

Improving Young Children's Social and Emotional Competence: A Randomized Trial of the Preschool "PATHS" Curriculum

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This paper reports the results from a randomized clinical trial evaluating an adaptation of the Promoting Alternative Thinking Strategies curriculum (PATHS) for preschool-age children in Head Start. PATHS is a universal, teacher-taught social-emotional curriculum that is designed to improve children's social competence and reduce problem behavior. Twenty classrooms in two Pennsylvania communities participated in the study. Teachers in the 10 intervention classrooms implemented weekly lessons and extension activities across a 9-month period. Child assessments and teacher and parent reports of child behavior assessments were collected at the beginning and end of the school year. Analysis of covariance was used to control for baseline differences between the groups and pretest scores on each of the outcome measures. The results suggest that after exposure to PATHS, intervention children had higher emotion knowledge skills and were rated by parents and teachers as more socially competent compared to peers. Further, teachers rated intervention children as less socially withdrawn at the end of the school year compared to controls.

Editors' Strategic Implications: *Findings from this and other randomized clinical trials confirm that the Preschool PATHS program is clearly a promising practice for improving children's social and emotional competence. Head Start and school programs will find these multi-informant data to be of interest as they consider a curriculum to help prepare children for school entry.*

KEY WORDS: preschool-age children; head start; prevention; social-emotional competence.

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INTRODUCTION

Addressing the mental health needs of our country's children and families has become a national priority. This concern is timely because expulsion rates for preschool children with severe emotional and behavioral problems are 3.2 times higher than those of children in elementary grades (Gilliam, 2005). The Surgeon General's 1999 report focused on mental health and endorsed prevention and the use of empirically-supported interventions as essential strategies for promoting mental health and reducing mental illness in America (Department of Health and Human Services, 1999). A variety of interventions have been proven efficacious in reducing symptoms of mental disorders and promoting social-emotional competence (see reviews by Anderson et al., 2003; Greenberg, Domitrovich, & Bumbarger, 2001; Nelson, Westhues, & MacLeod, 2003). Unfortunately, relatively few interventions with a mental health focus target preschool-age children from low-income families. Economically disadvantaged children are especially at risk for the development of mental health problems because of the greater number of risks to which they are exposed (Keenan, Shaw, Walsh, Delliquadri, & Giovannelli, 1997; Lavigne et al., 1998; McLeod & Shanahan, 1996; McLoyd, 1998). A review of preschool behavior problems by Huaging Qi and Kaiser (2003) reported a higher incidence of behavior problems in preschool children from low-income families compared to children in the general population.

Head Start is the largest provider of early childhood education for disadvantaged children and is required to serve all children who are eligible for the program including those with identified disabilities, which include emotional or behavioral disorders. Despite extremely high quality and research-based services, the mental health component of the program has been identified as an area that needs to be strengthened (Piotrkowski, Collins, Knitzer, & Robinson, 1994; Yoshikawa & Knitzer, 1997). Findings from studies of the program indicate that children still have unmet mental health needs (Fantuzzo, Bulotsky, McDermott, Mosca, & Lutz, 2003; Webster-Stratton & Hammond, 1998). Leaders in the field suggest that universal, skill-building interventions are important prevention components of comprehensive strategies to reduce children's mental health problems and improve competencies (Lopez, Tartullo, Forness, & Boyce, 2000).

Disruptive behavior problems that begin in early childhood years may be extremely stable across childhood and adolescence (Campbell, 1995; Kingston & Prior, 1995; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). Boys are more vulnerable to behavior problems compared to girls, as are children with poor language skills (Coie & Dodge, 1998; Kaiser, Cai, Hancock, & Foster, 2002). Young children with behavior problems also tend to also have a variety of social-emotional skill deficits (Bierman & Welsh, 1997) and this combination

of problems puts them at increased risk for difficulties at school entry, negative relationships with peers, and academic underachievement (Alexander, Entwisle, & Dauber, 1993; Gagnon, Craig, Tremblay, Zhou, & Vitaro, 1995; Huffman et al., 2000; O'Neil, Welsh, Parke, Wang, & Strand, 1997).

In order to prevent mental health problems in early childhood, interventions need to focus not only on reducing children's aggressive, disruptive, and withdrawn behavior, but also on building their social-emotional competence given the protective function it serves against the challenge of transitioning to kindergarten (Masten & Coatsworth, 1998; Rutter, 1987). Many young children are not ready for this challenge as indicated by a nationally representative survey in which 20% of kindergarten teachers reported that at least half of the students in their respective classes lacked the social skills necessary for success in that setting (Rimm-Kaufman, Pianta, & Cox, 2000).

Social-emotional competence in early childhood is multivariate, composed of skills and knowledge that are integrated across the emotional, cognitive, and behavioral domains of development. For example, emotional competence, which includes the awareness and expression of affect, emotion identification, situational knowledge, and emotion regulation (Denham, 1998; Saarni, 1999) serves cognitive skills such as attention, inhibitory control, and problem solving (Blair, 2002). Self-regulation, another aspect of social-emotional competence, is essential for positive social behavior which includes the ability to take others' points of view and think through problem situations (Raver, Blackburn, Bancroft, & Torp, 1999; Rudolph & Heller, 1997; Youngstrom et al., 2000). The lack of these skills has been associated with both internalizing and externalizing behavior, and peer rejection (Cook, Greenberg, & Kusché, 1994; Fine, Izard, Mostow, Trentacosta, & Ackerman, 2003; Schultz, Izard, & Ackerman, 2000; Schultz, Izard, Ackerman, & Youngstrom, 2001). Thus, the successful integration of cognitive, emotional, and behavioral skills is extremely important for socially competent behavior and positive peer relations (Consortium on the School-based Promotion of Social Competence, 1994; Halberstadt, Denham, & Dunsmore, 2001).

A substantial evidence base has accumulated documenting the ability of universal preventive interventions to improve school-aged children's social-emotional, behavioral and cognitive skills (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2002; Greenberg et al., 2001; Weissberg & Greenberg, 1998). Researchers are now developing similar programs for preschool-age children. Some of these programs target specific skill domains while others are more comprehensive. A complete review these programs is beyond the scope of this paper but examples of preventive interventions for preschool children include the Dinosaur School curriculum, part of the Incredible Years series (Webster-Stratton & Reid, 2004), the I Can Problem Solve curriculum (Shure, 1992), and the Emotions Course (Izard, Trentacosta, King, & Mostow, 2004; Lynch, Geller, & Schmidt, 2004). The findings from evaluation studies are promising and suggest that these interventions

have the ability to improve children's emotion knowledge, social skills, and social problem solving (Izard et al., 2004; Shure & Spivak, 1982; Webster-Stratton & Reid, 2004). PATHS expands on other universal social-emotional curricula by including instruction in multiple skill domains that is delivered in a developmentally appropriate sequence. The core of the curriculum is its emotional component that emphasizes affective awareness in oneself as well as in others. Finally, its emphasis is less on traditional behavior modification and more on supporting children's own ability to self-regulate.

The Present Study

The purpose of the present study was to evaluate the efficacy of a preschool version of the Promoting Alternative Thinking Strategies (PATHS; Kusché & Greenberg, 1994) curriculum utilizing a randomized clinical trial with a wait-list control group. The PATHS conceptual model was preserved but the curriculum components were modified to be developmentally appropriate for preschool children and to be integrated effectively with common early childhood programs. The Preschool PATHS Curriculum is a comprehensive curriculum intended to prevent or reduce behavior and emotional problems in young children and enhance children's social emotional competence. It is based on the ABCD (Affective-Behavioral-Cognitive-Dynamic) model of development (Greenberg & Kusché, 1993; Greenberg, Kusché, & Speltz, 1991), which places primary importance on the developmental integration of affect, behavior, and cognitive understanding as they relate to social and emotional competence. A basic premise of PATHS is the belief that children's adaptation is a function of both their own skill level and the environmental context that surrounds them (Bronfenbrenner & Crouter, 1983; Cicchetti & Toth, 1997). It emphasizes not only the teaching of skills, but also the creation of meaningful real-life opportunities to generalize skills for optimal internalization of concepts in effective skill application.

