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Effects of Teacher Training and Consultation on Teacher Behavior Toward Students at High Risk for Aggression

THE METROPOLITAN AREA CHILD STUDY RESEARCH GROUP*

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This investigation tested the effects of the Metropolitan Area Child Study (MACS) classroom enhancement intervention on teacher behavior. The teacher intervention consisted of teacher seminars and individual consultation, and was delivered in all three intervention conditions of the MACS study. Subjects for the present study were 287 students at high risk for aggression and 48 teachers randomly assigned by school to control or intervention conditions. Student and teacher behavior was observed prior to and following the intervention. Teacher feedback to students was associated with desirable change in student aggression. Teachers in the intervention condition provided more academic feedback to students, and used less large group lecture and more individualized seat work. Intervention teachers also became more likely than controls to give academic and behavioral feedback to more aggressive students. Other tests suggested that the intervention increased the likelihood that praise for positive behavior would be given to more aggressive students.

In recent years, prevention trials have produced evidence that interventions to change teacher behavior can be effective in reducing aggression and increasing academic achievement among high-risk children and youth (Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Metropolitan Area Child Study Research Group, 2002; Webster-Stratton, Reid, & Hammond, 2001). Although several interventions have produced evidence for the effectiveness of teacher

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intervention with high-risk children, few have examined the changes in teacher behavior that result from these interventions. In addition, no investigation has studied whether teacher interventions result in teacher behavior change toward more aggressive students. It is not known whether interventions reduce aggression through changes in teaching strategies toward all students, or whether the reinforcement contingencies experienced by highly aggressive students change as a result of teacher intervention. This investigation examined the effects of a teacher intervention on teaching practices with respect to students at high risk for aggression.

Teacher Behavior and Aggression

Teacher behavior is an important target for preventive intervention because many aspects of the classroom environment have been linked empirically with student aggression. Among these are teacher instructional and behavior management techniques (Gunter, Denny, Jack, Shores, & Nelson, 1993). There is evidence that student-teacher interaction and punitive practices in schools may contribute to increased levels of aggressive behavior (Ingersoll & LeBoeuf, 1997; Mayer, 1995; Wehby, Symons, & Shores, 1995). For example, VanAcker, Grant, and Henry (1996) found that highly aggressive children experienced "different classrooms" than other children. These investigators found that student-teacher interactions and classroom contingencies differed significantly based upon student risk for aggression. Teachers in the study did not attend positively to the desired social behavior of any of their students, and students at risk for aggression who performed well academically were less likely than were other students to receive praise.

Teacher interventions have focused on improving teacher instructional skills and classroom management, as represented by factors such as negative interactions with students, differential treatment of students, autocratic styles of leadership, a high reliance on suppressionary discipline, negative physical behaviors, and unrealistic social and academic demands. In particular, there is evidence that increasing teachers' use of contingent praise can positively affect high-risk children (Furguson & Houghton, 1992; Walker, 1996).

Interventions to Change Teacher Behavior

Several studies have demonstrated the efficacy of teacher interventions with high-risk children and youth. Hawkins and colleagues in the Seattle Social Development Project (Abbott et al., 1998; Hawkins et al., 1999; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002) found that teacher training emphasizing proactive classroom management, interactive teaching, and cooperative learning was related to lower levels of violent delinquency, sexual behavior, and cheating, and higher levels of school bonding and academic achievement. Specifically, teachers assigned to an intervention condition received a 5-day training course stressing consistent rules and expectations,

contingent praise for positive achievement and behavior, monitoring student progress, and individual attention and small group instruction. Teachers were observed using the Interactive Teaching Map (Kerr, Kent, & Lam, 1985). Implementation of these practices was positively related to classroom opportunities for students, reinforcement, and school bonding and achievement. Although mean differences suggested positive intervention effects on teaching strategies taught in the intervention, these differences were not substantial enough to be statistically significant.

