

# Social Information-Processing Skills Training to Promote Social Competence and Prevent Aggressive Behavior in the Third Grade

Mark W. Fraser, Maeda J. Galinsky, Paul R. Smokowski, Steven H. Day, Mary A. Terzian, Roderick A. Rose, and Shenyang Guo  
University of North Carolina at Chapel Hill

This article describes a school-based study designed to promote social competence and reduce aggressive behavior by strengthening children's skills in processing social information and regulating emotions. Three successive cohorts of 3rd graders ( $N = 548$ ) from 2 schools participated. In 2000–2001, children received a routine health curriculum; in 2001–2002, students received the Making Choices: Social Problem Solving Skills for Children (MC) program; and in 2002–2003, children received MC supplemented with teacher and parent activities. Compared with children in the routine condition, children in both MC conditions were rated lower on posttest social and overt aggression and higher on social competence. Moreover, they scored significantly higher on an information-processing skills posttest. The findings suggest that prevention programs can strengthen social-emotional skills and produce changes in aggressive behavior.

*Keywords:* aggression, prevention, social aggression, social competence, social information processing

Among a variety of individual, family, school, and neighborhood factors related to poor child developmental outcomes, early aggressive behavior and poor peer relationships have been implicated as major precursors of fighting, delinquency, and drug involvement (Dodge & Pettit, 2003). Indeed, recent research suggests that early conduct problems and peer relations may contribute uniquely to long-term social adjustment (Dodge et al., 2003; S. E. Nelson & Dishion, 2004). More important, acceptance by peers buffers the effects of aggressive behavior, whereas rejection appears to exacerbate it (Dodge et al., 2003; Prinstein & La Greca, 2004). Although much remains to be learned (e.g., differences by age, gender, and race/ethnicity), data suggest that potentially malleable factors, such as social competence, contribute to the effect of peer relationships on later development (Hanish & Guerra, 2002; Miller-Johnson, Coie, Maumary-Gremaud, & Bierman, 2002; D. Nelson & Crick, 1999; Reid, Patterson, & Snyder, 2002). Social competence, operationalized as social-cognitive and emotion regulation skills in this article, helps children "select and engage in social behaviors sensitively and appropriately in different situations" (Bierman, 2004, p. 79). These skills appear to be strongly related to developmental outcomes (Lengua, 2003;

Maughan & Cicchetti, 2002; Schwartz & Proctor, 2000; Zins, Weissberg, Wang, & Walberg, 2004). Hence, interventions intended to enhance social-emotional skills and to increase peer acceptance may promote positive social development and disrupt behavioral trajectories leading to delinquency, drug use, academic failure, and other social problems (Prinstein & La Greca, 2004).

The purpose of the present article is to describe findings from a study of a school-based prevention program designed to promote social competence and reduce aggression by strengthening children's skills in regulating emotional arousal, solving social problems, and building social relationships. Making Choices: Social Problem Solving Skills for Children (MC) bolsters these skills through an instructional program focused on teaching children how to encode and interpret social and environmental information, how to identify and manage feelings, and how to generate appropriate goals and responses in play and classroom interactions (Fraser, Nash, Galinsky, & Darwin, 2000).

## Aggression, Emotional Regulation, and Processing Information: A Developmental Perspective

Characterized by "behavior that is aimed at harming or injuring another person" (Coie & Dodge, 1998, p. 781), aggression has physical and social, verbal and nonverbal, and reactive and proactive elements. The role of physical aggression as a risk factor for later maladjustment has been implicated in research (Reid et al., 2002; Thornberry, Huizinga, & Loeber, 2004). However, studies suggest that socially aggressive behavior may also be linked to an array of adjustment problems, including depression, drug use, and disruptive conduct (Crick, Casas, & Mosher, 1997; Crick & Grotpeter, 1995; Juvonen & Graham, 2001; Solberg & Olweus, 2003). From recent research, three core concepts from child development underpin the design of interventions focused on aggressive behavior (Dodge & Pettit, 2003).

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Mark W. Fraser, Maeda J. Galinsky, Paul R. Smokowski, Steven H. Day, Mary A. Terzian, Roderick A. Rose, and Shenyang Guo, School of Social Work, University of North Carolina at Chapel Hill.

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Correspondence concerning this article should be addressed to Mark W. Fraser, School of Social Work, University of North Carolina at Chapel Hill, 301 Pittsboro Street, CB 3550, Chapel Hill, NC 27599-3550. E-mail: mfraser@email.unc.edu

1. Through early experiences, children accrue social knowledge that contributes to the formation of beliefs, schema, and scripts used in establishing and sustaining relationships.
2. Coupled with differential arousal and situational contingencies, accrued social knowledge influences the way children encode cues in the environment, interpret the intentions of others, set goals in social relations, and develop behavioral repertoires.
3. Over time, patterns in processing social information emerge as a function of biological predispositions (e.g., basal arousal), contextual influences (e.g., poverty), parental discipline (e.g., harsh punishment), and peer acceptance/rejection. These patterns in mentally processing social information mediate early life experiences and later conduct.

### *Social–Emotional Skills and Aggressive Behavior*

The processes through which social knowledge and skills mediate the relationship between environmental influences and behavior are not fully understood; however, they clearly have rational and emotional elements (Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005; Pakaslahti, 2000). Aggressive rejected children, for example, tend to be less adept both at managing their emotions (Bierman, 2004) and at processing social information (Dodge, 2003; Musher-Eizenman et al., 2004). Skills in regulating emotions can be seen as an integral aspect of cognitive problem solving because emotions arouse, motivate, and organize decisional processes (Lemerise & Arsenio, 2000). Poor skills in regulating arousal, encoding social cues, and interpreting the intentions of others increase the risk for peer victimization and reactive aggression, that is, retaliation in the context of anger (e.g., Dodge, 2003; Gifford-Smith & Rabiner, 2004; Hanish et al., 2004; Lengua, 2003). Relatedly, proactive aggression, which involves the use of force to achieve a desired goal, appears more highly correlated with formulating instrumental goals, having self-efficacy for enacting aggressive responses, and anticipating positive outcomes for aggressive acts (Crick & Dodge, 1996; Smithmyer, Hubbard, & Simons, 2000).