Hypotheses

We hypothesized that children whose teachers implemented Preschool PATHS in their classrooms for one school year would exhibit significantly better skills at posttest in four domains: emotional knowledge, inhibitory control, attention, and problem solving. We hypothesized that both teachers and parents would describe children who participated in PATHS during preschool as more competent and as exhibiting less problem behavior compared to peers who had not participated in the program.

METHOD

Design

Two regional Head Start programs located in moderate sized cities in central Pennsylvania participated in the present study. Head Start programs delivered services in multiple buildings with varying numbers of classrooms. As the programs had numerous locations, randomization took place at the building level; thus no intervention and control classrooms were in the same physical location. Due to this issue and the varying numbers of classrooms within buildings a mixed blocked design was utilized. Within each of the two regional programs, blocks were created that contained at least two matched classrooms with similar neighborhood population density. Two classrooms were excluded because the majority of students in those classrooms had developmental disabilities. Six classrooms (three pairs) were drawn from 15 eligible classrooms in one program and then randomly assigned intervention or control status. Ten classrooms (five pairs) were drawn from the 13 eligible classrooms in the other program and randomly assigned to intervention or control status. In each program there was one classroom that had to be assigned to intervention status because the teachers in these classrooms were involved in piloting the curriculum materials during the previous development year. A non-randomized control classroom was matched to each of these. The final total sample contained 10 intervention and 10 control classrooms.

Participants

Children

All three and four-year-old children and their families in participating Head Start classrooms were recruited for the study by their Head Start teachers during the enrollment period which lasted three months into the program year. There were 407 students eligible for participation in the study during this period. Children ineligible for recruitment were those whose primary language was not English or who had participated in the pilot intervention the previous year. Parental permission for participation in the study was obtained for 292 children who represented 76% of the total Head Start population. Pretest assessments were gathered on 275 of these children, but data from one child of a sibling pair or from children who transferred between intervention and control classrooms ($n = 46$) were omitted from the analysis.

The final sample of 246 children included 120 boys and 126 girls. Forty seven percent of the children were African-American, 38% were European-American, and 10% were Hispanic. Five percent of the children belonged to some other

ethnic group or were identified as being biracial. The number of students in each classroom ranged from 7 to 16. The mean age for children was 51.40 months ($SD = 5.91$). Seventy two percent of the primary caregivers were biological mothers. Almost half of these caregivers (45.5%) completed high school or had a GED. The mean annual income for families was \$7039. According to the Head Start directors, these demographics were consistent with the overall populations that each of the two programs served.

Procedure

The project was conducted over a three-year period. The first year was a development phase in which the research team worked collaboratively with Head Start staff to create and pilot the curriculum materials. In the second year, the randomly selected intervention teachers were trained in August and then implemented the curriculum in their classrooms between September and May. Pretest child assessments were conducted at the beginning of the school year (Time 1) and posttest assessments were conducted end of the school year (Time 2) in both the intervention and control classrooms. In the third year of the study, the wait-list control classrooms and all other Head Start teachers interested in using the curriculum were offered and received training and program materials.

At both Time 1 (pretest) and Time 2 (posttest) a multi-method assessment strategy was employed. Research assistants conducted direct assessments with Head Start children in quiet locations within the centers. Head Start teachers collected data on children from parent responses to questionnaires during regularly scheduled home visits and teachers, themselves, completed questionnaires on the children in their classroom. The same assessment battery was used at both time points with only a few exceptions. Family demographics were only collected at pretest. Two of the child measures of emotion understanding (Denham Puppet Interview, Assessment of Children's Emotions Scale) were only collected at posttest because they were late additions to the assessment battery.

Intervention

The Preschool PATHS curriculum used in this study contained 30 lessons that were delivered once a week by Head Start teachers during their "circle-time" sessions. The curriculum was divided into thematic units that included lessons on compliments, basic and advanced feelings, a self-control strategy, which was a revised version of the "Turtle Technique" (Robin, Schneider, & Dolnick, 1976), and problem solving. The primary objectives of the curriculum were to (1) develop children's awareness and communication regarding their own and others' emotions; (2) teach self-control of arousal and behavior; (3)

promote positive self-concept and peer relations; (4) develop children's problem solving skills by fostering the integration their self-control, affect recognition, and communication skills; and (5) create a positive classroom atmosphere that supports social-emotional learning.

In addition to the lessons, teachers generalized the concepts of the curriculum through detailed extension activities (e.g., group games, art projects, books) that were integrated into the existing typical preschool programs (language arts, music, art, etc.). The curriculum was designed to help teachers create an environment that promoted children's learning of social-emotional skills. Teachers were provided with guidelines on how to scaffold children's learning during natural situations (teachable moments) in which the children experienced an emotional reaction or a problem with a peers.

In Year 1 of the project, teachers in the intervention classrooms participated in a two-day training in the late summer to prepare them to use the curriculum. A one-day booster training session was conducted in January. In addition, each site designated 1–2 Head Start supervisory staff members to serve as the lead PATHS coordinators. The coordinator's role was to facilitate high quality implementation and consistency across classrooms and sites. They met with teachers on a regular basis both individually and in small groups to provide support and address any problems that arose. During the intervention year, the PATHS Coordinators at both sites conducted monthly classroom visits to provide technical support to intervention teachers and monitor implementation. After each visit the coordinator completed a rating scale that assessed the quality with which teachers taught PATHS concepts, the extent to which they generalized PATHS concepts, and their openness to consultation. The overall level of implementation was high.⁴ The program developers provided monthly supervision to the PATHS Coordinators to ensure that the intervention was being used appropriately and to monitor cross-site consistency.

Measures

Direct Child Assessments: Emotion Knowledge

A revised version of the Recognition of Emotion Concepts subtest from the Kusche Emotional Inventory (KEI; Kusché, 1984) was administered to

⁴The monthly coordinator ratings of implementation quality included 13 items that were rated on a 4-point Likert scale. These ratings were part of a process evaluation. No reliability data was collected so they were not used in outcome analyses. There was some variation across teachers on the scores for each dimension. The fidelity score ranged from 2.79 to 3.96. The generalization score ranged from 2.78 to 3.93 and the openness to consultation ranged from 2.57 to 4.0. The overall means for each of these dimensions were high (3.62, 3.37, and 3.67, respectively), indicating that teachers delivered the curriculum as designed in the manual and were positively engaged with coordinators in the implementation process.

children to assess their receptive emotion vocabulary (Speltz, DeKlyen, Calderon, Greenberg, & Fisher, 1999). The subtest consisted of 30 items (Cronbach's $\alpha = .75$ at pretest and $.81$ at posttest). Fifteen emotions are presented two times each. For each item, children are shown four cartoon drawings (including the target emotion and three distractors) and asked to identify the picture that corresponds to the word provided by the interviewer. Children receive two points for the correct response and zero for an incorrect response. If children choose a cartoon picture that depicts an emotional expression of the same valence as the target feeling word, they receive one point. The total possible score on this measure is 60. Total correct scores are converted to percent correct scores following the author's guidelines. For the original version of this subtest, Kusché (1984) reported a split-half reliability of $.89$ and test-retest reliability of $.85$.