Webster-Stratton and colleagues (Webster-Stratton, Reid, & Hammond, 2001, 2002) offered four full-day teacher training workshops to Head Start teachers over a 6-month period. The sessions targeted effective classroom management strategies for misbehavior, promoting social skills, improving relationships with difficult students, and approaches to collaboration with parents. In evaluating the teacher training, the investigators created a composite teacher negative behavior score consisting of observations of teacher criticism of students from the MOOSES (Tapp, Wehby, & Ellis, 1995), a classroom atmosphere measure from the FAST-Track program (Conduct Problems Prevention Research Group, 1999), and a coder impression inventory modeled after a measure used with parents. Teachers in all teacher training conditions exhibited lower levels of negative behaviors toward students. Interestingly, teachers of students in the child-training-only condition also exhibited lower levels of negative behaviors (Webster-Stratton et al., 2001).

Effects on teacher behaviors observed in the Seattle Social Development Project were suggestive, but not significant, and the designs of the Webster-Stratton et al. (2001, 2002) studies do not permit evaluating the effects of the teacher intervention in isolation from other conditions. The Webster-Stratton et al. (2001) study randomly assigned families to one of six conditions, combining components of the Incredible Years program. There was no condition in which teacher training was offered without either parent training or child training included. In the Webster-Stratton et al. (2002) study, Head Start centers were randomly assigned to either an intervention condition including parent, child, and teacher interventions, or an observation-only control condition. Teachers in the intervention condition exhibited higher levels of behaviors stressed by the intervention.

Like the Seattle Social Development Project and the Webster-Stratton et al. (2001, 2002) studies, the Metropolitan Area Child Study (MACS; Metropolitan Area Child Study Research Group, 2002) has demonstrated the efficacy of interventions including teacher training and consultation on student behavior and achievement. The MACS study tested the efficacy of a general classroom enhancement intervention, a small group social-skills training intervention, and a targeted family intervention, arranged in levels with increasingly intense interventions, on aggression and academic achievement. Sixteen schools were randomly assigned to one of four intervention conditions: (1) an observation-only control condition, (2) a classroom enhancement condition (Level A), (3) classroom enhancement plus small group social-skills training

(Level B), and (4) classroom enhancement, small group social-skills training, and family intervention (Level C). Results showed that the full (Level C) condition was effective in reducing aggression among younger children at high risk for aggression. Younger high-risk children in the three conditions receiving the general classroom enhancement intervention showed positive effects on academic achievement compared to controls. The effects on aggression in the MACS study were limited to children receiving treatment in earlier grades and occurred in a community with greater resources. Further analysis of the MACS sample suggested that teacher contingent reprimand of aggressive behavior, combined with classmates' normative pressure to reduce aggression, was associated with reductions in classroom levels of aggression (Henry et al., 2000).

The Current Study

Behavioral assessments collected on a subsample of schools during the first year of the MACS made it possible to examine the effects of teacher behavior on aggression and to evaluate the effects of the intervention on teacher behaviors. In addition, these observations allowed scrutiny of differential effects among the most aggressive students. Teacher interventions may change teacher behaviors generally, but there is little evidence that teacher interventions change teachers' behavior toward the most aggressive students. Thus, it is not known whether teacher interventions modify the conditions observed by Van Acker et al. (1996), namely that the most aggressive students experience different reinforcement contingencies than do other students in classrooms.

In this study, we investigated the effects of the MACS general classroom enhancement intervention on change in teacher behavior. In particular, we focused on the effects of the intervention on teacher behavior toward the most aggressive students. We hypothesized that the intervention should increase feedback generally, and academic and behavioral praise toward the most aggressive students in particular. We also hypothesized that intervention teachers would change the ways they structured class time, increasing use of structures that maximize individual attention. Specifically, we expected that teachers in the intervention condition would use less large-group class structure and more individual instructional seat work, and that these effects would be stronger among students exhibiting the most aggression at pretest. Finally, we expected that these effects would be present when the general classroom enhancement intervention was offered without other preventive interventions.

