

# Initial Behavior Outcomes for the **PeaceBuilders** Universal School-Based Violence Prevention Program

Daniel J. Flannery  
Kent State University

Alexander T. Vazsonyi  
Auburn University

Albert K. Liau  
Kent State University

Shenyang Guo  
University of North Carolina at Chapel Hill

Kenneth E. Powell  
Centers for Disease Control and Prevention

Henry Atha  
Pima County (AZ) Community Services Department

Wendy Vesterdal  
University of Arizona

Dennis Embry  
PAXIS Institute

**PeaceBuilders** is a universal, elementary-school-based violence prevention program that attempts to alter the climate of a school by teaching students and staff simple rules and activities aimed at improving child social competence and reducing aggressive behavior. Eight matched schools ( $N > 4,000$  students in Grades K–5) were randomly assigned to either immediate postbaseline intervention (PBI) or to a delayed intervention 1 year later (PBD). Hierarchical linear modeling was used to analyze results from assessments in the fall and spring of 2 consecutive school years. In Year 1, significant gains in teacher-rated social competence for students in Grades K–2, in child self-reported peace-building behavior in Grades K–5, and reductions in aggressive behavior in Grades 3–5 were found for PBI but not PBD schools. Differential effects in Year 1 were also observed for aggression and prosocial behavior. Most effects were maintained in Year 2 for PBI schools, including increases in child prosocial behavior in Grades K–2. Implications for early universal school-based prevention and challenges related to evaluating large-scale prevention trials are discussed.

Despite recent downturns in national rates of violence perpetration by juveniles, a significant number of young people remain both perpetrators and victims of interpersonal violence (Dahlberg, 1998; Mercy & Potter, 1996; Sickmund, Snyder, & Poe-Yamagata, 1997; Snyder & Sickmund, 1999). For example, though the overall homicide rate in the United States has declined, rates for homicide and nonfatal injuries among children and adolescents remain at

significantly high levels (Snyder & Sickmund, 1999). The proportion of young people who self-report having committed serious acts of violence has also held steady since peaking in the early 1990s (Snyder, 2000).

Violence occurs at home, in neighborhoods, and at school. Many recent studies illustrate the impact that exposure to violence and victimization from violence have on mental health and behav-

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Daniel J. Flannery and Albert K. Liau, Institute for the Study and Prevention of Violence, Kent State University; Alexander T. Vazsonyi, Department of Human Development and Family Studies, Auburn University; Shenyang Guo, School of Social Work, University of North Carolina at Chapel Hill; Kenneth E. Powell, Centers for Disease Control and Prevention, Atlanta, Georgia; Henry Atha, Pima County Community Services Department, Tucson, Arizona; Wendy Vesterdal, Department of Family and Consumer Resources, University of Arizona; Dennis Embry, PAXIS Institute, Tucson, Arizona.

Albert K. Liau is now at the Psychological Studies Group, National Institute of Education, Singapore. Kenneth E. Powell is now at the Georgia Department of Human Resources, Division of Public Health, Atlanta, Georgia.

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Correspondence concerning this article should be addressed to Daniel J. Flannery, Institute for the Study and Prevention of Violence, Kent State University, 230 Auditorium Building, Kent, Ohio 44242. E-mail: dflanne1@kent.edu

ior, including an increased risk for engaging in violent behavior (Elliott, Hamburg, & Williams, 1998; Flannery, 1997; Singer, Anglin, Song, & Lunghofer, 1995; Singer et al., 1999). Although the risk of homicide victimization at school remains low (Kachur et al., 1996), levels of exposure to violence and victimization from violence at school remain high, particularly for elementary and middle school children (Kaufman et al., 2000; Singer et al., 1999). While recent data suggest a decline in the number of students carrying weapons to school (7% of high school students were found to have done so within the previous 30 days; Kann et al., 2000), the use of firearms and other weapons has heightened the lethality of violence among young people (Rushforth & Flannery, 1999) and has significantly increased the likelihood that specific conflicts will escalate into lethal exchanges (Fagan & Wilkinson, 1997). In fact, despite recent declines in gun use and lethal forms of violence, the proportion of young people involved in nonfatal violence has not declined (Snyder, 2000). Arrest rates for aggravated assaults remain almost 70% higher than they were in 1983, and this is the offense most frequently captured in self-reports of violence (U.S. Department of Health and Human Services [USDHHS], 2001).

The data are clear. Violence among young people remains a significant public health problem (USDHHS, 2001). Although many school and community-based violence prevention programs exist, relatively few have been rigorously evaluated (Sherman et al., 1997; Thornton, Craft, Dahlberg, Lynch, & Baer, 2000). If psychologists are to inform public policy and facilitate risk prevention for young people, it is imperative that we identify, through applied evaluation studies, programs that effectively prevent youth violent behavior and its associated precursors (i.e., aggression) and rigorously evaluate the behavioral outcomes associated with these interventions (Powell & Hawkins, 1996; Satcher, Powell, Mercy, & Rosenberg, 1996; USDHHS, 2001). In the present study, we examined the potential impact of a universal elementary-school-based violence prevention program on student aggression and social competence.

### Preventive Interventions

The need to provide early prevention is illustrated by the multitude of studies that show that violent behavior occurs along a developmental continuum of behavioral severity (e.g., Flannery & Huff, 1999; Flannery & Williams, 1999; Tolan, Guerra, & Kendall, 1995; Tremblay, et al., 1992). The precursors to more serious violence perpetration in adolescence (e.g., homicide, assault) are young children's aggressive behaviors such as hitting, kicking, and verbal insults and threats (Conduct Problems Prevention Research Group [CPPRG], 1999; Dahlberg, 1998; Huesmann et al., 1996; Huesmann & Moise, 1999; Singer & Flannery, 2000; Stoolmiller, Eddy, & Reid, 2000; Tremblay, Pagani-Kurtz, Masse, Vitaro, & Pihl, 1995). These are the triggers that can escalate interpersonal conflict into violence and are the behaviors that need to be targeted in preventive interventions in elementary schools. Young people without the skills and competencies to resolve conflicts or solve problems are at increased risk for violence victimization and perpetration (Lochman & Dodge, 1994). Longitudinal research has consistently demonstrated that aggressive, peer-rejected children in first grade are at increased risk for engaging in delinquent, violent behavior in adolescence (Hawkins et al., 2000; Loeber &

Farrington, 1998; Tolan & Gorman-Smith, 1998; Tremblay et al., 1992, 1995; Walker, Colvin, & Ramsey, 1995) and for becoming antisocial adults (Eron & Huesmann, 1990).

Promising studies exist showing that the developmental trajectory of youth violence may be altered (CPPRG, 1999; Dahlberg, 1998; Englander-Golden, Jackson, Crane, Schwarzkopf, & Lyle, 1989; Hawkins, 1995; Howard, Flora, & Griffin, 1999; Reid, Eddy, Fetrow, & Stoolmiller, 1999; Stoolmiller et al., 2000; Tremblay et al., 1991). Several studies have now demonstrated that aggressive behavior can be reduced by altering the social environments at school (Farrell & Meyer, 1997; Gottfredson, 1997; Greenberg, Kusche, Cook, & Quamma, 1995; Grossman et al., 1997; Reid et al., 1999; Stoolmiller et al., 2000), particularly by emphasizing rewards and praise for prosocial behavior (CPPRG, 1999; Walker et al., 1995) and improving social competence (Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; O'Donnell, Hawkins, Catalano, Abbott, & Day, 1995) while reducing cues that might increase hostility (Lochman & Dodge, 1994).

The Good Behavior Game (GBG) is one type of school-based prevention program that has established clear evidence of reduced aggressive behavior and other forms of child and adolescent problem behavior such as tobacco use and poor academic achievement (Kellam & Anthony, 1998; Kellam, Ling, Merisca, Hendricks, & Ialongo, 1998; Salend, Reynolds, & Coyle, 1989). The GBG uses classroom behavior management as the primary means of reducing aggression and problem behavior. Student teams are rewarded by teachers if no member of a team exhibits undesirable behaviors while engaged in game sessions. Teachers begin by rewarding teams with tangible reinforcers and then gradually move to less tangible rewards.

The Linking the Interests of Families and Teachers (LIFT) program has also used the GBG as a core element of a 10-week universal preventive intervention strategy to reduce aggression and increase social competence (Reid et al., 1999; Stoolmiller et al., 2000). The overall intervention consisted of parent training, the GBG program, and systematic communication between teachers and parents. The intervention had immediate and significant effects on physical aggression among students on the playground as well as some impact on increased child social competence. Examination of the LIFT program outcomes has also shown strong differential effects of treatment, with children highest on aggression at baseline benefiting the most from the intervention (Reid et al., 1999; Stoolmiller et al., 2000). These short-term and differential effects on aggression are important to consider given the pressure to demonstrate significant behavior change with relatively brief school-based interventions.

Another program of research has been conducted by the Conduct Problems Prevention Research Group (CPPRG, 1999). The CPPRG has implemented and evaluated the Fast Track prevention trial for conduct problem behavior for elementary school children at high risk for long-term antisocial behavior. Fast Track is a developmentally based, long-term multicomponent and multisite intervention that has been evaluated using a randomized design with a nonintervention control group. After 1 year of intervention (from kindergarten to Grade 1), the group found moderate positive effects on children's social competence and conduct problems, including child aggressive behavior, for children in the intervention schools compared with children in the control group.