### *Social–Emotional Skills and Social Aggression*

Social aggression is distinguished from physical aggression by actions designed to harm another's self-esteem, social status, or friendship patterns (Galen & Underwood, 1997). It includes relationally aggressive behavior such as excluding a peer from an activity (e.g., lunch group), starting hurtful gossip, and engaging in hostile verbal behavior in order to inflict harm on the relationships of others. Although social aggression can be harmful, it may serve a variety of social functions. Studies suggest that it is used by some children to exert control in peer relations (Bukowski, 2003). That is, it may serve adaptive, although not necessarily prosocial, functions such as resource manipulation (Hawley, 2003) and norm setting (Putallaz, 2003). Other studies suggest that social aggression is a strategy that some youth use to achieve or maintain a popular—though not necessarily “liked”—social status (Prinstein

& Cillessen, 2003; Xie, Swift, Cairns, & Cairns, 2002). Within this framework in which peer and classroom dynamics are thought to provide reinforcing contingencies for exclusionary and potentially damaging social relationships (Farmer, 2000; Leadbeater, Hogg, & Woods, 2003), there is growing interest in the cognitive processes associated with social aggression.

Like physical aggression, social aggression appears to be related to social information-processing (SIP) skills. In a study of bullying, Arsenio and Lemerise (2001) found that socially aggressive children use faulty response evaluation and decisional processes that tend to create higher rates of conflict with peers. In a similar vein, Crick and her colleagues (Crick, Grotpeter, & Bigbee, 2002) found that relationally aggressive children are more likely to make hostile intent attributions and become distressed in response to ambiguous relational provocations.

Combined with physical aggression, social aggression may distinguish a high-risk group of children. In a longitudinal study of 1,100 children from toddlerhood through third grade, children in a developmental trajectory characterized by high-externalizing behavior, low social skill, and few friends were rated high on relational aggression and peer victimization (National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2004). Moreover, compared with children in other trajectories, children in this trajectory were more likely to make hostile intent attributions. For some children, then, a broad pattern of aggressive behavior, poor social–emotional skills, and peer rejection appear to increase the odds for a variety of adjustment difficulties (Crick & Dodge, 1999; Kaplow, Curran, Dodge, & Conduct Problems Prevention Research Group [CPPRG], 2002; Miller-Johnson et al., 2002).

### The MC Program

Using a social cognition perspective, the MC intervention is based on a body of research that links both physical and social aggression in childhood to SIP deficits and social–emotional maladjustment (Camodeca, Goossens, Schuengel, & Terwogt, 2003; Crick, Casas, & Nelson, 2002; Crick & Dodge, 1994; Crick et al., 2002; Hanish & Guerra, 2002). Although aggressive behavior declines for most children between the second and eighth years of life (NICHD, 2004; Shaw, Gilliom, Ingoldsby, & Nagin, 2003), poor social–emotional skills and impaired friendships begin by early elementary school to distinguish a developmental trajectory of chronically high aggressive behavior from trajectories of low or declining aggressive behavior (Broidy et al., 2003; NICHD, 2004; Patterson, Dishion, & Yoerger, 2000). Geared toward national education standards for courses of study in the third grade (e.g., ability to use figurative language to explain concepts and to verify facts on the basis of social knowledge), MC activities focus on social, emotional, and cognitive skills associated with building social relationships and working collaboratively with peers in classroom and other settings. The program is designed to strengthen children's social–emotional skills and, in so doing, to increase social competence, decrease peer rejection, increase contact with prosocial peers, and disrupt the chain of risk linking early aggressive behavior to later maladjustment.

The MC curriculum focuses on a theoretically based sequence of steps in processing social information. Though outside normal conscious awareness, these steps and the skills associated with

them are thought to define, in part, whether a child will encounter new situations with positive expectations or with a sense of distrust and defensiveness. They dispose children to interactional styles that affect opportunities for future social involvement and adjustment (Aber, Brown, & Jones, 2003; Dodge, 2003; Dodge & Pettit, 2003; Mayeux & Cillessen, 2003; Pakaslahti, 2000; Schultz & Shaw, 2003). Comprising multiple lessons, each unit of MC corresponds to one of seven steps in processing social information: (a) understanding and regulating emotions, (b) encoding social and environmental cues, (c) interpreting cues and intentions, (d) setting relational goals, (e) formulating alternative social strategies, (f) selecting prosocial strategies, and (g) enacting a selected strategy. Preliminary studies suggest that MC is effective in promoting social competence (Fraser, Day, Galinsky, Hodges, & Smokowski, 2004; Smokowski, Fraser, Day, Galinsky, & Bacallao, 2004).

In the present study, we focused on the impact of two versions of MC—the basic program of classroom lessons for students and an augmented program, Making Choices Plus (MC Plus), which comprises MC plus teacher and family enhancements. MC Plus addresses some of the broader classroom and family conditions that affect the use of social skills and that relate to the generalization of program effects to playground, lunch period, after school, and other settings. On the basis of previous findings, we hypothesize that children who participate in MC and MC Plus, compared with children in a routine health curriculum, would display greater SIP skills, greater social competence, and less aggressive behavior. To test this, we examined program effects in a multiethnic sample of rural and suburban children from a wide variety of socioeconomic backgrounds. Also on the basis of prior studies, we hypothesized that effects would not vary by gender or by race/ethnicity and that children in MC Plus would display a broader pattern of effects than children in MC training only.