Method

Research Participants

Participants in this study were 48 second- and fifth-grade teachers participating in the first year of the MACS, and 287 students at high risk for aggressive

TABLE 1
SAMPLE CHARACTERISTICS

	Condition		
	Control	Intervention	Difference
Teachers	16	32	
Observations			
Pretest	141	343	
Posttest	119	356	
Gender			
Female	94.1%	72.7%	$\chi^2(1) = 2.98, ns$
Male	5.9%	27.3%	
Ethnicity			
African-American	46.2%	58.3%	$\chi^2(1) < 1, ns$
Non-Hispanic White	30.8%	25.0%	
Latino	23.1%	18.9%	
Age			
Mean age	44.67	40.67	$Z = .83, ns$[a]

[a] Z statistic from Kolmogorov-Smirnov test.

behavior. The teachers and students were from three schools that had been randomly assigned to an observation-only control condition and seven schools assigned to one of three intervention conditions. Sixteen teachers taught in control schools and 32 in intervention schools. The demographic characteristics of the sample, by intervention condition, are reported in Table 1. The total sample of teachers was 81% female, reporting their ethnicities as 54.1% African American, 18.9% Latino, and 27.0% non-Hispanic white.

The students observed for this investigation were 287 second- (30.7%), third- (34.0%), and fifth-graders (35.2%) who had been selected for observation and intervention because of their risk for aggression as determined by a composite pretest aggression scale comprised of Peer Nominations of Aggression (Eron, Walder, & Lefkovitz, 1971) and the Teacher's Report Form of the Child Behavior Checklist (TRF; Achenbach, 1991). Using this measure, the upper 50% of each classroom was designated as high risk and selected to be offered the small group social-skills training and family interventions in Levels B and C of the MACS study. The Level A classroom-enhancement intervention was a universal intervention offered to all students and their teachers. These students were the students observed for this investigation. Nearly six-tenths (59.4%) of these students were male. Their teachers reported their ethnicities as 49.1% African American, 31.9% Latino, and 19.0% non-Hispanic white.

Measures

Observations of teacher and student behavior. We gathered observations of teacher and student behaviors using a method for real-time, multiple-entry

observations on laptop computers (Repp, Karsh, VanAcker, Felce, & Harman, 1989; VanAcker, Bush, Grant, & Getty, 1992). As a part of the larger MACS study, direct observations of student and teacher behaviors for all targeted at-risk students were conducted at the beginning and conclusion of the first year of intervention. Observation sessions were 20 minutes long at randomly selected structured and unstructured times during the school day to maximize the probability of gathering samples of low base-rate behaviors. The behavioral codes included information related to the instructional setting and structure, student task-related behavior, student compliance, social interaction, academic responding, and teacher feedback. We focused on codes for teacher feedback to students and class structure in this investigation.

Prior to collecting observations, observers passed a criterion test on code definitions with 95% accuracy, and achieved an 85% overall percentage agreement with another observer on three consecutive sessions. No individual code fell below an 80% overall percentage agreement within a ± 2 second window. Reliability checks were conducted across codes throughout the data-collection period on approximately 10% of the total sessions to avoid decay in reliabilities. Kappa coefficients were calculated for each reliability session by comparing the data streams on a second-by-second basis (MacLean, Tapp, & Johnson, 1985). The mean kappa coefficient for this study was .89 and the range was .45 to 1.0 (VanAcker et al., 1996).

Pretest observation codes for student aggression and pretest and posttest observation codes for teacher feedback and class structure were used in this investigation. The student aggression codes were a composite of observed aggressive and inappropriate behavior. Because there were multiple observations of each student, multiple student observations were aggregated to form pretest and posttest scores for each student. Table 2 reports the specific codes used and their operational definitions.

Demographics. Information on teachers' genders, ethnicities, and grade levels was gathered from a demographic questionnaire completed by teachers.