The Assessment of Children's Emotions Scales (ACES; Schultz et al., 2001) was administered to children to assess their emotion expression knowledge and to determine whether they exhibited any anger bias. In this task, interviewers present children with 12 photographs of elementary-aged children posing facial expressions. The images used in this study were a subset of the 26 photographs that are included in the original version of the measure. These included 2 validated expressions for each of the four basic feelings (happy, sad, scared, and mad). For the purpose of eliciting children's emotional biases, an additional set of 4 expressionless faces were included. After presenting a photograph, the interviewer asks a child, "Does s/he feel happy, sad, mad, scared, or no feeling?" Two different scores are created from children's responses on the ACES. The emotion accuracy score reflects how many items a child answers correctly (Cronbach's $\alpha = .59$). The anger bias score is the percentage of time children incorrectly identified the faces as displaying anger.

The Denham Puppet Interview (DPI; Denham, 1986) was administered to children in order to assess their affective perspective-taking skills. In this task, interviewers use puppets to enact eight vignettes depicting situations that typically provoke four target emotions (happiness, fear, sadness, anger). Each vignette has a standard script that the interviewer follows which includes vocal and visual-affective cues emitted by the puppet/interviewer. Two vignettes are used for each emotion. Prior to beginning the task, children are asked to identify the 4 feeling faces that are used to cover the puppets' faces in order to ensure that they are able to identify these basic emotions. After each vignette is presented, children are asked, "How does the puppet feel?" and are instructed to put the corresponding feeling face on the puppet. Two points are given for identifying the correct emotion, one point for identifying an emotion with the same valence, and a score of zero for incorrect responses. The total possible score for all eight vignettes is sixteen points (Cronbach's $\alpha = .64$).

Direct Child Assessments: Inhibitory Control

Two measures of inhibitory control were administered as part of the child battery. The first was the Day/Night task developed by Diamond and her colleagues (Diamond & Taylor, 1996). This measure has been used with children age 3.5 to 7 years old. Children are presented with a series of two types of cards. One is a black card painted with stars and the other is a white card painted with a sun. Children are instructed to say “day” to the black cards and “night” to the white cards. Children are given up to three practice trials to master the rules. Correct responses are praised and credited towards the total correct score. A review of the rules is provided for incorrect responses on the practice items. Children who do not pass the practice trials are given a score of zero. Children who pass the practice are administered 16 trials in which 8 of each card are included in a counterbalanced sequence. A total correct score is calculated for each child.

An adaptation of Luria’s (1966) tapping test was administered to assess children’s inhibitory control following administration procedures described by Diamond and her colleagues (Diamond & Taylor, 1996). Children are instructed to tap a wooden dowel twice when the experimenter taps once and to tap once when the experimenter taps twice. Children are given up to three practice trials to master the rules. Correct responses are praised and credited towards the total number correct score. A review of the rules is provided for incorrect responses to practice items. Children who do not pass the practice trials are given a score of zero. Children who pass the practice are administered 16 trials in which 8 of each action (one-tap and two tap) are included in a counterbalanced sequence.

Direct Child Assessments: Attention

The Attention Sustained subtest from the Leiter-Revised Assessment Battery, was administered to assess children’s visual-spatial memory and attention (Roid & Miller, 1997). This task includes four trials. In each trial, children are shown a target figure and then required to scan an array of similar figures and mark the targets as quickly as possible. Children are given up to 30 s to complete each trial. A set of practice items is presented at the beginning of each trial. Administration is terminated whenever a child fails to understand the practice items. For each trial, the total number of correct marks is adjusted by subtracting the number of errors. The adjusted correct scores are then summed and standardized. The Leiter-R Sustained Attention Subtest has good internal consistency for the 4–5 year old version (Cronbach’s $\alpha = .83$) and good test-retest reliability of ($r = .85$).

Direct Child Assessments: Interpersonal Problem Solving

The problem-solving portion of the Challenging Situations Task (CST, Denham, Bouril, & Belouad, 1994) was administered to assess children's behavioral responses to common social problems. Children are presented with a series of pictures that depicts four hypothetical peer situations and asked to pretend they are in the situation. The stories focus on peer entry and peer provocation, both challenging situations likely to elicit an affective response from young children. After the hypothetical situation is described, children are presented with four pictures of behavioral responses (prosocial, aggressive, avoidant, adult-dependent) and asked, "What would you do?" Frequency counts for each behavioral response are calculated across the four situations. An adaptive problem solving composite score was created by reverse coding the aggressive and avoidant scores and adding these to the prosocial and adult-dependent scores.

Teacher-Report of Child: Preschool and Kindergarten Behavior Scales (PKBS; Merrell, 1996)

This 42-item measure, with parallel teacher and parent versions, was used to assess children's social skills and problem behaviors. The Social Skills scale of the PKBS consists of 34 items that describe adaptive or positive behaviors (i.e., is cooperative, follows directions, shows self-control) and includes three subscales: Social Cooperation, Social Interaction, and Social Independence. The Problem Behavior scale consists of 42 items that are designed to reflect common preschool and kindergarten children behavior problems (i.e., has tantrums, will not share, is physically aggressive). Subscales include self-centered/explosive, attention problems/overactive, antisocial/aggressive, social withdrawal, and anxiety/somatic problems. For all items, responses are based on a four point scale: 0 = never true, 1 = rarely true, 2 = sometimes true, and 3 = often true. This measure was developed using a nationally representative sample and has good reliability and validity. In this study the alpha coefficients for all subscales on the teacher ratings were greater than .81. The internal consistency of parent ratings was slightly lower with Cronbach's α ranging from .55 to .71 for the internalizing subscales and greater than .80 for the externalizing subscales.

Parent-Report of Child: Head Start Competence Scale (HSCS; Domitrovich, Cortes, & Greenberg, 2001)

The Head Start Competence Scale is a 12-item, parent-report measure of children's social and emotional skills that reflects interpersonal relationships and

emotion regulation. It is designed to be more sensitive than traditional measures of social competence and was developed specifically for this evaluation. Respondents are asked to indicate how well each item on the scale describes the child using a 4-point scale that ranges from “not at all well” to “very well.” Based on the results of a confirmatory factor analysis a total score was created by averaging all of the items on the measure.⁵ The internal consistency of the scale was adequate ($\alpha = .74$)

Covariates

Verbal Ability

The Peabody Picture Vocabulary Test-Third Edition (PPVT-III; Dunn & Dunn, 1997) was used to measure child verbal ability. This assessment is a well-known and widely used measure of children’s receptive vocabulary. Across age groups, the internal consistency for the PPVT-III standard scores range from .92 to .98. Test-retest reliability ranges from .91 to .94 and for children 48 to 53 months of age; the split-half reliability coefficient is .71.

Family Demographics

Primary caregivers were asked to complete a short questionnaire regarding family characteristics including the age of child and primary caregiver, ethnicity of family members, language spoken in the home, and family income. Caregivers also were asked to provide some basic information regarding the health history of their child. Children were classified as special needs based on Head Start disability criteria.

RESULTS

Plan of Analysis

In preliminary analyses we tested for differences between children who left the study and those who remained in the study on key demographic characteristics and child verbal ability. We also tested for differences between the intervention and control groups on these variables at baseline to confirm the randomization process and identify necessary covariates. For the outcome analyses we conducted an analysis of covariance (ANCOVA).

⁵Results of the confirmatory factor analysis are available from the authors.