## Method

### Procedure

Using a cohort design, children in third-grade classrooms within two schools received different health education programs over a 3-year period. Following a procedure approved by the Institutional Review Board of the

University of North Carolina at Chapel Hill and the Superintendent of Schools for the school district, the district adopted the MC and MC Plus programs as elements of the health curriculum and managed data collection. In the first year, children received a routine health program. In the second year, the MC program supplemented the routine health curriculum. In the third year, third-grade children received the MC Plus program and regular health content. To assess the outcomes of the MC and MC Plus programs, teachers used anonymously coded instruments to rate children's school behavior in the fall and spring semesters. In addition, children's SIP skills were tested each spring. Through a confidentiality agreement, the coded data were provided to the researchers.

### Participants

The three cohorts of children successively entered the third grade in 2000, 2001, and 2002. In all, data were collected for 606 students. However, because of school-year relocations, pretest ( $n = 4$ ) or posttest ( $n = 26$ ) information was missing for 30 students, leaving a sample of 576 students. In addition, 28 retained children (Cohort 1,  $n = 5$ ; Cohort 2,  $n = 6$ ; Cohort 3,  $n = 17$ ) were excluded from the analysis because their grade retention doubled the participation of some children in the study. Grade retention exposed Cohort 1 retainees to the comparison and MC conditions, and it exposed Cohort 2 children to MC and MC Plus. For comparability, retained children across all 3 years were dropped from the analysis. This produced a sample of 548 children (comparison group:  $n = 177$ ; MC:  $n = 173$ ; MC Plus:  $n = 198$ ). The mean age of participants on January 1 of the third-grade year was 8.93 ( $SD = 0.50$ ). Shown in Table 1, approximately 41% of the students were Latino, 34% were European American, and 20% were African American. The two schools differed in racial/ethnic composition,  $\chi^2(3, N = 548) = 151.39, p < .001$ , and in free/reduced school lunch participation,  $\chi^2(1, N = 548) = 65.3, p < .001$ .

### Intervention Implementation

**Instructors.** MC lessons were provided by program specialists who made weekly visits to the classrooms of third-grade children in the second and third years of the study. Instructors had training in educational counseling, psychology, or social work. All had previous experience teaching in elementary schools.

**The MC.** The MC program was completed in the 20 classrooms (MC = 9; MC Plus = 11) of children receiving the intervention in years 2 and 3 of the study. On balance, completion of the curriculum required 22 sessions ( $M = 22.3, SD = 0.7$ ), involving an average of 18.4 ( $SD = 0.8$ )

Table 1  
Demographic Characteristics of Students by School ( $N = 548$ )

Demographic characteristic	Total sample ( $N = 548$ )	School A ( $n = 343$ )	School B ( $n = 205$ )	$\chi^2$
Free or reduced lunch	52.9%	81.6%	24.8%	65.3***
Race/Ethnicity ( $n$ )				
Latino	41.2% (226)	56.3% (193)	16.8% (33)	85.44***
European American	34.3% (188)	15.5% (53)	65.9% (135)	144.63***
African American	19.7% (108)	23.3% (80)	13.7% (28)	7.58**
Other	4.7% (26)	5.0% (17)	4.4% (9)	0.09
Gender ( $n$ )				
Female	49.1% (269)	48.1% (165)	50.7% (104)	0.35
Male	50.9% (279)	51.9% (178)	49.3% (101)	
Age <sup>a</sup>				
$M$	8.93	8.95	8.90	
$SD$	0.50	0.54	0.42	

<sup>a</sup> $t = 1.18$ .

\*\*  $p < .01$ . \*\*\*  $p < .001$ .

hr of classroom instructional time. No significant difference in hours of exposure was observed between schools. However, because of absences and scheduling conflicts, individual students varied in their exposure to MC and MC Plus. Of the students, 44% (MC = 43%; MC Plus = 45%) had perfect attendance and were exposed to 100% of the intervention content. Some 84% of the students (MC = 82%; MC Plus = 86%) received at least 90% of the training. On average, students in the MC condition received 15.9 ( $SD = 4.3$ ) hr of instruction, and students in the MC Plus condition received 17.6 ( $SD = 2.3$ ) hr of training,  $t(256.603) = -4.618$ ,  $p < .001$ . The difference in hours of instruction was in part because of school policies requiring some children to attend English-as-a-Second-Language and other special programs. Such policies can be considered aspects of implementation that are routinely encountered when bringing an intervention to scale. In the spirit of intent to treat, we included in our analyses all nonretained children, regardless of their exposure level to MC or MC Plus. Even though the program was completed in each school year (i.e., both intervention cohorts), readers are cautioned that student-level differences in dosage could be related to differences in outcomes between MC and MC Plus.

**MC Plus.** In the third year of the study, the MC program was augmented by teacher- and parent-involvement activities. Activities designed to help children strengthen emotional regulation were implemented by classroom teachers between visits from MC instructors. On the basis of information obtained from teacher logs, teachers at both schools implemented an average of 4.5 supplemental activities. Each activity was used approximately three times per week for 1 week. Furthermore, during the spring semester, teachers were encouraged to develop explicit behavioral management strategies such as creating group-level incentives, seating children in heterogeneous groups, and using the peer group as a means of setting norms and reinforcing classroom rules. To augment classroom management, all seven teachers at one school implemented the Good Behavior Game (GBG; Evertson, Emmer, Sanford, & Clements, 1983). Over a 6-week period, the GBG was used four times per week by each teacher. Although teachers in both schools implemented classroom activities, not all realized equal benefit. Classroom observations by two independent raters using a time-segmented protocol to score the use of positive classroom management techniques found that 9 of 11 teachers in the MC Plus condition had clearly established class rules and reward systems.