Several other programs of research have demonstrated child behavior change in the areas of improved social competence or reductions in aggressive behavior in the classroom or on the playground (e.g., Grossman et al., 1997; Hawkins et al., 1999; Tremblay et al., 1995; also see Thornton et al., 2000; USDHHS, 2001). In the current study, we sought to expand on these studies by examining the effects of an early elementary-school-based universal preventive intervention program called **PeaceBuilders**. This program attempts to alter individual child behavior—in particular, to reduce aggressive behavior and increase social competence—by changing the culture or climate of an entire school. There is some evidence that **PeaceBuilders** affects the incidence of assault-related and violent injury. Specifically, Krug and colleagues (Krug, Brener, Dahlberg, Ryan, & Powell, 1997) found that the frequency of injuries due to fighting for children in Grades K–5 whose schools were randomized to **PeaceBuilders** did not increase over a 1-year period, although the incidence of injuries due to fighting for children in control schools increased 56% over the same period. Although these are meaningful archival data, we report here on teacher and child self-reports of social competence and aggression, which have high predictive value for long-term prevention efforts (CPPRG, 1999; Tolan et al., 1995; Tremblay et al., 1995; Vazsonyi, Vesterdal, Flannery, & Belliston, 1999; Walker et al., 1995). School is a logical public health setting for changing the cognitive, social, and imitative characteristics of children at risk for violence. For example, schools can be thought of as large antecedent and reinforcement systems that can increase or decrease antisocial and prosocial behavior (Mayer & Sulzer-Azaroff, 1990). We still lack consistent evidence of whether a relatively low-cost, widely implemented universal preventive intervention approach in the early elementary grades will lead to significant and sustainable behavior change.

### The **PeaceBuilders** Program

**PeaceBuilders** is a universal school-wide violence prevention program for elementary schools (Grades K–5) implemented by all staff and students in a school (Embry, Flannery, Vazsonyi, Powell, & Atha, 1996). **PeaceBuilders** focuses on individual behavior change in proximal interpersonal and social settings (Tolan & Guerra, 1994). The program incorporates an ongoing, long-term strategy to alter the climate and culture of the entire school (Embry & Flannery, 1999; Embry et al., 1996; Flannery, 1997). The intervention is purposely woven into the school's everyday routine rather than presented as a time- or subject-limited curriculum. Thus, **PeaceBuilders** is not offered as a set number of sessions or hours per week but includes activities that can be implemented on a daily basis in any classroom by any teacher or staff person. Specifically, **PeaceBuilders** attempts to change characteristics of the setting (antecedents) that trigger aggressive, hostile behavior, and it increases the daily frequency and salience of both live and symbolic prosocial models. If there are more prosocial cues and models in a school and these behaviors are consistently reinforced and rewarded, then over time, child social competence will increase and the frequency and intensity of aggressive behaviors will decline. **PeaceBuilders** specifically rewards prosocial behaviors and provides strategies to avoid the differential or accidental reinforcement of negative behaviors and conflict that sometimes happens with conflict mediation programs (Webster, 1993).

All children and staff in a school learn five simple rules via a common language, which makes the intervention easy to learn and maintain: (a) praise people, (b) avoid put-downs, (c) seek wise people as advisers and friends, (d) notice and correct hurts we cause, and (e) right wrongs. To help students learn these principles, **PeaceBuilders** includes (a) daily rituals related to its language and principles that are meant to foster a sense of belonging; (b) cues and symbols that can be applied to diverse community settings; (c) specific prompts to “transfer” across people, behaviors, and time; and (d) new materials or strategies introduced for times and circumstances when positive behavior might otherwise decay (Embry, 1980; Embry et al., 1996; Stokes & Baer, 1977).

For example, staff and students are encouraged to use “praise notes” to pay attention to and reinforce positive, prosocial behavior in the classroom, at school, and at home. “Peace feet” might be placed by the drinking fountains to encourage children not to cut in line while waiting their turn, and students are sometimes sent to the principal for kind acts or good deeds rather than just for discipline problems (principal “preferrals”). **PeaceBuilder** rules and principles are prominently displayed throughout the school, and students complete activities from a specially designed comic book in which they are the designated hero (see Embry et al., 1996). Adults more actively monitor “hot spots” in school such as lunchrooms and hallways in between activities, praising prosocial behavior. All of these strategies and activities are geared toward creating a positive climate and culture in the entire school, with an emphasis on reinforcement of positive behavior rather than simply the reduction of negative behavior.

The training of teachers in the implementation of the present intervention had several phases, including a preintervention orientation for all faculty and staff of the schools, a half-day training workshop on the basic **PeaceBuilders** model, and extensive site coaching (on average, 2 hr per week) in the first 3 to 4 months of the intervention and then on an as-needed basis. All training and coaching were conducted by the model developer (Embry et al., 1996) as a means of facilitating internal validity. Each participating school also received specific in-service sessions on important issues identified by staff (e.g., implementing activities with special needs children), periodic group forums to discuss successes and challenges to implementation, and occasional 1-day institutes that focused on applying and creating new materials and interventions. Attendance was voluntary at the institutes and forums. Additional description of program materials and training is available elsewhere (e.g., Embry et al., 1996).

### Hypotheses

Our hypothesis was that youth aggressive behavior would be reduced by initiating prevention early in childhood and by increasing children's resilience and social competence. A dual focus on reducing aggression and increasing social skills and competencies is important because the prognosis for children with a combination of low social competence, aggressiveness, and poor emotional and cognitive preparation is poor (CPPRG, 1999; Kellam, Mayer, Rebok, & Hawkins, 1998; Tolan et al., 1995; Weissberg & Bell, 1997). We also examined the differential effectiveness of the intervention given evidence that treatment outcome effects may vary depending on a child's initial behavior status prior to participating in an intervention (Reid et al., 1999; Stoolmiller et al.,

2000). We examined both short-term change in aggression and competence (compared with controls) over the 1st year of intervention and longer-term change in Year 2, when all schools received intervention. Specifically, in the 1st year, we expected that children in the intervention-school group, compared with those in the control-school group, would report greater improvements in social competence and greater reductions in aggressive behavior. By the end of the 2 school years, when both groups were receiving the intervention, we expected that, relative to baseline levels, students in both conditions would exhibit significant increases in competence and prosocial behavior and decreases in aggressive behavior.

### Method

The study protocol was approved by the Institutional Review Board for Human Subjects at the University of Arizona in Tucson and by the respective schools' research review committees. Parents were notified of the project through letters mailed to their homes and by school-distributed newsletters. Parents were given the opportunity to withdraw their child from any data collection. Students were also informed that their participation was voluntary and were provided an opportunity for alternative classroom activities if they chose not to take part. If a student was engaged in another activity (e.g., band class), we returned to attempt to gather information at a later date. At the time of survey administration, students were asked to give oral assent, and questions were answered regarding their participation. All students received rewards such as stickers or pencils for completing the surveys and interviews.

Eight elementary schools (Grades K–5) in Pima County, Arizona, were selected from two large school districts to participate on the basis of having high rates of juvenile arrests and histories of suspensions and expulsions. After we met with school administrators to discuss the purpose and scope of the study, all schools that were initially contacted agreed to participate. Schools were located in all areas of town, including some in the central city and others on the outskirts of town. One of the eight schools consisted of a pair of schools in the same neighborhood, a school for Grades K–2 and a school for Grades 3–5 (approximately 1 block apart), and was treated as a single school for pairing, intervention, analysis, and discussion (School 2A). All of the other schools were self-contained Grades K–5 schools. One school that was randomly assigned to the delayed intervention condition (School 1B) did not gather initial baseline data but joined the study at

Time 2 in the spring of Year 1. All participating schools remained in the study through the first 2 intervention years.

### Design and Procedure

Prior to baseline data collection, the eight project schools were matched into four pairs primarily on the basis of geographic proximity, but we also considered the percentage of ethnic students, the percentage of students eligible for free or reduced-price lunch, and the percentage of students in English as a Second Language (ESL) classrooms (see Table 1). School 2A contained fewer Hispanic and more Native American students than its comparison School 2B, but these schools were paired because of their close geographic proximity. Four schools were then randomly assigned as **PeaceBuilders** immediate intervention (PBI) schools and began the program in the fall of 1994 immediately following baseline data collection. The remaining schools began the **PeaceBuilders** program in 1995 after 1 year of baseline data collection and are hereafter referred to as **PeaceBuilders** delayed (PBD) schools (see Figure 1). PBD schools received compensation in Year 1 (\$1,000) as an incentive for them not to engage in any **PeaceBuilders** program-related activities.

We randomized at the school level because all students and staff in a school were exposed to and participated in the intervention. Students in the four PBI schools were exposed to **PeaceBuilders** for a total of 2 school years, and PBD schools participated in the intervention for 1 school year between the fall and spring semesters of Year 2. Owing to limited resources, we did not collect any child self-report data from new kindergarten students in Year 2, we collected Grades 1 and 2 child self-reports only for students who had participated in Year 1, and we did not follow Year 1 fifth graders into sixth grade. Further, students new to PBI schools in Year 2 of the intervention were not included in these analyses.