Preliminary Analyses

Attrition

Data were collected at pretest on the initial sample of 246 children. At posttest, there was an 18% attrition rate. This resulted in a posttest sample of 201 subjects. This rate is similar to other studies evaluating intervention programs that target economically disadvantaged populations (Stormshak, Kaminski, & Goodman, 2002; Webster-Stratton, 1998). Using pretest data, analyses were conducted to compare children who left the study to those who remained. Very few differences were found. The attrition group showed somewhat higher functioning as indicated by findings that they were less likely to be classified by Head Start (7% vs. 27%) as having some form of special need (e.g., speech problems, language delay). Teachers also rated the children who attrited as less likely to exhibit behavior problems ($t = 2.09, p < .04$). Finally, the attrition group had a higher total correct score on the Day/Night task indicating that the children who dropped out of the study exhibited greater inhibitory control compared to those who remained ($t = -2.50, p < .02$).

Baseline Comparisons

Table I provides descriptive statistics at baseline and comparisons between the intervention and control groups at baseline. These comparisons were conducted to identify potential covariates that were necessary to include in the models testing outcome effects. T-tests were utilized for continuous variables and chi-square analyses for categorical variables. There were very few differences between the two conditions suggesting that the randomization process was successful. Children in the control group were slightly older and more likely to have a disability than those in the intervention group. There were also more minority children in the control group who were not identified as African-American.

Outcome Analyses

The effect of condition on posttest scores was tested using analysis of covariance (ANCOVA). A 2 (site) \times 2 (group) model was utilized and included pretest scores for the outcome variables and gender. Ethnicity, age, and special needs status were included as covariates in all models because the intervention and control groups differed on these two variables at pretest. On direct child assessments, child verbal ability was also included as a covariate in the model because it had the potential to effect children's performance in the testing situation and was the procedure followed in a similar emotion-oriented intervention conducted

Table I. Demographic and Moderator Variables at Baseline by Intervention Status

Demographic and Moderator variables	Control		Intervention		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Parent age	31.79	(10.63)	30.37	(8.93)	ns
Family income	7487	(6760)	6564	(6166)	ns
Parent depression	1.70	(.50)	1.70	(.50)	ns
Child age	4.36	(.47)	4.20	(.50)	$t(244) = 6.27^{**}$
Child PPVT standard score	89.30	(11.69)	87.50	(15.06)	ns
	%	N	%	N	X^2
Parent ethnicity (minority)	54	54	49	43	ns
Parent education					ns
Less than high school	28	27	15	16	–
High school or equivalent	47	46	62	65	–
Greater than high school	25	24	23	24	–
Parent employment					ns
Unemployed	43	46	35	37	–
Part-time	17	19	20	22	–
Full-time	40	43	45	48	–
Parent relationship to child (Biological)	80	89	86	87	ns
Child gender (male)	52	66	45	54	ns
Child ethnicity					$X(2) = 7.02^*$
African-American	41	52	54	65	–
European-American	39	49	37	44	–
Other minority	20	25	9	11	–
Child special needs	29	36	18	21	(1) = 4.23*

recently with young children (Izard et al., 2004). ANCOVAs were performed on each outcome variable and tested the main effects for site, group, and the interaction of site by group.

Recent conceptual models proposed by both cognitive and social developmentalists stress the interconnectedness of linguistic and social skills. Theoretically, internal language plays a key role in promoting self-regulation and goal-directed behavior (Greenberg et al., 1991), and effective communication skills allow children to sustain meaningful relationships with peers by fostering affiliation, intimacy, and effective conflict management (Gottman, 1983). As such, children's verbal ability was examined as a potential moderator of the intervention effect on all outcomes by including the interaction term of verbal ability and group. If the interaction term was non-significant the analysis was repeated with only the main effects of site and group included.

Direct Child Assessments

As seen in Table II, significant group effects were found on three of the four emotion knowledge measures after adjustment by covariates. The ANCOVA

Table II. Proximal Effects of Intervention on Child Outcomes

Outcome measure	Pre-Test		Post-Test		Adjusted M	ANCOVA	Effect Size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
KEI percent correct						$F(8, 166) = 8.86^{**}$	.36
Control	66.83	(13.41)	74.87	(13.58)	74.25		
Intervention	61.41	(11.95)	76.75	(12.46)	79.00		
DPI total score						$F(8, 157) = 3.54^{\\#}$	.28
Control	–	–	13.60	(2.73)	13.53		
Intervention	–	–	14.07	(2.21)	14.22		
ACES accuracy						$F(8, 163) = 5.59^*$	.37
Control	–	–	5.65	(2.01)	5.68		
Intervention	–	–	6.27	(2.12)	6.44		
ACES anger bias						$F(8, 163) = 6.71^{**}$	.40
Control	–	–	6.63	(9.76)	7.51		
Intervention	–	–	4.46	(7.85)	3.96		
Day/Night						ns	
Control	11.15	(5.39)	12.37	(5.09)	12.12		
Intervention	11.27	(5.19)	12.55	(4.58)	12.07		
Peg tapping						ns	
Control	9.53	(5.39)	11.45	(5.56)	10.77		
Intervention	9.73	(5.73)	9.80	(5.87)	9.24		
Leiter attention sustained						ns	
Control	10.80	(2.83)	11.38	(3.24)	11.34		
Intervention	10.57	(2.88)	11.75	(2.57)	11.85		
Adaptive problem solving						ns	
Control	7.52	(2.35)	7.85	(2.46)	7.77		
Intervention	7.45	(2.23)	8.14	(2.28)	7.95		

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

revealed significant group effects on the KEI, $F(8, 166) = 8.86$, $p < .01$ and the ACES accuracy score $F(8, 163) = 5.59$, $p < .05$. Adjusted means showed that children who were exposed to PATHS had a larger emotion receptive emotion vocabulary at post-test compared to control children and were more accurate in identifying feelings. In addition to increasing children's emotion knowledge, exposure to the intervention significantly reduced children's anger attribution bias. Children in the intervention group had significantly lower anger attribution bias scores at post-test compared to children in the control group, $F(8, 163) = 6.71$, $p < .01$. There were no significant differences between intervention and control students on measures of inhibitory control, attention, or problem solving. No interactions were found on any of the direct child assessment outcomes.

Teacher-Report of Child

Table III provides a summary of the outcome analyses conducted on teacher ratings of child behavior. Significant group differences were found on both

Table III. Distal Effects of Intervention on Child Outcomes by Teacher Report

Outcome measure	Pretest		Posttest		Adjusted M	ANCOVA	Effect Size
	M	SD	M	SD			
Head start Competence						$F(7, 186) = 16.16^{****}$	.46
Scale Total score							
Control	2.56	(.64)	2.62	(.68)	2.65		
Intervention	2.64	(.81)	3.01	(.76)	2.98		
Preschool Kindergarten behavior scales							
Social skills composite						$F(7, 187) = 17.62^{****}$	.48
Control	2.31	(.48)	2.33	(.40)	2.31		
Intervention	2.21	(.49)	2.48	(.40)	2.50		
Social cooperation							
Control	2.38	(.56)	2.38	(.47)	2.37	$F(7, 187) = 11.61^{***}$	.37
Intervention	2.41	(.56)	2.56	(.46)	2.54		
Social interaction							
Control	2.09	(.59)	2.11	(.54)	2.07	$F(7, 187) = 17.15^{****}$	.50
Intervention	1.73	(.67)	2.24	(.55)	2.34		
Social independence						$F(7, 187) = 6.11^{**}$	.26
Control	2.44	(.47)	2.49	(.41)	2.51		
Intervention	2.49	(.49)	2.63	(.36)	2.61		
Externalizing Composite						ns	
Control	1.00	(.67)	1.00	(.69)	.91		
Intervention	.68	(.68)	.82	(.71)	.95		
Aggression						ns	
Control	.79	(.69)	.80	(.74)	.74		
Intervention	.59	(.68)	.75	(.81)	.83		
Explosive behavior						ns	
Control	1.00	(.71)	1.00	(.78)	.93		
Intervention	.67	(.70)	.82	(.73)	.96		
Attention problems							
Control	1.22	(.74)	1.19	(.73)	1.09	ns	
Intervention	.79	(.76)	.88	(.72)	1.04		
Internalizing composite ^b							
Control	.87	(.47)	.85	(.56)	.76	ns	
Intervention	.58	(.60)	.61	(.58)	.70		
Social withdrawal						$F(7, 187) = 4.44^*$	.24
Control	.97	(.63)	1.00	(.64)	.92		
Intervention	.66	(.72)	.66	(.67)	.76		
Anxiety ^b							
Control	.77	(.45)	.70	(.56)	.61	ns	
Intervention	.50	(.55)	.56	(.54)	.64		

^aIn addition to the main effect for group on this outcome variable, child verbal ability also moderated the intervention effect. See description provided in results section.