Finally, special efforts were made to involve the families of students in the MC Plus condition. Over the school year, parents received five newsletters linked to units in the MC Plus intervention. Written in English and Spanish, each newsletter featured teachers and students using MC skills and invited parents to do a home-based MC exercise derived from recently completed material. In addition, parents were invited to five 1.5-hr information sessions. Held concurrently in English and Spanish, these "family night" meetings covered topics such as school and community resources, third-grade curricula, and MC content. Child care, transportation, and food were provided. On the basis of attendance rosters, 28% (55 of 198) of children in MC Plus had parents who participated in at least one family night session.

### Data Collection

**Measures.** Teachers rated child behavior in the fall and spring of each year using two instruments: the Carolina Child Checklist-Teacher Form (CCC; Macgowan, Nash, & Fraser, 2002) and the Aggression subscale of the Child Behavior Checklist-Teacher Form (CBCL; Achenbach & Edelbrock, 1991). The CCC is largely derived from the Teacher Observation of Classroom Adaptation-Revised (TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991). Previous research supported the dimensionality, internal consistency, and test-retest reliability of the TOCA-R as well as its concurrent and predictive validity (Werthamer-Larsson et al., 1991). Using multi-item scales, the CCC measures five dimensions of behavior in children 6–12 years of age. Four of these dimensions are from the

TOCA-R, including measures of cognitive concentration (e.g., concentrates in class), social contact (e.g., plays with others), authority acceptance (e.g., breaks rules), and social competence. Consistent with the content of MC, the social competence measure comprises items related to emotional regulation (e.g., controls temper when there is a disagreement, can calm down when excited or all wound up) and prosocial behavior (e.g., resolves peer problems on his or her own).

To assess social aggression, the fifth dimension of the CCC, we used a modified version of the Relational Victimization subscale derived from the Social Experience Questionnaire (SEQ; Crick & Grotpeter, 1996). Because the SEQ is a self-report measure assessing victimization, the subscale was revised for scoring by teachers. Social aggression comprises nine items: (a) can give suggestions and opinions without being bossy (reverse scored), (b) excludes other kids from peer group, (c) teases classmates, (d) excludes other kids from games or activities, (e) lies to make peers dislike a student, (f) yells at others, (g) tells peers he or she will not like them unless they do what he or she says, (h) stubborn, and (i) says mean things about others. In prior studies, we have called this measure "relational aggression," consistent with SEQ terminology (e.g., Fraser et al., 2004; Macgowan et al., 2002; Smokowski et al., 2004). However, we use the more inclusive term *social aggression* to describe the construct in this article because it has wider features of social coercion and verbal confrontation that may not be intended solely to harm relationships with peers but to connote efforts to control and establish status. The measure includes a range of behavioral characteristics consistent with verbal aggression, bullying, relational victimization, and authority avoidance (where stubbornness characterizes an early-start delinquency trajectory; see also Thornberry et al., 2004; Underwood, 2003).

In a validation study, the CCC was found to have acceptable construct and concurrent validity as well as test-retest reliability (Macgowan et al., 2002). Using pretest data, Cronbach's reliabilities for each measure were cognitive concentration ( $\alpha = .96$ ), social competence ( $\alpha = .92$ ), social contact ( $\alpha = .84$ ), social aggression ( $\alpha = .91$ ), and Authority acceptance ( $\alpha = .89$ ). On the basis of Rains (2003; see also Stormshak, Bierman, & CPPRG, 1998), the CBCL Aggression subscale was factored to produce a narrowband overt aggression subscale comprising six items (cruel or bullies, teases, threatens, physically attacks, fights, and brags or boasts). Measuring physical and verbal aggressive behavior, overt aggression had a pretest reliability ( $\alpha = .80$ ) in the acceptable range.

In addition, research staff administered a story-based child assessment protocol to all children each spring semester to measure SIP skills. Through children's responses to hypothetical interactions with peers, the Skill Level Activity measures different components of children's SIP skills. These skills include encoding cues ( $\alpha = .78$ ), attributing (hostile) intent ( $\alpha = .52$ ), formulating prosocial goals ( $\alpha = .76$ ), and making a response decision ( $\alpha = .80$ ). The SLA is an adaptation of Dodge's Home Interview for attributional bias (Dodge, 1980), modified for group administration as a pen-and-paper measure. Students listen to a series of six short stories in which a peer interaction of ambiguous intent occurs. They are asked to put themselves in the place of the main character and answer the questions according to how they would respond in the given situation. As a measure of hostile intent, they are asked to attribute friendly, hostile, or unknown intent to the antagonist in the story. For the measures of goal formulation and response decision, students select from among aggressive and nonaggressive response options. For encoding cues, students search an accompanying illustration for objects, persons, and expressions that "help tell you what is happening in the story," and they circle as many relevant cues as they can find. A coder compares circled objects with a rubric of acceptable cues, and the total number of acceptable cues is recorded. An independent assessment of the rubric-based scoring protocol found high agreement between two coders who scored three case scenarios on 414 child reports ( $\kappa = .96$ ) (Day, 2004).

### *Equivalence of Attrited and Nonattrited Participants*

For each cohort, pretest teacher ratings of child behavior were collected in the fall. Excluding the 28 retained children, these were completed for 574 out of 578 students. At the spring posttest, 26 students (Cohort 1,  $n = 10$ ; Cohort 2,  $n = 12$ ; Cohort 3,  $n = 4$ ) had moved. Consequently, no posttest data for these students were collected. Compared with participants with both pretest and posttest data ( $n = 548$ ), students missing posttest data ( $n = 26$ ) were older, on average 9.22 versus 8.93 years of age,  $t(572) = -2.92, p < .01$ ; more likely to be African American,  $\chi^2(1, N = 574) = 5.35, p < .05$ ; and less likely to be non-Latino European American,  $\chi^2(1, N = 574) = 3.99, p < .05$ . Despite these sociodemographic differences, attrited and nonattrited participants did not differ significantly on the six pretest behavioral measures.