Students in Grades 3–5 completed 100-item self-report surveys at each data collection point. Surveys were administered in classrooms of about 20 students with at least two research assistants present to read the entire survey aloud and to answer questions. This procedure resulted in few surveys with missing or incomplete data. Surveys were pilot tested in two elementary schools prior to data collection to assess the appropriateness of the items for young children. All child survey items were answered with the anchors *no*, *a little*, or *a lot*.

For students in Grades K–2, self-report data were collected through individual 20-item, face-to-face interviews. The 20 items were pilot tested with same-age children. Owing to time constraints (we were only able to interview as many children as time permitted during a single class period),

Table 1  
*School-Level Demographic Characteristics (%) of Matched Pairs*

Matched schools	Caucasian	African American	Hispanic	Native American	Asian American	Free lunch <sup>a</sup>	ESL pairs <sup>b</sup>
1A ( <i>n</i> = 704)	63.3	9.7	22.7	0.6	3.7	55	5
1B ( <i>n</i> = 551)	62.5	14.6	18.5	1.9	2.5	58	8
2A ( <i>n</i> = 817)	11.6	0.2	33.5	54.6	0.3	94	6
2B ( <i>n</i> = 377)	29.4	5.2	62.2	1.7	1.4	60	29
3A ( <i>n</i> = 550)	8.8	2.8	74.4	13.4	0.6	60	29
3B ( <i>n</i> = 573)	4.8	0.8	91.8	2.5	0.3	94	68
4A ( <i>n</i> = 327)	28.0	2.8	65.9	2.1	1.3	89	28
4B ( <i>n</i> = 780)	36.0	3.5	58.5	1.0	1.0	73	21

*Note.* "A" schools are those randomly assigned to the **PeaceBuilders** immediate (PBI) intervention, which occurred immediately after baseline data collection. "B" schools were assigned to the **PeaceBuilders** delayed (PBD) condition. <sup>a</sup> Percentage eligible for federally funded free or reduced-price lunch programs. <sup>b</sup> Students for whom English was their second language.



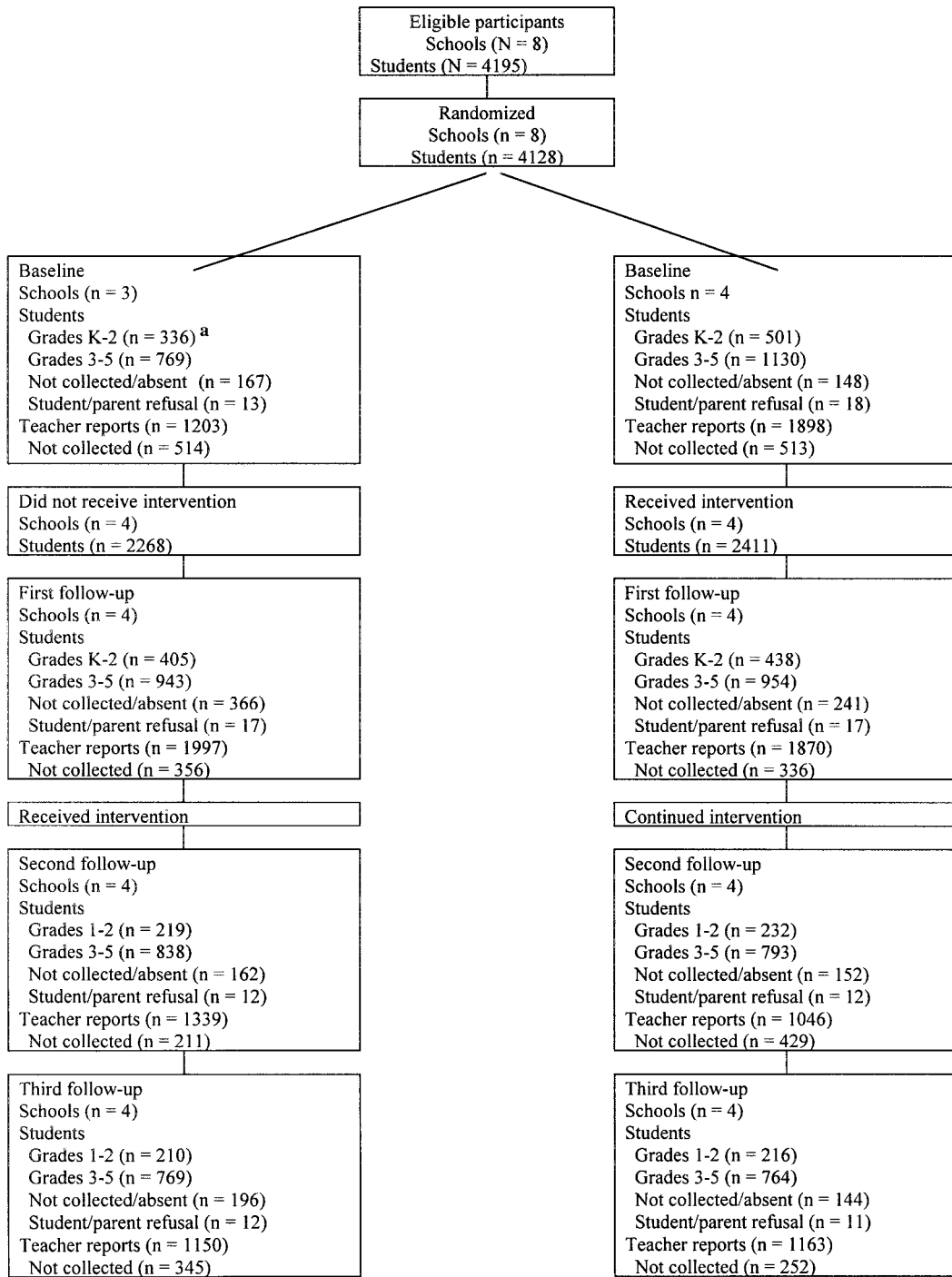


Figure 2. Student and teacher sample sizes at each data collection point. The unit of randomization was the school. <sup>a</sup>Of the children selected to be sampled, only 50% of the students in Grades K–2 were targeted to participate in the child self-report portion of the study.

**Aggressive behavior.** Teachers reported on child aggressive behavior using items adapted from the Aggressive Behavior subscale of Achenbach's (1991) Teacher Report Form (TRF). The TRF has been used extensively as both a clinical screening instrument and in large survey research to assess child externalizing behavior problems (Achenbach,

1991; Grossman et al., 1997). The 25-item Aggressive Behavior subscale asks teachers to rate child behavior on a 3-point scale in which 0 = *not true*, 1 = *somewhat or sometimes true*, and 2 = *very true or often true*. The items demonstrated high internal reliability ( $\alpha = .95$  at baseline) in our sample.

Child self-report of aggressive behavior in Grades 3–5 was assessed using items generated specifically for this study. The 9-item scale contained items such as “I hit someone” or “I put down other kids” that were rated on a 3-point scale ranging from *no* (1) to *a lot* (3). The scale demonstrated adequate internal consistency ( $\alpha = .86$  at baseline). Children in Grades K–2 answered yes or no to five items assessing whether they got into trouble at school, if they ever got into fights, and if they ever cut in line ( $\alpha = .66$  at baseline).

**Social competence.** Teachers rated child social competence using the elementary school version (Grades K–6) 19-item short form of the Walker–McConnell (W–M) Scale of Social Competence and School Adjustment (Walker, Irvin, Noell, & Singer, 1992; Walker & McConnell, 1995). The W–M scale has three subscales: School Adjustment (7 items), Peer-Preferred Behaviors (7 items), and Teacher-Preferred Behaviors (5 items). The School Adjustment subscale assesses adaptive social–behavioral competencies highly valued by teachers within classroom instructional contexts. Peer-Preferred Behaviors reflect peer values concerning forms of social behavior that govern peer dynamics and social relations within free-play settings. Teacher-Preferred Behaviors reflect teacher ratings of sensitivity, empathy, cooperation, self-control, and socially mature forms of behavior in peer relations. Teachers responded to such items as “appropriately copes with aggression from others” on a 5-point Likert scale ranging from *never* (1) to *frequently* (5). The W–M scale has demonstrated high internal consistency and test–retest reliability and correlates with other teacher and child self-report measures of social competence (Walker & McConnell, 1995). In the present sample, the internal consistency of the W–M scale was high ( $\alpha = .95$  at baseline). The W–M scale has been used in other preventive intervention studies with elementary-school-age children to differentiate behavior outcomes between treatment groups (e.g., Reid et al., 1999).

**Prosocial behavior.** Prosocial behavior for children in Grades 3–5 was measured with a 16-item instrument designed for this study. The items assessed child self-reported empathy, caring, helpfulness, and support of others. Sample items include “I helped adults at school without being asked” and “I helped other kids.” Children responded to each item using a 3-point scale that included *no* (1), *a little* (2), and *a lot* (3). The scale items loaded on a single factor (eigenvalue = 6.34) and displayed high internal consistency ( $\alpha = .92$  at baseline). Children in Grades K–2 answered *yes*, *sometimes* or *no*, *not really* to six questions assessing sharing, helpfulness, saying “thank you,” and saying “I’m sorry” ( $\alpha = .51$  at baseline).