Procedure

Intervention. The MACS conducted three types of intervention: a general classroom-enhancement intervention, a small group social-skills training intervention for high-risk students, and a family intervention for the families of high-risk students. The general enhancement intervention (Level A) consisted of three integrated elements: a teacher education program, collaborative support from project staff, and a manualized social-cognitive curriculum. The first element consisted of a 2-year seminar series for teachers taught by senior project staff. Seminars focused on the development of prosocial behavior in students, cultural sensitivity, and proactive behavior management. Improving distribution of attention to change the reinforcement contingencies experienced by the highest-risk students was also stressed. The second element involved teacher collaboration services. The goal of this system of observation, feedback, and collaboration was to provide guidance, modeling,

TABLE 2
OBSERVATIONAL CODES AND DEFINITIONS

Variable	Observational Code Definition
Child aggression	Physical aggression[a] initiated Physical aggression retaliation Verbal aggression initiated Verbal aggression retaliation Physical inappropriate[b] initiated Physical inappropriate retaliation Physical inappropriate initiated Physical inappropriate retaliation
Academic praise	Teacher academic praise following correct response
Academic correction	Teacher correction of incorrect response
Behavioral praise	Teacher praise of positive social behavior
Behavioral reprimand	Teacher reprimand of negative social behavior
Large group structure	Teacher lectures/instructs entire class of students
Individualized instructional seat work	Teacher circulates and interacts with students completing individual assignments.

[a] "Aggression" was coded for behavior obviously intended to harm another, such as hitting another child.
[b] "Inappropriate" was coded for behavior disruptive of class but not intended to harm, such as throwing a book on the floor.

and support to teachers as they utilized strategies learned in the seminars. Ultimately, the intent was to improve behavioral management in the classroom. The third element, the *Yes I Can* curriculum, consisted of 40, one-hour lessons taught by classroom teachers over the course of 2 years, with training, supervision, and support provided by teacher collaborators. Student workbooks were designed to match the children's academic and developmental levels.

The teacher collaborators had several years of classroom teaching experience and participated in extensive training on classroom collaboration, including weekly meetings with the supervising project investigator. Among teachers, 94% demonstrated mastery of content at or above the 80% level. Teachers assigned to the intervention condition had at least four observation and feedback sessions during the course of each academic year.

Teacher collaboration services were delivered as follows. Teacher collaborators made 40-minute appointments, twice in the fall semester and twice in the spring semester with teachers for individual observation of teaching and feedback. The first 20 minutes of each appointment was used in drawing a diagram of the classroom and recording information on classroom environment (noise, lighting, crowding, and other physical features), and the schedule and rules of the classroom. The last 20 minutes of the observation session

was used in observing teaching and recording teacher-student interaction. An observation system designed to facilitate recording of teacher-student interaction was used to record opportunities to respond, academic and behavioral feedback from teachers to students, student compliance with teacher requests, and on- and off-task behaviors of students. Collaborators described in narrative form specific behavioral-management tactics such as proximity control (moving nearer to the student), signal interference (eye contact or gestures used to manage behavior), touch, planned ignoring of inappropriate behavior, and use of isolation or time-out. Following each observation session, the teacher collaborators made appointments with teachers for individualized feedback on the observations. Feedback sessions focused on improving distribution of attention and classroom management, relationships with difficult students, behavior management techniques, and integrating social skills training with curriculum. Three to four full-time teacher collaborators staffed the entire MACS project at any given time. We estimate the cost per school of conducting the teacher collaboration intervention for a single year to be .25 FTE of a doctoral- or predoctoral-level educator, plus the costs associated with training and supervision of the collaborator.

Treatment implementation and fidelity. Data were collected on a variety of factors related to the delivery of the classroom-enhancement intervention, including attendance and concept mastery (based on work completed in the seminars). Ninety-one percent (91%) of the teachers in target grades attended the seminars in 1991 to 1992, the years evaluated in the present study. Teachers were assigned tasks to complete as part of the seminar series requirements. Ninety-four percent (94%) of the teachers involved in the seminar series demonstrated mastery of the content at or above the 80% level. Of these, 56% demonstrated mastery above the 90% level.