### *Analytical Strategy: Hierarchical Linear Modeling (HLM)*

As a consequence of the cohort design, some teachers participated in all three cohorts, whereas some—those who left, retired, or were newly hired—participated in only one or two cohorts. Thus, students were nested in schools and classrooms, but classrooms were nested in teachers. Because teachers both rated student behavior and had a collective influence on their classrooms, they are a potential source of error. At the same time, teachers who participated in the study more than 1 year had classrooms comprising different students. The classroom social dynamics that can arise from differing mixes of students compose a “classroom” source of error that is different from teacher-related error. This nesting of students within classrooms and classrooms within teachers may lead to violations of statistical assumptions embedded in linear regression models and thus produce spurious inference (Raudenbush & Bryk, 2002).

*Nesting and intraclass correlation (ICC).* HLM was used to account for the nested design. Because both classroom-only ( $j = 29$  classrooms) and teacher-only ( $k = 14$  teachers) nesting may lead to error dependence problems, we tested a student-classroom-teacher nesting design, although the number of teachers was so small as to make detection of teacher effects unlikely. School is treated as a fixed classroom- or teacher-level correlate. Although “school” represents another level of random variation above the teacher level, there were only two schools in the study, which is insufficient to consider modeling it as a random effect. The residual ICC—a measure of the proportion of variation in posttest scores that is between classrooms after accounting for a pretest—for social contact was .33, indicating that 33% of the residual variation in the social contact posttest was because of the classroom-level model. The other dependent variables had lower residual ICCs, ranging from .13 to .30. The ICCs were of sufficient magnitude to warrant using HLM.

*Intervention indicators.* MC and MC Plus were represented by two dummy variables, one for each of the cohorts (the common reference category represents the comparison group cohort). The indicators are invariant among students in a classroom. Consequently, intervention was modeled as a classroom-level effect. On the basis of previous research and on the a priori hypothesis that the intervention improves outcomes, the MC and MC Plus results were tested using one-tailed hypothesis tests (for a comparable example, see Raudenbush & Bryk, 2002, pp. 112–113).

*Covariates.* Student-level covariates were created to provide controls for gender and race/ethnicity. In addition, the pretest score is used to control for the initial status of each child at the study outset. Race/ethnicity of each student is included using two indicator variables, one indicating African American and the other indicating Latino. Gender is modeled using an indicator for male students.

*Model-fitting process.* Beginning with a theoretically based fixed-effects model and then testing variations on random effects models, we used a five-step forward selection process for fitting each dependent variable (see Snijders & Bosker, 1999). The first step was to construct a baseline random intercept model using a students-within-classrooms nesting structure. (In exploratory tests, a students-classrooms-teachers three-

level model demonstrated insufficient variability to distinguish the two higher levels.) From theory and prior research, the student-level explanatory variables used in the baseline models included pretest, race/ethnicity, and gender. The classroom-level variables were intervention and school. In the second step, we successively regressed each dependent variable on the baseline model, with one student-level covariate allowed to be random (Snijders & Bosker, 1999). We selected the best-fitting model by comparing the fit statistics—the Akaike information criterion (AIC) and Schwarz’s Bayesian criterion (SBC)—for these random slope models with those for the baseline models. In the third step, we used the best-fitting random structure (from Step 2) to test two sets of interactions. First, we tested a cross-level interaction between one of several student-level fixed effects (pretest, African American, Latino, or male) and the classroom-level intervention indicators. Second, we tested classroom-level interactions between school and intervention. To assess whether the effects of the programs differed by race/ethnicity, gender, or school, we evaluated these models on the basis of the significance of the added interaction terms. In the fourth step, we introduced the teacher level to the model (making a three-level model) and compared fit with the comparable two-level students-within-classrooms model at each step. If fit was better, then we retained the three-level model. The fifth step was based on a finding that in some cases, the school fixed effect actually reduced the amount of variance that was explained by the model. This is roughly equivalent to reducing the  $R^2$  in an ordinary least square (OLS) regression, except that in the case of multilevel modeling (which uses maximum likelihood), such an event can be used as a misspecification diagnostic. Following Snijders and Bosker (1999, p. 123), if school increased variance by 5% or more (i.e., decreased explained variance), then it was not modeled.

This process was conducted with SAS Proc Mixed using restricted maximum likelihood and the unstructured covariance. The denominator degrees of freedom for the fixed-effects hypothesis tests were estimated using the Kenward–Roger option. All of the explanatory variables were grand mean centered. In random slope models, the covariance between the intercept and slope parameters was allowed to be free. To test the significance of each variance component, we used a chi-square test on the deviances ( $-2 \log$  likelihood) of increasingly complex models (Littell, Milliken, Stroup, & Wolfinger, 1996). After estimating models, effect sizes for MC and MC Plus were estimated according to Raudenbush, Liu, and Congdon (2004; see also Bloom & Raudenbush, 2004).

*Results leading to final selection.* We determined that for most dependent variables, there was at least one model containing a random student-level slope parameter that fit the data better than the model with only a random intercept. Furthermore, compared with a student-classroom-teacher three-level model, most of the models fit better with two levels, students-within-classrooms. Social and overt aggression were the only dependent variables in which a three-level student-classroom-teacher model fit better than a two-level student-classroom model. The school variable was dropped for social aggression because it increased (by 12%) the variance.

## Results

The results of multilevel analyses of covariance for the six behavioral measures at pretest are presented first. Second, HLM analyses of the six behavioral outcomes are presented, followed by HLM analyses of SIP skills. Finally, effect sizes are presented for the six behavioral outcomes and the SIP measures.