**Peace-building behavior.** Child self-report of peace-building behavior in Grades 3–5 was assessed with three items: “I helped build peace at school,” “I told other kids they were peace builders,” and “I earned rewards for peace building.” Responses on the 3-point scale ranged from *no* to *a lot*. The three items loaded on a single factor (eigenvalue = 1.86) and demonstrated adequate internal consistency ( $\alpha = .72$  at baseline). Children in Grades K–2 responded yes or no to four items about building peace such as “I helped build peace at school” and “I earned rewards for peace building.” This yes/no scale demonstrated marginal internal consistency ( $\alpha = .58$  at baseline).

**Teacher training.** Immediately after teachers participated in an in-service training session, workshop or institute, they completed a 10-item survey designed to assess the clarity and effectiveness of the training and their impressions of whether the materials and program would be easy or difficult to implement. Sample items, rated on a 5-point scale ranging from *strongly agree* to *strongly disagree*, included “The basic philosophy behind **PeaceBuilders** is easy to understand”; “The training provided for the program was clear, effective and easy to follow”; and “As an intervention program, **PeaceBuilders** will be difficult to implement.”

**Implementation and fidelity.** In the spring of Year 2 (Time 4), teachers completed an 8-item survey that assessed their use and implementation of program materials. Some items assessed frequency of use, such as “I use the **PeaceBuilders** curriculum in my classroom” answered on a 5-point scale including *daily* (1), *occasionally* (3), and *not at all* (5). Other items

assessed degree of satisfaction or effectiveness of the program, such as “**PeaceBuilders** is easy to use” or “Overall, my school has implemented the **PeaceBuilders** curriculum,” answered on a 4-point scale ranging from *strongly agree* (1) to *strongly disagree* (4). Teachers were also asked to indicate the total number of core **PeaceBuilders** materials they used in their classrooms. These included the Action Guide, reproducible binders (separate lessons on **PeaceBuilders** rules), the “I Help Build Peace” storybook, praise notes in class, praise notes sent home, “First Aid for Anger,” the Playground Guide, and the Intensive **PeaceBuilders** Guide.

### Analysis Plan

After presenting correlation data on the relationship between teacher- and child-reported outcomes, we provide some descriptive data on the level of program implementation and teacher training. We then present data on sample attrition within and between school years and its relation to internal validity (differential attrition by intervention group) and external validity (characteristics lost to the sample). Then we turn to our main analytic questions of year-to-year differences in the immediate and delayed interventions’ effects on our outcomes of interest. We conducted two main types of analyses to address our specific hypotheses regarding school-year changes in behavior outcomes relative to baseline.

First, we constructed a three-level hierarchical linear model (Version 5, Bryk & Raudenbush, 1992) to examine change in behavior assessed at four points in time over 2 school years. The three levels of the model reflect change over time (Level 1), individual effects (Level 2), and school effects (Level 3). The model was constructed to examine both short-term (Year 1) and longer term (Year 2) change in outcomes after controlling for baseline levels and student gender. Because there was not continuous intervention over the summer months, we decided to model our effects by creating a series of dummy variables for each data collection time point (Neter, Wasserman, & Kutner, 1983), with baseline as the reference (spring of Year 1 = Time 2, fall of Year 2 = Time 3, spring of Year 4 = Time 4). Specifically, we first examined change from baseline to the spring semester (Time 2) in Year 1 for PBI schools and PBD schools. We also examined differences in Year 2 between schools with 2 years of intervention (PBI schools) and schools with 1 year of intervention (PBD schools). In PBI schools, we expected the most significant changes to occur at Time 2, after 1 year of intervention.

Hierarchical linear modeling (HLM) has several advantages for the analysis of longitudinal data. First, responses on any outcome variable from the same individual over time will be correlated, thus violating the assumption about independent sample observations embedded in most statistical models dealing with cross-sectional data, and HLM takes this correlation into account. This intraclass correlation also needs to be taken into account when school is used as the unit of assignment to condition (Koepke & Flay, 1989; Murray & Wolfinger, 1994; Piper, Moberg, & King, 2000; Rooney & Murray, 1996). Second, when applying conventional linear models to analyzing longitudinal data, one generally underestimates the standard errors of the impacts and therefore may erroneously assume statistical significance. HLM effectively handles this problem as well as others inherent in longitudinal data, such as varying times between observations, unequal groups at each data point over time, and the need to control for the effects of potentially confounding independent variables (Bryk & Raudenbush, 1992; Diggle, Liang, & Zeger, 1994; Lindsey, 1993). These advantages make HLM more appropriate than the more conventional repeated measures analyses used in longitudinal studies.

The second main analytic approach was a differential analysis on Year 1 baseline to Time 2 data for all outcome variables. Because of our delayed intervention model, Year 1 was the only period in which we had intervention schools compared with nonintervention schools. Our analytic procedure followed the protocol developed by Stoolmiller et al. (2000) and examined the extent to which intervention effectiveness depended on an individual’s initial (baseline) status on an outcome of interest.

Although we expected some gender differences between students at baseline (e.g., boys being more aggressive, girls being more socially competent), we did not expect differences on outcomes between schools at baseline. In general, we expected the PBI and PBD schools to be significantly different at Time 2 (spring of Year 1) and perhaps at Time 3 (fall of Year 2) because PBD schools would have just begun their interventions. We expected that the PBI and PBD schools might be significantly different from each other at Time 4 (spring of Year 2), although we expected all scores at Time 4 to reflect improvement (e.g., in social competence) or decline (e.g., in aggressive behavior) relative to baseline.

## Results

### *Zero-Order Correlations Among Outcome Variables*

In preliminary analyses, we examined the zero-order correlations among outcome variables.<sup>1</sup> The two main outcomes of interest, child social competence and aggression, were significantly related; teacher-rated aggression was negatively related to teacher-rated social competence,  $r(1613) = -.56, p < .001$ , at baseline. This relationship was largely unchanged over the four data collection points, and the correlation ranged from  $-.55$  to  $-.66$ . For children in Grades K–2, there were small to moderate relationships at baseline between child self-reported prosocial behavior and aggression,  $r(650) = -.03, ns$ ; between aggression and peace-building behaviors,  $r(650) = -.08, p < .05$ ; and between prosocial and peace-building behaviors,  $r(650) = .25, p < .001$ . For self-reports of children in Grades 3–5, the strongest relationship was between peace building and prosocial behavior,  $r(1879) = .69, p < .001$ . Relationships between aggressive behavior and prosocial behavior,  $r(1886) = -.23, p < .001$ , and between peace building and aggressive behavior,  $r(1879) = -.13, p < .001$ , were not as strong. Teacher reports of aggression were related to child self-reports of aggression at baseline,  $r(1316) = .34, p < .001$ , but rather modestly given the large sample size. The correlations between age and most outcome variables were statistically significant but weak, ranging from  $r(674) = .01, ns$  for child self-reports of peace-building behavior to  $r(1878) = -.25, p < .001$  for child self-reports of prosocial behavior in Grades 3–5. Correlations at baseline between age and social competence and between age and aggression were significant but low, averaging  $.08 (p < .01)$ .

### *Teacher Satisfaction With Training*

All regular and special education teachers in participating schools participated in the half-day workshops ( $n = 194$ ). Over the 2 years of intervention, training questionnaires were gathered from a total of 134 teachers (69%), 57 of whom were from PBI schools (43%) and the remainder of whom ( $n = 77$ ) were from PBD schools. Overall, 93% of teachers indicated they “strongly agreed” or “agreed” that the basic philosophy behind the PeaceBuilders intervention was easy to understand. Seventy-seven percent agreed or strongly agreed that the training provided was clear, effective, and easy to follow, and 83% agreed or strongly agreed that the ideas would be easy to use in the classroom. Three of four teachers who completed surveys believed that “PeaceBuilders will be very successful as an intervention” and strongly agreed or agreed that “The school administration stands behind this intervention effort 100 percent.”

### *Level of Implementation and Fidelity*

A total of 190 teachers (98%) completed a spring 1996 (Time 4) self-assessment of their use of intervention materials in their classrooms. Teachers completing the survey were distributed across all participating schools and grades and represented all participating teachers of Grades K–5 in each school. Teachers were equally divided between immediate- and delayed-intervention schools. The majority of teachers surveyed indicated that they used the PeaceBuilders curriculum in their classrooms on a daily (48%) or weekly (32%) basis. Nearly all teachers (98%) strongly agreed or agreed that “Overall, my school has implemented the PeaceBuilders curriculum,” 53% rated implementation as “extensive,” and 43% rated implementation as “moderate.” Teachers were also consistent in their agreement that the intervention “has decreased the level of violence in our school” (94%) and, conversely, that “PeaceBuilders has increased prosocial interactions in my class and in our school” (94%). Regarding the total number of program materials used, teachers reported, on average, that they used at least four of the eight core sets of materials in their classrooms. Teachers in the PBD schools reported, more than did teachers in the PBI schools, that during Year 2 they were more likely to use program materials daily (compared with weekly),  $\chi^2(4, N = 190) = 14.64, p < .01$ .

