was 100% agreement on the
data extracted for effect size calculation. It should be noted that two of the three studies
coded by Dr. Wilson in December involved group level assignment with an n of 1 per
condition and were later excluded during the analysis stage. Agreement between Wilson
and Lavenberg on the study that remained in the pool of studies was still 88%.
General characteristics of the included studies

An overview of the general characteristics of the studies included in the meta-analysis is presented in the form of two tables. Table 4 displays study level, methodological, and participant characteristics. Table 5 provides information on intervention characteristics.

As seen in Table 4, there has been strong interest in evaluating school-based cognitive-behavioral interventions since the treatment was first suggested in the mid-1970s, as demonstrated by the number of studies conducted between 1975 and 1995. Half of the studies included in this meta-analysis, however, were reported within the last decade. Graduate students, as well as advanced practice personnel and researchers, are inclined to develop and implement interventions, as reflected by the fact that one-third of the included studies were published as dissertations. The United States was the setting for almost all studies, with only two studies conducted elsewhere - Canada (Pepler, 1995) and Israel (Shechtman, 2000).

As could be predicted from the inclusion criteria for this study, experimental designs were predominant (83%, n = 25). Interventions often took place in suburban (43%, n = 13) public schools (73%, n = 22) and involved students exhibiting problematic, aggressive behavior at baseline (83%, n = 25). Suburban students made up 53% (n=1536) of the sample; urban students made up 6% (n = 171). Rural and students in other countries each represented 5% (n = 157 and n = 138, respectively). One large study was conducted in both urban and suburban settings and made up 27% (n = 790) of the sample.

Documentation of race and ethnicity and socioeconomic status (SES) was uneven.
Table 4

*General characteristics of included studies*

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<th>Baseline behavior</th>
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<tbody>
<tr>
<td>United States</td>
<td>27 90</td>
<td>exhibiting aggressive behavior 25 83</td>
<td></td>
</tr>
<tr>
<td>Other country</td>
<td>2 7</td>
<td>considered at-risk 2 7</td>
<td>anger primary 18 60</td>
</tr>
<tr>
<td>Unable to determine</td>
<td>1 3</td>
<td>not considered at-risk 2 7</td>
<td>anger embedded 12 40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School type</th>
<th>baseline behavior</th>
<th>not reported</th>
<th>School setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>22 73</td>
<td>Low 2 7</td>
<td>Urban 7 23</td>
</tr>
<tr>
<td>Alternative</td>
<td>7 23</td>
<td>Middle 2 7</td>
<td>Suburban 13 43</td>
</tr>
<tr>
<td>more than one type</td>
<td>1 3</td>
<td>multiple categories 7 23</td>
<td></td>
</tr>
<tr>
<td>not described</td>
<td>4 13</td>
<td>not considered at-risk 2 7</td>
<td>not reported 1 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School level</th>
<th>Intervention focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>14 47</td>
</tr>
<tr>
<td>Middle</td>
<td>8 27</td>
</tr>
<tr>
<td>High</td>
<td>4 13</td>
</tr>
<tr>
<td>more than one level</td>
<td>3 10</td>
</tr>
<tr>
<td>not reported</td>
<td>1 3</td>
</tr>
</tbody>
</table>
Just under two-thirds of the reports (63%, n = 19) described the racial and ethnic status of study participants. Of those that did report on participant race and ethnicity, half described the intervention as taking place with mixed racial groups; 57% of the reports (n = 17) omitted any description of participant SES. Of the approximately 40% that did report such information, the majority of groups were comprised of participants from different SES strata. Due to the amount of missing information in the race and ethnicity and SES categories, these variables were excluded from subsequent analyses.

Mean age was missing in 43% (n = 13) of the studies. School level (i.e., elementary, middle, and high) was selected to replace age as a variable for a number of reasons. First, school level grossly corresponds to the cognitive developmental level of the participants. Elementary school students between kindergarten and fifth grade are typically between five and ten years of age and functioning at the pre-operational (grades K – 2) and concrete operational (grades 3 – 5) Piagetian stages. Middle school students are typically between eleven and thirteen years old and beginning to move from the concrete operational stage to the formal operational stage. High school students are typically between fourteen and seventeen years old and are able to think abstractly (i.e., operate in the formal operational Piagetian stage). Durlak et al. (1991) also used these criteria.

Secondly, analyses conducted with the school level variable were thought to provide useful information for practitioners and school administrators who are interested in interventions for specific populations. Thirdly, policy makers interested in making funding decisions would also find school level analyses useful. School level was therefore used in all analyses.
Table 5 shows that interventions focusing exclusively on coping with anger accounted for the bulk (60%, n = 18) of the studies, while interventions designed to decrease aggressive behavior included anger management within the curriculum were the second most common intervention (27%, n = 8) implemented.

Comparisons between treatment groups and untreated controls were the predominant (81%, n = 30) contrast format. Placebo groups were employed in the remaining 19% contrasts, perhaps to allay ethical concerns surrounding random assignment -- as 5 of the 7 studies that utilized placebo groups were randomized controlled trials. Placebo conditions included activities such as game playing, movie watching, and goal setting instruction.

School counselors or psychologists and researchers delivered the intervention in more than half (57%, n = 17) of the studies. In contrast, teachers delivered interventions in relatively few (17%, n = 5) studies. The teachers that did carry out interventions were either executing a pre-packaged program (e.g., Second Step in Grossman, Neckerman, Koepsell, Liu, Asher, Beland; 1997; Think First in Nickerson, 2003) or working with special populations (e.g., emotionally and behaviorally disordered students in Etscheidt, 1991, and Robinson, 1999; “special education” students in Robinson, 1999). Classroom teachers were involved in implementing interventions along with school counselors or school counseling students, however, in an additional two studies. In all, teachers were involved in delivering cognitive-behavioral anger interventions in a modest 20% (n = 6) of the studies.
Table 5  
**Characteristics of interventions employed in the included studies**

<table>
<thead>
<tr>
<th>Program focus</th>
<th>n</th>
<th>%</th>
<th>Outcome measures</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>18</td>
<td>60</td>
<td>standardized</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Aggression</td>
<td>8</td>
<td>27</td>
<td>unstandardized</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>Coping with parental divorce</td>
<td>1</td>
<td>3</td>
<td>both types</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>social skills</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>self efficacy</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comparisons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no treatment control</td>
<td>30</td>
<td>81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placebo</td>
<td>7</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delivery personnel</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>counselor or psychologist</td>
<td>9</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>researcher or trained personnel</td>
<td>8</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>computer delivery</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>multiple</td>
<td>7</td>
<td>23</td>
<td></td>
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<td></td>
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<tr>
<td><strong>Delivery format</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>5</td>
<td>17</td>
<td></td>
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<td></td>
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<tr>
<td>small group (10 or &lt;)</td>
<td>14</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>large group (11 or &gt;)</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intact classroom</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
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<tr>
<td>multiple formats</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not reported</td>
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<td>3</td>
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<td><strong>Primary outcome informant</strong></td>
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<td>teacher</td>
<td>15</td>
<td>50</td>
<td></td>
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<td>parent</td>
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<td>0</td>
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<td>self report</td>
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<td>10</td>
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<td>peer</td>
<td>1</td>
<td>3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>trained observer</td>
<td>3</td>
<td>10</td>
<td></td>
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</tr>
<tr>
<td>multiple informants</td>
<td>8</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of intervention sessions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elementary</td>
<td>13</td>
<td>8</td>
<td>40</td>
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<tr>
<td>middle</td>
<td>10</td>
<td>8</td>
<td>20</td>
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<td></td>
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<tr>
<td>high school</td>
<td>9.5</td>
<td>8</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Length of intervention session (minutes)</strong></td>
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<tr>
<td>elementary</td>
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<tr>
<td>middle</td>
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</tr>
<tr>
<td>high school</td>
<td>50</td>
<td>30</td>
<td>60</td>
<td></td>
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</tr>
</tbody>
</table>

**Note.** * n=30.  
**n=37. Five studies contained two comparisons; one study contained three comparisons.
On the other hand, teachers were very involved in assessing the effectiveness of interventions. They were the sole informant in 50% (n = 15) of the studies as well as one of the informants in 100% of the studies utilizing multiple informants. Thus, teachers served as informants in 77% (n = 23) of all studies.

The small group format was the most common intervention delivery method (47%, n = 14), followed nearly equally by individual instruction (17%, n = 5), large groups (13%, n = 4), and intact classrooms (13%, n = 4). This overall pattern was not reflected consistently across school levels, however. Intact classrooms were the most common format for delivery of interventions at the middle school level, with 75% (n = 3) of the studies utilizing assignment by classroom occurring at this level. At the elementary and high school levels, the small group format did predominate; 62% (n = 8) of all elementary school interventions were delivered in this manner, as well as 50% (n = 2) of all high school interventions. Mean group size for the small group format overall was 7 participants.

Details of included studies – methodological characteristics

Methodological, participant, and intervention details have been implicated in affecting the overall effect size calculations, as noted in the methodology section. Thus, it is important to examine the details of each included study. Table 6 presents the methodological details of each study.

As revealed in the table, experimental evaluations of cognitive-behavioral interventions addressing anger management began in the early 1980s in the public elementary, middle, and high schools, as well as in alternative school settings. Assignment to condition by large groups (e.g., schools and school districts) began a
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Unit of assignment</th>
<th>Outcome measure - subscale</th>
<th>Assessment</th>
<th>Informant</th>
<th>Informant blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lochman et al. (1984)</td>
<td>Experimental</td>
<td>Individual</td>
<td>BOSPT - disruptive and aggressive behavior</td>
<td>1 month post-intervention</td>
<td>trained observer</td>
<td>no</td>
</tr>
<tr>
<td>Lochman (1985)</td>
<td>Quasi-Experimental</td>
<td>Individual</td>
<td>BOSPT - disruptive and aggressive behavior</td>
<td>1 month post-intervention</td>
<td>trained observer</td>
<td>yes</td>
</tr>
<tr>
<td>Pedro-Carroll &amp; Cowen (1985)</td>
<td>Experimental</td>
<td>Individual</td>
<td>CARS* - acting out, aggressive behavior</td>
<td>2 weeks post-intervention</td>
<td>Teacher</td>
<td>cannot determine</td>
</tr>
<tr>
<td>Omizo et al. (1988)</td>
<td>Experimental</td>
<td>Individual</td>
<td>MSBC* - aggressive behavior</td>
<td>1 week post-intervention</td>
<td>Teacher</td>
<td>Yes</td>
</tr>
<tr>
<td>Lochman et al. (1989)</td>
<td>Quasi-Experimental</td>
<td>Schools</td>
<td>MCBC* - aggressive behavior</td>
<td>3 weeks post-intervention</td>
<td>Teacher</td>
<td>No</td>
</tr>
<tr>
<td>Lochman et al. (1993)</td>
<td>Experimental</td>
<td>Individual</td>
<td>behavioral checklist - aggressive behavior</td>
<td>post-intervention and 1-year follow-up</td>
<td>peer teacher</td>
<td>Cannot determine</td>
</tr>
<tr>
<td>Pepler et al. (1995)</td>
<td>Experimental</td>
<td>Individual</td>
<td>TRF* - externalizing behavior</td>
<td>post-intervention</td>
<td>Teacher</td>
<td>No</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Unit of Assignment</td>
<td>Outcome Measure - Subscale</td>
<td>Assessment</td>
<td>Informant</td>
<td>Informant Blind</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Braswell et al. (1997)</td>
<td>Experimental</td>
<td>school districts</td>
<td>BASC* - externalizing behavior</td>
<td>after each year of 2-year program</td>
<td>parent</td>
<td>Cannot determine</td>
</tr>
<tr>
<td>Sukhodolsky et al. (2000)</td>
<td>Experimental</td>
<td>Individual</td>
<td>PAES - frequency of anger expression toward objects or people (student); TRS - behavioral manifestations of anger (teacher)</td>
<td>1 week post-intervention</td>
<td>student</td>
<td>Yes</td>
</tr>
<tr>
<td>Lochman &amp; Wells (2003)</td>
<td>Experimental</td>
<td>individual</td>
<td>TOCA - physically aggressive behavior</td>
<td>1 year post-intervention</td>
<td>teacher</td>
<td>No</td>
</tr>
<tr>
<td>Scheckner &amp; Rollin (2003)</td>
<td>Experimental</td>
<td>individual</td>
<td>BASC* - externalizing behavior</td>
<td>post-intervention</td>
<td>teacher</td>
<td>Yes</td>
</tr>
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</table>
Table 6

Methodologic Details of Included Studies by School Level (continued)

Middle School

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Unit of assignment</th>
<th>Outcome measure - subscale</th>
<th>Assessment</th>
<th>Informant</th>
<th>Informant blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainback (1986)</td>
<td>Experimental</td>
<td>individual</td>
<td>anger inventory - verbal aggression</td>
<td>post-intervention and 4-week follow-up</td>
<td>parent student teacher</td>
<td>Yes</td>
</tr>
<tr>
<td>Dauer (1994)</td>
<td>Experimental</td>
<td>individual</td>
<td>STAXI* - anger out (student), CTRS* - aggressive behavior (teacher)</td>
<td>post-intervention</td>
<td>student teacher</td>
<td>Yes</td>
</tr>
<tr>
<td>Deffenbacher et al. (1996)</td>
<td>Experimental</td>
<td>individual</td>
<td>STAXI* - anger out</td>
<td>8 weeks post-intervention</td>
<td>student</td>
<td>No</td>
</tr>
<tr>
<td>Robinson (1999)</td>
<td>Experimental</td>
<td>classrooms</td>
<td>STAXI* - anger out (student), TRF* - aggressive + externalizing behaviors (teacher)</td>
<td>post-intervention and 4-week follow-up</td>
<td>student teacher</td>
<td>No</td>
</tr>
<tr>
<td>Bosworth et al. (2000)</td>
<td>Experimental</td>
<td>teams within schools</td>
<td>author form - select items from aggressive behavior measure</td>
<td>4 months post-intervention</td>
<td>student</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 6

Methodologic Details of Included Studies by School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Unit of assignment</th>
<th>Outcome measure - subscale</th>
<th>Assessment</th>
<th>Informant</th>
<th>Informant blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varcoe (1983)</td>
<td>Experimental</td>
<td>individual</td>
<td>behavior observation scale - aggressive behavior</td>
<td>post-intervention</td>
<td>teacher</td>
<td>Yes</td>
</tr>
<tr>
<td>McWhirter &amp; Page (1999)</td>
<td>Quasi-Experimental</td>
<td>classrooms</td>
<td>STAXI* - anger expression</td>
<td>post-intervention</td>
<td>student</td>
<td>No</td>
</tr>
<tr>
<td>Whitfield (1999)</td>
<td>Experimental</td>
<td>individual</td>
<td>CBCL* - externalizing (parent); STAXI* - anger expression (student); TRF* - externalizing (teacher)</td>
<td>post-intervention and 6-month follow-up</td>
<td>parent student teacher</td>
<td>Yes</td>
</tr>
<tr>
<td>Nickerson (2003)</td>
<td>Experimental</td>
<td>individual</td>
<td>CRS-TSF* - conduct problems</td>
<td>post-intervention</td>
<td>teacher</td>
<td>No</td>
</tr>
<tr>
<td>More than one school level involved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conaway (1982)</td>
<td>Quasi-Experimental</td>
<td>individual</td>
<td>Class behavioral data form - physical + verbal aggression</td>
<td>during and post-intervention</td>
<td>teacher</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Table 6

Methodologic Details of Included Studies by School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Unit of assignment</th>
<th>Outcome measure - subscale</th>
<th>Assessment</th>
<th>Informant</th>
<th>Informant blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pascucci (1990)</td>
<td>Experimental</td>
<td>classrooms</td>
<td>Academic + behavioral transcript</td>
<td>4 weeks post-intervention</td>
<td>teacher</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>aggressive behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shechtman (2000)</td>
<td>Experimental</td>
<td>individual</td>
<td>CBCL* (student), TRF* (teacher) - aggressive behavior</td>
<td>2 weeks post-intervention</td>
<td>student teacher</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Undocumented school level

| Etscheidt (1991)  | Experimental | classrooms        | Behavioral observation - minor + severe acting out behavior | for 3 weeks post-intervention | trained observer | Yes             |

Note. * denotes measure reported in Buros Institute of Mental Measurements Yearbook(s) and classified as a standardized outcome measure for this project. BASC - Behavior Assessment System for Children; BOSPT - Behavior Observation Schedule for Pupils and Teachers; CARS - Classroom Adjustment Rating Scale; CBCL - Child Behavior Check List; CRS-TSF - Conners' Rating Scale - Teacher Short Form; CTRS - Conners' Teacher Rating Scale; MCBC - Missouri Child Behavior Checklist; MSBC - Miller School Behavior Checklist; PAES - Pediatric Anger Expression Scale; SSBS - School Social Behavior Scales; STAXI - State-Trait Anger Expression Inventory; TOCA - Teacher Observation of Classroom Adjustment; TRF - Teacher Report Form; TRS - Teacher Rating Scale.
decade and a half later, in the late 1990s. The lone exception to this pattern was the Lochman, Lampron, Gemmer, Harris, and Wyckoff. (1989) study, in which six schools were assigned to one of two conditions on an alternating basis (i.e., a quasi-experiment).

It is interesting to note that among the quasi-experimental designs, individual level assignment was used in the early studies (Conaway, 1982; Lochman, 1985) and group level assignment was used in later studies (Lochman, et al., 1989; McWhirter, 1999; Lochman, et al., 1989; McWhirter, 1999).

Testing for group equivalence with respect to the level of aggressive behavior displayed at baseline was conducted and explicitly discussed by the authors in 67% (n = 20) of the studies. A further 23% (n = 7) of studies indicate that tests for group equivalence were conducted, but the authors did not separately report the results. Of these seven studies, five used random assignment to condition and were, therefore, assumed to have baseline equivalence, one study used baseline scores as covariates in the analyses, and one study author reported that analyses were run only on cells with no differences in pretest scores. The final 10% of studies (n = 3) report that pre-equivalence testing was not conducted. All of these studies were randomized controlled trials, thus, baseline equivalence was assumed.

A variety of outcome measures to assess aggressive behavior were employed in the included studies. Measures used at the elementary school level were not used at any other school level, with the sole exception of scales developed by Achenbach and colleagues (i.e., Teacher Report Form (TRF), Child Behavior Check List (CBCL) for parents and for students). These were used at the middle school and high school levels as well as the elementary level. An equal number of standardized and unstandardized
measures were employed. In spite of array of measures used at the elementary level and the combination of standardized and unstandardized measures, however, all measures assessed aggressive student behavior. A table of outcome measures used at each school level is presented in Appendix G.

Student self report was noted in 63% (n = 5) of the studies conducted at the middle school level and in 50% (n = 2) of the studies conducted at the high school level. The State-Trait Anger Expression Inventory (STAXI) was the only standardized measure employed, with the anger-out and anger expression subscales being the two specific subscales used.

By and large, outcome assessments were conducted soon after the conclusion of the program. At the elementary level, outcomes were measured within one month of the completion of the program in all studies but one. At the high school level, outcomes were measured at the conclusion of the program in all programs. Interestingly, at the middle school level, half of the studies measured outcomes at the conclusion of the program, while the other half of the studies measured outcomes between five weeks and four months after the interventions ended.

Relatively few studies (n = 5) reported on follow-up assessments. Of those that did, two studies reported a one month follow-up and both had been conducted with middle school students. Two other studies reported four to six month follow-up assessments and both of these involved interventions implemented in the alternative school setting. The remaining study reported a one-year post-intervention assessment that had been implemented with elementary school students.
The final methodological detail considered in this overview of included studies was the status of the outcome informant’s knowledge with respect to the participant’s assignment to condition. As noted in the methodology section, knowledge of a participant’s assignment can lead to bias in reporting. Studies were coded on this item on a hierarchical basis. It was assumed that students would be aware of their assignment so they were not considered blind. Similarly, it was assumed that parents could be made aware of their child’s assignment through dinnertime and other conversations with the child and so they, too, were not considered blind.

Teachers, on the other hand, were considered blind if they were not involved in implementing the intervention in any way nor informed of the child’s assignment. Therefore, coding reflected teacher informants in all cases, except where trained observers (n = 3) were employed to assess child behavior. At the elementary level, 29% of the teachers were blind. At the middle school level, 38% were blind. And at the high school level, 50% were blind. While it appears that teachers at the high school level were most unaware of a participant’s condition, documentation in the studies reporting on elementary school interventions was poor and informant blinding could not be determined in 36% of the studies.

Details of included studies – participant and intervention characteristics

A summary of the participant and intervention characteristics of each study, organized by intervention focus and schooling level, is presented in Table 7. As can be seen, three of the seven studies focused on coping with anger and conducted at the elementary school level were conducted by Lochman et al. (1984; 1985; 1989). Each intervention was conducted with a different sample. Two of the studies (1984; 1985)
were conducted at the same school, however. The comparison groups used for the 1985 study were the untreated control and placebo groups from the 1984 study. The atypical nature of this design was discussed with two committee members (Dr. Boruch and Dr. Turner). It was decided that, while less than ideal, the 1985 study met the technical inclusion criteria for this study (i.e., the study evaluated the impact of an intervention by distinguishing between an intervention or treatment group and comparison or control group) and history effects were expected to be minimal. The study is thus included with a notation regarding the unique character of the comparisons involved. This level of specificity is reported to meet the goal of transparency, so that readers of this study and future reviewers of anger interventions are aware of some of the obstacles present in the literature. It should also be noted that both Lochman, et al. (1984) and Lochman (1985) were included in previous meta-analyses of cognitive-behavioral interventions investigating anger management (Beck and Fernandez, 1998; Gansle, 2005). The effect of eliminating the Lochman (1985) study will be analyzed in a forthcoming section.