### *Equivalence of Three Conditions/Cohorts at Pretest*

Children in the three cohorts did not differ significantly by age,  $F(2, 546) = 0.03, p = .97$ ; gender,  $\chi^2(2, N = 548) = 0.565, p = .75$ ; or race/ethnicity,  $\chi^2(8, N = 548) = 7.992, p = .24$ . In addition, multilevel analyses of covariance controlling for the

nesting of children in classrooms found no significant differences across cohorts on pretest cognitive concentration,  $F(2, 25) = 0.07, p = .94$ ; authority acceptance,  $F(2, 25.6) = 0.11, p = .89$ ; social competence,  $F(2, 25.7) = 0.00, p = .99$ ; social contact,  $F(2, 25.8) = 0.56, p = .58$ ; social aggression,  $F(2, 25.7) = 0.02, p = .98$ ; or overt aggression,  $F(2, 25.2) = 0.23, p = .79$ .

*Intervention Effects on Behavioral Outcomes at Posttest*

Controlling for covariates (pretest, gender, and race/ethnicity), the effects of the MC programs vary across dependent variables. Shown in Table 2, children in MC classrooms, as compared with routine curricula classrooms, displayed significantly improved social competence and social contact, and, in three-level models involving student, classroom, and teacher effects shown in Table 3, they engaged in less social and overt aggression. Students in MC Plus classrooms differed significantly from comparison cohort students on cognitive concentration, social competence, social aggression, and overt aggression. The difference between MC Plus and comparison group classes approached significance ( $.05 < p < .10$ ) for social contact, a measure of peer involvement.

*Other fixed effects and interactions.* The pretest covariate was always significant, and with the exception of school, each of the other fixed effects (African American, Latino, and male) was related to at least one of the six dependent variables. Four main effects for race/ethnicity were detected (see Tables 2 and 3). Across all three cohorts and controlling for other effects, African American children were rated lower at posttest on cognitive concentration and authority acceptance. Latino students were rated higher at posttest on social competence and lower on social aggression. In addition, a cross-level interaction indicated that the relationship between pretest and posttest cognitive concentration scores was stronger (more positive) for children in the MC condition than for children in the comparison cohort. Moreover, a significant gender interaction was observed for overt aggression. It suggests that boys may have benefited differentially from the MC intervention. No other interactions were observed. Given the potential for 60 interactions (5 fixed effects  $\times$  2 interventions  $\times$  6 outcomes), the effects of the programs appear to have varied little

by initial risk status (e.g., low social competence), race/ethnicity, gender, or school.

*Random effects.* Not shown in Tables 2 and 3, a variety of random effects were estimated. The variance of the conditional mean (student intercept) error term was significant for every dependent variable, and a random slope or intercept-slope covariance parameter was significant in all but the social competence model. For social and overt aggression, there were two random intercepts, one at the student level and another at the classroom level (varying over classrooms and teachers, respectively). The classroom random intercept variances for social and overt aggression were also significant. Substantively, in the context of a data collection strategy in which teachers were asked to rate the behaviors of their students at two different points in time, the random coefficient ( $u_{0j}$ ) represents the combined influence of two effects. The first is the rater differential scoring preferences and perceptions of student behavior. Assuming that these factors were consistent from pretest to posttest, then, the random intercept will have accounted for this variation. Second, the random coefficient represents classroom-level effects on the outcomes that are not modeled, similar to an error term in OLS analysis.

*Intervention Effects on SIP Skills*

Teachers were not blind to the assignment of children to cohorts. To provide an alternative measure to teacher assessment of children’s behavior, children were tested each spring on social and cognitive skills related to information processing.

Shown in Table 4, findings suggest that children exposed to MC and MC Plus had significantly more SIP skill when compared with children in routine health content classrooms. Specifically, children in MC classrooms were more skillful in encoding cues and formulating prosocial goals. A broader pattern of effects was observed for MC Plus, in which children differed significantly from comparison group children on encoding, hostile attribution, goal formulation, and response decision. Across the three cohorts of third graders, the fixed effects suggest that girls were more skillful in encoding, goal formulation, and response decision SIP-related activities. African American children scored lower at post-

Table 2  
*Student-Classroom Fitted Hierarchical Linear Models: The Effects of Making Choices (MC) and Making Choices Plus*

Level	Effect	Cog. Conc.		Auth. Accept.		Social Comp.		Social Contact	
		Est	SE	Est	SE	Est	SE	Est	SE
Student	Conditional mean (Intercept)	3.21***	0.06	4.24***	0.04	3.27***	0.07	3.98***	0.07
	Pretest	0.79***	0.03	0.79***	0.05	0.72***	0.03	0.57***	0.06
	African American	-0.23*	0.10	-0.14**	0.06	-0.08	0.07	0.06	0.07
	Latino	0.02	0.07	0.09	0.05	0.15*	0.06	0.05	0.06
	Gender (Male)	-0.06	0.06	-0.06	0.04	-0.05	0.05	0.04	0.05
Classroom	MC	0.19	0.15	0.03	0.10	0.29*	0.17	0.42*	0.19
	MC Plus	0.30*	0.14	0.11	0.09	0.36*	0.16	0.31†	0.18
	School	0.04	0.13	0.10	0.08	0.22	0.14	-0.10	0.16
Student $\times$ Classroom	Pretest $\times$ MC	0.19**	0.07						
	Pretest $\times$ MC Plus	0.07	0.07						

Note. For MC and MC Plus, hypothesis tests are one-tailed; all others are two-tailed. Cog. Conc. = cognitive concentration; Est = Estimate; Auth. Accept. = Authority Acceptance; Social Comp. = Social Competence  
 †  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 3  
*Student-Classroom-Teacher-Fitted Hierarchical Linear Model: The Effects of Making Choices (MC) and Making Choices Plus for Social and Overt Aggression, Controlling for Pretest, Race/Ethnicity, and Gender*

Level	Effect	Social Aggression		Overt Aggression	
		Est	SE	Est	SE
Student	Conditional mean (Intercept)	1.03***	0.07	0.18***	0.03
	Pretest	0.78***	0.07	0.83***	0.09
	African American	0.08	0.07	0.03	0.03
	Latino	-0.14*	0.06	-0.04	0.02
	Gender (Male)	-0.08	0.05	0.03	0.02
Classroom	MC	-0.19*	0.10	-0.08*	0.03
	MC Plus	-0.28**	0.10	-0.08*	0.03
Teacher	School			0.05	0.06
Student × Classroom	Gender × MC			-0.10*	0.05
	Gender × MC Plus			-0.06	0.05

Note. For MC and MC Plus, hypothesis tests are one-tailed; all others are two-tailed. Est = Estimate.