Teacher collaborators observed and gave feedback to every teacher in the target grades at least four times over the course of the academic year. The teacher collaborators spent a minimum of 1 school day per week in each school associated with this project. Teacher collaborators shared the data collected with each teacher and provided feedback on use of effective teaching strategies, implementation of positive behavior-management techniques, and integration of social skill and social problem-solving instruction with the existing curriculum. Overall, teachers in the target grades demonstrated the use of effective instructional strategies across 98% of all observations; use of positive behavior-management strategies (increase in the ratio of positive to negative behavior-management strategies above baseline levels) was displayed by 81% of the teachers.

Behavioral observation procedure. Observations of teacher behaviors were collected independently of the teacher collaboration services. This was done in the context of observing the behaviors of high-risk students in the MACS project. Observers were masked to whether or not the classroom being observed had received collaboration services. Up to three pretest and three posttest observations were collected per high-risk child. Because the

observation system allowed multiple channels of information to be collected simultaneously, observers could enter class structure information and teacher behaviors while observing the behavior of targeted children. The procedure resulted in the collection of 2 to 3 20-minute observation sessions for each student and between 7 and 12 observation sessions for each teacher at pretest and at posttest. Although the MACS intervention continued for 7 years, pretest and posttest observations in the same academic year were only collected for a subsample of schools and only during the first year of the study. These observations provided the data used in the present study.

Results

Table 3 reports means, standard deviations, and intercorrelations of all variables used in this investigation, and Tables 4 and 5 present the results. Using the behavioral observation data on individuals, we first conducted analysis of the effects of teacher feedback and class structure variables on later aggression, and then tested the effects of assigned intervention condition on teacher behaviors. Both of these analyses were done using generalized linear models. Because we were particularly interested in the extent to which teachers changed their behavior with respect to the most aggressive students, we also included the interaction between student pretest aggression levels and intervention condition in each model. In order to estimate effects on change in teacher behaviors, each model also controlled for pretest levels of the dependent variable. Because there were observation sessions on multiple high-risk students for each teacher, we entered individual intercepts for teachers as a random effect in each model, making these multilevel models that accounted for the clustering of observations within teachers. Multiple observation sessions conducted on each student were aggregated within individuals in order to match pretest and posttest observations by students. We used generalized estimation equations through SAS PROC GENMOD (SAS Institute, 1999) to fit these models.

Effects of Pretest Teacher Behavior Variables on Change in Observed Aggression

Table 4 reports the effects of the pretest teacher behavior variables on change in aggression as measured by posttest observed aggression controlling for pretest levels. The first panel of Table 4 reports effects on all 287 subjects within 47 classrooms. The second panel of Table 4 reports effects on a subsample of 164 students in 24 classrooms who were either assigned to the no-treatment control condition or to the condition receiving only the general classroom-enhancement intervention.

In the total sample, there was a significant main effect of academic correction on aggression. Higher levels of academic correction were associated with lower levels of aggression. There was also a marginal main effect of behavioral reprimand on aggression, with higher levels associated with higher aggression.