^bFor these variables there was no significant main effect for group but there was a significant site × group interaction. See description provided in results section.

* $p < .05$, ** $p < .01$, *** $p < .001$.

measures of social competence. Results showed a significant intervention effect on the Social Skills Composite of the PKBS, $F(7, 187) = 17.62, p < .0001$. The adjusted means indicated that at post-test teachers in the intervention classrooms described their students as significantly more cooperative, emotionally aware, and interpersonally skilled than did teachers in the control classrooms. The significant difference between the intervention and control group was consistent across all three subscales of the Social Skills composite. On the Social Cooperation Subscale children's verbal ability moderated the effect of the intervention, $F(9, 173) = 3.96, p < .05$. Follow up analyses suggested that the intervention effect was present for children with higher mean levels of verbal ability, but children in the intervention group with lower verbal ability were no different than controls.

There were no group differences on teachers' ratings of externalizing behavior but significant effects were found on teachers' ratings of internalizing behavior. First, a significant site by group interaction was found on the internalizing composite of the PKBS, $F(8, 186) = 4.10, p < .05$. The adjusted means favored the intervention group in the more rural of the two sites and were a function of differences on the anxiety subscale of the PKBS, $F(8, 186) = 7.88, p < .01$. In the less urban site, teachers rated intervention children as less anxious than control children. Finally, results revealed a significant group difference on the social withdrawal subscale of the PKBS, $F(7, 187) = 4.44, p < .05$. Children who were exposed to PATHS were significantly less likely to be described as withdrawn or lacking friends by their teachers at the end of the school year compared to controls. No other interactions were significant on the teacher report of child outcomes.

Parent-Report of Child

As seen in Table IV, the ANCOVA conducted using parent ratings of child behavior shows significant group effects on the total score of the Head Start Competence Scale, $F(7, 181) = 7.82, p < .01$. The adjusted means indicated that parents of students in intervention classrooms described their children as significantly more socially and emotionally competent than did parents of children in control classrooms. There were no significant group differences on parents' ratings of externalizing or internalizing behavior. In addition, there were no significant interactions on any of the parent report of child outcomes.

DISCUSSION

The results of this randomized clinical trial of the Preschool PATHS program suggest that Head Start teachers can effectively deliver a universal social-emotional curriculum and improve children's emotional knowledge, self-regulation, social

Table IV. Distal Effects of Intervention on Child Outcomes by Parent Report

Outcome measure	Pretest		Posttest		Adjusted <i>M</i>	ANCOVA	Effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Head start competence scale total score						$F(7, 181) = 7.82^{**}$	.36
Control	2.46	(.53)	2.46	(.59)	2.49		
Intervention	2.56	(.51)	2.68	(.47)	2.68		
Preschool Kindergarten behavior scales							
Externalizing composite						ns	
Control	1.33	(.60)	1.32	(.61)	1.28		
Intervention	1.17	(.55)	1.25	(.54)	1.32		
Aggression						ns	
Control	.95	(.66)	.96	(.68)	.95		
Intervention	.87	(.65)	.97	(.62)	1.03		
Explosive behavior						ns	
Control	1.51	(.63)	1.51	(.65)	1.44		
Intervention	1.29	(.60)	1.38	(.56)	1.45		
Attention problems							
Control	1.53	(.66)	1.49	(.67)	1.45	ns	
Intervention	1.35	(.59)	1.40	(.60)	1.49		
Internalizing composite							
Control	.85	(.40)	.96	(.45)	.95	ns	
Intervention	.81	(.42)	.87	(.40)	.91		
Social withdrawal ^a							
Control	.60	(.50)	.78	(.54)	.79	ns	
Intervention	.55	(.49)	.63	(.47)	.69		
Anxiety							
Control	1.11	(.44)	1.14	(.48)	1.12	ns	
Intervention	1.06	(.47)	1.12	(.45)	1.14		

^aFor this variable there was no significant main effect for group but maternal depression did moderate an intervention effect. See description provided in results section.

* $p < .05$, ** $p < .01$, *** $p < .001$.

interaction level and social skills in less than one preschool year. Intervention effects were found on key emotion knowledge skills targeted by the intervention. Both teachers and parents reported improvements in children’s social-emotional competence. The findings provide preliminary support for the adapted version of the elementary PATHS Curriculum (Greenberg, Kusché, Cook, & Quamma, 1995; Conduct Problems Prevention Research Group, 1999a, 1999b).

Preschool PATHS is one of a few universal, classroom-based, social-emotional curricula that have been evaluated in a randomized clinical trial with a population comprised solely of children under age five (Izard et al., 2004; Lynch et al., 2004). One of the strengths of the present study is that intervention impact was assessed using data from multiple reporters. Many interventions that target preschool-age children utilize teacher ratings to monitor intervention impact but do not include direct assessments of child skills. This is critical, not only because

the use of child outcomes adds to the literature regarding prevention with young children, but also because these measures are less vulnerable to bias than ratings by adult reporters.

After controlling for gender and verbal ability, children exposed to Preschool PATHS had greater emotion knowledge skills compared to children in the control classrooms. The receptive emotion vocabularies of intervention children increased by the end of the program year and children were more accurate at identifying facial expressions. Intervention children also made gains in their ability to correctly identify situations that elicit different basic emotions but the difference between the intervention and control groups was only marginally significant. In addition, intervention children were significantly less likely than controls to exhibit a bias toward misidentifying emotional expressions as angry.

Increasing children's emotion knowledge and improving the accuracy with which they process emotional expressions (i.e., reducing anger bias) increases the likelihood that children exposed to PATHS will be more successful in social situations with peers as these competencies are necessary for success in this area. These findings are important as they indicate that during the preschool period children's emotional competence can be enhanced through instruction. Based on theories of emotional development, reductions in perceptual biases represent changes in the "affective-cognitive structures" that guide emotional experience (Izard, 1977). Research with low-income preschoolers has shown that different aspects of emotion knowledge predict concurrent and future social functioning so changes in brain function and structure that manifest as improved skills have the potential to divert developmental trajectories away from poor outcomes (Fine et al., 2003; Izard et al., 2001; Schultz et al., 2000, 2001).

No intervention effects were found on direct measures of inhibitory control or sustained attention. Very few evaluations of preventive interventions with preschoolers have included measures of attention or executive function skills as outcomes and instead, have tended to use such measures to assess characteristics that moderate the effectiveness of interventions. The expectation for a program impact on this domain may have been unrealistic given the relatively low intensity of this component of the PATHS curriculum. More intensive interventions for young children with clinical levels of behavior problems have failed to show impact on child cognitive measures despite intervention effects on teacher ratings and observations (Barkley et al., 2000). The lack of an intervention effect in this domain may also reflect problems with the measures used to assess the constructs. Very little is known about how attention and executive function skills develop in young children and there are only a handful of measures, of varying reliability, that have been used to assess these constructs (Blair, Zelazo, & Greenberg, 2005). However, a randomized trial of PATHS with elementary aged students has shown significant impacts on measures of executive function and that these improvements in executive function (inhibitory control) mediate behavioral outcomes (Riggs, Greenberg, Kusche, & Pentz, 2006).