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

test on goal formulation, and children in one school scored lower on the encoding tasks. For goal formulation, a School × MC interaction was observed. Children in MC from the higher socioeconomic status (SES) school had significantly higher goal formulation scores (by .18) than their counterparts in the lower SES school.

As the three cohorts were not significantly different at pretest on sociodemographic characteristics or on the CCC and CBCL measures, this posttest-only comparison provides both a measure of concurrent validity for teacher reports and a tentative explanation for the behavioral outcomes. That is, though it is beyond the scope of this article, the concurrency of improved behavior and significant posttest differences in SIP skills suggests that the positive behavioral effects of the interventions may be mediated by SIP skills. Moreover, the pattern of SIP effects suggests that the programs may have had an effect both on reactive aggression, which is rooted in poor encoding and interpreting, and proactive aggression, which is related to setting aggressive goals and selecting coercive responses.

### Effect Sizes for Behavioral Outcomes and SIP Skills

Shown in Table 5, the effect sizes for MC Plus tended to be larger than the effect sizes for MC. For MC, effects fell in Cohen's medium range for social competence ( $\delta = .46$ ) and social contact ( $\delta = .67$ ; Cohen, 1988). For both MC and MC Plus, the effect for encoding was large (MC,  $\delta = .82$ ; MC Plus,  $\delta = .77$ ). For MC Plus, medium effects were observed for cognitive concentration ( $\delta = .43$ ), social competence ( $\delta = .56$ ), social contact ( $\delta = .48$ ), social aggression ( $\delta = -.48$ ), response decision ( $\delta = .54$ ), goal formulation ( $\delta = .66$ ), and hostile attribution ( $\delta = -.55$ ).

### Discussion

Early life experiences shape the skills and social knowledge that children use in school. Although there is no single pathway that leads to conduct problems, early experiences can produce significant deficits in social knowledge and skill that influence later behavior and peer relations. Elementary school is a primary setting

Table 4  
*Student-Classroom Hierarchical Linear Models: The Effects of Making Choices (MC) and Making Choices Plus on Social Information-Processing Skills, Controlling for Race/Ethnicity and Gender*

Level	Effect	Encoding		Hostile attribution		Goal formulation		Response decision	
		Est	SE	Est	SE	Est	SE	Est	SE
Student	Conditional mean (Intercept)	0.57***	0.01	0.56***	0.01	0.79***	0.01	0.72***	0.01
	African American	-0.04	0.02	0.04	0.03	-0.08*	0.03	-0.07	0.04
	Latino	-0.02	0.02	0.01	0.03	-0.05	0.03	-0.03	0.03
	Gender (Male)	-0.07***	0.01	-0.03	0.02	-0.07**	0.02	-0.14***	0.03
	Classroom	MC	0.12***	0.03	-0.04	0.03	0.07*	0.04	0.05
	MC Plus	0.12***	0.03	-0.13***	0.03	0.16***	0.03	0.16***	0.03
	School	-0.06*	0.03	-0.03	0.03	-0.01	0.03	0.03	0.03
Student × Classroom	School × MC					0.18*	0.07		
	School × MC Plus					0.11	0.06		

Note. For MC and MC Plus, hypothesis tests are one-tailed; all others are two-tailed. Est = Estimate.

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

Table 5  
*Effect Sizes for Making Choices (MC) and Making Choices Plus Programs*

Measure	MC	MC Plus
Cognitive concentration	0.27	0.43
Authority acceptance	0.06	0.23
Social competence	0.46	0.56
Social contact	0.67	0.48
Social aggression	-0.32	-0.48
Overt aggression	-0.17	-0.17
Encoding	0.82	0.77
Hostile attribution	-0.17	-0.55
Goal formulation	0.28	0.66
Response decision	0.18	0.54

Note. Effect size  $\delta = \beta/[(\tau^2 + \sigma^2)^{1/2}]$ , where  $\tau^2$  is error variance in conditional mean and  $\sigma^2$  is error variance.

in which children can be exposed to interventions designed to alter maladaptive beliefs, schema, scripts, rules, and skills that accrue in early childhood (Boxer & Dubow, 2002; Mostow, Izard, Fine, & Trentacosta, 2002). For children at risk, interventions such as the MC program may hold promise to change aggressogenic social knowledge and information-processing patterns.

Overall, the results support the research hypotheses. In contrast to children in comparison group classrooms, children in the two intervention conditions displayed increased social competence and decreased aggression, both social and overt. In addition, children in MC classrooms displayed increased social contact, and children in MC Plus classrooms showed enhanced cognitive concentration. Children in both intervention conditions performed better on encoding and goal formulation. Only one gender (MC: overt aggression) and no race/ethnicity interactions were observed. On balance, findings are similar to earlier results regarding the use of MC in small group (Fraser et al., 2004) and in classroom settings (Smokowski et al., 2004).