Even though the vast majority of studies took place in the United States, there was great geographic variability. Studies in suburban areas, the most prevalent setting (n=13), were located in the mid-Atlantic (NY, NJ, VA), southeastern (NC), mid-western, northern (MN), and western (CA) parts of the country. Urban sites were also varied, with studies (n = 6) conducted in the northeast, mid-Atlantic, southeast, south, mid-west, and HI. Rural sites were less diverse, with studies (n = 5) conducted primarily in the eastern third of the country (KY, PA FL, and NC).
**Table 7**

*Participant and Intervention Details by Primary Focus and School Level*

**Anger as Primary Focus**

**Elementary**

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lochman, et al. (1984)</td>
<td>public school in suburban NC</td>
<td>4th-6th grade males; AA and C</td>
<td>aggressive</td>
<td>Anger Coping, Anger Coping + Goal Setting-12</td>
<td>guidance counselors + staff from local clinic</td>
<td>not reported</td>
<td>12 sessions, length unreported</td>
</tr>
<tr>
<td>Boswell (1984)</td>
<td>public school in rural central PA</td>
<td>3rd-5th grade males</td>
<td>aggressive</td>
<td>Novaco Anger Program, multimodal anger coping program</td>
<td>counselor</td>
<td>individual, during school day</td>
<td>10 sessions of 30-40 minutes</td>
</tr>
<tr>
<td>Lochman (1985)</td>
<td>public schools in suburban NC</td>
<td>4th - 6th grade males; AA and C</td>
<td>aggressive</td>
<td>Anger Coping + Goal Setting-18</td>
<td>school counselor + social work trainee</td>
<td>small groups of 5-6 students</td>
<td>18 sessions of 45-60 minutes</td>
</tr>
<tr>
<td>Omizo, et al. (1988)</td>
<td>public school in urban Hawaii</td>
<td>4th - 6th grade males and females</td>
<td>aggressive</td>
<td>coping with angry feelings</td>
<td>researcher</td>
<td>groups of 12 students</td>
<td>10 sessions of 45-50 minutes</td>
</tr>
<tr>
<td>Study</td>
<td>Setting/school type</td>
<td>Participants*</td>
<td>Baseline Behavior</td>
<td>Intervention</td>
<td>Delivery personnel</td>
<td>Format/time of delivery</td>
<td>Number/length of sessions</td>
</tr>
<tr>
<td>------------------------------</td>
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</tr>
<tr>
<td>Lochman, et al. 1989)</td>
<td>public school in suburban NC</td>
<td>4th - 6th grade males; AA and C</td>
<td>aggressive</td>
<td>Anger Coping, Anger Coping with teacher support</td>
<td>school counselor + staff from local clinic</td>
<td>small groups of 4-8 students</td>
<td>18 sessions of 45-60 minutes</td>
</tr>
<tr>
<td>Sukhodolsky, et al. 2000</td>
<td>public school in suburban NY</td>
<td>4th-5th grade males</td>
<td>aggressive</td>
<td>modified Feindler’s Anger Control Training</td>
<td>researcher</td>
<td>small groups of 4-7 students</td>
<td>10 sessions of 40 minutes</td>
</tr>
<tr>
<td>Scheckner &amp; Rollin 2003</td>
<td>public school in urban South</td>
<td>5th grade males and females; AA, C, Al</td>
<td>aggressive</td>
<td>SMART Talk</td>
<td>computer</td>
<td>individual</td>
<td>8 sessions of 45 minutes</td>
</tr>
</tbody>
</table>

**Middle School**

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dauer 1994</td>
<td>public schools in suburban VA</td>
<td>6th-7th grade males; AA, H, C</td>
<td>aggressive</td>
<td>Morganett anger management curriculum</td>
<td>school psychologist, social worker, counselor</td>
<td>small groups of 5-7 students, during the school day</td>
<td>8 sessions of 40 minutes</td>
</tr>
<tr>
<td>Deffenbacher 1996</td>
<td>public schools in OR + CO</td>
<td>6th-8th grade males and females; H, C, A, Al</td>
<td>not aggressive</td>
<td>cognitive relaxation coping skills</td>
<td>counselor, psychologist</td>
<td>groups of 12-14 students, during the school day</td>
<td>9 sessions of 45 minutes</td>
</tr>
</tbody>
</table>
Table 7

Participant and Intervention Details by Primary Focus and School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robinson (1999)</td>
<td>1 alternative + 2 public schools in rural central FL</td>
<td>6th-8th graders; AA, H, C, A, multiracial</td>
<td>aggressive</td>
<td>5-week anger management program, enhanced 5-week anger management program</td>
<td>classroom teacher</td>
<td>intact class, during the school day</td>
<td>10-15 sessions of 50 minutes</td>
</tr>
<tr>
<td>Colletti (2000)</td>
<td>alternative school in suburban NJ</td>
<td>7th-8th grade males and females</td>
<td>aggressive</td>
<td>Kellner's In Control program</td>
<td>Licensed clinical social workers</td>
<td>intact class of approx. 10 students, during the school day</td>
<td>10 sessions of 30 minutes</td>
</tr>
<tr>
<td>Salvador (2003)</td>
<td>alternative school in suburban NJ</td>
<td>7th-8th grade males and females</td>
<td>aggressive</td>
<td>Kellner's In Control program</td>
<td>Licensed clinical social workers</td>
<td>intact class, during the school day</td>
<td>10 weekly sessions of 30 minutes + 3 booster sessions</td>
</tr>
</tbody>
</table>
Table 7

Participant and Intervention Details by Primary Focus and School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McWhirter &amp; Page (1999)</td>
<td>alternative school in the urban Midwest</td>
<td>males and females; AA, H, C, AI</td>
<td>not aggressive; at-risk for school drop out</td>
<td>Morganett anger management curriculum</td>
<td>class teacher + master’s level counseling students</td>
<td>small groups of 8-10 students, during the school day</td>
<td>9 sessions of 60 minutes</td>
</tr>
<tr>
<td>Whitfield (1999)</td>
<td>alternative school within public school system in rural KY</td>
<td>males and females; AA, C</td>
<td>aggressive</td>
<td>Feindler’s Anger Control Training</td>
<td>researcher</td>
<td>individual, during the school day</td>
<td>12 sessions of 60 minutes</td>
</tr>
<tr>
<td>Nickerson (2003)</td>
<td>public school in suburban CA</td>
<td>9th-10th grade males and females; H</td>
<td>not aggressive; considered at-risk</td>
<td>Think First</td>
<td>Teacher volunteer</td>
<td>large group, after school</td>
<td>8 sessions of 30 minutes</td>
</tr>
<tr>
<td>More than one school level involved</td>
<td></td>
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</tr>
<tr>
<td>Conaway (1982)</td>
<td>alternative school in TX</td>
<td>males only</td>
<td>aggressive</td>
<td>modified Novaco Anger Management Program</td>
<td>Author</td>
<td>individual</td>
<td>11 sessions of 60 minutes</td>
</tr>
</tbody>
</table>
Table 7

Participant and Intervention Details by Primary Focus and School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length Of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undocumented School Level</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pascucci (1990)</td>
<td>alternative school in urban Northeast</td>
<td>males only; AA aggressive</td>
<td>modified Goldstein Anger Control Training</td>
<td>researcher</td>
<td>small group of 6-7 students, during the school day</td>
<td>5 sessions of 30 minutes</td>
<td></td>
</tr>
<tr>
<td>Etscheidt (1991)</td>
<td>alternative school</td>
<td>males and females aggressive</td>
<td>modified Lochman's Anger Coping program</td>
<td>class teacher</td>
<td>intact class of 5 students</td>
<td>12 sessions of 30-40 minutes</td>
<td></td>
</tr>
<tr>
<td><strong>Anger Embedded in the Curriculum</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Elementary</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedro-Carroll &amp; Cowen (1985)</td>
<td>public school in suburban NY</td>
<td>3rd - 6th grade males and females; C not aggressive</td>
<td>coping with parental divorce</td>
<td>School counselors, psychology postdoctoral fellow</td>
<td>small groups of 8-9 students</td>
<td>10 sessions of 60 minutes</td>
<td></td>
</tr>
<tr>
<td>Lochman, et al. (1993)</td>
<td>public school in urban NC</td>
<td>4th grade males and females; AA aggressive</td>
<td>social relations curriculum</td>
<td>Trained graduate students</td>
<td>individual and group program delivery</td>
<td>26 individual sessions + 8 group sessions of 30 minutes</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Setting/school type</td>
<td>Participants*</td>
<td>Baseline Behavior</td>
<td>Intervention</td>
<td>Delivery personnel</td>
<td>Format/time of delivery</td>
<td>Number/length Of sessions</td>
</tr>
<tr>
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</tr>
<tr>
<td>Pepler, et al. (1995)</td>
<td>public school in Canada</td>
<td>1st - 4th grade males and females</td>
<td>aggressive</td>
<td>Earlscourt Social Skills Group Program</td>
<td>trained child care workers</td>
<td>small groups of 7 students</td>
<td>2 weekly sessions of 75 minutes x 12-15 weeks</td>
</tr>
<tr>
<td>Grossman, et al. (1997)</td>
<td>public schools in urban and suburban WA</td>
<td>2nd - 3rd grade males and females; AA, H, C, Al</td>
<td>not aggressive</td>
<td>Second Step violence prevention program</td>
<td>classroom teacher</td>
<td>intact classroom, during the school day</td>
<td>30 sessions of 35 minutes</td>
</tr>
<tr>
<td>Braswell, et al. (1997)</td>
<td>public schools in suburban MN</td>
<td>1st - 4th grade males and females</td>
<td>aggressive</td>
<td>Multicomponent Competence Enhancement Intervention</td>
<td>School psychologist</td>
<td>small groups of 6-8 students</td>
<td>28 sessions of 45-60 minutes over a 2-year period</td>
</tr>
<tr>
<td>Lochman &amp; Wells (2003)</td>
<td>public school in suburban NC</td>
<td>5th grade males and females</td>
<td>aggressive</td>
<td>Coping Power</td>
<td>Program specialist + guidance counselor</td>
<td>small groups of 5-8 students after school or before school</td>
<td>6 individual + 34 group sessions of 40-50 minutes</td>
</tr>
<tr>
<td>DeRosier (2004)</td>
<td>public schools in suburban NC</td>
<td>males and females; AA, H, C, A, biracial</td>
<td>aggressive</td>
<td>S.S.GRIN</td>
<td>School counselor + trained intern</td>
<td>small group of 6 students, during the school day</td>
<td>8 sessions of 50-60 minutes</td>
</tr>
</tbody>
</table>
Table 7

Participant and Intervention Details by Primary Focus and School Level (continued)

**Middle School**

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feindler (1984)</td>
<td>public schools in urban mid-Atlantic</td>
<td>not reported</td>
<td>aggressive</td>
<td>Anger Control Training</td>
<td>Trained therapist + aide</td>
<td>small group of 6 students</td>
<td>20 sessions of 50 minutes</td>
</tr>
<tr>
<td>Stainback (1986)</td>
<td>public school in rural NC</td>
<td>7th - 8th grade males and females; AA, C</td>
<td>aggressive</td>
<td>author developed program targeting verbal aggression</td>
<td>teacher + school counselor</td>
<td>small groups of 10 students</td>
<td>8 sessions of 30 minutes</td>
</tr>
<tr>
<td>Bosworth (2000)</td>
<td>public regional school in the Midwest</td>
<td>6th-8th grade males and females; AA, C, biracial</td>
<td>aggressive</td>
<td>SMART Talk</td>
<td>computer</td>
<td>individual</td>
<td>not reported</td>
</tr>
</tbody>
</table>

**High School**

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varcoe (1983)</td>
<td>intermediate public high school in rural central PA</td>
<td>males and females</td>
<td>aggressive</td>
<td>author developed cognitive coping skills program</td>
<td>guidance counselor + school psychologist</td>
<td>small groups of 4-6 students, during the school day</td>
<td>10 sessions of 45-50 minutes</td>
</tr>
</tbody>
</table>
Table 7

Participant and Intervention Details by Primary Focus and School Level (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting/school type</th>
<th>Participants*</th>
<th>Baseline Behavior</th>
<th>Intervention</th>
<th>Delivery personnel</th>
<th>Format/time of delivery</th>
<th>Number/length of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shechtman (2000)</td>
<td>public school in urban Israel</td>
<td>5th-9th grade males and females</td>
<td>aggressive</td>
<td>structured bibliotherapy and counseling</td>
<td>Graduate students</td>
<td>variable: individual, dyad, and groups of approximately 10-12 students</td>
<td>10 sessions of 45 minutes</td>
</tr>
</tbody>
</table>

Note. * The following abbreviations are used to represent the ethnic background of the participants: A - Asian; AA - African-American; AI - American Indian; C - Caucasian; H - Hispanic.
Interventions in the suburban setting were predominantly conducted in public schools, as were two-thirds of the urban interventions. Interventions in the rural areas, however, were equally likely to be conducted in public or alternative school settings.

Examining the interventions by school level, one can see that there were an equal number of interventions with anger control as the primary focus and with anger management embedded in the curriculum of another program at the elementary school level. All interventions focusing primarily on anger control, however, were conducted with older elementary students (usually grades 4 – 6). Interventions involving the younger elementary students (grades 1-4) were typically those that had anger management embedded within the curriculum. At the middle and high school levels, there were slightly more interventions focusing chiefly on anger control. In alternative schools, however, only interventions with anger control as the primary focus were implemented. Male only groups were utilized solely in interventions where anger control was the primary focus -and mostly in studies conducted between 1984 and 1994.

Classification of the intervention focus was based on author description of the purpose of the intervention and program content (when available). This information was often found in the introduction and literature review sections of the reports. Occasionally it was difficult to determine the appropriate classification, as the author description of the program focus contrasted with the intervention employed. For example, Feindler et al (1984) describe their study as “[d]esigned to evaluate the effectiveness of a self-control training program ….this intervention targeted incidents of aggression, social problem-solving skills, and self-control” (p. 301) so the study was classified as having anger management embedded in the curriculum. The intervention, however, was labeled as an
"anger control training program." Studies that subsequently used Feindler’s intervention program (Sukhodolsky, Solomon, & Perine, 2000; Whitfield, 1999) focused primarily on anger control. Although this discrepancy suggests that the dichotomous nature of the classification used in this study may be somewhat artificial, relatively few studies suffered from this inconsistency. Since the author’s stated purpose and the title or description of the intervention appeared to match, the dichotomous classification of intervention foci as primary or embedded was retained and used in subsequent analyses.

No individual program or curriculum predominated in either the group of anger-primary focus interventions or the anger-embedded interventions. Five programs made up 50% of the interventions. Lochman and colleagues were the authors of five of the included studies, thus their Coping Power Program (with its various enhancements over time) was the most frequently identified program. Only one other researcher adapted the Lochman program, however (Etscheidt, 1991).

The next most commonly employed program was Feindler, et al.’s Anger Control Training; it was developed and used by Feindler and colleagues in 1984 and adapted by Whitfield (1999) and Sukhodolsky, et al. (2000). Sections of the Morganett Skills for Living: Group Counseling Activities for Young Adolescents curriculum were used by Dauer (1994) and McWhirter (1999), while the In-Control program was used by Colletti (2000) and Salvador (2003). Finally, SMART Talk, a computerized program, was used by Bosworth (2000) and Scheckner and Rollin (2003). The remaining 50% of studies involved unique, discrete programs.
Issues surrounding effect size calculation

The overwhelming majority of studies (n = 27) included in this meta-analysis offered outcome data in the form of group means and standard deviations. The remaining few studies (n = 3) presented the data as t or F statistics. As previously described, CMA 2.0 has the capability to synthesize effect sizes from data presented in different formats, so there was no need to transform any of the data to a different format.

In nine studies, however, groups of individuals had been assigned to condition, yet results were reported as means and standard deviations at the individual level. The What Works Clearinghouse has termed this a “mismatch” (Technical Paper: What Works Clearinghouse tutorial on mismatch between unit of assignment and unit of analysis; downloaded 2/6/07) and recommends application of a clustering correction, developed by Hedges (2004; 2005) to correctly calculate an effect size and variance. Table 8 illustrates the effects of the corrections applied to studies in which classrooms were the units of assignment. As can be seen in all cases, the uncorrected effect size is overstated, albeit by only a small margin.

At times, though, a small difference can be important. In the Robinson (1999) study, for example, effect sizes for teacher report of aggression (TRF-aggression) and student self report (STAXI-anger out) in the enhanced anger program were statistically significant (p = .04, p = .03, respectively) prior to undergoing correction and with a mere decrease of .01, the effect sizes were statistically non-significant afterward (p = .10, p = .08, respectively). At other times, clustering corrections do not lead to a change in statistical significance. In the Etscheidt (1991) study and among the comparisons for the anger treatment group for all outcomes measured at posttest in the Robinson (1999)
Table 8

Clustering corrections applied to classroom level assignment

EXPERIMENTS: CLASSROOMS RANDOMLY ASSIGNED TO CONDITION

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Uncorrected Hedges</th>
<th>Corrected for clustering Hedges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>g</td>
<td>Variance</td>
</tr>
<tr>
<td>Etscheidt (1991)</td>
<td>anger program vs control</td>
<td>Behavioral observations</td>
<td>-2.514**</td>
<td>0.341</td>
</tr>
<tr>
<td></td>
<td>anger program plus vs control</td>
<td>Behavioral observations</td>
<td>-1.157**</td>
<td>0.217</td>
</tr>
<tr>
<td>Pascucci (1990)</td>
<td>anger program vs control</td>
<td>Behavioral + academic transcript</td>
<td>0.608</td>
<td>0.142</td>
</tr>
<tr>
<td>Robinson (1999)</td>
<td>anger program plus vs control</td>
<td>TRF-externalizing (post)</td>
<td>-0.592</td>
<td>0.099</td>
</tr>
<tr>
<td></td>
<td>anger program plus vs control</td>
<td>TRF-aggression (post)</td>
<td>-0.667*</td>
<td>0.1</td>
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<tr>
<td></td>
<td>anger program plus vs control</td>
<td>STAXI-anger out (post)</td>
<td>-0.689*</td>
<td>0.1</td>
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<tr>
<td></td>
<td>anger program plus vs control</td>
<td>TRF-externalizing (follow-up)</td>
<td>-0.115</td>
<td>0.094</td>
</tr>
<tr>
<td></td>
<td>anger program plus vs control</td>
<td>TRF-aggression (follow-up)</td>
<td>-0.131</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>anger program plus vs control</td>
<td>STAXI-anger out (follow-up)</td>
<td>-0.39</td>
<td>0.096</td>
</tr>
<tr>
<td></td>
<td>anger program vs control</td>
<td>TRF-externalizing (post)</td>
<td>-1.034**</td>
<td>0.121</td>
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<tr>
<td></td>
<td>anger program vs control</td>
<td>TRF-aggression (post)</td>
<td>-1.075**</td>
<td>0.13</td>
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<tr>
<td></td>
<td>anger program vs control</td>
<td>STAXI-anger out (post)</td>
<td>-1.158**</td>
<td>0.119</td>
</tr>
<tr>
<td></td>
<td>anger program vs control</td>
<td>TRF-externalizing (follow-up)</td>
<td>-0.466</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Table 8

*Clustering corrections applied to classroom level assignment (continued)*

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Uncorrected Hedges</th>
<th>Corrected for clustering Hedges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TRF-aggression (follow-up)</td>
<td>-0.426</td>
<td>-0.420</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STAXI-anger out (follow-up)</td>
<td>-0.634</td>
<td>-0.625</td>
</tr>
<tr>
<td>Salvador (2003)</td>
<td>anger program vs control</td>
<td>TRF-aggression</td>
<td>0.038</td>
<td>0.037</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incident Reports</td>
<td>-0.381</td>
<td>-0.374</td>
</tr>
</tbody>
</table>

**QUASI-EXPERIMENTS: CLASSROOMS NON-RANDOMLY ASSIGNED TO CONDITION**

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Uncorrected Hedges</th>
<th>Corrected for clustering Hedges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colletti (2000)</td>
<td>anger program vs control</td>
<td>TRF-aggression</td>
<td>-0.067</td>
<td>-0.066</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crisis logs</td>
<td>-0.081</td>
<td>-0.079</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incident reports</td>
<td>0.427</td>
<td>0.419</td>
</tr>
<tr>
<td>McWhirter (1999)</td>
<td>self-efficacy vs control</td>
<td>STAXI-anger expression</td>
<td>-0.342</td>
<td>-0.334</td>
</tr>
</tbody>
</table>

*Note.* *p < .5; **p < .001.
study, the effect sizes remained statistically significant. Studies with non-significant effect sizes prior to undergoing correction remained non-significant after correction, as would be expected.

Table 9 illustrates the effects of the clustering corrections applied to the studies (n = 3) in which the units of assignment were larger than the classroom (e.g., schools). Here again, all effect sizes were reduced after the corrections for mismatch between unit of assignment and unit of analysis were made. Even slight reductions in effect size among these larger groups can be important. The effect sizes calculated for teacher-reported outcomes in Braswell (1997) were statistically significant prior to correction ($p = .000$ post year 1; $p = .02$ post year 2, respectively) and non-significant afterward ($p = .06$ post year 1; $p = .42$ post year 2, respectively).

**Combining effect sizes**

A total of 70 effect sizes were derived from 37 comparisons present in the 30 studies included in the review. 40% of the effect sizes (n = 28) came from the nine studies that required cluster corrections. 83% of the effect sizes (n = 58) were generated from studies in which there was a comparison between an intervention group and an untreated control, while 17% of effect sizes (n = 12) were generated from studies in which an intervention group was compared with a placebo group.

The number of effect sizes obtained from each study ranged from one to twelve. Three studies (Robinson, 1999; Stainback, 1986; Whitfield, 1999), however, were
Table 9

Clustering corrections for studies with large group assignment

**EXPERIMENTS: RANDOM ASSIGNMENT TO CONDITION**

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Comparison</th>
<th>Unit of assignment</th>
<th>Mean cluster size/ total # clusters</th>
<th>Outcome</th>
<th>Uncorrected Hedges g</th>
<th>Uncorrected Variance</th>
<th>Corrected Hedges g</th>
<th>Corrected Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosworth (2000)</td>
<td>aggression prevention vs control</td>
<td>teams within schools</td>
<td>57 / 9</td>
<td>Aggressive behaviors teacher: externalizing (post yr 1)</td>
<td>-0.049</td>
<td>0.008</td>
<td>-0.048</td>
<td>0.058</td>
</tr>
<tr>
<td>Braswell (1997)</td>
<td>aggression prevention vs control</td>
<td>school districts</td>
<td>47 / 6</td>
<td>parent: externalizing (post yr 1)</td>
<td>0.136**</td>
<td>0.014</td>
<td>0.134</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>teacher: externalizing (post yr 1)</td>
<td>-0.117</td>
<td>0.024</td>
<td>-0.115</td>
<td>0.088</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>parent: externalizing (post yr 2)</td>
<td>0.323*</td>
<td>0.018</td>
<td>0.318</td>
<td>0.083</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>parent: externalizing (post yr 2)</td>
<td>-0.158</td>
<td>0.042</td>
<td>-0.155</td>
<td>0.104</td>
</tr>
</tbody>
</table>

**QUASI-EXPERIMENTS: NON-RANDOM ASSIGNMENT TO CONDITION**

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Comparison</th>
<th>Unit of assignment</th>
<th>Mean cluster size/ total # clusters</th>
<th>Outcome</th>
<th>Uncorrected Hedges g</th>
<th>Uncorrected Variance</th>
<th>Corrected Hedges g</th>
<th>Corrected Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lochman (1989)</td>
<td>anger program vs control</td>
<td>schools</td>
<td>3.0 / 6</td>
<td>Aggression</td>
<td>-0.425</td>
<td>0.202</td>
<td>-0.42</td>
<td>0.272</td>
</tr>
<tr>
<td></td>
<td>anger program plus vs control</td>
<td></td>
<td>3.5 / 6</td>
<td>Aggression</td>
<td>-0.049</td>
<td>0.186</td>
<td>-0.048</td>
<td>0.238</td>
</tr>
</tbody>
</table>

**Note.** *p < .05; **p < .001
responsible for 23 effect sizes, or one-third of the total. Each of the remaining studies contributed an average of 1.5 effect sizes. The relatively small number of effect sizes generated from each study is not due to limitations of the studies themselves. Rather, it can be attributed to the fact that the outcome of interest for this project was a single construct (i.e., aggressive student behavior) and, thus, only data directly addressing this construct was extracted from each study. In one study alone was the larger construct of aggressive behavior divided such that the intervention specifically targeted aggressive verbal behavior and measured only aggressive verbal behavior (Stainback, 1986).