### *Attrition*

We first calculated attrition within each intervention year (from baseline to Time 2 in Year 1 and from Time 3 to Time 4 in Year 2) and between Years 1 and 2 to determine rates of attrition and to determine whether there was differential attrition by intervention group. We also examined differences in outcomes between students with baseline-only data and those with baseline data plus at least one additional data point over the 2-year period. In a second set of analyses, we examined demographic characteristics related to attrition between PBI and PBD schools. Finally, we examined our two main outcomes of interest, teacher-rated social competence and aggression, to determine whether children lost from the sample after baseline were different from those children who remained part of the sample. All attrition analyses on outcomes were conducted separately for the Grades K–2 and Grades 3–5 samples.<sup>2</sup>

Within each intervention year, the average rate of attrition (fall data but no spring data) was 12% in Year 1 and 17% in Year 2. Between-years attrition was 32% for students in Grades K–2 (331 of 1,037 students) and 28% for students in Grades 3–5 (231 of

<sup>1</sup> These zero-order correlations do not take into consideration intragroup correlation among students within classes and therefore serve only a descriptive and exploratory purpose.

<sup>2</sup> To corroborate our attrition analyses, we also conducted logistic regressions with attrition status as the outcome variable. We ran regressions with grade, gender, intervention-group membership, Grades K–2 teacher-rated social competence and aggression, as well as Grades 3–5 teacher-rated social competence and aggression as independent variables. The results of these regression analyses were consistent with the analysis of variance and chi-square results reported here. To control for possible variation due to grade or gender, we also ran regressions controlling for those variables, and the results remained the same.



814). We did not include new kindergarten students in Year 2, nor did we track Year 1 fifth-grade students into Year 2. For all students assessed at baseline, 169 (10%) of 1,615 students (Grades K–2) and 120 (9.5%) of 1,140 students (Grades 3–5) had no other data over the 2-year period.

Students in Grades K–2 with baseline-only data (those lost to attrition) were rated by teachers at baseline as more aggressive,  $F(1, 1612) = 11.05, p < .01$ , and less socially competent,  $F(1, 1611) = 7.09, p < .01$ , than were students who remained part of the study sample. Students in Grades 3–5 with baseline-only data were also rated by their teachers as more aggressive,  $F(1, 1258) = 14.70, p < .01$ , and less socially competent,  $F(1, 1258) = 13.60, p < .01$ , than were students who remained part of the study sample. Rates of attrition from baseline were not significantly different by gender, grade, or intervention-group membership for either children in Grades K–2,  $\chi^2(1, N = 1,615) = 0.804, p > .05$ , or children in Grades 3–5,  $\chi^2(1, N = 1,260) = 0.389, p > .05$ .

### Behavior Outcomes

HLM was our main analytic approach to examining school-level effects. We used a three-level hierarchical linear model, with the first level representing change over time, the second level representing individual student differences (gender), and the third level representing differences between schools. The model examined differences between schools after controlling for baseline levels of behavior ( $\beta_{0ij}$ ) and gender. The Level 1 model was specified as

$$Y_{hij} = \beta_{0ij} + \beta_{1ij}T2 + \beta_{2ij}T3 + \beta_{3ij}T4 + e_{hij}$$

The Level 2 model was specified as

$$\beta_{0ij} = \pi_{00j} + \pi_{01j}MALE + r_{0ij}$$

$$\beta_{1ij} = \pi_{10j}$$

$$\beta_{2ij} = \pi_{20j} + r_{2ij}$$

$$\beta_{3ij} = \pi_{30j} + r_{3ij}$$

The Level 3 model was specified as

$$\pi_{00j} = \gamma_{000} + \gamma_{001}PBI + u_{00j}$$

$$\pi_{01j} = \gamma_{010}$$

$$\pi_{10j} = \gamma_{100} + \gamma_{101}PBI$$

$$\pi_{20j} = \gamma_{200} + \gamma_{201}PBI$$

$$\pi_{30j} = \gamma_{300} + \gamma_{301}PBI$$

$\beta_{0ij}$  represents the intercept or baseline. T2 represents data collected in the spring of Year 1 (Time 2), T3 represents data collected in the fall of Year 2 (Time 3), and T4 represents data collected in the spring of Year 2 (Time 4). The Level 1 error term,  $e_{hij}$ , is assumed to be normally distributed with a zero mean and a constant variance. At Level 2, MALE is the dichotomous gender variable equal to 1 if the child was a boy and 0 if the child was a girl. The Level 2 random effects  $r_{0ij}$ ,  $r_{2ij}$ , and  $r_{3ij}$  are assumed to be normally distributed with a zero mean and a constant variance. The variable PBI represents the **PeaceBuilders** immediate intervention

(as opposed to the delayed intervention, or PBD). Adding the error term ( $u_{00j}$ ) to the intercept equation at the school level (Level 3) takes into account the autocorrelation within schools—namely, the nonindependence of students within a school.

In determining the specification of our model, we followed the recommendation of Snijder and Bosker (1999) by first testing the significance of random effects in our models. The models with significant random effects were then compared using Akaike's information criterion (AIC) and Schwarz's Bayesian criterion (SBC). These criteria measure whether specifying additional random effects improves fit if the models under comparison have the same structure of fixed effects. A larger value of AIC or SBC is an indication of better fit (Littell, Milliken, Stroup, & Wolfinger, 1996; see also Guo & Hussey, 1999). The model with the random specification above emerged most consistently as the model with the largest likelihood function, and the best fit to the data, compared with all the other models that we explored.<sup>3</sup>

The fixed effects presented in Tables 2 and 3 illustrate semester effects that reflect differences (not taking into account other factors such as intervention) on outcomes over time. Individual effects reflect Level 2 gender differences at baseline, and the school effects reflect differences between PBI and PBD schools at baseline. As shown in Tables 2 and 3, the random effects are statistically significant, which indicates that specifying such extra heterogeneity to control for intragroup correlation is necessary. School effects reflect baseline differences in outcomes between PBI and PBD schools. The Level 3 effects are Semester  $\times$  School interaction effects. These results show, after controlling for baseline (Level 1) and gender (Level 2), how immediate-intervention schools compared with delayed-intervention schools on the outcomes of interest at each subsequent point in time: spring of Year 1 (Time 2), fall of Year 2 (Time 3), and spring of Year 2 (Time 4).

To address the issue of floor effects in the aggression scales, we log-transformed aggression scale scores for both teacher and child reports (Cohen & Cohen, 1983; cf. Stoolmiller et al., 2000). For example, at baseline, for Grades K–2 and Grades 3–5 teacher-reported aggression, teachers identified 33% and 37% of the children, respectively, as not engaging in any aggressive behavior. At baseline, for Grades K–2 and Grades 3–5 child self-reported ag-

<sup>3</sup> To determine the best Level 2 random effects specification for our model, we ran all possible permutations of random effects for all 10 of the outcome variables. Following the recommendation of Snijder and Bosker (1999), we started by testing the significance of random effects in our models. We found two models had significant random effects for most of the outcome variables. Model A (the model we used) had significant random effects for nine of the outcome variables, and Model B (with only one random effect at Level 2 for the intercept) had significant random effects for all 10 of the outcome variables. To determine which model provided a better fit to the data, we then compared the models using the AIC and the SBC. For example, for Grades K–2 teacher-rated competence, for Model A, AIC = -20,936 and SBC = -20,943, and for Model B, AIC = -21,077 and SBC = -21,072. Model A had consistently larger AIC and SBC values than Model B for all 10 outcome variables. Thus, Model A emerged most consistently as the model with the largest likelihood function, and the best fit to the data, compared with all the other models that we explored. However, for one of the outcome variables, Grades K–2 child-reported peace-building behavior, we used Model B, because two of the random effects at Level 2 for Model A were not significant.

Table 2  
*Hierarchical Linear Modeling Results: Teacher Ratings of Child Social Competence and Aggressive Behaviors*

Fixed effects	Coefficients (standard errors)			
	Kindergarten–2nd grade teacher ratings		3rd–5th grade teacher ratings	
	Social competence	Log aggression	Social competence	Log aggression
<b>Semester effects</b>				
Baseline	72.12*** (1.25)	1.49*** (.008)	73.28*** (0.94)	1.46*** (.007)
Spring Year 1	2.52*** (0.51)	−0.013** (.004)	1.39** (0.49)	0.020*** (.004)
Fall Year 2	0.31 (0.75)	−0.017** (.006)	−0.08 (0.69)	0.005 (.005)
Spring Year 2	2.24** (0.78)	−0.011† (.006)	−0.12 (0.66)	0.009† (.005)
<b>Individual effects</b>				
Gender: boy (Reference: girl)	−7.12*** (0.57)	0.061*** (.005)	−7.22*** (0.53)	0.070*** (.004)
<b>School effects (baseline)</b>				
PBI (Reference: PBD)	2.27 (1.77)	−0.034* (.010)	0.94 (1.18)	0.006 (.010)
<b>Semester × School interaction effects</b>				
Spring Year 1 × PBI	3.05*** (0.66)	0.006 (.005)	1.06† (0.62)	0.017** (.005)
Fall Year 2 × PBI	8.20*** (1.08)	−0.014† (.008)	4.98*** (0.95)	−0.026*** (.007)
Spring Year 2 × PBI	7.17*** (1.10)	−0.009 (.008)	6.24*** (0.88)	−0.019** (.007)
<b>Random effects variance</b>				
Level 2, $r_{0ij}$	157***	.011***	162***	.012***
Level 2, $r_{2ij}$	134***	.009***	146***	.004***
Level 2, $r_{3ij}$	138***	.008***	84.6***	.004***
Level 3, $u_{00j}$	4.66***	.000***	1.71***	.000***