Preschool PATHS did not have an impact children's social problem solving skills. The most extensively evaluated program that targets children's problem solving skills is the I Can Problem Solve intervention (Shure & Spivak, 1982). Research on this program and others has confirmed that with instruction and practice, children can develop these skills (Denham & Almeida, 1987). The most common outcome measure used in these studies and other program evaluations is one in which children generate open-ended solutions in response to a series of problem scenarios. Due to time limitations in the current evaluation, children were not able to give free responses but instead were asked to pick their most likely response from four options to only four situations. It is possible that this methodological difference limited our ability to detect an intervention effect.

It is important to note that compared to PATHS, the I Can Problem Solve program has a much narrower focus designed to specifically build children's skills in problem solving. In one of the original studies, Shure and Spivak (1982) provided intervention children with 20 min of training daily over the course of 8 weeks. This intense dose of instruction resulted in significant gains for intervention children over those in the control classrooms (Shure & Spivak, 1982). The PATHS Curriculum only contains three lessons specifically devoted to problems solving. Teachers are encouraged to scaffold children throughout the day as they attempt to negotiate problem situations with peers, but if generalization was limited then it is unlikely that exposure to the lessons alone would cause significant changes in this skill domain.

In addition to finding significant intervention effects on child indicators of social competence, teachers and parents described PATHS children as better adjusted compared to children in the control condition. These findings are consistent with other social-emotional interventions with young children (Denham & Burton, 1996; Izard et al., 2004; Lynch et al., 2004). Both teachers and parents described intervention children as exhibiting significantly higher levels of social interaction, emotion regulation, and social skills with peers at the end of the program year. In addition to describing intervention children as more socially competent, teachers rated intervention children as significantly less withdrawn compared to controls. With the exception of teacher ratings of anxiety, the intervention effects were consistent across both sites.

Despite individual differences across participants, verbal ability only moderated the effects of the intervention on the Social Cooperation subscale of the PKBS. According to teachers, intervention children with higher verbal ability were more cooperative with their peers compared to controls but this was not the case for intervention children with low levels of verbal ability. This finding is positive and suggests that PATHS is effective with a broad range of students including those with language delays. However, it is very possible that the combination of a universal social-emotional curriculum and a language intervention would cause even stronger impacts on children's ability to use verbal mediation to self regulate and to

communicate effectively with others about their own thoughts and feelings. Such an integrated model is being evaluated in the current trial of preschool PATHS, which is almost complete.

In this study, there were no intervention effects on parent or teacher ratings of children's externalizing behavior. This finding is not uncommon in evaluations of universal preventive interventions because the base rates of these behaviors is low and the intervention is less intensive than most interventions attempting to reduce aggression which typically involve a smaller group format and/or individual skill coaching (Bierman & Welsh, 1997). As Bryant and colleagues point out, reducing aggression in young children requires interventions to focus on factors that contribute to the development and maintenance of the problem behavior (Bryant, Vizzard, Willoughby, & Kupersmidt, 1999). Preschool PATHS is an intervention that promotes child skill development and includes an entire unit on developing children's self-control skills but it does not target the parental behaviors or environmental conditions that may also need to change in order to see significant behavioral improvement in children that lasts over time. A more intensive intervention model could be developed that includes a parent module in addition to the classroom intervention. This approach has been used by other program developers (see, for example, the work of Webster-Stratton). Finally, it is also possible that children's behavior did improve in this study but not enough to alter teachers and parents global perceptions of the children (Stoolmiller, Eddy, & Reid, 2000).

Limitations and Future Directions

The results of this study are promising and interpreted as initial support for the efficacy of Preschool PATHS. However, additional research is needed to replicate these findings. One of the limitations of this study was the use of behavior ratings rather than direct observations of child behavior. Although there are problems inherent in teacher ratings, particularly when they are collected from teachers who also deliver the intervention, the fact that an intervention effect was found on parent ratings in addition to teacher ratings, and that the pattern of findings was similar across both reporters lends credibility to the findings. Parents were aware that across a two year period, a new curriculum was being implemented and evaluated in the Head Start program but they were blind to the design of the study.

A second limitation of the current was that analyses were conducted at the individual child level even though the unit of randomization was the classroom. Unfortunately, the small number of classrooms did not provide sufficient statistical power to use multi-level model in the current study. The clustering of students within classrooms results in the non-independence of subjects, an assumption inherent in the analyses conducted in this study. It is possible that this could bias the statistical tests used to identify intervention effects. As Stoolmiller et al.

(2000) discuss, this is one of several challenges associated with detecting effects of universal, school-based interventions. A final limitation to the study was the lack of an extended follow-up assessment. As described, the evaluation plan was to follow Head Start children into Kindergarten to determine whether the intervention continued to have a positive effect on children as they transitioned into elementary school. This was not possible given the contamination of the control subjects once they entered school. Unfortunately this is one of the realities of working at a university research center with a history of extensive community collaborations and outreach efforts.

Head Start and public preschool programs are striving to improve the school readiness of our nation's youngest citizens as a foundation for future achievement and mental health. Low-income young children are challenged by the multiple risks associated with life in disadvantaged communities. Children who develop emotional and behavioral problems in these contexts are especially vulnerable. Early education programs have the potential to exert an even stronger positive influence on children's lives if they foster social-emotional learning as much as they promote early academic skills and adaptive family functioning (Raver, 2002). Universal social-emotional curricula are not intensive enough on their own to meet the mental health needs of all children but they represent a critical building block to protect all children from previous or future risk exposure.

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REFERENCES

- Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First grade classroom behavior: Its short and long-term consequences for school performance. *Child Development, 64*, 801–814.
- Anderson, L. S., Shin, C., Fullilove, M. T., Scrimshaw, S. C., Fielding, J. E., Normand, J., et al. (2003). The effectiveness of early childhood development programs: A systematic review. *American Journal of Preventive Medicine, 24*(suppl. 3), 32–46.
- Bierman, K. L., & Welsh, J. A. (1997). Social relationship deficits. In E. J. Mash & L. G. Terdal (Eds.), *Assessment of childhood disorders* (3rd edn., pp. 328–365). New York: Guilford Press.
- Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist, 57*, 111–127.
- Blair, C., Zelazo, P. D., & Greenberg, M. T. (2005). The measurement of executive function in early childhood. *Developmental Neuropsychology, 28*, 561–571.