As noted in the general characteristics subsection discussion, anger control was the primary focus in 60% (n = 18) of the studies and imbedded within the curriculum of the other 40% (n = 12) of studies. These other studies addressed such things as developing general violence prevention skills, correcting specific deficits in social skills or self-efficacy, and dealing with the feelings and challenges involved as one’s parents divorce. 63% of the comparisons (n = 44) were generated from studies with anger control as the primary focus, while 37% of the comparisons (n = 26) were generated from studies with anger management embedded in the curriculum. The number of comparisons generated, therefore, was essentially in proportion to the number of studies from each focus.

Even though an individual study may generate more than one effect size, only one effect size can be used to represent each study in the meta-analysis (as discussed in the methodology chapter). The decision regarding the choice of effect size to use was made on a case-by-case basis. Briefly, whenever two cognitive-behavioral anger control interventions were implemented—and each was compared to the untreated control group—
(e.g., Boswell, 1984), an average effect size was calculated and used to represent the study. Likewise, in studies where an anger intervention was compared to an untreated control group and also to a placebo group (e.g., Lochman, 1985), the average effect size of the two comparisons was used.

In studies employing multiple informants or multiple outcome measures (e.g., a standardized and an unstandardized measure), an average effect size was calculated across informants or measures for the omnibus analysis. The relevant comparison effect size by informant or measure was used in subsequent moderator analyses. This method allowed for a more detailed exploration of the findings. Table 10 provides the single representative effect size (Hedges g), standard error, and sample size for each study. Appendix H contains the effect size and standard error calculated for each of the 70 comparisons.

Sample size and attrition

A total of 2904 students were involved in the 30 studies; 1536 students were in groups that received an intervention and 1368 students were in the control and placebo groups. In spite of the large number of participants overall, sample sizes were relatively small in the great majority of studies. Five studies contained more than 100 participants. Four studies had 20 or fewer participants. Of the 21 remaining studies, sample sizes ranged from 22 to 87 (median = 39). Journal publications were responsible for all studies with more than 100 participants, as well as three of the four studies with sample sizes less than or equal to 20. Three dissertations had sample sizes below the median and five had sample sizes above the median, indicating that dissertations were clustered within the center of the distribution.
Table 10

Sample size, effect size and confidence interval by study

<table>
<thead>
<tr>
<th>Study</th>
<th>Program focus</th>
<th>n</th>
<th>Hedges g</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boswell (1984)</td>
<td>anger management</td>
<td>30</td>
<td>0.201</td>
<td>-0.500</td>
<td>0.902</td>
<td>0.574</td>
</tr>
<tr>
<td>Bosworth et al. (2000)</td>
<td>violence prevention</td>
<td>516</td>
<td>-0.048</td>
<td>-0.520</td>
<td>0.424</td>
<td>0.842</td>
</tr>
<tr>
<td>Braswell et al. (1997)</td>
<td>violence prevention</td>
<td>159</td>
<td>0.046</td>
<td>-0.538</td>
<td>0.629</td>
<td>0.878</td>
</tr>
<tr>
<td>Colletti (2000)</td>
<td>anger management</td>
<td>46</td>
<td>-0.091</td>
<td>-0.894</td>
<td>0.711</td>
<td>0.824</td>
</tr>
<tr>
<td>Conaway (1982)</td>
<td>anger management</td>
<td>18</td>
<td>-0.336</td>
<td>-1.223</td>
<td>0.551</td>
<td>0.458</td>
</tr>
<tr>
<td>Dauer (1994)</td>
<td>anger management</td>
<td>87</td>
<td>0.109</td>
<td>-0.309</td>
<td>0.526</td>
<td>0.610</td>
</tr>
<tr>
<td>Deffenbacher et al.</td>
<td>anger management</td>
<td>80</td>
<td>-1.129</td>
<td>-1.597</td>
<td>-0.661</td>
<td>0.000</td>
</tr>
<tr>
<td>DeRosier (2004)</td>
<td>social skills</td>
<td>267</td>
<td>-0.230</td>
<td>-0.478</td>
<td>0.018</td>
<td>0.069</td>
</tr>
<tr>
<td>Etscheidt (1991)</td>
<td>anger management</td>
<td>20</td>
<td>-1.794</td>
<td>-3.009</td>
<td>-0.579</td>
<td>0.004</td>
</tr>
<tr>
<td>Feindler et al. (1984)</td>
<td>anger management</td>
<td>36</td>
<td>-0.817</td>
<td>-1.487</td>
<td>-0.148</td>
<td>0.017</td>
</tr>
<tr>
<td>Grossman et al. (1997)</td>
<td>violence prevention</td>
<td>790</td>
<td>-0.044</td>
<td>-1.088</td>
<td>1.001</td>
<td>0.935</td>
</tr>
<tr>
<td>Lochman &amp; Wells (2003)</td>
<td>violence prevention</td>
<td>122</td>
<td>-0.281</td>
<td>-0.635</td>
<td>0.074</td>
<td>0.120</td>
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<tr>
<td>Lochman (1985)</td>
<td>anger management</td>
<td>39</td>
<td>-0.627</td>
<td>-1.262</td>
<td>0.008</td>
<td>0.053</td>
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<td>Lochman et al. (1984)</td>
<td>anger management</td>
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<td>-0.399</td>
<td>-1.031</td>
<td>0.234</td>
<td>0.216</td>
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<td>Lochman et al. (1993)</td>
<td>social skills</td>
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<td>-0.872</td>
<td>-1.859</td>
<td>0.115</td>
<td>0.083</td>
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<tr>
<td>Lochman et al. (1989)</td>
<td>anger management</td>
<td>20</td>
<td>-0.234</td>
<td>-1.224</td>
<td>0.756</td>
<td>0.643</td>
</tr>
<tr>
<td>McWhirter &amp; Page (1999)</td>
<td>self efficacy</td>
<td>33</td>
<td>-0.334</td>
<td>-1.241</td>
<td>0.573</td>
<td>0.470</td>
</tr>
<tr>
<td>Nickerson (2003)</td>
<td>anger management</td>
<td>84</td>
<td>-0.075</td>
<td>-0.499</td>
<td>0.349</td>
<td>0.729</td>
</tr>
<tr>
<td>Omizo et al. (1988)</td>
<td>anger management</td>
<td>24</td>
<td>-0.699</td>
<td>-1.497</td>
<td>0.100</td>
<td>0.086</td>
</tr>
<tr>
<td>Pascucci (1990)</td>
<td>anger management</td>
<td>28</td>
<td>0.594</td>
<td>-0.358</td>
<td>1.546</td>
<td>0.221</td>
</tr>
<tr>
<td>Pedro-Carroll &amp; Cowen</td>
<td>coping with parental</td>
<td>72</td>
<td>-0.773</td>
<td>-1.249</td>
<td>-0.296</td>
<td>0.001</td>
</tr>
<tr>
<td>(1985)</td>
<td>divorce</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepler et al. (1995)</td>
<td>violence prevention</td>
<td>72</td>
<td>-0.339</td>
<td>-0.801</td>
<td>0.122</td>
<td>0.150</td>
</tr>
<tr>
<td>Robinson (1999)</td>
<td>anger management</td>
<td>39</td>
<td>-0.606</td>
<td>-1.405</td>
<td>0.194</td>
<td>0.138</td>
</tr>
<tr>
<td>Salvador (2003)</td>
<td>anger management</td>
<td>46</td>
<td>-0.169</td>
<td>-0.971</td>
<td>0.634</td>
<td>0.681</td>
</tr>
<tr>
<td>Scheckner &amp; Rollin</td>
<td>anger management</td>
<td>32</td>
<td>0.419</td>
<td>-0.286</td>
<td>1.124</td>
<td>0.244</td>
</tr>
<tr>
<td>(2003)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Shechtman (2000)</td>
<td>violence prevention</td>
<td>66</td>
<td>-0.576</td>
<td>-1.075</td>
<td>-0.077</td>
<td>0.024</td>
</tr>
<tr>
<td>Stainback (1986)</td>
<td>violence prevention</td>
<td>40</td>
<td>-0.040</td>
<td>-0.754</td>
<td>0.674</td>
<td>0.913</td>
</tr>
<tr>
<td>Sukhodolsky et al.</td>
<td>anger management</td>
<td>33</td>
<td>-0.417</td>
<td>-1.097</td>
<td>0.263</td>
<td>0.230</td>
</tr>
<tr>
<td>(2000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varcoe (1983)</td>
<td>anger management</td>
<td>32</td>
<td>-0.341</td>
<td>-1.022</td>
<td>0.339</td>
<td>0.326</td>
</tr>
<tr>
<td>Whitfield (1999)</td>
<td>anger management</td>
<td>16</td>
<td>-0.764</td>
<td>-1.891</td>
<td>0.364</td>
<td>0.184</td>
</tr>
</tbody>
</table>

Overall Mean Effect Size - Fixed Effects model  
-0.311 -0.415 -0.207 0.000

Overall Mean Effect Size - Random Effects model  
-0.327 -0.472 -0.182 0.000

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Examination of differential attrition, an ideal situation, was beyond the scope of this project. Overall attrition was addressed by relying on author documentation in the text or, in the absence of author documentation, comparing the number of students assigned to condition with those assessed post-intervention. Attrition was greater than 20% in only two studies - Braswell (1997) with 25% and McWhirter (1999) with 39%. The effects of removing these studies from the analyses will be addressed in a forthcoming section.

Effect size analyses

An omnibus effect size was calculated using the single effect size representing each study, controlling only for sample size. The grand mean was -0.31 (95% CI -0.415, -0.207) under a fixed effect and essentially the same, -0.33 (95% CI -0.472, -0.182), under a random effects model. Regardless of the model selected, the mean effect size was statistically significant ($p = .000$), indicating that students who participated in cognitive-behavioral anger interventions delivered in the school setting decreased their aggressive behavior by approximately a third of a standard deviation and that this difference was beyond any difference expected by chance. Using Cohen's $U3$ statistic to translate the finding into practical terms, the average student in the intervention group reduced displays of aggressive behavior 62% more than the average student in the control group.

Figure 3 illustrates the omnibus effect size analysis. As can be seen, each study is listed with the comparison condition and type of outcome measure identified on the left side. The forest plot, which presents a graphical depiction of effect size (vertical hash
Figure 3. Effectiveness of school-based cognitive-behavioral anger interventions

<table>
<thead>
<tr>
<th>Model</th>
<th>Study name</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Hedges’s g and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conaway (1982)</td>
<td>anger vs placebo</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varno (1983)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bocwell (1984)</td>
<td>anger vs control</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feingold et al. (1984)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lochman et al. (1986)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lochman (1987)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedro-Carroll &amp; Cowen (1985)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steinback (1986)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ortize et al. (1988)</td>
<td>anger vs placebo</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lochman et al. (1989)</td>
<td>anger vs control</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasucci (1990)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eboselt (1991)</td>
<td>anger vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lochman et al. (1991)</td>
<td>social skills vs control</td>
<td>unstandardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dauer (1994)</td>
<td>anger vs control</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepler et al. (1995)</td>
<td>aggression vs control</td>
<td>standardized</td>
<td></td>
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</tr>
<tr>
<td>Dellenbach et al. (1996)</td>
<td>anger vs control</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brezewell et al. (1997)</td>
<td>aggression vs placebo</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grossman et al. (1997)</td>
<td>aggression vs control</td>
<td>standardized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whitfield (1999)</td>
<td>anger vs control</td>
<td>both</td>
<td></td>
<td></td>
</tr>
<tr>
<td>McKenna &amp; Page (1999)</td>
<td>self-efficacy vs control</td>
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<td>both</td>
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<td>DeRosier (2004)</td>
<td>social skills vs control</td>
<td>unstandardized</td>
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</table>
meta-analysis of school-based cognitive-behavioral anger interventions

mark) and 95% confidence interval (horizontal line) associated with each study, is on the
right side. The length of the confidence interval reflects sample size, with wider
confidence intervals associated with smaller sample sizes (and associated larger
variances) and narrower confidence intervals associated with larger sample sizes
(with less variance).

Effect sizes reflecting less posttest aggressive behavior among students in
intervention groups as compared to control groups are located between 0.00 and -2.00.
Effect sizes indicating less posttest aggressive behavior among control group participants
as compared to intervention participants are located between 0.00 and +2.00. The effect
size is a standardized measure and reflects the absolute magnitude of effect of an
intervention. The direction (i.e., negative or positive) serves to identify the group that
improved and the choice of direction is up to the meta-analyst. Thus, while negative
effect sizes represent improvement among intervention participants in this study, another
meta-analyst may elect to reverse the direction in his study.

Effect sizes ranged from -1.794 to 0.594, with a mean effect size of -0.31
(95% CI -0.415, -0.207) under the fixed effect model and a mean of -0.33
(95% CI -0.472, -0.182) under the random effects model, as already noted. The
overwhelming majority of effect sizes favored the intervention group (n = 25). Most of
the effect sizes fell between zero and minus one. Two studies, Etscheidt (1991) and
Deffenbacher, et al. (1996), however, exceeded one standard deviation, indicating that
students participating in these interventions dramatically decreased their aggressive behavior.

*Investigating variability*

The visual variability observed in the forest plot was examined by means of statistical tests. To determine the extent to which the individual effect sizes varied from the overall effect size (i.e., the grand mean), a $Q$ test was conducted. The $Q$ test indicated the presence of statistically significant heterogeneity across effect sizes ($Q = 47.8$, $p = .015$). Though helpful in identifying the presence of heterogeneity, the $Q$ statistic does not indicate the extent of the impact of heterogeneity.

An $I^2$ statistic was therefore calculated and used to address the impact of the heterogeneity. The $I^2$ statistic indicated that 39% of the variability in effect sizes was due to something other than sampling error. While Borenstein (2005) and Higgins and Thompson (2002) both recommend interpreting the meaning of $I^2$ in light of the substantive issues being investigated, Higgins and Thompson (2002) offer tentative suggestions for interpreting amounts of heterogeneity likely to cause concern. Heterogeneity less $\leq 31\%$ would be cause for little concern, while heterogeneity $\geq 56\%$ would be cause for considerable caution. A finding of 39% variability, then, falls toward the lower end of the 'moderate concern' range.

*Sensitivity analyses*

Using the CMA 2.0 procedure for one-study removed, a sensitivity analysis was conducted to assess the impact of removing an individual study on the overall effect size. Table 11 presents the sensitivity analysis conducted under a fixed effect model; Table 12 shows the results of the analysis under a random effects model.
Table 11

*Sensitivity analysis, assuming a fixed effect model*

<table>
<thead>
<tr>
<th>Study name</th>
<th>Program focus</th>
<th>Point estimate</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>p-Value</th>
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Table 11

*Sensitivity analysis, assuming a fixed effect model (continued)*

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Random                       |                          | -0.33 | -0.472      | -0.182      | 0.000   |
effect size ranges from -0.34 to -0.27 under the fixed effect model and from -0.35 to -0.28 under the random effects model.

A second sensitivity analysis was conducted to assess the impact of removing studies that employed a quasi-experimental design. The overall effect size remained unchanged from the omnibus effect size calculated with both experimental and quasi-experimental designs. Assuming a fixed model effect, the effect size was -0.31 (95% CI -0.415, -0.198; p = .000). Assuming a random effects model, the effect size was -0.33 (95% CI -0.490, -0.161; p = .000). Due to the unusual control group used by Lochman (1985), a sensitivity analysis was conducted by removing this study from the overall effect size analysis. As seen in Tables 11 and 12, removal of this study from the analysis did not cause any real change in the effect size or level of significance (Hedges' g without the Lochman 1985 study is -0.30 under the fixed effect model and -0.32 under the random effects model). This sensitivity analysis indicates that no individual study exerts an inordinate influence on the overall effect size.

Assessment of publication bias

Three tests were performed to detect the presence of publication bias. First, a funnel plot was constructed to visually represent the full sample of studies collected for this meta-analysis (Figure 4), using the fixed effect model (as recommended by M. Borenstein, personal communication, 3/19/07). The effect size is plotted along the x-axis and the precision (1/standard error) is plotted along the y-axis. Larger studies with smaller errors are located toward the top of the graph and tend to cluster near the mean effect size; smaller studies with larger errors are located toward the bottom and are usually more dispersed. The graph shows the majority of studies clustering in the mid-
lower section, suggesting that many of the studies had smaller numbers of participants. This supports the data presented earlier in the discussion of sample size.

In the absence of publication bias, there is symmetry about the mean. Figure 4 appears to be relatively symmetrical suggesting that publication bias is not of concern.

Interpretation of the funnel plot to detect publication bias is subjective, however. A fail-safe N was calculated in order to determine the number of missing studies that would be required to nullify the detected effect. The fail-safe N indicated that 230 additional studies would need to be located and included in order for the alpha to be > .05. In essence, for each study presently included in this meta-analysis, an additional 7.7 studies would need to be obtained and included in order for the effect size to nullify

Figure 4. Funnel plot examining publication bias.
the effect. Since the fail-safe N assumes that the studies located in the additional search will contain null findings, however (and this appears unlikely given the sample of studies obtained for this review), further investigation was carried out. The trim and fill procedure, an option offered in the CMA 2.0 program, evaluates the funnel plot to assess asymmetry then imputes missing studies and lastly recalculates an overall effect size. Under the fixed effect model, this procedure suggested that three studies were missing to the right of the mean (dark circles in Figure 5). With the inclusion of the three imputed studies, the overall effect size decreases slightly to -0.25 (95% CI -0.42, -0.09) but remains statistically significant and continues to favor the intervention group, as reflected in Figure 5. Assessing the impact of imputed studies, using the trim and fill method.
by the placement of the black diamond in Figure 5. Given that the funnel plot is relatively symmetric, an additional 230 studies with an effect size of zero are required to render the overall effect size statistically non-significant, and imputing missing studies does not alter the overall effect size markedly, it can be concluded that publication bias is not an issue of concern.

Cumulative meta-analysis

Cumulative meta-analysis, while often done to assess the effects of including small studies, can also be conducted to demonstrate the cumulative weight of the evidence over time. The procedure is rather intuitive: studies are first sorted by year of publication and then each study is added in sequence and the data analyzed. As seen in Figure 6, the first study was conducted by Conaway (1982). The effect size was -0.34, 95% CI -1.223, 0.551, \( p = .46 \). Data from the second study, Varcoe (1983), was then added to Conaway's and analyzed. The effect size remained the same, but the confidence interval became smaller yet still not significant (95% CI -0.879, 0.201, \( p = .22 \)).

The weight of evidence became statistically significant with the addition of Lochman, et al. (1984) to the previous body of knowledge. The effect size remained essentially unchanged (Hedges g -0.35) but, for the first time, the confidence interval did not include zero (-0.664, -0.038, \( p = .03 \)). Intervention and control group participants had statistically significant differences in aggressive behavior, with intervention participants decreasing aggressive behavior more than control group participants as measured post-intervention. All studies added since Lochman (1984) have not dramatically altered the overall effect size and confidence interval. Since 1984, effect sizes have varied from -0.31 to -0.50 (i.e.,
Figure 6. Cumulative Meta-Analysis, by year of publication

Cumulative meta-analysis by year

<table>
<thead>
<tr>
<th>Studyname</th>
<th>Comparison</th>
<th>Outcome</th>
<th>Cumulative statistics</th>
<th>Cumulative hedges's g (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>Point</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Conaway (1962)</td>
<td>anger v placebo</td>
<td>unstandardized</td>
<td>-0.336</td>
<td>-1.223</td>
</tr>
<tr>
<td>Varcoe (1963)</td>
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<td>unstandardized</td>
<td>-0.330</td>
<td>-0.879</td>
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<tr>
<td>Boewell (1964)</td>
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<td>unstandardized</td>
<td>-0.138</td>
<td>-0.596</td>
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<tr>
<td>Feindler et al (1964)</td>
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<td>-0.762</td>
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<td>-0.383</td>
<td>-0.674</td>
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<tr>
<td>Lochman (1965)</td>
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<td>unstandardized</td>
<td>-0.405</td>
<td>-0.686</td>
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<tr>
<td>Pedro Carroll &amp; Cowen (1965)</td>
<td>coping with v control</td>
<td>unstandardized</td>
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<td>-0.746</td>
</tr>
<tr>
<td>Starbeck (1966)</td>
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<td>unstandardized</td>
<td>-0.442</td>
<td>-0.666</td>
</tr>
<tr>
<td>Orino et al (1968)</td>
<td>anger v placebo</td>
<td>standardized</td>
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<td>-0.675</td>
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<td>Picoult (1969)</td>
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<tr>
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</tr>
<tr>
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</tr>
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<td>standardized</td>
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<td>Salazar (2003)</td>
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<td>Nicolson (2003)</td>
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-2.00 -1.00 0.00 1.00 2.00

Favors Intervention Favors Control
slightly less than one-third to one-half standard deviation) and the confidence intervals have remained to the left of zero (and statistically significant at \( p < .001 \) since Pedro-Carroll, 1985). Thus, the weight of evidence suggesting that school-based cognitive-behavioral anger interventions are effective in reducing aggressive student behavior has been remarkably consistent for nearly a quarter-century.

Correlations

Despite the relative stability of the overall effect size and gradually smaller confidence intervals since the mid-1980s, the omnibus analysis revealed significant heterogeneity \( (Q = 47.8, p = .02) \) and the \( I^2 \) indicating that 39% of the variance in effect size was due to something other than sampling error. Bivariate correlations were calculated in order to investigate relationships among the variables and provide information regarding potential sources of this variability.