Note. PBI = PeaceBuilders immediate-intervention schools; PBD = PeaceBuilders delayed-intervention schools. †  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 3  
*Hierarchical Linear Modeling Results: Child Self-Report of Aggressive, Prosocial, and PeaceBuilding Behaviors*

Fixed effects	Coefficients (standard errors)					
	Kindergarten–2nd grade self-report			3rd–5th grade self-report		
	Log aggression	Prosocial	PeaceBuilding	Log aggression	Prosocial	PeaceBuilding
<b>Semester effects</b>						
Baseline	0.27*** (.01)	5.71*** (.05)	3.43*** (.06)	1.00*** (.01)	33.60*** (.58)	5.50*** (.13)
Spring Year 1	−0.01 (.01)	−0.05 (.05)	0.01 (.06)	0.01 (.00)	−0.18 (.30)	−0.32*** (.07)
Fall Year 2	−0.01 (−.02)	−0.05 (.06)	0.23** (.07)	−0.01** (.00)	1.10** (.35)	0.71*** (.09)
Spring Year 2	0.03† (−.02)	−0.02 (.06)	0.17* (.10)	−0.000 (.01)	−1.00** (.37)	0.40*** (.09)
<b>Individual effects</b>						
Gender: boy (Reference: girl)	0.09*** (.01)	−0.11** (.03)	−0.11** (.04)	0.06*** (.00)	−4.00*** (.26)	−0.63*** (.06)
<b>School effects (baseline)</b>						
PBI (Reference: PBD)	−0.02 (.02)	−0.02 (.06)	−0.03 (.07)	−0.02 (.01)	1.40 (.78)	0.03 (.17)
<b>Semester × School interaction effects</b>						
Spring Year 1 × PBI	0.02 (.02)	0.10 (.07)	0.19* (.08)	−0.003 (.01)	−0.77* (.39)	0.71*** (.10)
Fall Year 2 × PBI	−0.02 (.03)	0.19* (.09)	0.02 (.09)	−0.001 (.01)	−0.38 (.47)	0.36** (.12)
Spring Year 2 × PBI	−0.01 (.03)	0.19* (.08)	0.01 (.10)	0.001 (.01)	−1.1* (.50)	−0.11 (.12)
<b>Random effects variance</b>						
Level 2, $r_{0ij}$	.021***	.108***	.158***	.007***	36.0***	1.58***
Level 2, $r_{2ij}$	.012***	.120**	NA	.002***	14.4***	1.20***
Level 2, $r_{3ij}$	.011***	.087**	NA	.005***	24.6***	1.72***
Level 3, $u_{00ij}$	.000	.002*	.002*	.000***	.947***	.044***

Note. PBI = PeaceBuilders immediate-intervention schools; PBD = PeaceBuilders delayed-intervention schools; NA = not applicable. †  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

gression, 31% and 44% of the students, respectively, reported not engaging in any aggressive behavior.

**Baseline effects.** With only one exception, students in PBI and PBD schools were not significantly different from each other at baseline (see school effects for baseline in Tables 2 and 3). Teachers rated students in Grades K-2 in the PBI schools as slightly lower in aggressive behavior overall than students in the PBD schools (see Table 2).

As expected, there were several gender differences at baseline. Teachers rated boys as significantly lower in social competence and higher in aggressive behavior than girls at baseline. This effect was consistent for both students in Grades K-2 and students in Grades 3-5 (see Table 2). Child self-reports of gender differences at baseline showed that among students in Grades K-2 and Grades 3-5, boys rated themselves as significantly more aggressive, less prosocial, and lower in peace-building behavior than did girls (see Table 3).

**Intervention effects.** Given the unique design of our evaluation, in which the PBI schools received the intervention during Year 1 and Year 2 but the comparison PBD schools received the intervention only during Year 2, our hierarchical linear model outlined above enabled us to examine the effects of the intervention at each data collection point (Time 2, Time 3, and Time 4) relative to baseline by examining the cross-level Semester ×

School interaction effects. For example, a significant Time 2 × School interaction would indicate that, with baseline and gender differences controlled, the PBI schools were significantly different from the PBD schools at Time 2. These effects are illustrated for significant outcomes in Figure 3 (teacher data) and Figure 4 (child self-report data).

**Time 2.** At Time 2 (spring of Year 1), compared with students in PBD schools, teachers rated students in PBI schools as significantly higher in social competence (for Grades K-2; effects were marginal for students in Grades 3-5,  $p < .10$ ) and significantly lower in log aggression (for Grades 3-5; see Table 2 for coefficients). Compared with students in PBD schools, students in PBI schools reported significantly greater peace-building behavior (for both Grades K-2 and Grades 3-5; see Table 3 for coefficients) but self-reported less prosocial behavior (Grades 3-5).

**Time 3.** At Time 3 (fall of Year 2), compared with students in PBD schools, teachers rated students in Grades K-2 and Grades 3-5 in PBI schools as significantly higher in social competence and significantly lower on log aggression, although the effects were stronger for students in Grades 3-5 ( $p < .001$ ) than for those in Grades K-2 ( $p < .10$ ; see Table 2). Compared with students in PBD schools, students in PBI schools reported significantly greater peace-building behavior (Grades 3-5) and prosocial behavior (Grades K-2; see Table 3 for coefficients).

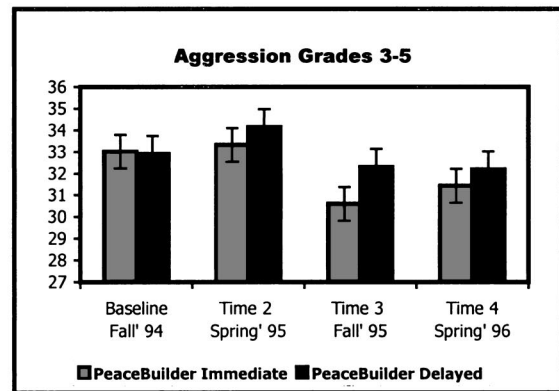
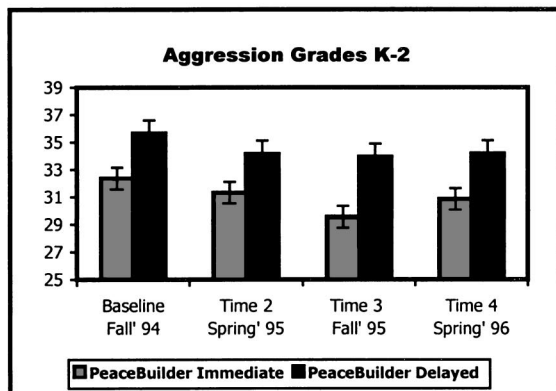
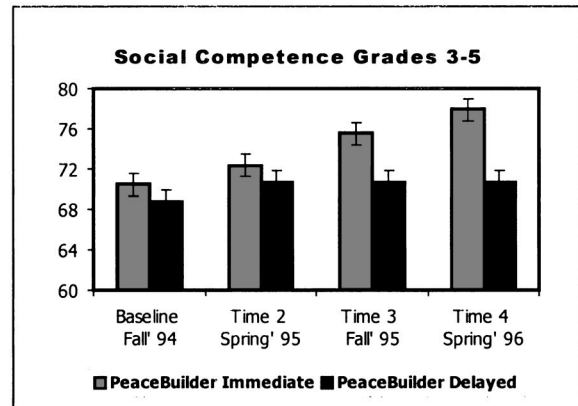
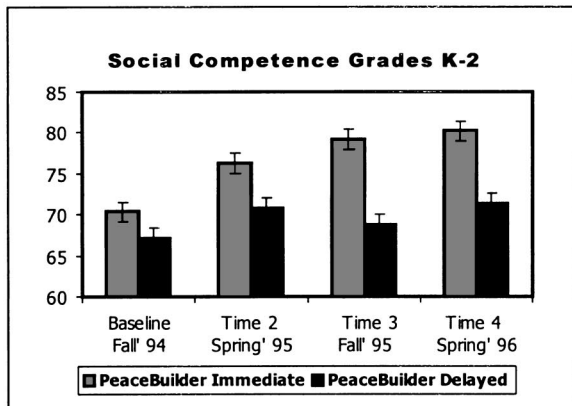


Figure 3. Means for teacher-reported social competence and aggression for PeaceBuilders immediate-intervention and PeaceBuilders delayed-intervention schools at baseline, Time 2, Time 3, and Time 4.