- Bronfenbrenner, U., & Crouter, A. C. (1983). The evolution of environmental models in developmental research. In P. H. Mussen (Series Ed.) & W. Kessen (Vol. Ed.), *Handbook of child psychology: Vol. 1. History, theory, and methods* (4th ed., pp. 357–413). New York: Wiley.
- Bryant, D., Vizzard, L. H., Willoughby, M., & Kupersmidt, J. (1999). A review of interventions for preschoolers with aggressive and disruptive behavior. *Early Education and Development, 10*, 47–68.
- Campbell, S. B. (1995). Behavior problems in preschool children: A review of recent research. *Journal of Child Psychology and Psychiatry, 36*(1), 113–149.
- Catalano, R. F., Berglund, M. L., Ryan, J. A. M., Lonczak, H. C., & Hawkins, J. D. (2002). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Prevention & Treatment, 5*, Article 15. Retrieved October 5, 2004, from <http://journals.apa.org/prevention/volume5/pre0050015a.html>.
- Cicchetti, D., & Toth, S. L. (1997). Transactional ecological systems in developmental psychopathology. In S. S. Luthar, J. A. Burack, D. Cicchetti, & J. R. Weisz (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder* (pp. 317–349). New York: Cambridge University Press.
- Coie, J. D., & Dodge, K. A. (1998). Aggression and anti-social behavior. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th edn., pp. 779–862). New York: Wiley.
- Conduct Problems Prevention Research Group (1999a). Initial impacts of the Fast Track prevention trial for conduct problems: I. The high-risk sample. *Journal of Consulting and Clinical Psychology, 67*, 631–647.
- Conduct Problems Prevention Research Group (1999b). Initial impacts of the Fast Track prevention trial for conduct problems: II. Classroom effects. *Journal of Consulting and Clinical Psychology, 67*, 648–657.
- Consortium on the School-based Promotion of Social Competence (1994). The school-based promotion of social competence: Theory, research, practice, and policy. In R. J. Haggerty, L. R. Sherrod, N. Garnezy, & M. Rutter (Eds.), *Stress, risk, and resilience in children and adolescents: Processes, mechanisms, and interventions* (pp. 268–316). Cambridge, UK: Cambridge University Press.
- Cook, E. T., Greenberg, M. T., & Kusché, C. A. (1994). The relations between emotional understanding, intellectual functioning, and disruptive behavior problems in elementary school aged children. *Journal of Abnormal Child Psychology, 22*, 205–219.
- Denham, S. A. (1986). Social cognition, prosocial behavior, and emotion in preschoolers: Contextual validation. *Child Development, 57*, 197–201.
- Denham, S. A. (1998). *Emotional development in young children*. New York: Guilford Press.
- Denham, S. A., & Almeida, M. C. (1987). Children's social problem-solving skills, behavioral adjustment, and interventions: A meta-analysis evaluating theory and practice. *Journal of Applied Developmental Psychology, 8*, 391–409.
- Denham, S. A., & Burton, R. (1996). A socio-emotional intervention for at-risk 4-year-olds. *Journal of School Psychology, 34*(3), 225–245.
- Denham, S. A., Bouril, B., & Belouad, F. (1994). Preschoolers' affect and cognition about challenging peer situations. *Child Study Journal, 24*(1), 1–21.
- Department of Health and Human Services (1999). *Mental health: A report of the Surgeon General*. Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health.
- Diamond, A., & Taylor, C. (1996). Development of an aspect of executive control: Development of the abilities to remember what I said and to "Do as I Say, Not as I Do." *Developmental Psychobiology, 29*(4), 315–334.
- Domitrovich, C., Cortes, R. C., & Greenberg, M. T. (2001). *Head Start Competence Scale Technical Report*. Unpublished manuscript, Pennsylvania State University.
- Domitrovich, C. E., Greenberg, M. T., Kusche, C., & Cortes, R. (1999). *Manual for the Preschool PATHS Curriculum*. South Deerfield, MA: Channing-Bete Company.
- Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test-Revised*. Circle Pines, MN: American Guidance Service.

- Fantuzzo, J., Bulotsky, R., McDermott, P., Mosca, S., & Lutz, M. N. (2003). A multivariate analysis of emotional and behavioral adjustment and preschool educational outcomes. *School Psychology Review, 32*(2), 185–203.
- Fine, S. E., Izard, C. E., Mostow, A. J., Trentacosta, C. J., & Ackerman, B. P. (2003). First grade emotion knowledge as a predictor of fifth grade self-reported internalizing behaviors in children from economically disadvantaged families. *Development and Psychopathology, 15*, 331–342.
- Gagnon, C., Craig, W. M., Tremblay, R. E., Zhou, R. M., & Vitaro, F. (1995). Kindergarten predictors of boys' stable behavior problems at the end of elementary school. *Journal of Abnormal Child Psychology, 23*(6), 751–766.
- Garner, P. W., Jones, D. C., & Miner, J. L. (1994). Social competence among low-income preschoolers: Emotion socialization practices and social cognitive correlates. *Child Development, 65*, 622–637.
- Gilliam, W. S. (2005). *Prekindergarteners left behind: Expulsion rates in State Prekindergarten systems*. Unpublished manuscript, Yale University.
- Gottman, J. M. (1983). *How children become friends*. Chicago: University of Chicago Press.
- Greenberg, M. T., Domitrovich, C., & Bumbarger, B. (2001). The prevention of mental disorders in school-aged children: Current state of the field. *Prevention & Treatment, 4*, Article 1. Retrieved March 30, 2001, from <http://journals.apa.org/prevention/volume4/pre0040001a.html>.
- Greenberg, M. T., & Kusché, C. A. (1993). *Promoting social and emotional development in deaf children: The PATHS Project*. Seattle: University of Washington Press.
- Greenberg, M. T., & Kusché, C. A. (1998). Preventive intervention for school-aged deaf children: The PATHS Curriculum. *Journal of Deaf Studies and Deaf Education, 3*, 49–63.
- Greenberg, M. T., Kusché, C. A., Cook E. T., & Quamma, J. P. (1995). Promoting emotional competence in school-aged children: The effects of the PATHS Curriculum. *Development and Psychopathology, 7*, 117–136.
- Greenberg, M. T., & Kusché, C. A., & Speltz, M. (1990). Emotional regulation, self-control and psychopathology: The role of relationships in early childhood. In D. Cicchetti & S. Toth (Eds.), *Rochester symposium on developmental psychopathology*, Vol. 2. New York: Cambridge University Press.
- Greenberg, M. T., Kusché, C. A., & Speltz, M. (1991). Emotion regulation, self-control, and psychopathology. In D. Cicchetti & S. Toth (Eds.), *Internalizing and externalizing expressions of dysfunction. Rochester Symposium on Developmental Psychopathology*, Vol. 2 (pp. 21–55). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Halberstadt, A. G., Denham, S. A., & Dunsmore, J. C. (2001). Affective social competence. *Social Development, 10*, 79–119.
- Huaging Qi, C., & Kaiser, A. P. (2003). Behavior problems of preschool children from low-income families: A review of the literature. *Topics in Early Childhood Special Education, 23*, 188–216.
- Huffman, L. C., Mehlinger, S. L., Kerivan, A. S., Cavanaugh, D. A., Lippett, J., & Moyo, O. (2000). *Off to a good start: Research on the risk factors for early school problems and selected federal policies affecting children's social and emotional development and their readiness for school*. Chapel Hill, NC: University of North Carolina, FPG Child Development Center.
- Izard, C. E. (1977). *Human emotions*. New York: Plenum Press.
- Izard, C., Fine, S., Schultz, D., Mostow, A., Ackerman, B., & Youngstrom, E. (2001). Emotion knowledge as a predictor of social behavior and academic competence in children at risk. *Psychological Science, 12*(1), 18–23.
- Izard, C. E., Trentacosta, C. J., King, K. A., & Mostow, A. J. (2004). An emotion-based prevention program for Head Start children. *Early Education and Development, 15*, 407–422.
- Izard, C. E., Fine, S., Schultz, D., Mostow, A., Ackerman, B., & Youngstrom, E. (2001). Emotion knowledge as a predictor of social behavior and academic competence in children at risk. *Psychological Science, 12*, 18–23.
- Kaiser, A. P., Cai, X., Hancock, T. P., & Foster, M. E. (2002). Teacher reported behavior problems and language delays in boys and girls enrolled in Head Start. *Behavior Disorders, 28*, 23–39.
- Keenan, K., Shaw, D. S., Walsh, B., Delliquadri, E., & Giovannelli, J. (1997). DSM-III-R disorders in preschool children from low-income families. *Journal of American Academy of Child and Adolescent Psychiatry, 36*(5), 620–627.