Table 13 shows the intercorrelations between methodological variables and effect size. Of the six variables investigated, only publication type was significantly related to effect size \( (r_{pb} = .39, p = .035) \). This finding suggests that dissertations were more likely to have interventions that favored the control group.

Among the intercorrelations for methodological variables, assignment to condition was significantly related to number of outcome measure informants \( (\phi = .39, p = .032) \). This finding suggests that interventions in which participants were assigned to condition in a non-random fashion were associated with just one level of informant (e.g., teacher) to assess the outcome, while interventions in which participants were randomly assigned to condition were associated with multiple levels of informants (e.g., teacher and student) to assess the outcome.
Intercorrelations between study level, participant, and intervention variables and effect size are displayed in Table 14. While none of the variables investigated were significantly related to effect size, cognitive development (as reflected by school level), program focus, gender, and baseline behavior did reveal significant relationships. Interventions with more cognitively advanced students (i.e., middle or high school) were associated with alternative school settings ($r_s = .58, p = .002$) and interventions with anger as the primary intervention focus ($\varphi = -.50, p = .008$). In fact, interventions with anger embedded in the curriculum did not take place in the alternative settings whatsoever.

Table 13

| Intercorrelations of Methodological Variables and Effect Size |
|---------------------|----|----|----|----|----|----|----|
| Variable            | 1  | 2  | 3  | 4  | 5  | 6  | 7  |
| Publication type    | -- | .06| .14| .05| .05| -.24| .39*|
| Assignment          | -- | .09| .39*| -.12| .12| .04|    |
| Outcome measure     | -- | .16| .34| .22| -.14|    |    |
| Informant           | -- | -.05| .28| .01|    |    |    |
| Blinding            | -- | .12|    |    |    |    |    |
| Fidelity            | -- | .06|    |    |    |    |    |
| Effect size         | -- |    |    |    |    |    |    |

Note. $*p < .05$
Interventions with anger embedded in the curriculum were associated with groups made up of both male and female participants ($\varphi = .51, p = .007$), rather than male participants alone – which was observed in the descriptive review of intervention characteristics. Interventions implemented by multiple or more experienced research personnel were associated with students exhibiting aggressive behavior at baseline ($r_s = .46, p = .019$) rather than with those not exhibiting aggressive behavior at baseline.

Table 14

*Intercorrelations of Study, Participant, and Intervention Variables and Effect Size*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<td>5. Baseline behavior</td>
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<td>-.07</td>
<td>.46*</td>
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<td>6. Intervention focus</td>
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<td>7. Delivery personnel</td>
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</tr>
</tbody>
</table>

*Note.* $^*p < .05$, $^{**}p < .01$
Table 15 shows the intercorrelations between methodological, study, participant, and intervention variables. Publication type is significantly related to setting ($r_s = -.46, p = .02$), school type ($\phi = .37, p = .05$) and school level ($r_s = .55, p = .002$), suggesting that dissertations are associated with rural and suburban students, interventions that occur in alternative settings, and take place with older participants. Journal publications, on the other hand, are associated with suburban and urban students, interventions that take place in public schools, and involve younger participants.

Assignment to condition is significantly related to school type ($\phi = .38, p = .05$) and intervention focus ($\phi = -.37, p = .05$), with random assignment associated with interventions in public schools and anger control as the primary focus of the program. Interventions with a primary focus on anger management are associated with single informants ($\phi = -.38, p = .04$) rather than multiple informants. Finally, interventions with students exhibiting aggressive behavior at baseline are associated with outcome informants that are blind to the participant’s group assignment ($\phi = .41, p = .04$). In fact, all studies with students who were not identified as exhibiting aggressive behavior at baseline made use of outcome informants who were aware of the students’ assignment to condition.

A bivariate correlation was also calculated to investigate the relationship between the total length of the intervention program (i.e., the ‘dose’) and the effect size. As the length of the program increased, the effect size decreased -as would be expected with negative effect sizes representing a decrease in aggressive behavior by intervention group participants. The relationship ($r = -.06, p = .78$), however, was not statistically significant.
Table 15

**Intercorrelations of Methodological, Study, Participant, and Intervention variables**

<table>
<thead>
<tr>
<th>Methodological</th>
<th>Study level</th>
<th>Participant</th>
<th>Intervention</th>
<th>Interv</th>
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<td>Setting</td>
<td>School type</td>
<td>Gender</td>
<td>Level</td>
</tr>
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<td>Publication type</td>
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<td>.37*</td>
<td>-.24</td>
<td>.55**</td>
</tr>
<tr>
<td>Assignment</td>
<td>.07</td>
<td>.38*</td>
<td>-.32</td>
<td>.17</td>
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<td>.18</td>
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<td>Informant</td>
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<td>-.07</td>
<td>.12</td>
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<td>Blinding</td>
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<td>.04</td>
<td>-.26</td>
<td>.10</td>
</tr>
<tr>
<td>Fidelity</td>
<td>.29</td>
<td>-.08</td>
<td>-.05</td>
<td>-.19</td>
</tr>
</tbody>
</table>

*Note: *p < .05, **p < .01*
**Moderator analyses**

As previously noted, the only bivariate correlation significantly related to effect size (statistically) was that of publication type. An exploration of potential moderators was therefore conducted to afford a more detailed and nuanced analysis and provide clue to the possible source(s) of heterogeneity found in the omnibus analysis. Table 16 lists the effect size and heterogeneity statistics for selected methodological, study, intervention and participant characteristics.

A statistically significant level within a moderator suggests that a significant difference exists between the intervention and control groups within that level. For example, the effect size for randomized controlled trial (as a specific level within the design variable) is significant (ES -0.34, 95% CI -0.455, -0.218) at $p < .001$, indicating that students in randomized controlled trial intervention groups experienced a statistically significant reduction in aggressive behavior as compared to randomized controlled trial control groups (though, as noted, the design variable did not significantly affect the magnitude of the effect size. Despite the .23 difference in effect size between QED and CRT, the heterogeneity between study designs is not statistically significant ($Q = 1.12, p = .57$).

Several methodological variables implicated in previous meta-analyses show statistically significant differences between the intervention and control groups. The following specific within-variable characteristics are statistically significant and have effect size variability no greater than normally expected by chance (i.e., there is homogeneity): quasi-experimental design, [use of] unstandardized outcome measures,
### Table 16

#### Summary of moderator analyses

| Effect size and 95% confidence interval | Heterogeneity |  |
|----------------------------------------|---------------|--
| Publication                             |               |  |
| Dissertation                           | 10            | -0.05 | -0.256 | 0.148 | 0.601 | 5.87 | 0.753 | 0 |
| Journal                                | 20            | -0.40 | -0.525 | -0.283 | 0.000 | 33.45 | 0.021 | 43 |
| Design                                 |               |  |
| RCT                                    | 18            | -0.34 | -0.455 | -0.218 | 0.000 | 33.64 | 0.009 | 49 |
| CRT                                    | 7             | -0.14 | -0.418 | 0.132 | 0.308 | 11.28 | 0.080 | 47 |
| QED                                    | 5             | -0.37 | -0.731 | -0.003 | 0.050 | 1.18 | 0.883 | 0 |
| Outcome measure                        |               |  |
| Std                                    | 15            | -0.33 | -0.482 | -0.177 | 0.000 | 31.38 | 0.005 | 55 |
| Unstandardized                         | 13            | -0.31 | -0.453 | -0.159 | 0.000 | 15.95 | 0.194 | 25 |
| Outcome informant                      |               |  |
| Parent                                 | 3             | 0.18 | -0.249 | 0.611 | 0.410 | 0.74 | 0.692 | 0 |
| Teacher                                | 23            | -0.22 | -0.346 | -0.090 | 0.001 | 31.42 | 0.088 | 30 |
| Student                                | 9             | -0.49 | -0.679 | -0.294 | 0.000 | 29.28 | 0.000 | 73 |
| Outcome informant blind                 |               |  |
| Yes                                    | 13            | -0.31 | -0.495 | -0.118 | 0.001 | 23.62 | 0.023 | 49 |
| No                                     | 12            | -0.34 | -0.50 | -0.173 | 0.000 | 15.34 | 0.167 | 28 |
| Setting                                |               |  |
| Rural                                  | 5             | -0.23 | -0.572 | 0.113 | 0.189 | 3.54 | 0.473 | 0 |
| Suburban                               | 13            | -0.23 | -0.358 | -0.097 | 0.001 | 11.72 | 0.468 | 0 |
| Urban                                  | 7             | -0.38 | -0.658 | -0.107 | 0.007 | 12.77 | 0.047 | 53 |
| School type                            |               |  |
| Public                                 | 22            | -0.31 | -0.417 | -0.197 | 0.000 | 37.04 | 0.017 | 43 |
| Alternative                            | 7             | -0.29 | -0.644 | 0.056 | 0.100 | 10.22 | 0.116 | 41 |
| Gender                                 |               |  |
| male only                              | 8             | -0.13 | -0.366 | 0.102 | 0.269 | 8.21 | 0.310 | 16 |
| mixed groups                           | 20            | -0.34 | -0.454 | -0.216 | 0.000 | 3.37 | 0.017 | 45 |
| Intervention focus                     |               |  |
| Anger primary                          | 18            | -0.30 | -0.46 | -0.141 | 0.000 | 35.76 | 0.005 | 52 |
| Anger embedded                         | 12            | -0.32 | -0.456 | -0.182 | 0.000 | 12.01 | 0.363 | 8 |
| Delivery personnel                      |               |  |
| Counselors                             | 17            | -0.31 | -0.436 | -0.190 | 0.000 | 28.07 | 0.031 | 43 |
| Researchers                            | 10            | -0.42 | -0.612 | -0.226 | 0.000 | 8.46 | 0.488 | 0 |
| Teachers                               | 5             | -0.42 | -0.821 | -0.027 | 0.036 | 6.75 | 0.150 | 41 |
| School level                           |               |  |
| Elementary                             | 14            | -0.29 | -0.422 | -0.156 | 0.000 | 15.13 | 0.299 | 14 |
| Middle                                 | 8             | -0.33 | -0.532 | -0.120 | 0.002 | 21.15 | 0.004 | 67 |
| High                                   | 4             | -0.22 | -0.543 | 0.098 | 0.174 | 1.53 | 0.677 | 0 |
| Baseline behavior                      |               |  |
| Aggressive                             | 25            | -0.26 | -0.37 | -0.140 | 0.000 | 30.13 | 0.181 | 20 |
| Not aggressive                         | 5             | -0.57 | -0.81 | -0.320 | 0.000 | 12.64 | 0.013 | 68 |
teacher as outcome informant, and informant awareness of participant assignment to condition.

Statistically significant, heterogeneous methodological variables are [use of] standardized outcome measures, students as outcome informants, and blind outcome informants – in addition to the randomized controlled trial design noted above. Student informants possess an excessive amount of heterogeneity (73%), raising concerns about the representativeness of the mean effect size or this level of the informant variable.

Geographic setting

Students assigned to intervention groups in suburban settings demonstrate a significant decrease in aggressive behavior compared to control groups (Hedges g = -0.23, 95% CI = -0.358, -0.097, p = .001), with noted homogeneity (Q = 11.72, p = .47) indicating that the variability in effect size among these studies is no greater than is expected by chance. Therefore, the variability observed is due to sampling error and the effect size reflects the actual intervention effect.

Students assigned to intervention groups in urban settings also demonstrate a significant decrease in aggressive behavior (-0.38, 95% CI = -0.658, -0.107, p = .007), but the variability is more than expected and in the moderate range (53%), and, therefore, confidence in the magnitude of effect as reflecting the actual intervention effect is not strong.

No statistically significant difference between intervention and control group participants is seen in interventions implemented in rural schools. The difference in effect size magnitude between urban and suburban school settings is .15 standard deviations. While not statistically significant, it may hint at something of practical importance. The
distinction between rural, suburban, and urban settings has not been documented in previous meta-analyses.

**Intervention focus**

Intervention foci, as dichotomized by anger-as-primary focus or anger embedded within curriculum designed to address another problem, has also not been addressed in previous meta-analyses. Both foci reveal nearly identical effect sizes (Hedges g -0.30, 95% CI -0.460, -0.141 for anger-primary; Hedges g -0.32, 95% CI -0.456, -0.182 for anger-embedded). In addition, both reveal significant decreases ($p = .000$) in aggressive behavior among intervention participants, with a moderate—but not problematic—amount of heterogeneity (52%) existing among anger-as-primary focus interventions.

As noted earlier, no single intervention or anger control program predominated in the sample of studies. Nevertheless, a preliminary investigation of programs that were replicated was undertaken. Feindler, et al. (1984), Whitfield (1999), and Sukhodolsky, et al. (2000) used Anger Control Training. The mean effect size obtained was a notable -0.63 (95% CI -0.462, -0.210), $p = .005$, with homogeneity. Dauer (1994) and McWhirter (1999) used portions of the Morganett Skills curriculum; the mean effect size was 0.03 (95%CI -0.351, 0.416), $p = .87$. Colletti (2000) and Salvador (2003) used the In Control program; the mean effect size was -.04 (95% Cl -0.617, 0.538), $p = .89$. Bosworth (2000) and Scheckner & Rollin (2003) used SMART Talk and had an effect size of 0.10 (95% CI -0.301, 0.491), $p = .64$. Lochman (1984, 1985, 1989, 1993, 2003) and Etscheidt (1991) used the Coping Power program (with its iterations over time) and had an effect size of -0.45 (95% CI -0.705, -0.194; $p = .001$), with homogeneity.
Although the number of studies employing the same intervention was low, the Coping Power and Anger Control Training programs show promising effects. Effectiveness of the intervention did not appear to vary by delivery personnel. Intervention group participants decreased aggressive behavior more than control group participants three-tenths of a standard deviation for counselor implementation (Hedges g = -0.31, 95% CI = -0.436, -0.190) and four-tenths of a standard deviation for researchers (Hedges g = -0.42, 95% CI = -0.612, -0.226) and teachers (Hedges g = -0.42, 95% CI = -0.821, -0.027). Teachers, as noted earlier, implemented interventions in only 6 studies, either as sole delivery person or as part of a team. Counselors (which include school guidance counselors, licensed social workers, school psychologists, and graduate level counseling students) implemented the majority of interventions at all levels of schooling.

Baseline behavior and gender

Related to the participant level characteristics considered in the analyses, there was a statistically significant difference between levels of baseline behavior (Q = 5.45, p = .02). The disproportionate number of studies with students exhibiting aggressive behavior at baseline (n = 25) could possibly be the source or major influence for this finding. Interestingly, a notable 68% variability in effect sizes was detected among the relatively few studies (n = 5) conducted with students not exhibiting aggressive behavior at baseline.

Interventions comprised of groups of male and female participants and elementary and middle school students also significantly decreased aggressive behavior as compared
to students in control groups. Notable heterogeneity (67%) was found at the middle school level, however.

Attrition and absolute assessment time

Two additional variables that came to light during the discussion of the details of the interventions were evaluated: attrition and the absolute assessment time. Braswell, et al. (1997) and Whitfield (1999) both had > 20% overall attrition. Removing these two studies from the analysis revealed a Hedges g of -0.33 (95% CI -0.438, -0.215), $p = .000$, with $Q = 46.26$, $p = .009$ and $P = 44$ under a fixed effect model and only a very slight increase (Hedges g -0.35, 95% CI -0.509, -0.185, $p = .000$) under the random effects model. Eliminating these studies, thus, had virtually no impact on the overall effect size.

Absolute assessment time was divided into three categories based on the most common outcome measurement periods: posttest to 4 weeks, 5 to 16 weeks, and 5 months to 1 year. Table 17 presents the effect size, confidence interval, significance and heterogeneity statistics for each of these respectively. As can be seen, the fixed and random effects models effect are relatively stable and statistically significant at posttesting within the first month after completion of the intervention and at 6 months to one year follow-up. In the 5 week to 5 month assessment period, however, there is a doubling of the fixed effect model Hedges g with an extremely high level of heterogeneity (73%), rendering the significance of the effect size at this time period
Table 17

Effect size and heterogeneity at various posttest assessments

<table>
<thead>
<tr>
<th>Assessment time</th>
<th>Model</th>
<th>n</th>
<th>Hedges g</th>
<th>LCI</th>
<th>UCI</th>
<th>p</th>
<th>Q</th>
<th>p</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest - 4 weeks</td>
<td>Fixed</td>
<td>2</td>
<td>-0.25</td>
<td>-0.356</td>
<td>-0.139</td>
<td>.000</td>
<td>32.33</td>
<td>.183</td>
<td>19.57</td>
</tr>
<tr>
<td></td>
<td>Random</td>
<td>7</td>
<td>-.26</td>
<td>-.394</td>
<td>-.127</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 weeks - 5 months</td>
<td>Fixed</td>
<td>5</td>
<td>-.50</td>
<td>-.771</td>
<td>-.238</td>
<td>.000</td>
<td>14.70</td>
<td>.005</td>
<td>72.79</td>
</tr>
<tr>
<td></td>
<td>Random</td>
<td></td>
<td>-.44</td>
<td>-.973</td>
<td>.098</td>
<td>.109</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months - 1 year</td>
<td>Fixed</td>
<td>4</td>
<td>-.30</td>
<td>-.497</td>
<td>-.110</td>
<td>.002</td>
<td>4.39</td>
<td>.222</td>
<td>31.68</td>
</tr>
<tr>
<td></td>
<td>Random</td>
<td></td>
<td>-.36</td>
<td>-.658</td>
<td>-.062</td>
<td>.018</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

questionable. The random effects model, in fact, demonstrates a slightly reduced effect size that is not significant. No studies assessed intervention effects beyond one year.

Investigation of variable combinations

The intercorrelations between the methodological, study, participant, and intervention variables suggested some interesting relationships, as noted earlier. The relationships between design, school type, and focus were further explored in the moderator analysis by comparing the effect sizes of groups of studies with different levels of these characteristics. For example, randomized trials conducted in public schools with interventions having a primary focus on anger control (n = 8) had an effect size of -0.26 (95% CI -0.45, -0.06), p = .01, Q = 23.74, and P = 71 while randomized
trials conducted in public schools with interventions having anger management embedded in the curriculum of a program (n = 12) had an effect size of -0.32 (95% CI -0.46, -0.18), \( p = .000, Q = 12.01, p = .367, \) and \( F = 8 \). So, while the effect sizes are not very dissimilar (a difference of .06), there is homogeneity among the anger-embedded interventions and quite notable heterogeneity among interventions with anger as the primary focus.

Randomized controlled trials were only conducted in the alternative setting with anger as the primary intervention focus (n = 4); the effect size for this group of studies (Hedges g -0.35, 95% CI -0.84, 0.15) was similar to that of the omnibus effect size. While the effect size for the omnibus analysis was statistically significant, however, the effect size for randomized controlled trial interventions delivered in the alternative school setting was not significant \( (p = .17) \). The effect sizes of these interventions were also extremely heterogeneous \( (Q = 9.92, p = .02; F = 70) \). It is unclear why reports of studies of interventions implemented in the alternative school settings and containing anger management within the curriculum were not identified in the literature search.

Among the subgroup of trials in which groups of students were randomly assigned to condition (i.e., CRTs), the overall effect size was lower than the omnibus effect size and not significant (Hedges g -0.14, 95% CI -0.418, 0.132; \( p = .31 \)) without significant heterogeneity \( (Q = 11.28, p = .08) \). Examining CRTs (n = 7) by intervention focus, however, suggests an area of study that might be useful to follow. The effect size for CRTs involving interventions with anger as the primary focus (n = 4) was -0.36 (95% CI -0.813, 0.091) with marked heterogeneity \( (Q = 9.79, p = .02, F = 69) \). The effect size for CRTs involving interventions with anger management embedded in the
program \((n = 3)\), on the other hand, was only -0.02 \((-0.361, 0.332, p = .93)\), with
homogeneity \((Q = .06, p = .97)\). Despite this large difference in the magnitude of effect
size, a wide margin of the two confidence intervals overlapped and there was no
significant difference between the two foci \((Q = 1.43, p = .23)\).

The correlations presented earlier also suggested interesting relationships between
publication type, setting, and school type. Too few studies existed within each variable
level to make a formal analysis meaningful, however. For example, of the five studies
conducted in the rural setting, one was published as a journal article and four were
dissertations. Of the dissertations, three reported on interventions in the public school
setting: one each at the elementary, middle, and high school levels. The fourth
dissertation reported on an intervention conducted with special education students in the
public schools as well as students attending an alternative school. Studies in the urban
setting \((n = 7)\) contained less variety with respect to school type and school level, but still
contained too few studies within each of the variable levels to make noteworthy
comparisons.

**Intervention elements**

An attempt was made to code the theoretical foundations used to develop each
intervention. Agreement between S. J. Wilson and J. Lavenberg on the operationalization
of the definitions could not be met within the time allotted to the development of the
coding form and manual so this variable was eliminated from any analyses.

Interventions were coded for the cognitive elements underlying each program and
for the behavioral techniques employed to address the elements. All interventions drew
upon more than one element \((mean = 4)\) and utilized a combination of techniques.
The intercorrelations between the cognitive elements and the omnibus effect size are displayed in Table 18. Of the six elements used to categorize the interventions, only skill enhancement was significantly related to the magnitude of the effect size ($r = -.38, p = .04$). Skill enhancement interventions were those that aimed to teach students specific skills (e.g., the use of I-statements in communicating feelings, the steps in developing and enacting a problem solving strategy, etc.).

### Table 18

*Intercorrelations between cognitive elements and effect size*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self monitoring and enhanced awareness</td>
<td><strong>.52</strong></td>
<td>.32</td>
<td>.11</td>
<td>.01</td>
<td><strong>.54</strong></td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td>2. Stimulus control and response disruption</td>
<td><strong>.32</strong></td>
<td><strong>.37</strong></td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Palliative</td>
<td></td>
<td><strong>-.23</strong></td>
<td><strong>.37</strong></td>
<td>.07</td>
<td><strong>-.14</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cognitive restructuring</td>
<td></td>
<td></td>
<td><strong>.48</strong></td>
<td><strong>-.23</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Relaxation coping</td>
<td></td>
<td></td>
<td></td>
<td><strong>.04</strong></td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Skill enhancement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>-.38</strong></td>
<td></td>
</tr>
<tr>
<td>7. Effect size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * $p < .05$. ** $p < .01$
The significant correlations between self monitoring/enhanced awareness, stimulus control/response disruption, and skill enhancement indicate that interventions encouraging students to become aware of their feelings (e.g., by identifying anger triggers) also addressed alternatives to typical, maladaptive patterns of responding and provided instruction on specific skills to promote more adaptive patterns of responding. Interventions that aimed to teach students strategies to limit or minimize emotional arousal also taught strategies for self-soothing (e.g., by focusing on alternately tensing and relaxing specific muscles in a particular sequence). Interventions intended to promote cognitive restructuring (i.e., change thoughts and underlying premises, assumptions, or attitudes) also aimed to provide instruction on the use of specific skills.