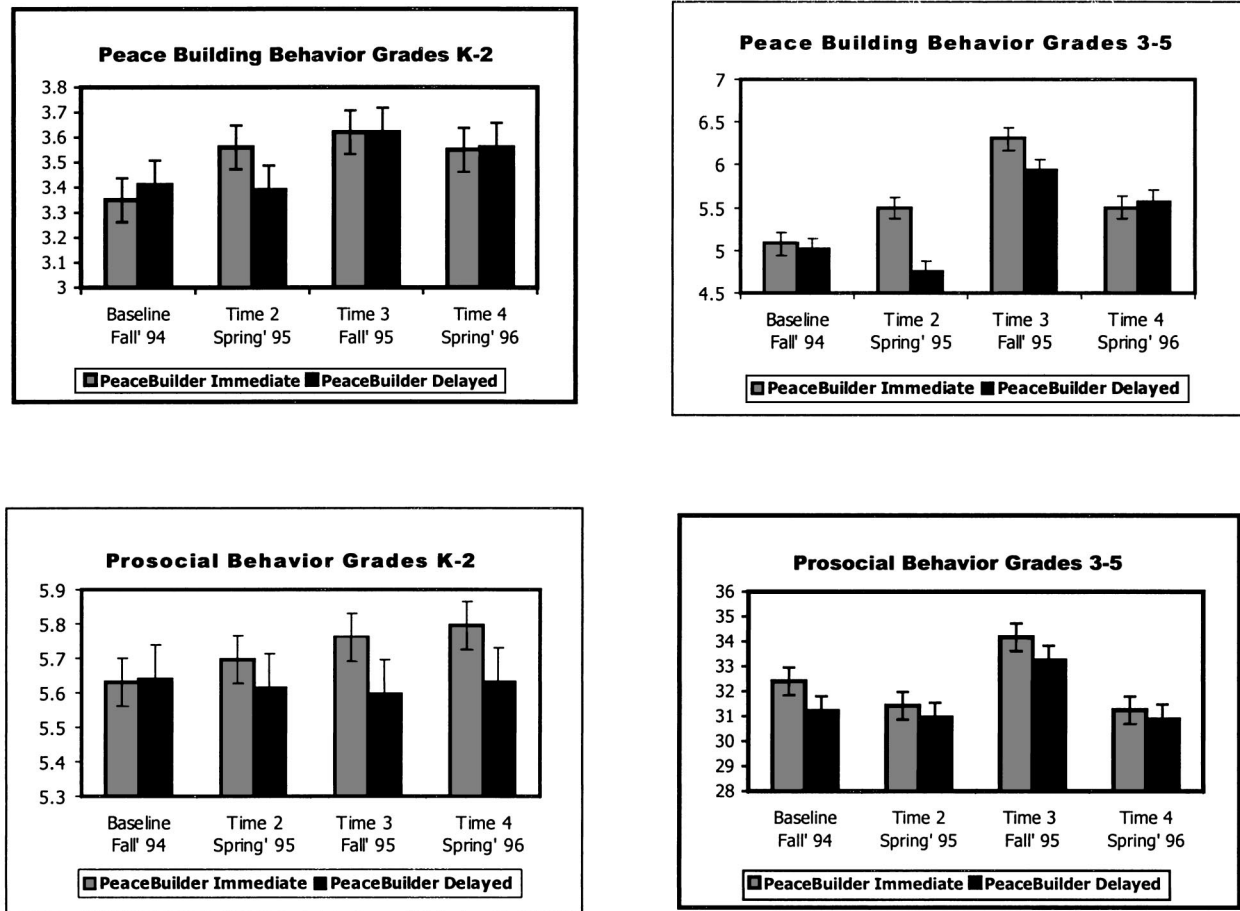


Figure 4. Means for child self-reported peace-building and prosocial behavior for PeaceBuilders immediate-intervention and PeaceBuilders delayed-intervention schools at baseline, Time 2, Time 3, and Time 4.

*Time 4.* At Time 4 (spring of Year 2), compared with students in PBD schools, teachers rated the students in PBI schools as significantly higher in social competence (Grades K–2 and Grades 3–5) and lower on log aggression (Grades 3–5 students only; see Table 2 for coefficients). Compared with students in PBD schools, students in PBI schools reported significantly greater prosocial behavior in Grades K–2 but lower prosocial behavior in Grades 3–5 (see Table 3).

*Differential effects.* We conducted a series of linear regressions to examine the potential for differential effectiveness of the intervention—namely, that treatment effects would vary depending on an individual student's initial status on an outcome at baseline. We conducted differential analyses only for Year 1 data (from baseline to Time 2) because this was the only year in which we had intervention (PBI) and nonintervention (PBD) comparison groups. We conducted differential analyses on all main outcomes of interest.

Following the protocol developed by Stoolmiller et al. (2000), we conducted a linear regression of Time 2 (spring of Year 1) scores on baseline scores. We were interested in whether the regression slopes would significantly differ. If the slopes are not parallel, this is evidence that treatment effects vary according to initial status (or that the treatment is differentially effective). For

teacher-rated dependent variables, we found significantly different slopes for Grades 3–5 log aggression,  $t(1174) = 3.84, p < .001$ . For child self-reported dependent variables, we found significantly different slopes for Grades K–2 peace-building behavior,  $t(649) = -2.46, p < .05$ ; Grades K–2 prosocial behavior,  $t(649) = -2.48, p < .05$ ; Grades 3–5 prosocial behavior,  $t(1494) = 1.97, p < .05$ ; and Grades 3–5 aggression,  $t(1494) = 14.19, p < .001$ . There were no differential effects for social competence, Grades K–2 teacher-reported or child self-reported aggression, or Grades 3–5 child self-reported peace-building behavior.

We can illustrate the difference on aggression by mapping the effect sizes for aggression scores at four points:  $-1, 0$  (mean),  $1$ , and  $2$  SDs above the mean for the baseline sample. The mean difference is computed by plugging the preintervention score into the fitted equation for both groups and then subtracting the predicted intervention mean from the predicted control mean (Stoolmiller et al., 2000). The obtained effect sizes for teacher-reported Grades 3–5 log aggression were  $.00, .26, .52$ , and  $.78$ , respectively, and those for child self-reported Grades 3–5 log aggression were  $-.17, -.08, .02$ , and  $.12$ , respectively. Thus, the effect size (i.e., treatment effect) was larger for students with higher aggression scores at baseline.

For peace-building and prosocial behavior, we can illustrate the effect sizes at four points:  $-2$ ,  $-1$ ,  $0$  (mean), and  $1$  *SD* above the mean, because we would expect children lower at baseline to increase their positive behavior after intervention. The obtained effect sizes were .48, .27, .07 and  $-.13$ , respectively, for Grades K–2 child self-reported peace-building behavior. Similarly, for Grades K–2 prosocial behavior, the obtained effect sizes were .57, .38, .18, and  $-.01$ , respectively. For Grades 3–5 child self-reported prosocial behavior, the obtained effect sizes were .27, .16, .05, and  $-.06$ , respectively. The effect size was larger for students with lower baseline peace-building and prosocial behavior scores, suggesting a bigger treatment effect for increases in positive behavior for students who were lower at baseline.

### Discussion

This study examined the initial behavior outcomes of Peace-Builders, a universal school-based preventive intervention program focused on reducing aggressive behavior and increasing social competence. We examined behavior change over 1 school year in which half of our randomly assigned schools received immediate intervention and half received no intervention. We also examined change in Year 2, when the immediate-intervention schools continued treatment and the control schools received intervention for the first time. In general, we found consistent behavior effects in Year 1, with students in Grades K–2 in the immediate-intervention schools being rated significantly higher by teachers on social competence than control students (moderate effects were obtained for students in Grades 3–5). Third- to fifth-grade students in the immediate-intervention schools were also rated by teachers as significantly less aggressive than students in nonintervention schools. As expected, students in the immediate-intervention condition also rated themselves higher on peace-building behaviors (Grades K–5) than control students. These behavior changes occurred in intervention schools during Year 1, when no significant change in behavior was observed in nonintervention schools.

Effects for increases in social competence and declines in teacher-reported aggressive behavior were maintained for all students in Grades K–5 in immediate-intervention schools in the fall of Year 2. Higher levels of peace building (Grades 3–5) and prosocial behavior (Grades K–2) were also maintained at Time 3 and at Time 4 (Grades K–2 for prosocial). At Time 4 (spring of Year 2), students from immediate-intervention schools were still rated higher on social competence, higher on prosocial behavior (Grades K–2), and lower on aggression (Grades 3–5) relative to students in delayed-intervention schools. Our overall findings are consistent with previous studies that have demonstrated the efficacy of elementary-school-based universal prevention programs for increasing social competence and reducing aggressive behavior (CPPRG, 1999; Grossman et al., 1997; Kellam, Ling, et al., 1998; Reid et al., 1999). The one trend that ran counter to expectations was for older students' (Grades 3–5) prosocial behavior. At both Time 2 and Time 4, students in the immediate-intervention schools rated themselves as less prosocial than students in the delayed-intervention schools. In general, however, we found consistent intervention effects for social competence and aggression. These effects were realized using a conservative three-level hierarchical

linear model that accounted for school-level differences and variability in individual student change over time.