TABLE 3

DESCRIPTIVE STATISTICS AND CORRELATIONS, $N = 287$ CHILDREN IN 48 CLASSROOMS

Variable	Mean	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Academic praise (pre)	0.12	0.37	1.00												
2. Academic praise (post)	0.09	0.32	−0.01	1.00											
3. Academic correction (pre)	0.23	0.60	0.27**	0.02	1.00										
4. Academic correction (post)	0.28	0.86	0.05	0.02	0.16**	1.00									
5. Behavioral praise (pre)	0.03	0.15	0.05	−0.06	0.10	0.10	1.00								
6. Behavioral praise (post)	0.05	0.20	−0.04	0.09	−0.07	−0.05	0.18**	1.00							
7. Student aggression (pre)	0.23	1.26	−0.02	−0.02	−0.04	−0.04	0.27**	−0.04	1.00						
8. Behavioral reprimand (pre)	1.05	1.58	−0.04	0.11	0.06	0.01	−0.05	−0.03	0.05	1.00					
9. Behavioral reprimand (post)	1.14	1.67	0.00	0.04	0.06	0.01	0.05	−0.05	0.03	0.24**	1.00				
10. Large group structure (pre)	435.37	372.34	0.06	0.02	0.09	0.01	0.02	−0.03	−0.02	−0.03	−0.04	1.00			
11. Large group structure (post)	396.42	367.86	−0.06	0.04	−0.03	−0.07	−0.05	−0.03	−0.07	0.02	−0.01	0.00	1.00		
12. Individualized seat work (pre)	336.26	329.17	−0.08	−0.05	−0.07	0.00	−0.09	0.04	−0.03	0.04	−0.03	−0.47**	−0.01	1.00	
13. Individualized seat work (post)	349.66	348.06	−0.04	−0.11	0.00	−0.09	0.04	−0.10	0.14	0.00	0.14	−0.01	−0.48**	0.04	1.00

* $p < .05$; ** $p < .01$.

TABLE 4

EFFECTS OF PRETEST TEACHER BEHAVIOR VARIABLES ON POSTTEST OBSERVED AGGRESSION

Variable	Main Effect Estimate			Increase in Estimate Per Unit Increase in Aggression		
	Parameter	*p*	*d*	Parameter	*p*	*d*
All conditions (N = 287 individuals in 48 classrooms)						
Academic praise	−0.02	*ns*	0.12	−0.33	<.05	0.63
Academic correction	−0.09	<.01	1.29	0.01	*ns*	0.08
Behavioral praise	−0.01	*ns*	0.02	0.16	*ns*	0.24
Behavioral reprimand	0.03	<.10	0.61	−0.04	<.10	0.53
Large group structure	0.00	*ns*	0.00	0.00	*ns*	0.00
Individual seat work	0.00	*ns*	0.00	0.00	*ns*	0.37
Level A and control only (N = 164 students in 24 classrooms)						
Academic praise	−0.11	<.01	1.58	−0.05	*ns*	0.18
Academic correction	−0.06	<.01	1.63	0.00	*ns*	0.00
Behavioral praise	0.20	*ns*	0.24	−0.42	*ns*	0.51
Behavioral reprimand	0.03	<.10	0.89	−0.06	*ns*	0.66
Large group structure	0.00	*ns*	0.37	0.00	*ns*	0.56
Individual seat work	0.00	*ns*	0.10	0.00	*ns*	0.53

TABLE 5

INTERVENTION EFFECTS ON TEACHER BEHAVIOR, INCLUDING INTERACTIVE EFFECTS WITH AGGRESSION

Variable	Means by Condition				Increase or Decrease in Dependent Variable Per Unit Increase in Aggression			
	Control	Intervention	*p*	*d*	Control	Intervention	*p*	*d*
All conditions receiving classroom enhancement intervention vs control (N = 287 individuals in 48 classrooms)								
Academic praise	0.08	0.08	*ns*	.01	−0.10	0.00	<.10	.21
Academic correction	0.04	0.30	<.05	.63	−0.05	−0.03	<.01	.31
Behavioral praise	0.03	0.04	*ns*	.11	−0.04	−0.02	*ns*	.16
Behavioral reprimand	1.00	0.85	*ns*	.19	−1.15	0.03	<.001	.42
Large group structure	497.78	366.13	<.05	.64	−125.25	−14.25	*ns*	.03
Individual seat work	240.89	359.18	<.05	.59	−311.09	36.29	<.001	.41
Level A vs. control only (N = 164 students in 24 classrooms)								
Academic praise	0.09	0.08	*ns*	0.07	−0.10	0.00	<.10	0.30
Academic correction	0.05	0.31	*ns*	0.57	−0.06	−0.03	*ns*	0.03
Behavioral praise	0.03	0.04	*ns*	0.02	−0.04	−0.01	*ns*	0.25
Behavioral reprimand	1.06	1.21	*ns*	0.16	−1.22	0.10	<.001	0.56
Large group structure	498.63	298.07	<.01	1.06	−125.90	−8.08	*ns*	0.04
Individual seat work	236.81	382.18	*ns*	0.51	−314.48	57.60	<.001	0.56

Analysis of the interactions between pretest aggression levels and teacher behavior variables returned a significant interaction effect of academic praise and aggression. Among most aggressive children, higher levels of academic praise were associated with lower levels of aggression. There was also a marginal interaction between pretest aggression levels and behavioral reprimand on posttest aggression. Among more aggressive children, higher levels of behavioral reprimand were associated with lower levels of aggression.