Figure 7 depicts the eight most common behavioral techniques employed in school-based cognitive-behavioral anger interventions and the percentage of studies using each technique by school level. Correlations between behavioral technique and effect size ranged from -0.22 to 0.33, with only self-instruction significantly related to the magnitude of the effect size \((r = -.60, p = .000)\). Interestingly, self-instruction was used in slightly more than half of the interventions at the elementary and middle school levels.

Discussion and role play were used in at least 75% of the interventions across all grade levels. Feedback and reinforcement were used least frequently in high school interventions, yet role play is used in all high school interventions. This finding is contrary to what one would expect. In use of role plays as an instructional technique, one
would expect group leaders or peers to provide responses, e.g., verbal praise, encouragement, feedback or other rewards for participating in the activities.

Less than half of the interventions used emotion identification (43%, n = 13), relaxation (33%, n = 10), homework (30%, n = 9), or anger logs (17%, n = 5). Emotion identification was used primarily at the elementary school level (n = 8), as one might surmise. The two interventions addressing emotion identification at the middle school level, however, were fairly creative. One employed computerized instruction and a game-like format (Bosworth, 2000) and the other made use of stories (Shechtman, 2000) to indirectly tap into students’ feelings. Anger logs were used mostly at the middle school level and almost exclusively in interventions focusing primarily on anger control.
Lastly, correlations were calculated to investigate the relationship between the cognitive elements of the intervention and the behavioral techniques employed. Table 19 reports the results.

The significant correlations found between certain cognitive elements and behavioral techniques are unsurprising. Interventions intended to sever students' habitual response to provocation were related to the use of discussion, exposure (e.g., through vignettes) and role plays while interventions aiming to build skills were correlated with interactive dialogue, instruction on [and use of] methods to reduce physiological arousal, and instruction on [and use of] overt or covert methods of talking oneself through a situation. Interventions aiming to explicitly alter student cognitions were associated with the use of homework and instruction on methods of self talk.

Interventions aiming to reduce arousal were significantly related to the use of discussion and instruction on methods of relaxation, such as deep breathing exercises and pleasant imagery. Relatedly, interventions aiming to address relaxation as a means of decreasing reactive aggression were associated with discussion and instruction on methods of reducing physiological arousal.
Table 19

Correlations between cognitive elements and behavioral techniques

<table>
<thead>
<tr>
<th></th>
<th>Self monitoring</th>
<th>Response disruption</th>
<th>Palliative</th>
<th>Cognitive Restructuring</th>
<th>Relaxation coping</th>
<th>Skill enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger logs</td>
<td>0.18</td>
<td>0.15</td>
<td>0.18</td>
<td>-0.03</td>
<td>0.22</td>
<td>0.22</td>
</tr>
<tr>
<td>Discussion</td>
<td>0.35</td>
<td>0.75***</td>
<td>0.37*</td>
<td>0.22</td>
<td>0.34</td>
<td>0.45**</td>
</tr>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identification</td>
<td>0.34</td>
<td>0.29</td>
<td>-0.30</td>
<td>0.11</td>
<td>-0.25</td>
<td>0.27</td>
</tr>
<tr>
<td>Exposure</td>
<td>0.25</td>
<td>0.60***</td>
<td>0.29</td>
<td>0.07</td>
<td>0.42*</td>
<td>0.32</td>
</tr>
<tr>
<td>Feedback</td>
<td>0.20</td>
<td>0.11</td>
<td>0.00</td>
<td>-0.07</td>
<td>0.21</td>
<td>0.17</td>
</tr>
<tr>
<td>Homework</td>
<td>0.26</td>
<td>-0.02</td>
<td>0.06</td>
<td>0.50**</td>
<td>0.10</td>
<td>0.33</td>
</tr>
<tr>
<td>Instruction</td>
<td>0.08</td>
<td>-0.05</td>
<td>0.11</td>
<td>0.23</td>
<td>0.34</td>
<td>0.27</td>
</tr>
<tr>
<td>Modeling</td>
<td>0.17</td>
<td>0.02</td>
<td>0.24</td>
<td>-0.05</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>0.00</td>
<td>-0.11</td>
<td>0.27</td>
<td>-0.21</td>
<td>-0.07</td>
<td>-0.17</td>
</tr>
<tr>
<td>Relaxation</td>
<td>0.07</td>
<td>0.24</td>
<td>0.43**</td>
<td>0.25</td>
<td>0.64***</td>
<td>0.35*</td>
</tr>
<tr>
<td>Role plays</td>
<td>0.29</td>
<td>0.36*</td>
<td>0.22</td>
<td>0.07</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Self instruction</td>
<td>0.08</td>
<td>0.18</td>
<td>0.11</td>
<td>0.51**</td>
<td>0.06</td>
<td>0.44*</td>
</tr>
</tbody>
</table>

Note. * p < .05, ** p < .01, *** p < .001
CHAPTER 5
Discussion

The objective of this study was to determine whether school-based cognitive-behavioral anger management interventions were effective in reducing child and adolescent aggressive behavior. Findings have implications for educators, policymakers, and prevention researchers. To begin, a summary of the findings will be presented and then examined within the context of the current literature. Next, implications of these findings for educators, policy makers, and prevention researchers will be discussed. This will be followed by the limitations of this study. Lastly, suggestions for future research will be put forward.

Overall effects

To investigate the effects of school-based cognitive-behavioral anger interventions on reducing child and adolescent aggressive behavior in the school setting, a systematic review of the literature and meta-analysis was conducted. Interventions were found at all school levels in all geographic locations. The great majority had been implemented in the United States with groups comprised of both males and females.

Overall, the meta-analytic findings indicate that school-based interventions utilizing cognitive-behavioral theoretical frameworks to address anger management significantly reduce aggressive behavior among children and adolescents in the school setting. Sensitivity analyses confirmed the appropriateness of including all studies in the omnibus effect size in two ways. First, the analysis revealed that no individual study exerted an inordinate influence on the overall effect size. Second, study design (i.e., randomized controlled trial or quasi-experimental design) did not exert undue influence
on the effect size. Therefore, all studies and all designs were combined to calculate the omnibus effect size. The average student participating in the intervention group of school-based cognitive-behavioral anger interventions exhibited 62% fewer displays of aggressive behavior, as compared to the average student in the control group.

Furthermore, cumulative meta-analysis uncovered the fact that the weight of the evidence has consistently demonstrated significant effects favoring intervention group participants for over twenty years. Cognitive-behavioral interventions vary in the combination of cognitive components and behavioral techniques employed. Despite this variability, however, interventions that address anger by overtly and explicitly attempting to alter mental images, thoughts, and thought patterns, while simultaneously providing opportunities to practice alternative ways of behaving (e.g., through exposure to anger provoking situations via vignettes and role-plays), are effective in reducing aggressive behavior among students.

**Methodological characteristics**

Publication type was the only variable tested that was significantly related to the magnitude of the effect size. Journal publications indicated that students who participated in treatment groups demonstrated statistically significant decreases in aggressive behavior when compared to students who participated in control or comparison groups. Dissertations did not find a significant difference between intervention and control group participants.

Interventions conducted as doctoral projects often have smaller sample sizes than interventions reported in peer reviewed journals. One might, therefore, attribute the difference between the effect size of doctoral dissertations and the effect size of peer-
reviewed journal to a lack of power to detect an effect among dissertation interventions. In the pool of studies collected for this project, however, the sample size for interventions conducted as doctoral dissertations was equally distributed about the median. So it is unlikely that the difference observed between publication types was due to a lack of power to detect an effect within dissertation-related interventions. A more plausible explanation is that interventions reported in dissertations are confounded with the geographic setting of the school. Of five interventions conducted in rural settings, four were published in dissertations.

Additional methodological variables were investigated in this study. Random assignment to condition, type of outcome measure used, identity of the outcome informant, and follow-up assessment periods are important in understanding school-based interventions. Each will be discussed in turn.

In studies where participants were randomly assigned to condition on an individual basis, intervention group participants demonstrated significantly less aggressive behavior than control group participants. In studies where participants were randomly assigned to condition as a group, however, no significant differences between intervention and control group participants was noted. In addition, the effect size for cluster randomized designs was less than half the magnitude of research designs in which students were individually assigned to condition. Reasons for this finding do not appear to be related to any of the variables investigated, i.e., publication type and other methodological characteristics (e.g., use of standardized outcome measures, outcome informant), study characteristics (e.g., geographic setting and school type), intervention characteristics (e.g., anger control as primary focus, anger management embedded in
curriculum), or participant characteristics (e.g., gender, school level, baseline level of behavior).

Since classrooms were the most common unit of assignment among the cluster randomized trials, perhaps contamination was an issue. It is conceivable that students, teachers, or school administrators could potentially contribute, albeit unintentionally. Flay and Collins ((2005) note that many school-based interventions have associated materials (e.g., posters) that reflect the intervention content. A teacher may display materials on classroom walls to reinforce lesson plans or objectives for intervention students. Control students may then enter those intervention classrooms for shared activities (e.g., movies) and view the materials, indirectly becoming aware of the information.

The type of outcome measure used in interventions is another methodological variable typically investigated, as it quantifies the outcome variable. If a measure has been tested and shown to be valid and reliable (i.e., standardized), one can have confidence that it measures what it was intended to measure and that it does so consistently. A measure designed to capture information logically (e.g., a measure developed for a particular intervention) may actually not capture the intended information or may not do so dependably, but this aspect has not been tested (i.e., the measure is unstandardized). In this study, studies using standardized and unstandardized measures both revealed significant differences between the intervention and control groups. This finding raises the possibility that aggressive behavior observed in the school setting is clearly identifiable and adequately recorded on both types of measures.

Teachers were responsible for completing the majority of outcome assessments.
Interestingly though, the effect size for student informants was more than twice the magnitude of that for teacher informants; and both were statistically significant. Student informants were used almost exclusively with middle and high school students; it is therefore possible that informant is confounded with school level or cognitive ability. It is also possible that the effect size reflects a true intervention effect. Students may report on behaviors across settings (i.e., in areas not necessarily monitored by adult informants, such as the school bus or neighborhood gathering locations) and across time (i.e., including evenings and weekends) when answering questions, while teachers report on behavior observed only in the school setting.

Parental ratings were used in a small number of studies, and were not significant. The direction of the effect, however, implies that decreases in aggressive behavior observed in the school setting are associated with increases in aggressive behavior in the home setting. Investigation of this phenomenon does not appear to be a routine part of school-based interventions for anger management.

Given the research on the stability of aggressive behavior over time, it is interesting that few studies conducted follow-up assessments to evaluate the effectiveness of interventions over time. In fact, no study included in the review conducted a follow-up assessment beyond one year. Findings from studies that did reported outcome measurements six months to one year after the intervention (n = 4) suggest that intervention effects are maintained.

Study level characteristics

Study level characteristics are typically appraised during the descriptive phase of systematic reviews and met-analyses. However, the type of school and the geographic
location of the school, two study level characteristics, were investigate more closely in this study. The effect sizes for public and alternative schools were similar in magnitude, but only the effect size for interventions implemented in the public schools demonstrated a significant difference between the intervention and control group participants, with intervention group participants showing a significant decrease in aggressive behavior at posttest. It should be noted, however, that alternative schools only implemented interventions in which anger control was the primary focus. Thus, school type and intervention focus are confounded in the alternative school setting and the effects of each cannot be parceled out at this time.

In the urban and suburban settings, students assigned to intervention groups significantly decrease their aggressive behavior. The magnitude of the effect size for urban students is 1.7 times greater than that of suburban students. Variability among the effect sizes of studies conducted in the urban setting, however, is more than expected by chance and is considered borderline-notable, so caution should be used in interpreting this finding. The moderator variables investigated in this study did not explain the heterogeneity among effect sizes.

Students in rural settings demonstrate the same magnitude of effect as students in the suburban setting, but there is no significant difference in aggressive behavior between students in intervention and control groups in rural schools. Only five studies, representing 16% of the sample, were implemented in rural schools. Of these five studies, four were dissertations. Since rural schools report minimal rates of verbal and physical aggression against teachers, it is conceivable, perhaps, that school administrators do not perceive a need for cognitive-behavioral anger management interventions.
**Intervention characteristics**

The effect size for teacher implementation of the intervention was equal to that of researchers. This held true whether teachers were the sole delivery personnel or part of a team delivery approach. Just over half of the teachers delivering the interventions taught in alternative school settings (n = 3). Teachers in public school settings (n = 2) delivered packaged programs. One program was Larson’s *Think First*, a manualized but not packaged intervention (the program is available in book form); the other program, *Second Step Violence Prevention Program*, is a pre-packaged program with a set curriculum and materials.

The paucity of teacher-implemented interventions in the public school setting could be the result of the intensive amount of labor and time required to train students in anger and aggression management skills, thus forcing teachers to put aside other responsibilities and duties (Larson, 2005). Counselors delivered the most interventions, as might be expected, given the psychological foundation of the program, counselor training and job descriptions. Nonetheless, effect sizes for all delivery personnel were statistically significant, with teachers and researchers slightly more effective than counseling personnel. On the whole, then, school-based cognitive-behavioral anger interventions are effective in reducing aggressive behavior regardless of delivery personnel.

Overall, interventions with anger coping as a primary focus appear to be equally as effective as interventions with anger management embedded in the curriculum of a program designed to target another problem, with similar effect sizes and significance. There was a moderately high amount of heterogeneity among interventions with anger as
the primary focus, though this appears to be driven by the two studies with effect sizes greater than one standard deviation (Deffenbacher, et al., 1996; Etscheidt, 1991).

As discussed, alternative schools did not implement any embedded-anger interventions, so the relative equality between program types is confined to public schools. When the anger focus was examined in combination with assignment to condition, randomized trials revealed that effect sizes for embedded-anger interventions were essentially the same as anger-as-primary focus interventions, further supporting the previous observation of equal effectiveness between program types. This finding suggests that students in public schools who take part in anger interventions benefit equally from full and partial emphasis on anger management skills.

Among the studies collected for this review, no individual intervention was widely used. Only five interventions were implemented by more than one researcher. Of these, two interventions showed strong, statistically significant and homogeneous effects: Anger Control Training (Feindler, et al., 1984; Whitfield, 1999; Sukhodolsky, et al., 2000) and Coping Power (Lochman, et al., 1984; Lochman, 1985; Lochman, et al., 1989; Lochman, et al., 1993; Lochman & Wells, 2003; Etscheidt, 1991). Anger Control Training was implemented at all levels, suggesting its flexibility and usefulness across cognitive abilities. Coping Power was used by Lochman and colleagues at the elementary school level, while Etscheidt (1991) implemented the program in an alternative school. An assumption is made that participants in Etscheidt's study were at least middle school age (no alternative schools were noted to have Kindergarten to 5th grade students). It appears, then, that Coping Power is also flexible and useful for students of different cognitive levels of development.
Length of time spent in the intervention was not related to the magnitude of the effect size. The median number of sessions ranged from 9.5 to 13, with the greater number of sessions occurring in the elementary schools and decreasing as school level increased (i.e., number of sessions was lowest in high school). Interestingly, the median length of individual sessions was similar across all school levels. This could be due to the nature of the theoretical framework of the intervention, i.e., the time necessary to first address the cognitive component through instruction and discussion and then the behavioral component through exposure and practice.

**Participant characteristics**

Three participant variables were addressed: gender, school level, and baseline level of aggressive behavior. To address the gender issue, studies were coded as either male-only or mixed groups. Early research began with boys (Boswell, 1984; Conaway, 1982; Lochman, et al., 1984; Lochman, 1985), as they exhibited more physically aggressive problematic behavior in the school setting than girls. Groups of males and females together in interventions targeting anger in more recent years suggest that aggressive behavior among girls may also occur in response to anger (Nickerson, 2003; Salvador, 2003; Whitfield, 1999). The magnitude of effect was 2.5 times greater, and statistically significant, for combined groups than for males alone. In fact, intervention and control male-only groups revealed no significant differences in aggressive behavior. This finding suggests that focusing solely on males does not significantly reduce aggressive behavior.

Reports of mean age were missing in 43% of the studies so participants were coded by school level, which roughly corresponds to normative cognitive changes and
has been used in previous studies (Mytton, et al., 2002; Mytton, et al., 2006).

Additionally, it was felt that this categorization would make the findings useful to educators and policymakers alike. Interventions conducted in the elementary school with anger as the primary focus were generally implemented with older elementary students (i.e., 4th grade and up). Interventions with younger elementary students were those that embedded anger in the curriculum. Since the theoretical CBT framework involved in both types of interventions was the same, and elementary school children are capable of benefiting from it (Durlak, et al, 1991), it is unclear why no studies of anger-as-primary-focus were conducted with early elementary students.

Overall, elementary students who participated in school-based anger interventions exhibited significantly less aggressive behavior at posttest than did control group participants. Middle school intervention participants also demonstrated significantly less aggressive behavior than control participants. Additionally, the magnitude of effect was similar at both levels. High school intervention participants, on the other hand, did not demonstrate significantly less aggressive behavior. It is possible that this finding is related to the small number of studies conducted in the high school setting.

**Cognitive components and behavioral techniques**

On the whole, interventions used a combination of cognitive components and behavioral techniques. Only skill enhancement was significantly related to the magnitude of the effect size. Correlations found significant relationships between skill enhancement and the behavioral techniques of discussion relaxation, and self instruction. This finding underscores the importance of providing children and adolescents with skills necessary for managing anger without (re)acting aggressively.
Comparison with past literature

The overall effect size obtained in this study is consistent with the overall effect size—and direction—obtained by Gansle (2005), the only previous systematic review to evaluate school-based anger interventions. On the surface, this is not surprising since both reviews addressed the same issue. However, this finding is somewhat misleading, as Gansle included externalizing, internalizing, social skills, academics, and beliefs and attitudes as outcome measures. The magnitude of the effect size for externalizing was higher (0.54, sd = .55) than the overall effect size (.31, sd = .49), thus while the current study found that school-based cognitive-behavioral anger interventions significantly reduced aggressive behavior, it was less than what Gansle observed. One reason for this discrepancy may lie in the publication status of the included studies. Gansle included only peer reviewed, published reports, while this study included both published and unpublished studies. As was demonstrated and discussed earlier, unpublished dissertations revealed no significant effect sizes and therefore tended to decrease the overall effect size. For a complete picture of the effectiveness of interventions, it is thus necessary to include unpublished studies.

The mean effect size obtained in the current study is consistent with the two Mytton et al. (2002, 2006) reviews of school based interventions targeting aggression. This study and Mytton et al. employed extensive and multidisciplinary searches (i.e., multiple databases, hand searches of print journals, use of the informal network) to identify trials, and included published and unpublished literature. In addition, the populations were similar. Mytton et al. specifically identified aggressive or at-risk for future violent behavior as an inclusion criteria for her sample population. And although
inclusion criteria for this study included all risk levels, the overwhelming majority of studies were conducted with students already exhibiting aggressive behavior at baseline.

Interestingly, the mean effect size obtained in the present study was approximately half that of Sukhodolsky, et al. (2004), Smith, et al. (2000), and Beck and Fernandez (1998), the three reviews of cognitive-behavioral interventions. Sukhodolsky et al. and Smith et al. focused on cognitive-behavioral anger interventions implemented with youth. Possible reasons include the types of research designs included the multiplicity of outcomes measured, and the types of participants. Sukhodolsky et al. included designs with only group comparisons (but it should be note that less than one-fourth of all comparisons came from randomized trials) and 41% of comparisons came from youth in non-school settings (e.g., outpatient and inpatient psychiatric clinics, correctional facilities). Smith et al. included various experimental and non-experimental designs (e.g., one group pre-post and single subject making up a total of 38% of the studies), measured negative and positive behaviors as well as cognitions (e.g., self perception), and included youth with diagnosed psychiatric or legal classifications. It is likely that the differences in effect size are a combination of the above issues, rather than just one issue alone (e.g., research design).

It should be emphasized, however, that the purpose(s) of these reviews was to determine the effectiveness of the cognitive-behavioral approach to anger management for youth rather than determine specifically for whom and under what conditions it works best. The current study sought specifically to determine the effectiveness of school-based cognitive-behavioral interventions for youth and is, thus, best compared to Gansle (2005). In general, the findings from this study are not in opposition to the current literature.
Rather, these findings hint that certain subpopulations included in previous studies were differentially affected by the intervention.

**Implications**

Nevertheless, the weight of the evidence supporting the overall effectiveness of school-based cognitive-behavioral interventions for anger management has been remarkably consistent (as demonstrated by cumulative meta-analysis) and is not associated with one particular intervention. This suggests that the cognitive-behavioral approach is the important factor. Furthermore, the cognitive-behavioral theoretical approach allows for consideration of relevant contextual factors in the development of interventions intended for particular subgroups populations, or settings.

In addition, findings from the current study suggest that school-based anger interventions need not be primarily focused on anger in order to reduce aggressive behavior in the public school setting. In view of limited resources, it may be a better use of funds to implement interventions in which anger management is embedded within the curriculum of another problem behavior intervention.

Finally, results of this study highlight the value of the meta-analytic technique for educators, policymakers and researchers. Educators now have more evidence with which to make a decision regarding the type of intervention to employ with their particular population. Policymakers have additional evidence upon which to base funding decisions. Researchers have additional information with respect to areas in need of more research.

**Limitations**

Application of the meta-analytic technique to the research questions addressed in the current study clearly provided valuable information for a variety of stakeholders.
Meta-analysis, however, relies on the documentation provided by the primary author. Studies with a strong research design but with inadequate reports of participant characteristics, for example, yield limited practical information. In the current meta-analysis, primary author documentation regarding SES, race/ethnicity, and age was poor in many studies. The lack of documentation with respect to these specific contextual variables hindered the interpretation of the impact of interventions for certain groups of students.

In addition to the limitation imposed by primary author documentation on the meta-analytic technique, the current study suffers from some specific limitations. These limitations are primarily methodological in nature. The first, and most significant, limitation is the potential for bias. The search, development of the inclusion and exclusion criteria, development of the screening forms and manual, the development of the coding manual, data extraction, and all analyses were conducted by a single person. While there was a plan for an experienced meta-analyst to independently code a random sample of 20% of the studies, less than 10% of the studies were therefore double coded. Attempts were made to reduce bias whenever possible. For example, studies that were retrieved for full text review were read only far enough to determine if they met the eligibility criteria as determined by the question. This involved reading methods section primarily.