- Kingston, L., & Prior, M. (1995). The development of patterns of stable, transient, and school-age onset aggressive behavior in young children. *Journal of American Academy of Child and Adolescent Psychiatry, 34*(3), 348–358.
- Kusché, C. A. (1984). *The understanding of emotion concepts by deaf children: An assessment of an affective education curriculum*. Unpublished doctoral dissertation, University of Washington.
- Kusché, C. A., & Greenberg, M. T. (1994). *The PATHS curriculum*. South Deerfield, MA: Channing-Bete Co.
- Lavigne, J. V., Arend, R., Rosenbaum, D., Binns, H. J., Christoffel, K. C., & Gibbons, R. D. (1998). Psychiatric disorders with onset in the preschool years: I. stability of diagnoses. *Journal of American Academy of Child and Adolescent Psychiatry, 37*(12), 1246–1254.
- Lopez, M. L., Tartullo, L. B., Forness, S. R., & Boyce, C. A. (2000). Early identification and intervention: Head Start's response to mental health challenges. *Early Education and Development, 11*, 265–282.
- Luria, A. R. (1966). *Higher cortical functions in man*. New York: Basic Books.
- Lynch, K. B., Geller, S. R., & Schmidt, M. G. (2004). Multi-year evaluation of the effectiveness of a resilience-based prevention program for young children. *The Journal of Primary Prevention, 24*, 335–353.
- Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53*, 205–220.
- McLeod, J. D., & Shanahan, M. J. (1996). Trajectories of poverty and children's mental health. *Journal of Health and Social Behavior, 37*(3), 207–220.
- McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist, 53*(2), 185–204.
- Merrell, K. W. (1996). Socio-emotional assessment in early childhood: The Preschool and Kindergarten Behavior Scales. *Journal of Early Intervention, 20*, 132–145.
- Moffitt, T. E., Caspi, A., Dickson, N., Silva, P., & Stanton, W. (1996). Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Development and Psychopathology, 8*, 399–424.
- Nelson, G., Westhues, A., & MacLeod, J. (2003). A meta-analysis of longitudinal research on preschool prevention programs for children. *Prevention & Treatment, 6*, Article 31. Retrieved May 11, 2005, from <http://journals.apa.org/prevention/volume6/pre0060031a.html>.
- O'Neil, R., Welsh, M., Parke, R. D., Wang, S., & Strand, C. (1997). A longitudinal assessment of the academic correlates of early peer acceptance and rejection. *Journal of Clinical Child Psychology, 26*, 290–303.
- Piotrkowski, C. S., Collins, R. C., Knitzer, J., & Robinson, R. (1994). Strengthening mental health services in Head Start: A challenge for the 1990's. *American Psychologist, 49*(2), 133–139.
- Raver, C. C. (2002). Emotions matter: Making the case for the role of young children's emotional development for early school readiness. *Society for Research in Child Development, Social Policy Report, 16*(3), 3–18.
- Raver, C. C., Blackburn, E. K., Bancroft, M., & Torp, N. (1999). Relations between effective emotional self-regulation, attentional control, and low-income preschoolers' social competence with peers. *Early Education & Development, 10*(3), 333–350.
- Riggs, N. R., Greenberg, M. T., Kusche, C. A., & Pentz, M. A. (2006). The mediational role of neurocognition in the behavioral outcomes of a social-emotional prevention program in elementary school students: Effects of the PATHS Curriculum. *Prevention Science, 7*, 91–102.
- Rimm-Kaufman, S. E., Pianta, R. C., & Cox, M. J. (2000). Teachers' judgements of problems in the transition to kindergarten. *Early Childhood Research Quarterly, 12*, 363–385.
- Robin, A. L., Schneider, M., & Dolnick, M. (1976). The Turtle Technique: An extended case study of self control in the classroom. *Psychology in the Schools, 13*, 449–453.
- Roid, G., & Miller, L. (1997). *Examiner's manual: Leiter International Performance Scale-Revised*. Wood Dale, IL: Stoelting Co.
- Rudolph, K. D., & Heller, T. I. (1997). Interpersonal problem solving, external behavior, and social competence in preschoolers: A knowledge-performance discrepancy? *Journal of Applied Developmental Psychology, 18*, 107–118.

- Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, 57(3), 316–331.
- Saarni, C. (1999). *The development of emotional competence*. New York: Guilford Press.
- Schultz, D., Izard, C. E., & Ackerman, B. P. (2000). Children's anger attribution bias: Relations to family environment and social adjustment. *Social Development*, 9, 284–301.
- Schultz, D., Izard, C. E., Ackerman, B. P., & Youngstrom, E. A. (2001). Emotion knowledge in economically disadvantaged children: Self-regulatory antecedents and relations to social difficulties and withdrawal. *Development & Psychopathology*, 13, 53–67.
- Shields, A., Dickstein, S., Seifer, R., Guisti, L., Magee, K., & Spritz, B. (2001). Emotional competence and early school adjustment: A study of preschoolers at risk. *Early Education and Development*, 12(1), 73–96.
- Shure, M. B. (1992). I Can Problem Solve (ICPS). *An interpersonal cognitive problem solving program (preschool)*. Champaign, IL: Research Press.
- Shure, M. B., & Spivak, G. (1982). Interpersonal cognitive problem solving in young children: A cognitive approach to prevention. *American Journal of Community Psychology*, 10, 341–356.
- Sinclair, E., Del'Homme, M., & Gonzalea, M. (1993). Systematic screening for preschool behavioral disorders. *Behavior Disorders*, 19, 177–188.
- Speltz, M. L., DeKlyen, M., Calderon, R., Greenberg, M. T., & Fisher, P. A. (1999). Neuropsychological characteristics and test behaviors of boys with early onset conduct problems. *Journal of Abnormal Psychology*, 108, 315–325.
- Sroufe, A. (2000). Early relationships and the development of children. *Infant Mental Health Journal*, 21, 67–74.
- Stoolmiller, M., Eddy, M. J., & Reid, J. B. (2000). Detecting and describing preventive intervention effects in a universal school-based randomized trial targeting delinquent and violent youth. *Journal of Consulting and Clinical Psychology*, 68, 296–306.
- Stormshak, E. A., Kaminski, R. A., & Goodman, M. R. (2002). Enhancing the parenting skills of Head Start families during the transition to kindergarten. *Prevention Science*, 3(3), 223–234.
- Webster-Stratton, C. (1998). Preventing conduct problems in Head Start children: Strengthening parenting competencies. *Journal of Consulting and Clinical Psychology*, 66, 715–730.
- Webster-Stratton, C., & Hammond, M. (1998). Conduct problems and level of social competence in Head Start children: Prevalence, pervasiveness, and associated risk factors. *Clinical Child and Family Psychology Review*, 1(2), 101–124.
- Webster-Stratton, C., & Reid, J. (2004). Strengthening social and emotional competence in young children: The foundation for early school readiness and success. *Infants and Young Children*, 17, 96–113.
- Weissberg, R. P., & Greenberg, M. T. (1998). School and community competence-enhancement and prevention programs. In I. Siegel & A. Renninger (Vol. Eds.), *Handbook of child psychology: Vol. 4. Child psychology in practice* (5th edn.). New York: J. Wiley.
- Yoshikawa, H., & Knitzer, J. (1997). *Lessons from the field: Head Start mental health strategies to meet changing needs*. New York: National Center for Children in Poverty.
- Youngstrom, E., Wolpaw, J., Kogos, J., Schoff, K., Ackerman, B., & Izard, C. (2000). Interpersonal problem solving in preschool and first grade: Developmental change and ecological validity. *Journal of Clinical Child Psychology*, 29(4), 589–602.