Effects were similar in the reduced sample. There were significant main effects of academic praise and academic correction on aggression and a marginal effect of behavioral reprimand on aggression. In the cases of academic praise and correction, higher levels of the teacher behavior were associated with lower levels of aggression.

The main and interaction effects of behavioral reprimand in both samples were in opposite directions. Overall, higher levels of behavioral reprimand were associated with higher subsequent levels of aggression. However, among the most aggressive children, higher levels of behavioral reprimand were associated with lower subsequent aggression.

There were no significant effects of class structure on aggression. However, in the reduced sample, there were interaction effects of aggression and class structure whose magnitude was greater than one-half standard deviation ($d > .5$). Because of this, we retained the class structure variables in analyses of effects of the intervention.

Intervention Effects on Teacher Behavior

Table 5 reports the results for effects of the intervention on teacher behavior variables, along with effect sizes. The first panel of Table 5 reports comparisons between controls and all intervention conditions including teacher intervention. There were significant main effects for intervention condition on one of the teacher feedback variables and both class structure variables. Teachers in the intervention condition provided more academic correction to all students. Teachers in the intervention condition also structured class time differently than did teachers in the control condition. They used less large group class structure and more individualized seat work class structure. As can be seen in Table 4, the effect sizes of these differences are all greater than one-half standard deviation.

There were four significant effects for the interaction between intervention condition and aggression. Teachers in the conditions assigned to receive the teacher intervention were marginally more likely to give academic praise to more aggressive students than were teachers in the control condition. Using parameters from the generalized linear model, Figure 1 plots this effect. Teachers in the control condition tended to decrease the frequency with which they gave academic praise as student pretest aggression increased. However, no such decline in contingent academic praise was seen among teachers in the intervention condition.

Similar interaction effects were found for academic correction and behavioral

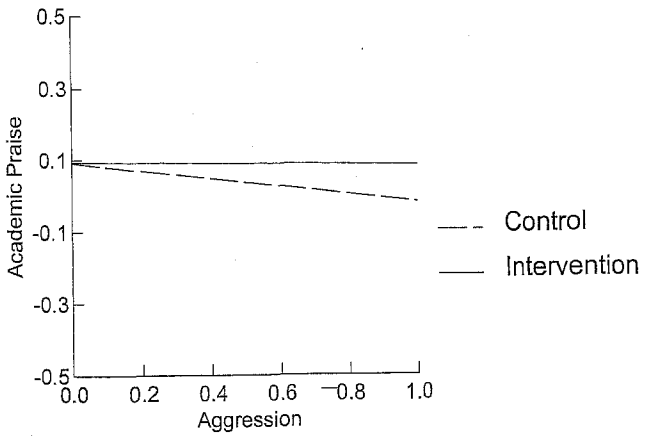

FIG. 1. Academic praise as a function of child aggression and intervention condition: full intervention sample (N = 287 students and 48 teachers).

reprimand. Control teachers became less likely to give contingent academic correction and contingent behavioral reprimand as student aggression increased. However, teachers in the intervention condition were more likely to give academic correction and behavioral reprimand to aggressive students. Finally, teachers in conditions assigned to the teacher intervention were more likely than controls to use individual instructional seat work with aggressive students.

The second panel of Table 5 reports the effects when the intervention sample was limited to the Level A condition, in which the general classroom-enhancement intervention was the only intervention offered. There was only one significant main effect, namely, that teachers in the Level A intervention condition used less large-group structure in their teaching overall. However, examination of the effect size estimates suggests that the main effects were similar to those observed when the full sample of 48 teachers was analyzed.