Another limitation has to do with the elements of the studies that were—and were not—coded. For example, participant groups were identified by the overall composition of the group (e.g., male and female, checklist documenting ethnic and racial background) rather than the specific composition of the group (e.g., % male or % specific ethnicity or
race). This results in a loss of ability to interpret the findings more precisely or with more detail and minimizes generalizability.

Still another limitation was the restriction of outcome to one construct. While the choice to measure just one outcome construct was to narrow the focus to intervention effects on anger-related aggressive behavior, other important and related constructs may have been missed. The limitations of the current study thus lead to suggestions for further research.

Suggestions for further research

Several avenues for research emerge from this work. First, due to the potential for bias caused by a single individual developing the study, implementing the process, and analyzing results, these findings should be considered preliminary and replicated by others. Second, additional investigations of cluster randomized trials conducted in schools are needed to identify issues related to effective implementation of psychologically-oriented interventions within and between schools. Third, additional studies of teachers as implementers of interventions are needed. Fourth, additional investigations of psychologically-oriented interventions should be conducted in rural and urban areas, as well as in alternative school settings, and with follow-up assessments beyond one year. Fifth, elements of participant characteristics that are reported in primary studies should be addressed with more specificity (e.g., documentation of % male and % female, % ethnic and racial background, etc) and considered within larger developmental theories and the sociocultural context of anger.

And finally, primary authors of research reports are strongly encouraged to provide essential details regarding intervention participants (e.g., mean age, race/ethnicity, SES)
and results. Participant details are critical to understanding the contextual factors that influence the effectiveness of interventions among specific groups. Advanced statistical techniques are not needed to present essential details of program evaluations. Basic statistics (e.g., means, standard deviations and sample sizes of each group) are adequate. In cluster randomized trials, this would include the number of clusters, in addition to the sample size for each cluster. The reporting of such data is, of course, useful to researchers conducting meta-analyses. The ultimate benefit, however, will be to students and society.
APPENDIX A

Database descriptions

The following is a brief description of each database used in the search to identify relevant studies. In addition to a summary, documentation is provided regarding the coverage period, producer, and update frequency for all databases.

**Database name:** CENTRAL (Cochrane Central Register of Controlled Trials)
**Years of coverage:** 1898 - present
**Producer:** John Wiley & Sons. To contact the producer:
www3.interscience.wiley.com/aboutus/contactus/contactus.html
**Updated:** Quarterly
**Contents:** CENTRAL is part of the Cochrane Library. As of April 2007, CENTRAL contained approximately 495,000 citations to published and unpublished sources of information. Cochrane aims to produce independent systematic reviews and meta-analyses to inform healthcare decision-making, thus the focus is on biopsychosocial information. Approximately 60% of the citations in CENTRAL come from MEDLINE.

**Database name:** C2-SPECTR (Campbell Collaboration’s Social, Psychological, Educational, and Criminological Trials Register)
**Producer:** The Campbell Collaboration. To contact the producer:
http://campbellcollaboration.org/
**Updated:** Not specified. Contributions are made to the database by volunteers and graduate students who conduct hand and electronic searches for randomized trials, as well as by members of the invisible college.
**Contents:** C2-SPECTR is a database of approximately 12,000 randomized (or possibly randomized) trials in education, psychology, social work, social welfare, and criminal justice. Trials in this database are coded by research design, a helpful
bit of information for systematic reviewers and meta-analysts. Trials in which individuals are randomly assigned to condition are labeled as RCT; trials in which groups of participants (e.g., classrooms, schools, neighborhoods, etc.) are randomly assigned to condition are labeled as CRT. Quasi-experimental designs are labeled as QED.

Database name: Dissertation Abstracts

Years of coverage: 1861 - present

Producer: UMI ProQuest.
789 East Eisenhower Parkway
Ann Arbor, MI 48106

Updated: Monthly

Contents: Dissertation Abstracts contains more than 1.6 million dissertations completed at universities in North American and select universities in Europe. Previews of the first 24 pages of the dissertation are available in pdf format for titles published since 1997. As of July 21, 2007, a subscription will be required to access this database.

Database name: ERIC (Education Resources Information Center)

Years of coverage: 1966 - present

Producer: United States Department of Education
Institute of Education Sciences
4483-A Forbes Boulevard
Lanham, MD 20706

Updated: Monthly.

Contents: This database indexes education-related information published in journals or disseminated through other sources (e.g., conference presentations, meetings, government documents, reports, directives, books, monographs). As of March, 2007, the database contained approximately 1,200,000 items.
Database name: Index to Theses
Years of coverage: 1716 - present
Producer: Expert Information, Ltd.
   Hamilton House
   1 Temple Avenue
   London, UK EC4Y 0HA
Updated: Not reported.
Contents: This database contains a list of theses completed at universities in Great Britain and Ireland. As of February 2007, there were 498,960 theses in the database.

Database name: MEDLINE
Years of coverage: 1950 – present
Producer: United States Government - Library of Medicine
   8600 Rockville Pike
   Bethesda, MD 20894
Updated: daily Tuesday through Saturday
Contents: This database contains approximately 16 million citations from approximately 5000 journals published in 37 different languages. Though the database indexes life science information, the focus is on biomedicine.

Database name: NCJRS (National Criminal Justice Reference Service)
Years of coverage: 1970 - present
Producer: National Criminal Justice Reference Service (NCJRS)
   P.O. Box 6000
   Rockville, MD 20849-6000
Updated: Semi-annually
Contents: This database contains abstracts of approximately 190,000 research reports, journal articles, and government documents related to crime, law enforcement and the justice system. The database is administered by the Office of Justice
Projects, United States Department of Justice, though it is produced by a private contractor.

*Database name:* PsycINFO  
*Years of coverage:* 1806 - present  
*Producer:* American Psychological Association  
750 First Street NW  
Washington, DC 20002  
*Updated:* Weekly  
*Contents:* As of April 2007, this database contained approximately 2,400,000 citations to books, book chapters, commentaries, conference proceedings, dissertations, editorials, encyclopedia entries, journal articles (peer-reviewed and non-peer-reviewed), manuals, reviews, and study guides related to psychology.

*Database name:* Sociological Abstracts  
*Years of coverage:* 1952 - present  
*Supplier:* Cambridge Scientific Abstracts  
PO Box 22206  
San Diego, CA 92192  
*Updated:* Monthly  
*Contents:* As of April 2007, this database contained approximately 800,000 abstracts of journal articles and book reviews from more than 1800 publications in sociology and the related disciplines of social and behavior science. The database is international in scope.
APPENDIX B

Search strategies

The overall search strategy utilized terms to capture the outcome, intervention, setting and participants. When available, the database thesaurus was consulted for specific terminology.

**CENTRAL (Cochrane Central Register of Controlled Trials)**

*Thesaurus terms:* anger, aggression, impulsive behavior, social behavior disorders; behavior therapy, cognitive therapy, behavior control; adolescent behavior, child behavior; program evaluation

*Search:* anger OR aggression AND cognitive therapy OR behavior control AND adolescent behavior or child behavior AND program evaluation

*Notes:* Since CENTRAL is closely tied to MEDLINE, the thesaurus was consulted for Medical Subject Heading (MeSH) terms. There was no way to use these terms as such in the search string on the website, so the thesaurus terms were used to search “all text” in order to identify studies.

**C2-SPECTR (Campbell Collaboration’s Social, Psychological, Educational, and Criminological Trials Register)**

*Thesaurus:* None

*Search:* Summer 2005

- anger or violen* all indexed fields
- OR anger or violen* all non-indexed fields
- AND child* or adol* all non-indexed fields
AND cog* or behave* or ther* all non-indexed fields

Fall 2006

anger all non-indexed fields
OR Aggression all non-indexed fields
OR aggressive behavior all non-indexed fields
AND cognitive all non-indexed fields

Notes: The indexed fields consist of: author, keyword, periodical, and publication;
the non-indexed fields consist of: title, abstract, and notes.

Dissertation Abstracts

Thesaurus: None

Search: anger or aggression AND cognitive behav* AND evaluation AND child*
or adol*

Notes: Performed this search in stepwise fashion, with anger or aggression AND
cognitive behave* first and then the outcome and target population
second and third.

ERIC (Education Resources Information Center)

Thesaurus: aggression, anger, cognitive behavior modification, cognitive
restructuring, program effectiveness, anger management, program
evaluation

Search: cognitive restructuring or cognitive therapy or cog* behav* ther* or
cog* behav* NEAR interv* or treat* AND anger or angry or aggress*
AND evaluation or evaluat* or program* AND school or sch*

Delimiters: English, 1975 to 2006
Notes: Using keywords offered a more precise search; when descriptors were used, there were too many irrelevant hits. Multiple combinations of the above search terms were used to conduct the search during the Summer and Fall of 2005 and the Fall of 2006.

Index to Theses

Thesaurus: None.

Search: (ti contains anger) OR (ti contains aggression) AND (ti contains cognitive therapy) OR (ti contains cognitive behavioural) OR (ti contains cognitive restructuring) OR (ti contains school*) OR (ti contains prog* or eval*)

Notes: Decisions were made based on returned titles alone; no abstracts were available for viewing. Searches were also conducted on single terms in isolation.

MEDLINE

evaluation studies [mh] OR follow-up studies [mh] OR prospective studies [mh] OR cross-over studies [mh] OR control* [tw] OR prospective* [tw] OR volunteer* [tw]) NOT (animal [mh] NOT human [mh])

Notes: Anger was defined as anger-in according to the biomedical acronym and definition database. Since anger-in was not the focus of this project, anger was not included as a search term. Rather, aggression, a broad term was used. Cochrane has developed a sensitive search strategy\(^3\) to target the methodological aspect of trials. This sensitive strategy was adapted for use here.

**NCJRS (National Criminal Justice Reference Service)**

**Thesaurus:** Aggression, anger, acting out behavior, individual behavior, problem behavior; cognitive therapy, behavior modification, behavior modification training; adolescent males, adolescent females, children at risk; effectiveness, program evaluation, program implementation, criminal justice program evaluation.

**Search:** 2005

(anger or aggression or aggress* behav*)

AND (cognitive therapy or treatment techniques)

AND (adol* or child*)

AND (program eval* or program implem*)

---


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Search: 2006

anger OR aggression AND program evaluation

Notes: Both concept and Boolean searches conducted to cast widest net; the
Boolean searches were too limited, returning zero hits at times. The
concept searches were more productive.

PsycINFO

Thesaurus: anger, anger control, aggressive behavior, conduct disorder,
fighting; cognitive therapy, cognitive behavior therapy, cognitive
restructuring, behavior modification, behavior change, coping
behavior; elementary school students; school based intervention

Search: 2005

(anger or (anger management) or (anger control)) AND ((verbal
cog* restruct*) or (behave* mod*)) AND school* AND interv*

Delimiters: English

Search: 2006

(anger or aggress* or (conduct dis*)) AND ((cog* behave* ther*) or
(cog* restruc*) or (behave* mod*)) AND school* AND interv*

Delimiters: Publication type: unlimited

Language: English

Population: human
Age: school age (6-12), adolescence (13-17)

Methodology: empirical study, experimental replication, followup study, longitudinal study, prospective study, quantitative study, or treatment outcome/randomized

Notes: Multiple combinations of individual search terms were also used to carry out electronic searches.

Sociological Abstracts

Thesaurus: anger, aggression, behavior problems, aggressive behavior; treatment; program evaluation, evaluation research, effectiveness.

Search: 2005

(anger or aggress* or viol*) AND ((cog* behav*) or behave*) AND school* AND (eval* or effectiv*) AND (prev* or prog*)

2006

(anger or aggress* or (aggress* behave*)) AND ((prog* eval*) or (eval* res*) or effective*) AND school*

Notes: Use of descriptors limited hits. Searching the ‘abstract’ was more productive, as was searching ‘anywhere.’
APPENDIX C

Screening forms and manual
Phase I Screening Form: Topic, Setting, Population, and General Design Relevance

Study # ______  Screener initials/date: ____________________

(1) Full Citation (APA style):
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(2) How was this study identified?
   a. Electronic search of online database
   b. Bibliography of relevant study
   c. Cited in meta-analysis or systematic review
   d. Handsearch of journal
   e. Search of conference proceedings
   f. Web search (e.g., Google)
   g. Organizational website
   h. Other: ________________________________________________________________

(3) Does this study address anger management, anger control, or emotional literacy?
   YES  UNSURE  NO (STOP/exclude)

(4) Does this study take place in a school setting?
   YES  UNSURE  NO (STOP/exclude)

(5) Are the participants K – 12 students?
   YES  UNSURE  NO (STOP/exclude)

(6) Are there at least two groups of participants? (e.g., treatment and control)
   YES  UNSURE  NO (STOP/exclude)

Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Decision:  ___ Exclude  ___ Include/progress to Phase II screening

Phase II Screening Form: Research Design, Intervention and Outcome Relevance
Study # ____________ Screener initials/date: ____________

First author (year) _________________________

(1) Research design:
   - Randomized controlled trial (individuals randomly assigned to condition)
   - Group randomized controlled trial
   - Quasi-experimental design
   - Single group pretest/posttest design (Stop/exclude)
   - Case study (Stop/exclude)
   - Correlational or ex post facto design (Stop/exclude)
   - Other: __________________________________________(Stop/exclude)
   - Unsure/unable to determine

Location of identifying information:
   - Title page: ____________
   - Abstract page: ____________
   - Method section page: ____________

(2) Is this a cognitive-behavioral intervention?

   YES  UNSURE  NO (Stop/Exclude)  Page: ____________

   - Author identified
   - Screener identified

Comment:

   ___________________________________________________________

   ___________________________________________________________

(3) Do the groups receive conceptually different interventions?

   YES  UNSURE  NO (Stop/Exclude)  Page: ____________

Comment:

   ___________________________________________________________

   ___________________________________________________________
(4) Are acceptable aggressive behaviors measured as an outcome? (refer to Screening Guide)

| YES | UNSURE | NO | Page: ____________ |

Comment:
______________________________________________________________
______________________________________________________________

(5) Is a standardized measure used to record the outcome? (refer to Screening Guide for list)

| YES | Page: ____________ |
| UNSURE | NO | Page: ____________ |

If Unsure or NO selected, does the measure used have face validity?

| YES | UNSURE | NO |

Comment:
______________________________________________________________
______________________________________________________________

(6) Does this study report outcomes such that an effect size may be calculated? (refer to Screening Guide for details)

| YES | UNSURE | NO (Stop/Exclude) | Page: ____________ |

Comment:
______________________________________________________________
______________________________________________________________

Additional Comments
______________________________________________________________
______________________________________________________________
______________________________________________________________

Decision:
___ Exclude       ___ Include/Continue to Coding Phase

SCREENING MANUAL

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This manual provides detailed information on completing the screening forms for the project entitled, “Effects of cognitive-behavioral school-based anger programs: A systematic review and meta-analysis.” The screening for this project will be conducted in two phases. In the first phase, titles and abstracts are read for eligibility. This is the broadest level, with the goal of identifying potential studies from the literature of several different disciplines. In the second phase, the title, abstract, and method sections are searched for information. There will be times when other sections of articles, reports, etc will need to be read.

Phase I Screening Form
This purpose of this form is to help identify potentially relevant trials by addressing the topic, setting, population and general research design. All answers should be based on author documentation.

**Study ID:**
The study ID number is assigned by the primary investigator. Numbers are assigned sequentially as the studies are retrieved. The ID number can be found on the tab of the folder holding the study, as well as in the upper right hand corner of the first page of the document.

**Screener initials and date:**
Fill in initials of first and last name (e.g., Julia Lavenberg would be JL). The format of the date is: month/day/year (e.g., 01/01/06)

**Item 1: Full Citation (APA style):**
Use the standard APA format for the document type.

*Journal article:*

*Book chapter:*

*Book:*

Refer to APA manual for details or other types of documents.
Item 2: How was this study identified?

(a) **Electronic search of online database.** Select this choice if the study was located in any of the following electronic databases: PsycINFO, ERIC, MEDLINE, Dissertation Abstracts, C2-SPECTR, CENTRAL, NCJRS, Sociological Abstracts, Index to Theses.

(b) **Bibliography of relevant study.** Select this choice if the study was located in the reference list of a study that was included in this project.

(c) **Cited in meta-analysis or systematic review.** Select this choice if the study was located in the reference list of a meta-analysis or systematic review included in this project.

(d) **Hand search of journal.** Select this choice if the study was located in a page-by-page search of the following journals: Aggressive Behavior (1975-July 2006), Behavior Therapy (1997-July 2006), Cognitive Therapy and Research (2000-2005), Journal of School Health (1975-July 2006).

(e) **Search of conference proceedings (either electronic or hardcopy listings)** Select this choice if the study was identified by searching conference proceedings via organizational websites or publications.

(f) **Web search.** Select this choice if the study was located via a generalized web search. Specify the search engine (e.g., Google, GoogleScholar, etc.)

(g) **Organizational website.** Select this choice if the study was identified via links located on the organization’s website.

(h) **Other.** Select this choice if the study was identified by means other than those listed above (e.g., through word of mouth or email notification from a colleague). This can be a study identified through the invisible college, or any other source not listed above. Specify the source.

Item 3: Does this study address anger management, anger control, or emotional literacy?

Programs that address anger management or anger control aim to increase children’s and adolescent’s knowledge and skills with respect to the expression of angry feelings. Programs that address emotional literacy aim to educate children and adolescents about the wide variety of feelings that one may experience; anger is typically included.

Select **yes** if the authors address any aspect of anger management, anger control, or emotional literacy.

Select **no** if the authors clearly exclude anger.

Select **unsure** if there is a possibility that anger is addressed in the program.

Item 4: Does this study take place in a school setting?

Children attend various types of schools. Acceptable school settings for this project include: public, private, parochial (i.e., religiously oriented), charter (e.g., focused on the arts), vocational (e.g., auto mechanic training), or alternative (e.g., schools that follow the traditional academic calendar and hours of operations but are set up for a specific
population, such as pregnant teens)>

In addition, the intervention must be delivered during the traditional school day or after school, as a supplemental program, Monday through Friday.

Select yes if the school meets the above criteria. Select no if the school does not meet the above criteria. Select unsure in any case where documentation is vague.

**Item 5: Are the participants Kindergarten through grade 12 students?**

The target populations are children and adolescents enrolled in kindergarten through high school (U.S. levels) or primary and secondary (non-U.S. levels) schools. The schooling levels correspond to ages 5 though 18, though some children begin slightly early or graduate slightly later. The acceptable age range is 4 to 20 years.

Select yes if the target population meets the above criteria for grade and age. Select no if the target population does not meet the above criteria (e.g., preschool or college). Select unsure if the documentation is vague.

**Item 6: Are there at least two groups of participants** (e.g., treatment and control)?

Select yes if two or more groups of participants are being compared. Select no if there is one group of participants tested before and after the intervention or if the study focuses on an individual (i.e., case-study). Select unsure if the documentation is vague.

**Comments:**

Fill in any information regarding the intervention, setting, participants, or design that would provide guidance for the reviewer. Document the location of this information by listing the page number first and then the paragraph and sentence number.
**Phase II Screening Form**

This purpose of this form is to further investigate studies relevant to this project. Questions on this form refer to the overall research design, details of the intervention, and outcome measures. Studies passing this phase will be coded and entered into analyses, thus it is important to be thorough. Please ask for help if you are unsure of any question. Although it may seem time consuming at present, it will save time in the long run. And, as before, all answers should be based on author documentation.

**Study ID:**
The study ID number was assigned by the primary investigator. The ID number can be found on the tab of the folder holding the study, as well as in the upper right hand corner of the first page of the document. Document this number in the space provided.

**Screener initials and date:**
Fill in initials of first and last name (e.g., Julia Lavenberg would be JL). The format of the date is: month/day/year (e.g., 01/01/06), the same procedure as Phase I.

**Item 1: Research design**
In order to be considered for this review, a study must be either a randomized controlled trial or a quasi-experiment containing a control group.

- Randomized controlled trials may assign either individuals or groups of individuals (e.g., classrooms, schools, school districts, etc) to condition.
- Quasi-experimental designs may be pretest-posttest control group designs in which individuals (or groups) were assigned by alternation or matching.
- Single group pretest/posttest designs are not eligible. STOP screening and exclude study at this point.
- Case studies are not eligible. STOP screening and exclude study at this point.
- Correlational or ex-post facto designs are not eligible. STOP screening and exclude study at this point.
- Other. Briefly describe the design, then STOP screening and exclude study at this point.
- If you are unable to determine the study design, mark the form and bring to the attention of the PI.
- Identify the location of the information used to complete this item on the form. Check all selections that apply and note page numbers.

**Item 2: Is this a cognitive-behavioral intervention?**

Cognitive-behavioral theory posits that cognitions influence emotions and behavior; it seeks to alter one’s thoughts and provide guidance for the development and practice of alternative behavioral scripts. As such, cognitive-behavioral interventions must be designed to change mental images, thought, and thought patterns in an overt, explicit manner. In addition, the intervention must make use of acceptable behavioral techniques (e.g., modeling, role-playing, reinforcement, self-instruction, etc.) when implementing the intervention.

- Select *yes* if the intervention is consistent with the above definition.
- Select *no* if the intervention does not meet the above definition. STOP screening and exclude study at this point.
- If the description of the program is vague and you cannot make a determination, select *unsure*. Continue with the screening form, but be sure to bring the study to the attention of the PI.
- Identify whether the author explicitly identified the program as a cognitive behavioral intervention or whether you made the inference based on information presented in the study (e.g., via a table of lesson plans).

**Item 3: Do the groups receive conceptually different interventions?**

Eligible studies will contain an intervention group(s) and either an untreated control group or a placebo group. If a placebo group is used, participants must receive a conceptually different intervention (e.g., watching videos, playing games).
• Select *yes* if intervention and comparison groups are assigned to receive different treatments.

• Select *no* if groups receive conceptually similar treatments (e.g., if Group 1 receives a cognitive-behavioral intervention and Group 2 receives the same cognitive-behavioral intervention with teacher support). STOP screening and exclude study at this point.

• If you are unable to determine what treatment is received by each group, select *unsure*. Continue with the screening form, but be sure to bring the study to the attention of the PI.