From a policy perspective, it is important that early preventive intervention focus on increasing positive skills and competencies as well as reducing aggressive and other problem behaviors. These skills lay the groundwork for success in school, positive adult-child and peer relations, and long-term child adjustment and resiliency. Interventions should contain strategies specifically designed to accomplish both of these behavioral goals in order to increase the chances of sustained behavior change over time (Mayer, Butterworth, Nafpaktitis, & Sulzer-Azaroff, 1983; Tolan et al., 1995; Tremblay et al., 1995). Developmentally, children who display aggressive and socially incompetent behavior at school are also at high risk for rejection by their normative peer group. This increases their risk of associating with other deviant or rejected peers, which in turn increases their risk of subsequent delinquency and other conduct problems (CPPRG, 1999; Reid et al., 1999).

The fact that we found effects for students both in Grades K–2 and Grades 3–5 also underscores the importance of providing preventive intervention services early in elementary school. The majority of school-based violence prevention programs are in middle schools (e.g., Farrell & Meyer, 1997; Orpinas, Parcel, McAlister, & Frankowski, 1995) or high schools (Howard et al., 1999), but there is ample evidence that intervening earlier in elementary school can have greater effects on both educational outcomes and risk behaviors than can waiting to intervene later (CPPRG, 1999; Dolan et al., 1993; Kellam & Anthony, 1998; Tremblay et al., 1995) and that early and continued intervention in the elementary grades can help put children on a positive developmental course that is maintained through high school (Hawkins et al., 1999).

This study also reinforces the need to consider the potential differential effects of preventive intervention trials (Stoolmiller et al., 2000). Although we found some significant effects for all children exposed to the intervention, which is important for universal prevention efforts (compared with targeted interventions that focus on high-risk youth), we also found larger treatment effects for youth in Grades 3–5 who were higher on aggression at baseline. We found these differential effects for both teacher-reported and child self-reported aggression. We did not, however, see differential effects for the aggressive behavior of younger children (Grades K–2) even though teacher-rated aggression of children in Grades K–2 was the only significant school-level difference at baseline. We did find differential effects for child self-reported prosocial behavior despite finding significant declines overall in prosocial behavior for children in Grades 3–5. Children who were the least prosocial at baseline improved the most after 1 year of intervention. In general, effect sizes were in the moderate range (.27–.78) for the children at highest risk at baseline, defined here as  $> 2$  *SD* above the sample mean. Effects for children closer to the sample mean at baseline were not as dramatic. As Battistich and colleagues (Battistich, Schaps, Watson, Solomon, & Lewis, 2000) and others (Stoolmiller et al., 2000; Vazsonyi et al., 1999) have pointed out, however, few children in early elementary school have begun to show serious conduct problems. We adjusted for low base rates of aggression in our models and still found significant effects for aggressive behavior. Even small early differences may lead to large preventive effects as children mature, a position that is consistent with models

of the developmental progression of conduct problems and violent behavior (CPPRG, 1999; Reid et al., 1999; Tolan et al., 1995).

Although a specific focus on variations in the fidelity of treatment implementation is beyond the scope of this article, we provide some evidence (a) that the program was implemented as designed and was provided by teachers with reasonable intensity, (b) that teachers were satisfied with their training and program materials, and (c) that students seemed to acquire the skills that were emphasized as part of the school-based program (e.g., peace-building behavior). First, over 90% of teachers who responded to surveys indicated that the philosophy behind the program was easy to understand, and over 80% believed the ideas would be easy to use in the classroom. It is extremely important that teachers understand the reason they are implementing a particular curriculum or activity and the intended impact of the intervention. If the materials are difficult to implement, few teachers will take the time or effort to adapt them. There exist too many demands on already busy teachers for them to implement complicated programs that they do not understand or support. It is imperative that psychologists continue to evaluate the implementation and effectiveness of scientifically based, easy-to-implement, and cost-effective prevention programs. Few violence prevention programs systematically focus on the importance of staff training or on assessing the fidelity of program implementation (Flannery & Seaman, 2001).

Another indicator of program implementation was the survey that teachers completed at the end of the 2nd year of intervention, when all teachers surveyed had been trained and had been implementing the curriculum for at least 1 school year. Nearly all teachers in project schools completed the surveys, and 8 of 10 reported that they used materials in their classrooms on a regular basis. In some ways, observed changes in peace-building behavior also acted as a validity check that the program was being implemented as intended. There was also strong consensus that the program had been integrated at the school level. In fact, by the end of the 2nd year, both participating school districts had formally adopted the program as part of their regular curriculum.

For two of our outcomes of interest, peace-building behavior and prosocial behavior, the data suggest a potential "summer effect" in that students in the delayed-intervention schools self-reported a significant increase in behavior at Time 3 (fall of Year 2) relative to baseline. At least two factors may explain these "spikes," which were not realized for aggression or social competence. First, most teachers in the PBD schools received training immediately at the beginning of the school year (given their interest in implementation). Teacher and student survey data were gathered about 1 month into the fall semester, so most students in the PBD condition had at least some initial exposure to the intervention. Second, peace-building and prosocial behaviors are the most intervention-specific behaviors we assessed, so an increase in child self-reports may reflect a response to initial intervention exposure.

Several important characteristics, particularly those related to the likelihood of observing systematic behavior change, separate **PeaceBuilders** from other school-based violence prevention programs. First, the focus of **PeaceBuilders** was to alter the entire school climate, not just individual risk factors. Second, **PeaceBuilders** was implemented in the immediate-intervention schools for a longer period than is the case for most other time- or curriculum-limited prevention programs, and once it was imple-

mented, it was maintained over time with no prespecified end point to the intervention. Third, **PeaceBuilders** focused on universal prevention with children beginning in kindergarten. Persistent behavioral change is more likely to occur when children are younger, the behavior is more malleable, and the intervention is maintained over time (Tolan et al., 1995).

Conducting program evaluation on a large number of students in predominantly urban, mobile school populations presents many empirical and practical challenges not easily overcome. Attrition can have an adverse impact on behavioral outcomes, especially if longitudinal samples are not large enough to provide adequate power to detect treatment effects over a long period of time. Attrition in our sample was not negligible, although our rates are comparable to those of other studies conducted with higher risk, frequently mobile students and families (Hansen, Tobler, & Graham, 1990).

Large-scale intervention studies also face attrition by teachers or attrition at the school level, with schools sometimes dropping out of a project. This may occur because of changes in administrators, changes in school district policy, reductions in resources, changing academic demands (e.g., proficiency testing), or changes in teacher staff to the point that there no longer exists a majority who are willing to participate in training, to complete data collection instruments, or to implement a program (e.g., CPPRG, 1999; Reid et al., 1999). Although we had no schools drop out of our study in the first 2 years, we did have one control school delay data collection until the spring of the 1st year. There is a need to balance the gains from doing large-scale preventive interventions with the limitations in research design and method that occur when attempting to bridge science and practice (Flannery & Huff, 1999).

Limits also exist on the extent to which one can control a child's exposure to other school and community programs or events that may influence the outcome behavior being examined. We took several steps to limit the cohort's degree of exposure to the intervention. For example, PBD schools agreed not to implement the **PeaceBuilders** program during the 1st year, and we removed from our sample children in the PBI condition in Year 2 who were not also present in Year 1.

Methodologically, there exist significant challenges to doing large-scale preventive intervention work. Every school we approached about participating in the project expressed a high need for immediate intervention and was uneasy about the prospect of even a 1-year nonintervention period. Despite our strategy of offering monetary incentives to schools to remain in a 1-year control condition, it was difficult to withhold interventions from schools that had a need for immediate help. Matters were further complicated when we not only wanted to withhold intervention but also requested detailed survey data from teachers and students. This influenced our design over the course of the multiyear longitudinal study because of the absence of an ongoing nonintervention control or comparison group.

Another methodological challenge is presented by the increased emphasis on school-level (i.e., climate or culture changing) preventive interventions. Programs limited to a few schools may compromise their chances of finding significant effects on behavior because of problems of limited sample size (e.g., the unit of analysis is the school rather than the individual child; see Battistich et al., 2000; Stoolmiller et al., 2000) and because individual

students in a school are not independent of each other with regard to the potential effects of a universal prevention program.

Despite the limitations inherent in applied evaluation research, this project also had many strengths. The sample was large and ethnically diverse and included a significant number of Hispanic and Native American children, two groups rarely sampled in longitudinal studies of violence prevention programs. The children were younger and covered a broader age range than the children found in many other previous longitudinal evaluations (e.g., Grossman et al., 1997; but see CPPRG, 1999), and the schools were from both urban and nonurban districts. Although our focus here was on the first 2 years of exposure to the intervention, we have continued to gather outcome data from the children as they mature through middle school (Grades 6–8), over a 5-year period. Assessing outcomes such as aggression, delinquent and violent behavior, and violence exposure/victimization as a function of years of exposure to intervention may yield more information about the effects of age of first exposure, developmental trajectories for subgroups of children (e.g., high-aggressive youth with low social competence vs. high-aggressive youth with high social competence), or differences in program effectiveness related to child gender or history of exposure to violence (Flannery, 2000).

In sum, this evaluation of a universal preventive intervention program for children in Grades K–5 showed significant improvements in child social competence and peace-building behavior, as well as reductions in aggressive behavior, after 1 year of intervention relative to students in nonintervention schools. These effects were largely maintained in a 2nd year of intervention. It is also important to examine the differential effects of treatment on aggression and prosocial behavior so that one does not falsely assume that a universal preventive intervention failed because it lacked the power to affect the population as a whole.

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