The changes in effects by initial child aggression among the Level A teachers are similar to those observed with the entire sample, with one exception. There is a slight trend toward an effect on behavioral praise that may have been obscured by analysis of the entire sample. Teachers in the Level A intervention condition appeared slightly more likely to use behavioral praise with more aggressive students.

Discussion

This investigation produced evidence that teacher feedback generally, and teacher feedback to the most aggressive students in particular, was associated with change in aggression. The results also suggested that the

teacher intervention of the MACS changed both teacher feedback and class structure variables, generally and with the most aggressive students. These changes were in directions consistent with lowering levels of aggression.

Although teacher behavioral praise has been shown to affect aggressive behavior of students, and the intervention stressed contingent praise for positive social behavior as a tool for behavioral management, little behavioral praise was found in this investigation, either in the control or intervention conditions. Overall, behavioral praise was observed only about 1/20th as often as behavioral reprimand, or once in every 20 observation sessions, whereas behavioral reprimand was observed an average of once each observation session. There was a slight indication of an increase in behavioral praise with more aggressive students when the Level A intervention was considered in the absence of other levels of intervention.

Previous research has suggested that aggressive students receive excessively punitive treatment from their teachers (Mayer, 1995; VanAcker et al., 1996). However, the results of this investigation suggest that more aggressive students actually receive less contingent reinforcement for their academic performance and behavior than do less aggressive students. Teachers in the control condition in this study tended to give less feedback overall as student aggression increased. The slopes between aggression and teacher academic praise, academic correction, and behavioral reprimand were all negative among controls, and significantly different from those observed among teachers in the intervention condition. The intervention appears to have been successful in equalizing the amount of contingent reinforcement received by students at all levels of aggression. All indicators suggested that teachers receiving the intervention increased the amount of individual attention given to more aggressive students over pretest levels.

Teachers assigned to receive the intervention were also observed structuring class time differently than controls. Classes conducted by teachers in the intervention condition consisted of less time spent in large group lectures and substantially more class time devoted to individual seat work. These effects were stronger among more aggressive students, indicating, perhaps, that intervention teachers with more aggressive classes tended to change the ways they structured their classes.

Overall, this study is consistent with the findings of Webster-Stratton et al. (2001, 2002) and the Seattle Social Development Project (Abbott et al., 1998; Hawkins et al., 1999; Lonczak et al., 2002). The effect sizes of the significant effects in this study averaged .46 in the full sample and .62 in the reduced sample. These are comparable with effect sizes reported by Webster-Stratton et al. (2002), which ranged from .46 to .63 for effects on teacher negative behavior. Taken together, evidence from these studies suggests that teacher interventions may be effective because they change the contingent reinforcement experienced by aggressive children in their classrooms.

Limitations

There are two limitations that should be considered in interpreting the findings of the present study. Both limitations are related to this study being a supplementary investigation of the larger MACS project, whose findings suggested positive effects of a general classroom-enhancement intervention, alone and in combination with other intervention strategies.

One limitation concerns the nature of random assignment in the MACS study. Schools were randomly assigned to conditions. Assignment to conditions by school requires that analysis take into account the clustering of individual observations within schools. The sample size in the present investigation did not permit analyses in which schools are regarded as the "subjects." However, the outcome analyses that demonstrated the efficacy of the Level A MACS intervention did treat schools as "subjects" (Metropolitan Area Child Study Research Group, 2002).

The second consideration is that the classroom-enhancement intervention included a social-skills training curriculum that was administered to students by teachers. Thus, the MACS design makes it impossible to disentangle the effects of this curriculum from the effects of the teacher training and consultation interventions. However, the observed effects are consistent with the aims of the teacher training and consultation interventions. Overall, the results of this study support the notion that teacher training and consultation can change the classroom experiences of high-risk students and that through these processes, teacher intervention is an effective strategy for reducing risk and enhancing achievement.

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