**Item 4: Are acceptable aggressive behaviors measured as an outcome?**

The following definition is adopted for use in this project: Aggression is “a set of primarily interpersonal actions that consist of verbal or physical behaviors that are destructive or injurious to others or to objects” (Lochman, Whidby, & FitzGerald, 2000, p. 31). Therefore, either verbal or physical aggression is an acceptable outcome. Examples of verbal aggression may include, but are not limited to: yelling at teachers or other adults with supervisory responsibilities or issuing threats to any person. Physical aggression may include, but is not limited to: pushing, shoving, hitting, breaking objects, fighting and acting out.

• Select *yes* if the study reports at least one quantitative measure of verbal or physical aggression as an outcome.

• Select *no* if the study does not report at least one quantitative measure of verbal or physical aggression as an outcome.

• Select *unsure* if you are unable to determine whether the aggression measured is acceptable. Continue with the screening form, but be sure to bring the study to the attention of the PI.

**Item 5: Is a standardized measure used to record the outcome?**

Both standardized and unstandardized (with adequate face validity) measures are acceptable for measuring aggressive behavior. For purposes of this study, measures
indexed in Buros Institute of Mental Measures yearbooks are considered the standardized measures. Examples include:

- Behavior Assessment for Children (BASC)
- Child Behavior Checklists (CBCL; as developed by Achenbach & Edelbrock, including the teacher and student versions – TRF and YSR )
- Conners’ Rating Scale (CTRS)
- Missouri Children’s Behavior Checklist (MCBC)
- School Behavior Checklist (SBC)
- School Social Behavior Scales (SSBS)
- State-Trait Anger Expression Inventory (STAXI)

Unstandardized measures should appear to capture verbal or physically aggressive behavior. Disruptive behaviors, such as frequent teacher interruption, are not considered acceptable.

- Select yes if the outcome measure used in the study is on the above list (or located in the Buros Institute yearbooks).
- Select unsure or no if the measure does not meet the standardized criteria. Elaborate on your decision by commenting on the face validity of the measure in the area provided.

**Item 6: Does this study report outcomes such that an effect size may be calculated?**

Since the data necessary to conduct meta-analysis is basic, it is expected that many studies will report the outcome in acceptable formats. Additionally, the software that will be used to conduct the meta-analysis is flexible and can handle data in different formats. Examples of acceptable outcome data:

- Means, standard deviations, and sample size for each group
- Differences in means, common standard deviation, and sample size
- Cohen’s d (standardized by pooled within groups standard deviation) and sample size
- Means, sample size, and t-values
- Sample size and t-values
Means, sample size, and p-values
Means pre- and posttest in each group, F for difference between changes, total sample size

- Select yes if the study reports outcomes in any of the above formats.
- Select no if the study does not report outcomes in any of the above formats.
- Select unsure if you are unable to determine if the outcomes reported are eligible.
Bring to the attention of the PI.

Additional comments.

Please identify anything you think might be important in deciding whether this study should proceed to the next stage of processing (i.e., the coding stage).

Decision:

Please record an overall judgment by checking the appropriate selection on the form.

- Select Exclude if the study does not meet the criteria for any of the following: research design, cognitive-behavioral intervention status, differential treatment, or data for effect size calculation.
- Select Include if the study meets those criteria.
- Any study with an unsure decision should be brought to the attention of the PI

THANK YOU!
CODING FORM for SCHOOL-BASED ANGER INTERVENTIONS

1. Study ID number [STUDYID]

Study Related Characteristics

2. Publication year [PUBYR]

3. Publication type [PUBTYPE]
   1 journal article
   2 doctoral dissertation
   3 master's thesis
   4 book chapter or book
   5 government report
   6 organizational report
   7 conference paper
   8 other: ____________
   9 cannot determine

4. Country in which study conducted [ST_CNTRY]
   1 United States
   2 other: ____________
   9 not reported

5. Location of study [ST_SCHSET] page(s) ________
   Describe geographic location and setting (e.g., southeastern PA, urban area)

6. School type [ST_SCHTYPE] page(s) ________
   Author report:
   1 public
   2 private
   3 parochial
   4 charter
   5 alternative
   6 other: ____________
   Coder interpretation:
   7 public
   8 other: ____________
   Not addressed in report:
   9 cannot determine
Methodological Characteristics

7. Assignment to condition [UNIT] page(s) _______
   1 individual 3 school
   2 classroom 4 other: ________________
   9 cannot determine/not reported

8. Mechanism of allocation [ASSIGN] page(s) _______

   Random assignment:
   1 random assignment, with or without matching

   Non-random, but control group matched to treatment group:
   2 matched ONLY on personal characteristics or demographics
   3 matched ONLY on pretest measures of outcome variables
   4 matched on both of above
   5 other: _____________________________________________

   Non-random, no matching prior to treatment:
   6 groups of convenience
   7 purposive selection of individuals

   Assignment to condition not described or vague:
   9 not reported/cannot determine

Comments:

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

9. Were groups tested for equivalence prior to intervention? [PREEQUIV] page(s) _________
   1 yes
   2 no
   3 tested but not analyzed by author(s)
   9 cannot determine

10. Unit of analysis [UNITANALYSIS] page(s) _______
11. Does the unit of analysis match the unit of assignment? [UNITMATCH]

|   |   |   
|---|---|---
| 1 | individual | 2 | group | 9 | cannot determine |

Comments:

12. Comparison condition [COMP_TYPE] page(s)__________

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>receives nothing</td>
<td>4</td>
<td>attention placebo</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>wait list</td>
<td>5</td>
<td>alternative treatment</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>treatment as usual</td>
<td>6</td>
<td>more than one comp group</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>not reported/cannot determine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

13. Gender [GENDER] page(s)_______

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>male only</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>female only</td>
<td>9</td>
</tr>
</tbody>
</table>

Comments:

14. Schooling level [SCHLEV] page(s)_______

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>elementary</td>
<td>5</td>
<td>mixed:</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>middle school</td>
<td>9</td>
<td>not reported/cannot determine</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>kindergarten through grade 8 constellation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>high school</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Comments:

15. Grade [GRADE] page(s)_______

<p>| | | | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindergarten</td>
<td>7th grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st grade</td>
<td>8th grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd grade</td>
<td>9th grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd grade</td>
<td>10th grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th grade</td>
<td>11th grade</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5th grade</td>
<td>12th grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th grade</td>
<td>not reported/cannot determine</td>
<td></td>
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</tr>
</tbody>
</table>

16. Mean age [AGEMEAN] page(s)_______

<p>| | | | | |</p>
<table>
<thead>
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</tbody>
</table>

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18. Race/ethnicity [RACE] page(s) ______

Check all that apply:

__ African American    __ Hispanic/Latino/-a
__ Caucasian          __ Asian
__ other: ________________
__ not reported/cannot determine

Text 19. Socioeconomic status [SES] page(s) ______

__ low                  __ upper
__ low-middle           __ reported as numerical value
__ middle               __ not reported/cannot determine
__ middle-upper

Comments:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

20. Baseline level of aggressive behavior [BASEBEHAV] page(s) ______

1 not demonstrating aggressive behavior
2 considered at risk for aggressive behavior
3 exhibiting aggressive behavior
9 not reported/cannot determine

Text 21. Co-morbid conditions [COMORBID] page(s) ______
List formal diagnoses of participants, if any:

<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 anger management</td>
</tr>
<tr>
<td>2 substance abuse</td>
</tr>
<tr>
<td>3 youth violence or aggression</td>
</tr>
<tr>
<td>4 coping with parental divorce</td>
</tr>
<tr>
<td>5 other: _________________</td>
</tr>
<tr>
<td>9 not reported/cannot determine</td>
</tr>
</tbody>
</table>

Comments:

Intervention: Program Characteristics

22. Primary focus of program [INTFOCUS] page(s) _____

<table>
<thead>
<tr>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 anger management</td>
</tr>
<tr>
<td>2 substance abuse</td>
</tr>
<tr>
<td>3 youth violence or aggression</td>
</tr>
<tr>
<td>4 coping with parental divorce</td>
</tr>
<tr>
<td>5 other: _________________</td>
</tr>
<tr>
<td>9 not reported/cannot determine</td>
</tr>
</tbody>
</table>

**Name of program/intervention: __________________________

**Manualized program?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 yes</td>
</tr>
<tr>
<td>2 no</td>
</tr>
<tr>
<td>9 cannot determine</td>
</tr>
</tbody>
</table>

Comments: __________________________________

23. Theoretical framework [INTTHEORY] page(s) _____

Briefly describe the theory underlying the intervention:

<table>
<thead>
<tr>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

24. Time of program delivery [INTDELIVTIME] page(s) _____

<table>
<thead>
<tr>
<th>Time of Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 during school day</td>
</tr>
<tr>
<td>3 other _____________</td>
</tr>
</tbody>
</table>

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25. Total length of program [INTLENGTH] page(s) ____________
   01 author reported: __________________________ (in minutes)
   02 coder determined: __________________________ (in minutes)
   99 not reported/cannot determine

26. Number of sessions [INTSESSNUMB] page(s) ____________
   01 author reported: __________________________
   02 coder determined: __________________________
   99 not reported/cannot determine

27. Length of each program session [INTSESSLENGTH] page(s) ____________
   01 author reported: __________________________ (in minutes)
   02 coder determined: __________________________ (in minutes)
   99 not reported/cannot determine

Comments:

28. Method of delivery [INTDELIVMETH] page(s) ____________
   1 individual instruction
   2 small group format (≤ 10)
   3 large group format (≥ 11)
   4 entire intact classroom
   5 mixed method
   9 not reported/cannot determine

Comments:

29. Personnel delivering intervention [INTDELIVPERSON] page(s) ____________
   1 classroom teacher
   2 other teacher
   3 counselor/psychologist
   5 lay persons
   6 other: ____________________________
   7 multiple personnel

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30. Fidelity of program implementation addressed by author? [INTFIDEL]

1 yes  
2 no

Comments regarding program implementation:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

31. Briefly describe the cognitive-behavioral components of the intervention. [INT_COMPTYPE] page(s) __________

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

32. Briefly describe the techniques employed in the delivery of the intervention. [INT_TECHNIQ] page(s) __________

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

33. Supplemental intervention components: [INT_ADDLCOMP] page(s) __________
Check all that apply:

__ none
__ school (e.g., a change in school climate, teacher support, etc)
__ family involvement
__ community involvement
__ other: _____________________________________________
__ not reported/cannot determine

Comments:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Outcome Measure(s)

Text 34. Explicit characterization or description of behavioral outcomes
[OUTCOMEDOC] page(s) ______

1 yes
2 no

34a. If yes, document types of aggression measured.
[OUTELEM] page(s) ______

Check all that apply:
__ physical aggression
__ verbal aggression
__ relational aggression
__ other: ___________

Comments and specific behaviors:
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Text 35. Outcome informant [OUTINFORM] page(s) ______

1 teacher
2 student
4 other: __________________
5 multiple

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36. Outcome informant blind to condition? [OUTINFORMBLIND] page(s) ______

1 yes  2 no  9 not reported/cannot determine

Text 37. Outcome measure(s) used [OUTMEAS] page(s) ______

______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________

Text 38. Time of outcome assessment [OUTMEASTIME] page(s) ______

______________________________
______________________________
______________________________

Please turn to the Effect Size information collection section on the following page to complete this form.
Effect size information:

Two groups compared: Group 1: ____________________________________________

Group 2: ____________________________________________

<table>
<thead>
<tr>
<th>Outcome A:</th>
<th>Group 1 Pretest</th>
<th>Group 1 Posttest</th>
<th>Group 1 Follow-up Time:</th>
<th>Group 2 Pretest</th>
<th>Group 2 Posttest</th>
<th>Group 2 Follow-up Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SD</td>
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<td>n</td>
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<tr>
<td>d (author reported)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Other statistics reported:</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome B:</th>
<th>Group 1 Pretest</th>
<th>Group 1 Posttest</th>
<th>Group 1 Follow-up Time:</th>
<th>Group 2 Pretest</th>
<th>Group 2 Posttest</th>
<th>Group 2 Follow-up Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
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<td>SD</td>
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<td>d (author reported)</td>
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<tr>
<td>Other statistics reported:</td>
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</tr>
</tbody>
</table>
Copy this page as needed to report on multiple comparison groups or multiple outcomes.

Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Any other relevant information:

Overall comments regarding study:
This manual provides detailed information regarding the procedures and background information needed in order to complete the coding form for this project.

Since the template for the coding form was constructed using theoretical and conceptual issues addressed in the project, the information required to answer questions will be scattered throughout the reports under review. It will thus be necessary to read the sections of the report in a non-linear manner in order to answer the questions sequentially. The bulk of the information, however, should be located within the methods and results sections.

To provide some relevant background information, the main research questions and key definitions are presented first. The procedure for extracting information from a report is next.

The first section of the coding form deals with study related characteristics. The second section addresses methodological characteristics. The third and fourth sections focus on the intervention (participants and program characteristics). The fifth section concentrates on outcome measurement. The final section deals with the specific data required for effect size calculations.
Many of the questions ask you to document the page(s) of the report on which the information is located. Although this information may seem irrelevant, it is useful in investigating and resolving any sources of disagreement that arise among coders.

Thank you for your assistance with this project. For additional information, contact Julia Lavenberg at jlavenbe@dolphin.upenn.edu.
Research Questions

The following research questions will be addressed in this study.

(7) Are cognitive-behavioral school-based interventions that target anger management effective in reducing aggressive behavior in children and adolescents?

(8) Are methodological issues such as randomized assignment of participants related to effect size?

(9) What elements of cognitive-behavioral interventions are associated with larger effect sizes (e.g., role playing, modeling, feedback, self instruction)?
   a. Are these elements consistently associated with larger effect sizes at all grade levels?

If the sample of studies is large enough and relevant data is present in the primary studies, the following research questions will also be addressed:

(10) Are cognitive-behavioral school-based anger management interventions more effective in one type of school (e.g. public, private, parochial, charter, alternative) or setting (e.g., urban, suburban, rural)?

(11) What participant characteristics are associated with larger effect sizes (e.g., gender, age, baseline level of aggressive behavior)?
   a. Are there any significant interactions among specific characteristics (e.g., gender and age; age and risk level)?
Definitions

The following definitions were adopted for use in this project:

Aggression. Aggression is “a set of primarily interpersonal actions that consist of verbal or physical behaviors that are destructive or injurious to others or to objects” (Lochman, Whidby, & FitzGerald, 2000, p. 31).

Anger. Anger is “a negative phenomenological (or internal) feeling state associated with specific cognitive and perceptual distortions and deficiencies (e.g., misappraisals, errors, and attributions of blame, injustice, preventability, and/or intentionality), subjective labeling, physiological changes, and action tendencies to engage in socially constructed and reinforced organized behavioral scripts” (Kassinove & Sukhodolsky, 1995, p. 7).

Cognitive-behavioral intervention. Cognitive-behavioral theory posits that cognitions influence emotions and behavior; it seeks to alter one’s thoughts and provide guidance for the development and practice of alternative behavioral scripts. As such, cognitive-behavioral interventions must be designed to change mental images, thought, and thought patterns in an overt, explicit manner. In addition, the intervention must make use of acceptable behavioral techniques (e.g., modeling, role-playing, reinforcement, self-instruction, etc.) when implementing the intervention.

Anger management interventions. Anger management interventions must be cognitive-behavioral in nature and must aim to increase skills for emotion regulation regarding the expression of feelings of anger. This can be achieved by targeting cognitive deficits, cognitive distortions, overt anger expression, or
identification and management of anger arousal. Anger management interventions may be found either as stand alone programs (e.g., Anger Coping Program) or as components embedded within larger interventions directed toward the prevention of other negative behavior (e.g., aggression, antisocial behavior, substance abuse or violence).
Instructions for completing the coding form

Before beginning to extract information from a report, place your initials in the top left section of the first page and the date you perform the coding in the top right section.

1. Study ID number. [STUDYID]

Three digit Study ID numbers were assigned by the primary investigator as reports were identified for this project. These ID numbers are found in the top right corner of the first page of the report, as well as on the tab of the report folder. Place the three digit Study ID number in the far left column of the coding form.

- In the research literature, multiple publications may relate to one particular research study. When multiple publications are related to the same primary research study in this project, you will see a decimal point and a two digit extension following the three-digit Study ID number.
- If these supplementary reports are used to extract information, note this in the comment section at the end of the Study Related Characteristics section by documenting the three digit Study ID number along with the appropriate two digit extension(s).

Study Related Characteristics

2. What is the publication year of the report? [PUBYR]

Fill in the four digit publication year in the spaces provided.

- If the year is unknown, or you cannot determine the year, code the study as 9999.

3. What is the report publication type? [PUBTYPE]

If two or more reports are being used to code the study, use the publication type of the three-digit, primary study identified by the Primary Investigator (i.e., the number preceding the two digit extension).

Select the code that best describes the publication source.

1. journal article – online or hardcopy journal report
2. doctoral dissertation – published or unpublished doctoral dissertation
3. master’s thesis – report submitted in order to achieve a master’s degree
4. book chapter or book

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4. In what country was the study conducted? [ST_CNTRY]

Select the code for the country in which the research was conducted.

1 United States
2 other: _____. Fill in the name of the country in the space provided.
9 not reported

5. Describe the geographic location and school setting in which the study was conducted. [ST_SCHSET]

Briefly describe where the school was located in terms of geography and setting in the space provided. Document the page number(s) of the report on which this information is located.

- The geographic location includes the state, area of the country, city/town, etc. (e.g., southeastern Ontario, Canada; Midwestern US; Philadelphia, Pennsylvania; etc.)
- Record the setting as urban, rural, or suburban (or list the combination of settings, if applicable) whenever documented by the author.
- Specifically document if this information is not reported by the author (i.e., "not reported")

6. In what type of school did the intervention take place? [ST_SCHTYPE]

Select the code that best describes the school in which the study took place. Document the page number(s) of the report on which this information is located.

Author report:
1 public
2 private
3 parochial or religiously-oriented
4 charter
5 alternative – describe this more fully in the comment section provided after this question
6 other: _______. Fill in the type of school in the space provided and describe more fully in the comment section

Coder interpretation, often determined by reading introduction and methodology sections.

7 public
8 other: _________________. Fill in the type of school in the space provided and describe more fully in the comment section

Not addressed in report:
9 cannot determine

Comment section at the end of the Study Related Characteristics section.

Use this section to:
• document supplemental reports used to extract information on this particular study,
• describe the school setting more fully, or
• provide any other additional information related to study characteristics.

Methodological Characteristics

7. What is the unit of assignment to condition? [UNIT]

Select the code that best describes how participants were assigned to treatment and comparison groups. Document the page number(s) of the report on which this information is located.

1 individual – select this code if individuals were assigned to groups
2 classroom – select this code if entire classrooms were assigned
3 school – select this code if entire schools were assigned
4 other – select this code if none of the above apply. Briefly describe.
9 cannot determine/not reported

8. What was the mechanism of allocation to condition? [ASSIGN]

Select the code that best describes how participants were allocated to groups. Document the page number(s) of the report on which this information is located.

Random assignment:
1 random assignment, with or without matching

Non-random assignment, but control group matched to treatment group:
2 matched ONLY on personal characteristics or demographics
3 matched ONLY on pretest measures of outcome variables
4 matched on both of above
5 other: _____. Note mechanism here and briefly describe in the comment section.

Non-random assignment:
6 groups of convenience
7 purposive selection of individuals

Allocation to condition not described or vague
9 not reported/cannot determine

Comment section:

Use this section to provide any additional information related to allocation of participants to condition.

9. Were the groups tested for equivalence prior to the intervention? [PREEQUIV]

This question addresses the similarity of groups at baseline. Were measures of aggressive behavior administered to all participants prior to the initiation of the intervention? Document the page number(s) of the report on which this information is located

1 yes - the groups were both tested for equivalence at baseline and the authors discussed results
2 no - the groups were not pretested on measures of aggressive behavior
3 tested but not analyzed by author(s) – pretests were administered, but the authors did not discuss baseline similarity in the text (e.g., pretests were administered to all participants but the authors merely report pretest means and standard deviations without commenting on group equivalence)
9 cannot determine

10. What was the unit of analysis? [UNITANALYSIS]
Select the code that best describes the unit of analysis. Document the page number(s) of the report on which this information is located.

1  individual
2  group
9  cannot determine

11. Does the unit of analysis match the unit of assignment to condition?  
[UNITMATCH]
Select the code that is most appropriate.

1  yes – unit of assignment and unit of analysis are the same
  (e.g., individuals were randomly assigned to condition and
  individual level means and standard deviations were reported)
2  no – unit of assignment and unit of analysis units are different
  (e.g., classrooms were assigned to condition but individual level
  data was analyzed)
9  cannot determine

Comment section:

Use this section to provide any additional information related to group equivalence or issues surrounding the unit of analysis.

12. What is the nature of the comparison group?  [COMP_TYPE]

This question addresses the treatment(s) given to the comparison group(s). Document the page number(s) of the report on which this information is located.

Select the code that best describes the treatment of the comparison group.

1  receives nothing – no evidence of any treatment or attention. Students merely attend school and participate in regularly scheduled school or classroom activities.
2  wait list – participants in the comparison condition receive the intervention after posttests completed
3  treatment as usual – participants receive the standard care provided by the school to all students (e.g., individual counseling or guidance on an as-needed basis; participation in a token economy as part of school rules)
4 attention placebo – the comparison group receives an intervention unrelated to anger management or aggression (e.g., watching nonviolent movies, playing games)

5 alternative treatment – the comparison group receives a non-cognitive-behavioral intervention to reduce aggressive behavior

6 more than one comp grp – there is more than one comparison group (e.g., group 1 receives the school-based intervention, group 2 receives the school-based intervention plus parent involvement, and group 3 is a no-treatment control, receiving neither the school-based intervention nor the parent involvement component)

9 not reported/cannot determine – the comparison group treatment is not described or it is described so vaguely that you cannot establish the nature of the treatment

Comment section:

Use this section to provide any additional information related to the comparison condition(s).

Intervention: Participants

13. Gender. [GENDER]

Select the code that best describes the participants. Document the page number(s) of the report on which this information is located.

1 male only
2 female only
3 mixed group – both males and females
9 not reported/cannot determine

Comment section:

Use this section to comment on the gender make-up of the sample.

14. Schooling level. [SCHLEV]

What is the school structure in terms of grade clusters? Document the page number of the report on which this information is located.

Select the code that best describes the cluster of grades in the school.

1 elementary school – contains kindergarten through grade 5 or 6, or any combination of grades less than 6 (e.g., K through 3rd grade)
2 middle school – contains grades 6-7-8, 7-8-9, or any combination of grades 6 through 8
3 kindergarten through grade 8 – contains kindergarten through grade 8
4 high school – select this code if the school contains grades 9-10-11-12 or 10-11-12
5 mixed – the intervention is conducted at schools containing different grade clusters. Document the specific cluster of grades in the comment section.
9 not reported/cannot determine – select this code if the author does not report the school structure or you cannot determine the structure (e.g., European schooling levels). Provide any information offered by the author that might be helpful in determining the school structure in the comment section.