In addition, we hypothesized that children in MC Plus classrooms would display a broader pattern of effects than would children in MC classrooms. Although the two interventions were examined in relation to the comparison condition and not to each other, the pattern of effects and effect sizes tend to support this hypothesis. Besides effects on social competence, social aggression, and overt aggression observed in both interventions, MC Plus also showed positive effects on hostile attribution and response decision and on cognitive concentration, a measure that differentiated boys with chronic high aggression from boys with less serious behavioral problems in a longitudinal study in Baltimore schools (Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003). This somewhat broader and, based on effect sizes, stronger pattern of effects for MC Plus may be because of supplemental activities implemented in the third year by teachers and MC trainers. Although MC was limited to a skill-building intervention with children, MC Plus included a focus on the sociocultural context in which children's skills are reinforced. However, unlike the Seattle Social Development Project, Fast Track, and other projects in which parents were offered extensive training (for a review, see Terzian & Fraser, 2005), the involvement of parents in MC Plus was principally through five newsletters that summarized MC Plus activities and contained a related "family homework" activity and

five informational evening programs. In addition, classroom teachers were involved in a 4- to 5-week program of activities designed to infuse MC content into language arts and other classroom activities. These focused principally on helping children identify and regulate emotions. In addition, teachers were encouraged to develop classroom management schemes such as the GBG. In the cohort design, it is not possible to disentangle the effects of these parent and teacher enhancements. However, it appears that modest efforts to involve parents and teachers in MC Plus may have produced added changes in children's classroom comportment and SIP skills.

The two schools differed markedly on SES and ethnic composition, with one having a large proportion of Latino children with limited English language proficiency. Though the program is designed to be flexibly applied in a range of sociocultural situations, this sample heterogeneity produced a robust test. As hypothesized, program effects did not vary by race/ethnicity, and, with the exception of SIP goal formulation, findings did not differ by school. Moreover, the effect sizes for significant outcomes compare favorably with the effect sizes from other prevention interventions, including those that focus predominantly on higher risk children (e.g., CPPRG, 2002; Lochman & Wells, 2004).

Finally, the findings are consistent with theory. Mastery of social-cognitive skills, plus the ability to control the valence of emotions, are related negatively to aggressive behavior and are thought to potentiate a child's ability to navigate social situations (Bierman, 2004; Leve, Pears, & Fisher, 2002). Although more research is needed to replicate and extend these findings, the observed effects are promising in the sense that they provide support for recent child development research (e.g., Dodge et al., 2003; Prinstein & La Greca, 2004).

### Limitations

As is suggested above, the present study has several limitations. Though the sample was ethnically and culturally diverse, the study was undertaken in predominantly rural and suburban communities. Findings provide no information about how the MC and MC Plus programs may function with children in urban settings. In addition, pre- and posttest data were collected in the third grade. It is not known whether the observed effects provide a sufficient foundation for prevention interventions developmentally appropriate for later grades. From a measurement perspective, teachers were not blind to the services received by children, and so their ratings of children could have been affected by their participation in the program. Although three-level HLMs were estimated and such models tend to account for rater effects (e.g., Cheong & Raudenbush, 2000; Guo & Hussey, 1999), they do not account for social desirability, that is, rating children on the basis of their participation in the intervention program rather than on their actual behavior. At fall pretest, there were no indications of social desirability, and social desirability would have had to prompt teachers to recall and systematically misrepresent child behavior in the spring assessments. Given the concurrent validity suggested in the child assessment of SIP skills, an effect of social desirability is plausible but unlikely.

The cohort design is vulnerable also to the effects of history. In the 3-year period during which the study took place, significant changes occurred in public schools as a result of the No Child Left

Behind Act of 2001 (PL 107–110). These include changes in testing at end of grade, performance evaluations of teachers, and policies related to retention. In addition, the cohorts may have differed on unmeasured variables or been differentially influenced by community events. It is difficult, however, to develop an argument for how such events may provide an alternative explanation for the pattern of behavioral and SIP effects related to the interventions.

The reliability of measures and the use of summated scales pose other potential limitations. Although most measures had acceptable reliability, the alpha of hostile attribution was marginal. From a measurement perspective, the use of summated rather than weighted scales could have added noise to the data. This, however, is likely to increase a Type II error; that is, it would not inflate the chances of observing treatment effects.

Finally, because the interventions were undertaken over a 2-year period, it is possible that the effects of MC Plus are not only because of the enhanced intervention and of the slightly more exposure to training—MC Plus students received about 1.7 hr more classroom instruction—but also because of the cumulative effect of MC. Though an examination of individual classroom and teacher random effects showed no discernable pattern, both the teachers and program specialists benefited in the third year (MC Plus) of the study from work done in the second year (MC only). Whereas this potential cumulative effect could increase the parameter estimate for MC Plus, it may not be a serious limitation from a practice perspective. Indeed, from both policy and clinical points of view, it could be beneficial to know that the effects of prevention efforts grow over time, perhaps because of the added skill of those implementing the program and changes in institutional climates and individual attitudes that prevention programs may help to precipitate.

From an intent-to-treat perspective, the findings suggest that MC and MC Plus can have effects under routine circumstances, in which students filter in and out of classrooms and have differential exposure to prevention and other programs. As universal prevention interventions, MC and MC Plus do not label students. There is no potential for deviancy training and other iatrogenic effects that occur when high-risk children are placed together for special services (e.g., Dishion, McCord, & Poulin, 1999). MC provides all children the opportunity to serve as role models and peer leaders. This tends to decrease labeling and other dynamics that can exacerbate peer rejection and foster aggression. In addition, as a classroom-based intervention, it holds the potential to affect classroom peer relations and other contingencies that reinforce exclusionary, damaging social relationships (e.g., Farmer, 2000; Leadbeater et al., 2003).

### Conclusion

MC is based on a core idea: Mental processes mediate, at least in part, the relationship between early social experiences and later developmental outcomes. It is difficult to alter the early life experiences of children and the social-environmental conditions that shape these experiences. However, it appears possible to broaden children's social knowledge and change the ways they process social information and make social decisions. With a diverse sample of children, the findings from this study suggest that

school-based prevention programs can strengthen social-emotional skills and produce significant changes in classroom and peer-related behavior.

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