Comment section:
Use this section to provide any details related to the clustering of grade levels.

15. Grade. [GRADE]
Select the grade level(s) of the participants. Mark all that apply. Document the page number(s) of the report on which this information is located.

   _ Kindergarten  _ 7th grade
   _ 1st grade    _ 8th grade
   _ 2nd grade    _ 9th grade
   _ 3rd grade    _ 10th grade
   _ 4th grade    _ 11th grade
   _ 5th grade    _ 12th grade
   _ 6th grade    _ other: ____________
   _ not reported/cannot determine

16. Mean age. [AGEMEAN]
Select the appropriate code for the mean age of the participants at the beginning of the study. Document the page number(s) of the report on which this information is located.

   01 author reports mean age. Fill in the age in the space provided.
   02 author provides information to calculate. Show calculation(s) in the space provided.
99 neither the age nor the information needed to calculate mean age is reported

17. Age range. [AGERANGE]

Record the age range of the participants in the sample. Document the page number(s) of the report on which this information is located.

01 author reported range. Fill in the ages in the space provided.
99 not reported

Comment section:

Use this section to provide any additional information or concerns related to participant grade or age.

18. Race/ethnicity. [RACE]

Select the appropriate code to indicate the racial or ethnic background of the participants in the sample. Mark all that apply. Document the page number(s) of the report on which this information is located.

__ African American __ Hispanic/Latino/-a
__ Caucasian __ Asian
__ other: _____________________
__ not reported/cannot determine

• If the author provides the racial and ethnic makeup of the school, but does not provide the makeup of the sample, mark the code for “not reported/cannot determine.”

19. Socioeconomic status. [SES]

Select the appropriate code to indicate the socioeconomic status of the participants in the sample. Mark all that apply. Document the page number(s) of the report on which this information is located.

__ low upper
__ low-middle
__ middle __ reported as numerical value
__ middle-upper __ not reported/cannot determine

• Use author defined criteria. Do not make any assumptions or interpretations.
• If the author provides numerical criteria, document this in the comment section.
• Use the comment section following the question to provide any relevant information related to SES.

20. Baseline level of aggression. [BASEBEHAV]

This question is meant to address the risk level of the sample. Low risk children do not exhibit aggressive behavior problems. High risk children exhibit problematic aggressive behavior. Document the page number(s) of the report on which this information is located.

Select the code that reflects the behavior of the sample at baseline.

1  not demonstrating aggressive behavior – students not selected for program based on behavior. Rather, students are selected for the program by virtue of being a student attending a participating school or classroom
2  considered at risk for aggressive behavior – students selected for the program by virtue of living in a high-risk setting, attending an urban school, or if the author described the students as being “at-risk” for aggressive behavior for any reason
3  exhibiting aggressive behavior – students demonstrate aggressive behavior or are characterized as “angry.” Often students in this category are recommended to the program by teacher or counselor nomination.
9  not reported/cannot determine – the author does not describe the students’ baseline behavior.

• Do not interpret any scores on measures of aggression taken at pretest in order to select the code, unless the author specifically defines the parameters. For example, if the author states that T-scores above 70 indicate aggressive behavior and you note that the mean scores of the intervention and comparison groups at pretest are all above 70, you can code the sample as 3 – exhibiting aggressive behavior.

21. Co-morbid conditions. [COMORBID]

This question is meant to distinguish participants with formal psychological diagnoses from those without such diagnoses, even though both may demonstrate aggressive behavior. Students with official diagnoses often suffer from more severe problems than those without official diagnoses. Document official diagnoses (e.g., Oppositional Defiant Disorder, Attention Deficit with Hyperactivity Disorder) in the area provided. Record the page number(s) of the report on which this information is located.
Comment section:

Use this section to record any information germane to understanding the participants.

**Intervention: Program characteristics**

22. Primary focus of the intervention. [INTFOCUS]

Anger management may be addressed in the school setting in the form of a stand-alone anger program (e.g., Anger Coping Program) or embedded as a lesson within another type of program (e.g., Second Step Violence Prevention). This question addresses the overarching goal of the intervention.

Select the code below that best describes the overall program. Document the page number(s) on which this information is located.

1. anger management – program is focused on managing anger or more than half of the curriculum is dedicated to understanding and managing anger
2. substance abuse – the primary focus of the intervention is prevention of alcohol, drug or tobacco use
3. youth violence or aggression – the primary focus of the intervention is reduction of violent or aggressive behavior and anger is addressed within the curriculum as a topic in one or more sessions
4. coping with parental divorce – the primary focus of the intervention is to assist children in coping with parental separation or divorce
5. other – the primary focus of the intervention is something other than anger management, substance abuse, aggressive behavior, or coping with divorce
9. not reported/cannot determine

Name of intervention or program:

Fill in the name of the intervention or program in the space provided (e.g., Anger Control Training, Second Step Violence prevention curriculum, etc.). If the program is not named in the text, provide a brief descriptive label and elaborate in the comment section.

Manualized program:
This question attempts to address the level of standardization across individuals, groups, and settings. Manualized programs, in theory, ensure that all participants are exposed to the same information and offer a certain level of assurance that delivered programs are equivalent.

Select the code that best describes the level of program standardization.

1 yes 2 no 9 cannot determine

Comment section:

Use this section to note any pertinent information regarding the focus of the overall intervention.

23. Theoretical foundation of the program. [INTTHEORY]

This question addresses the underlying theoretical framework of the intervention in order to offer insight into how and why it should work. The theoretical framework may be developmental, cognitive (e.g., social learning, information processing), cognitive-behavioral, ecological, or some combination. Briefly describe the theory/theories cited by the author(s) in the area provided. Document the page number(s) of the report on which this information is located.

• Some theorists and theories that may be cited include:
  o developmental: Erikson
  o cognitive: Piaget, Bandura, social learning, information processing
  o cognitive-behavioral: Meichenbaum, Kendall
  o ecological: Bronfenbrenner
  o anger-specific: Novaco, Crick & Dodge, Berkowitz

24. Time of program delivery. [INTDELIVTIME]

Select the code that best describes when the intervention was implemented. Document the page number(s) on which this information is located

1 during the school day (i.e., traditional instructional hours)
2 after school hours (but still Monday – Friday)
3 other: __________. Document in the space provided.
9 not reported/cannot determine

25. Total length of program in minutes. [INTLENGTH]
Record the total amount of time that participants were exposed to the intervention. Document the page number(s) of the report on which this information is located.

01 author reported. Fill in total number of minutes in the space provided.

02 coder determined. Calculate the total number of minutes from the information provided in the report and record in the space provided.

• Formula: number of minutes per session x number of session = total length of program in minutes.

99 not reported/cannot determine

26. Number of sessions. [INTSESSNUMB]

Record the number of sessions; include booster sessions (e.g., 10 weekly sessions and 3 monthly booster sessions would be 13 sessions) if applicable. Document the page number(s) of the report on which this information is located.

01 author reported. Fill in the number of sessions in the space provided.

02 coder determined. It may be necessary to count the number of sessions from an overview presented in a table or an appendix. Fill in the number of sessions in the space provided.

99 not reported/cannot determine

27. Length of each program session. [INTSESSLENGTH]

Record the length of each session in minutes. Document the page number(s) of the report on which this information is located.

01 author reported. Fill in the number of minutes per session in the space provided.

02 coder determined. It may be necessary to calculate this from information provided in the report. Document your calculations in the comment section and fill in the number of minutes per session in the space provided.

99 not reported/cannot determine
Comment section.

Use this section to describe any information you feel is relevant to understanding the intervention session structure and delivery. Avoid fidelity of implementation issues, as that issue is addressed later.

28. What is the method of delivery of the intervention? [INTDELMETH]

Select the code that best describes how the intervention is administered to the participants. Document the page number(s) of the report on which this information is located.

1 individual instruction – the intervention is administered to individuals (e.g., via individualized counseling sessions)

2 small group format – ≤ 10 students at a time receive the intervention. Note the number of students per group in the comment section.

3 large group format – more than 11 students at a time receive the intervention. Note the number of students per group in the comment section.

4 entire intact classroom – the whole class receives the intervention at one time. Note the number of students per class in the comment section.

5 mixed method – a combination of delivery methods are used (e.g., individual instruction combined with entire class instruction). Note the combination of delivery methods in the comment section.

9 not reported/cannot determine – the method of delivery is not documented in the report

Comment section:
Use this section to document any pertinent information related to the method of delivery.

29. Who is responsible for delivering the intervention? [INTDELIVPERSON]

Select the code that best reflects the personnel administering the intervention to the participants. Document the page number(s) of the report on which this information is located.

1 classroom teacher – the participant’s regularly assigned teacher
2 other teacher – this teacher may be from the same school as the participant, a different school, or be hired specifically for the project
3 counselor/psychologist – the school social worker, school psychologist, or counselor (may be guidance counselor)
4 researcher – the author(s) of the report, graduate students affiliated with them or their institution, or a person hired and trained by the research team
5 lay persons – untrained personnel (paid or unpaid)
6 other – none of the above apply, but author described person(s) who delivered the intervention. Briefly describe the personnel in the space to the right of this choice.
7 multiple personnel – more than one category of personnel deliver the intervention. Document the specific personnel in the comment section following this question
9 not reported/cannot determine

Examples:

-- If two graduate students co-lead the intervention sessions, code the personnel delivering the intervention as “4”.
-- If a graduate student and the school counselor co-lead the intervention sessions, use code “7” and describe the leaders in the comment section.

Comment section:

Use this section to provide descriptions of the personnel responsible for delivering the intervention to the participants.

30. Was the fidelity of the intervention addressed by the author? [INTFIDEL]

Many times, research reports do not discuss issues surrounding implementation of the intervention. This question is aimed at documenting the prevalence of such reporting.

Select the code that best describes the author documentation of fidelity.

1 yes – the author discusses issues of fidelity in the report
2 no – there is no discussion of issues of fidelity

Comment section:
Use this section to briefly describe how the author addressed fidelity (e.g., fidelity assessed by post-session checklists).

31. What types of cognitive-behavioral components were incorporated into the intervention? Briefly describe the cognitive-behavioral components incorporated into the intervention. Document the page number(s) of the report on which this information is located. [INT_COMPTYPE]

Major cognitive-behavioral components and examples:
- self-monitoring and enhanced awareness – detection or exploration of feelings (e.g., by identifying triggers, paying attention to physiologic symptoms that accompany angry feelings, filling out anger logs, etc.)
- stimulus control and response disruption – alteration or interruption of typical, maladaptive pattern of responding angrily to (real or perceived) provocation
- palliative (i.e., reduced arousal) – use of strategies to limit or minimize emotional arousal, usually through a combination of cognitive and behavioral coping skills
- cognitive restructuring – use of techniques to change thoughts and the underlying premises, assumptions, or attitudes
- relaxation coping – use of strategies to promote self soothing (e.g., by focusing on alternately tensing and relaxing specific muscles, taking deep breaths, etc.)
- skill enhancement (including behavioral skills) – instruction on specific skills (e.g. the use of I-statements in communicating feelings, the use of problem solving strategies, the use of practice via role-plays, etc.)

32. Briefly describe the specific techniques used by group leaders to implement the intervention? Document the page number(s) of the report on which this information is located. [INT_TECHNIQ]

Common techniques used with children and adolescents include:
- anger logs – forms filled out by students detailing antecedents, beliefs, and consequences of episodes of anger
- discussion – interactive dialogue between group leaders and students, as well as between students and students
- emotion identification – discussion, differentiation, and labeling of feelings
• exposure - to situations that typically cause anger; may be real events or imagined events (e.g., through anticipatory guidance of an upcoming event or via video vignettes)
• feedback – response by group leader(s) or peer(s); may be verbal or written
• homework – activities assigned for completion between intervention sessions
• instruction – didactic presentation of material
• modeling – demonstration of appropriate cognitions, behaviors, or processes (e.g. verbalization of problem solving process); modeling may be live (e.g., the group leader) or symbolic (e.g., by means of viewing a video or reading a story)
• reinforcement – may be verbal (e.g., praise) or behavioral (e.g., token economies, rewards for participation)
• relaxation – instruction on and use of methods to reduce physiological arousal (e.g., deep breathing exercises, tensing and relaxing muscles, pleasant imagery, etc.)
• role-plays – participants enact different roles in order to express experiences through action and verbalization; many times they serve as mechanisms for learning how others feel as well as practice for anticipated future real-life experiences
• self-instruction – instruction on and use of overt or covert methods of talking oneself through a situation

33. What additional components are utilized to supplement the school-based intervention? [INT_ADDLCOMP]

Select the code that best describes supplements to the school-based intervention. Mark all that apply. Document the page number(s) of the report on which this information is located.

__ none
__ school – support provided to classroom teachers, efforts made to change school climate surrounding aggressive behavioral norms, etc.
__ family involvement – parental programming, combined parent-child sessions
__ community involvement – church or community organization co-sponsored activities
__ other – note any component not listed above and provide a brief description in the comment section
__ not reported/cannot determine

Comment section:
Use this section to provide a brief description of any of the above components (e.g., teacher consultation provided once per week to teachers of intervention group participants).

**Outcome Measure(s)**

34. Does the author explicitly describe or characterize the types of aggressive behaviors measured as the dependent variable?  
   [OUTCOMEDOC]

   1  yes. Answer question #34a below.
   2  no. Continue with question #35.

34a. If yes, mark the types of aggression measured.  
   [OUTELEM]  
   Check all that apply. Document the page number(s) on which this information is located.

   __ physical aggression  
   __ verbal aggression  
   __ relational aggression (e.g., starting rumors, maligning someone's reputation)  
   __ other. Fill in the type of behavioral outcome in the space provided and briefly describe in the comment section.

Comment section:

Use this section to elaborate on the behavioral outcomes measured for this study. List the specific behaviors included (e.g., hitting, pushing shoving, kicking, biting, fighting, name-calling, taunting, arguing, threats, etc.)

35. Who provides information on the outcome measures?  
   [OUTINFORM]

Select the code that best describes the person completing the outcome measure. Document the page number(s) of the report on which this information is located.

   1  teacher  
   2  student  
   3  parent  
   4  other. Note identity of outcome informant in the space provided.  
   5  multiple informants – more than one person supplies information. List all informants in the comment section.  
   9  not reported/cannot determine

Comment section:
Use this section to provide pertinent information regarding outcome informants.

36. Was the outcome informant unaware of (i.e. blind to) participant assignment to condition? [OUTINFORMBLIND]

Select the code that best reflects the informant’s blindness in terms of participant assignment. Document the page number(s) of the report on which this information is located.

1 yes – the informant was blind to participant condition
2 no – the informant knew participants’ group assignment
9 not reported/cannot determine

37. What outcome measures were used? [OUTMEAS]

List the outcome measures used, along with the author(s) and year for clear identification whenever possible. Select outcome measures used to assess aggressive behavior. Document the page number(s) of the report on which this information is located.

Examples:
- School Behavior Checklist (Miller, 1981)
- Pediatric Anger Expression Scale (PAES; Jacobs et al, 1989)
- National Youth Survey, minor assault subscale (NYS; Elliott, Huizinga & Ageton, 1985)
- Classroom observation by trained observers
- School records: referrals to administrator’s office for disciplinary action

38. When was the outcome measure administered? [OUTMEASTIME]

Briefly describe when the posttest was administered. List follow-up posttest times, if applicable, as well. Document the page number(s) of the report on which this information is located.

Examples:
- Students were administered the PAES during the final session of the intervention.
Teacher observations were made twice daily for two weeks after the intervention.

Parents were asked to fill out measures two months after the intervention ended.

**Effect Size Information**

This section of the coding form is set up as a series of tables in order to streamline the process of collecting the data. Please be as concise (yet specific) as possible. And, of course, write legibly. Document the page(s) of the report on which the information is located.

Two groups compared. Label the groups compared by treatment (e.g., Think First intervention, game-playing control, untreated control, etc) to avoid the need to refer back to earlier pages.

Outcome A cell: Fill in the first outcome measurement. Use the name of the measure and the specific subscale whenever possible (e.g., Teacher Report Form, aggression).

Group 1 Follow-up and Group 2 Follow-up: Record the length of time since the intervention was completed (e.g., one year), if applicable, for outcome A. There may be instances when multiple outcomes are used for a particular study, yet different outcomes are measured at different times.

Mean, standard deviation and sample size (n): Record these values in the appropriate cells. All means are assumed to be unadjusted. If they are adjusted, make a note of it in the cell below the corresponding sample size.

$d$: Record the author's calculation of Cohen's $d$. If any other effect size statistic is calculated by the author (e.g., Hedges' $g$), record that information in the notes cell of the corresponding row.

Other statistics: Record reported $p$ values, $F$ values, degrees of freedom, Chi-square, or $t$ values.

Outcome B: Identify the second outcome measurement and record the means, standard deviations, sample sizes, and other statistics reported in the appropriate cell.

Comment section: Use the comment section to address any issues or concerns regarding the data to be used for calculating effect sizes (e.g., highlight the
difference in attrition between the intervention and control groups, note that the means presented are adjusted, etc).

Any other relevant information: Use this section to record data not documented in other areas of this form (e.g., subgroup data such as outcomes presented by gender, etc.).

Overall comments section: Use this area to relay any thoughts, feelings, or concerns regarding this report.

Thank you!
APPENDIX E
Hand Search Results: Randomized or possibly randomized trials, by journal and year

<table>
<thead>
<tr>
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<td>6</td>
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|                                | 4    | 0    | 1    | 4    | 1    | 2    | 2    | 1    | 1    | 0    | 2    |          | 18    |
| Behavior Therapy               | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |          |       |
| Cognitive Therapy and Research | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |          |       |
| Journal of School Health       | 4    | 2    | 1    | 4    | 2    | 3    | 3    | 5    | 1    | 3    |    |          | 29    |

|                                | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006* |
|                                | 2    | 1    | 2    | 0    | 2    | 0    | 4    | 4    | 2    | 3    |    |          | 20    |
| Behavior Therapy               | 4    | 12   | 12   | 11   | 10   | 9    | 16   | 9    | 17   | 9    |    |          | 109   |
| Cognitive Therapy and Research | -    | -    | -    | 7    | 1    | 6    | 3    | 3    | 12   | NA   |    |          | 32    |
| Journal of School Health       | 3    | 3    | 3    | 4    | 0    | 4    | 2    | 3    | 1    | 2    |    |          | 25    |

Note. * Journal issues dated January through June 2006 were searched. NA indicates the journal was not available; NS indicates the journal was not searched.
APPENDIX F

Excluded studies

Most of the studies excluded from this systematic review and meta-analysis were deemed ineligible during the Phase I and Phase II screening process. Only those studies suffering from methodological confounds were excluded during the data analysis phase of the project. This appendix lists the excluded studies according to the reason for exclusion.

Studies excluded because the intervention did not take place in the school setting


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cognitive-behavioral treatment program for aggressive children. *Journal of
Abnormal Child Psychology, 11*, 101-114.

treatment of children with ADHD, with and without aggressiveness. *Psychology in
the Schools, 37*, 169-182.

training on adolescent antisocial behavior. *Research on Social Work Practice, 7*,
446-462.

non-aggressive school children affected by attention deficit hyperactivity disorder
(ADHD). *Dissertation Abstracts International, 59* (01), 159C.

prevent drug abuse and violence among high-risk youth. *Addictive Behaviors, 29*,
225-229.

control training for children: A randomized pilot study of social problem-solving
versus social skills training components. *Behavior Therapy, 36*, 15-23.

van Manen, T. G., Prins, P. J. M., & Emmelkamp, P. M. G. (2004). Reducing aggressive
behavior in boys with a social cognitive group treatment: Results of a randomized,
controlled trial. *Journal of American Academy Child and Adolescent Psychiatry,
43*, 1478-1487.

*Studies excluded because the intervention does not involve the target population*


*Studies excluded because the intervention does not address anger management*


*Studies excluded because the intervention does not employ an eligible study design*


Romasz, T. E. (2003). Teaching social and emotional learning through literature: The development and pilot implementation of a tertiary prevention group-counseling...
curriculum for use with young urban elementary school students demonstrating disruptive classroom behaviors. *Dissertation Abstracts International, 64* (09), 4633B.


*Studies excluded because the report did not provide enough details about the intervention*
disabled children: Effects of social skills and relaxation training on self-concept

Bienert, H. & Schneider, B. H. (1995). Deficit-specific social skills training with peer-
nominated aggressive-disruptive and sensitive-isolated preadolescents. *Journal of
Clinical Child Psychology, 24*, 287-299.


management program with adolescents reporting high and low levels of emotional

Hains, A. A. & Ellman, S. W. (1994). Stress inoculation training as a preventative
intervention for high school youths. *Journal of Cognitive Psychotherapy: An

*Studies excluded because the intervention was not based on the cognitive-behavioral
theoretical framework*

(2003). Initial behavior outcomes for the Peacebuilders universal school-based

Abstracts International, 42*, 2527.


*Studies excluded because groups received similar intervention*


*Studies excluded because outcomes reported were ineligible*


*Studies excluded because the report does not present data such that an effect size can be calculated*


*Studies excluded because of methodological confounds*


APPENDIX G

Standardized outcome measures, by school level

**Elementary**

Behavior Assessment System for Children (BASC)

Classroom Adjustment Rating Scale (CARS)

Missouri Child Behavior Checklist (MCBC)

Miller School Behavior Checklist (MSBC)

School Social Behavior Scales (SSBS)

Teacher Report Form (TRF; teacher version of the Child Behavior Checklist)

**Middle School**

State-Trait Anger Expression Inventory (STAXI)

Teacher Report Form (TRF; teacher version of the Child Behavior Checklist)

**High School**

State-Trait Anger Expression Inventory (STAXI)

Child Behavior Checklist (CBCL)

Conners' Rating Scale-Teacher Short Form (CRS-TSF)

**Note:** Measure was considered standardized if it was published in the Buros' Institute of Mental Measures yearbook(s).
#### APPENDIX H

Full complement of comparisons (n = 70): Effect size, standard error, and variance

<table>
<thead>
<tr>
<th>Study</th>
<th>Comparison</th>
<th>Informant</th>
<th>Measure</th>
<th>Behavior Assessment</th>
<th>Hedges's g</th>
<th>Std Err</th>
<th>Variance</th>
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<tr>
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<td>Multimodal anger vs control</td>
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<td>SBCL</td>
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<td>Boswell (1984)</td>
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