Evaluating a Cognitive/Ecological Program for the Prevention of Aggression Among Urban Children

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The Metropolitan Area Child Study (MACS) is a multifaceted school- and family-based intervention and evaluation study designed to prevent and understand the development of aggressive behavior. The multifaceted interventions are grounded in combined social-cognitive and ecologic theories. Social-cognitive theories contend that cognitive scripts, attributions, and beliefs acquired early in life mediate the effects of ecological factors that influence the development of antisocial behavior. Prevention programs aimed at these cognitions must address multiple dimensions of the child's environment including family, peer, school, and community. The program has three levels of intervention delivered in two-year segments: (1) Level 1: a general enhancement classroom intervention that stresses culturally sensitive student and teacher interaction involving instructional and classroom management strategies and a social-cognitive curriculum that mitigates aggressive development; (2) Level 2: intensive small-group sessions designed to change children's cognitions and enhance peer relationship skills for at-risk children added to the general classroom enhancement program; and (3) Level 3: a one-year family relationship intervention that stresses parenting skills building and emotional responsiveness in family interactions added to the general enhancement and small-group training conditions. Sixteen Chicago-area schools are randomly assigned (four each) to a control group or one of the three intervention levels. Individual child assessments, peer assessments, classroom behavioral observations, and archival data are collected before the interventions begin, during the interventions, at the end of each intervention, and at a follow-up point. The pretests indicate that the children on average have higher levels of aggression than found nationally and elevated clinical levels of other psychopathologies. Across the four intervention levels there are no significant differences in ethnic composition, socioeconomic status (SES), aggressive behavior, and normative beliefs about aggression. Medical Subject Headings (MeSH): aggression, intervention studies. [Am J Prev Med 1996;12 (Suppl 2):120–128]

In the United States, there is an increasing concern over the steady rise in both the number and the seriousness of crimes committed by and against young minority youths from the inner city. Because of the early onset of this antisocial behavior and its relative intractability once established, emphasis is being placed on prevention and intervention early in the life course. Unfortunately, prevention programs typically have not targeted populations most at risk for developing antisocial behavior, and the few interventions available have demonstrated only modest gains in reducing aggressive behavior among specific groups of individuals. The utility of these interventions for the prevention of serious aggressive behavior in a high-risk population (e.g., inner-city youths) is, at best, questionable.

By the early 1990s, scholars and policy makers agreed that there was an urgent need to develop prevention programs that were effective in distressed urban-community settings. In response to this need, Guerra, Eron, Huesmann, Tolan, and Van Acker designed a comprehensive, long-range preventive intervention program to be tested in schools embedded in neighborhoods with high levels of social distress. To test the interventions, the project, called the Metropolitan Area Child Study (MACS), was initiated in 1991 in 16 schools in the Chicago metropolitan area. The major goal of the multicomponent program is to prevent the development of aggression and antisocial behavior among
youths and to reduce the levels of such behavior. The complementary component programs, grounded in psychological theory, reflect the view that only multicontext, long-term interventions that have an impact on multiple dimensions of a child's environment are likely effective.

Theory
A body of research points to the stability of aggressive and antisocial behavior that starts in early childhood and continues throughout adolescence and into adulthood. The stability of serious chronic antisocial behavior seems to crystallize between the ages of 8 and 12 years. The specific forms of antisocial behavior may change with development, but the relative rates for different individuals tend to be consistent over time. Huesmann and Dodge contend that aggressive behavior is maintained over time by deviant cognitions, including hostile attributional biases, aggressive scripts, and normative beliefs accepting aggression.

The social-cognitive theorists believe that while antisocial behavior is predicted by a set of multiple risk markers, such behavior is mediated at the individual level by a number of cognitive factors amenable to change through interventions. These cognitive factors are acquired early in an individual's development and include biased modes of the perception of others, the programs or scripts about how to respond in an antisocial and violent way to different stimuli, fantasy rehearsal of aggressive acts, and normative beliefs about the appropriateness of aggression.

The specific components of this intervention are grounded in social-cognitive theory. Because the cognitions and scripts are acquired early in life, prevention programs aimed at interfering with the emergence of antisocial behavior must also begin in the elementary school years. However, it is not entirely clear whether the programs should be introduced early or late during this period. Specifically, some programs targeted at changing cognitions may be more effective at the critical point when those cognitions crystallize rather than before they have begun to take form.

The protocol of the interventions is also guided by an ecologic model of prevention, which emphasizes the dynamic interaction of individuals and environmental characteristics in determining behavior. This ecologic perspective is also evident in various recent developmental models, including the social interaction perspective, the social development and family interaction model, and the transactional-developmental model of risk.

Intervention Plan
The strategy for preventing the emergence of serious antisocial behavior among inner-city high-risk children is to modify the individual child's cognitive system and relevant aspects of those contextual systems that have been shown empirically to be most influential in the learning of antisocial behavior but still amenable to change. Contextual systems are the classroom and school environment and the family. The contextual emphasis represents a shift from an individual model focused primarily on cognitive factors to an ecologic model that emphasizes the dynamic interaction of individual and environmental risk markers.

In keeping with the ecologic perspective, there are three intervention components: a General Enhancement ("Yes I Can") curriculum, a small-group intervention for high-risk children, and a family intervention program for families of high-risk children (see Figure 1). The General Enhancement curriculum program consists of 40 cognitive classroom lessons conducted by teachers in grades 1-6 twice a week (20 lessons per year) for two years. Each lesson lasts from 50 to 60 minutes. Separate training programs have been developed for the different grade levels, tailored to match the children's developmental level. The first year of intervention presents themes of self-understanding, relationship of self to others, and moral beliefs aimed toward increasing children's motivation to behave in prosocial ways and to decrease their acceptance of aggression in social interactions. The second year presents the themes of control and prosocial action plans to provide children with cognitive and behavioral repertoires for use in daily social interactions.

The teachers in all grades also participate in 30 hours of teacher seminars during the first year of the intervention. The seminars motivate the teachers to use the cognitive lessons in the classroom, but their primary focus is in changing the teachers' own classroom behavior. During the second year of intervention, teachers are given monthly reviews intended to personalize the issues raised in the seminar series and help them develop action plans for dealing with day-to-day classroom issues, particularly those of peer relationships, and conflict management and resolution.

The second-level component is more intensive; it is directed toward children already identified by teachers and peers as being at high risk for developing aggressive behaviors. In addition to the general enhancement training, these children receive more intensive social-cognitive and peer-relationship training with a group of approximately six other high-risk students. The small-group intervention is aimed at changing children's attributions, beliefs, and scripts and gives these at-risk students further opportunities to practice their social scripts in an intimate setting.

The small groups meet once a week for 28 weeks over the course of two years (12 weeks in the first year and 16 weeks the second year). Graduate students in clinical psychology work with the groups to review the classroom lessons and allow children to practice (through modeling and role play) what they have learned. To increase their level of social interaction, small-group participants are designated as "leaders" for the classroom cognitive lessons during the second year of the intervention. By identifying the weekly small-group meetings as "leadership training meetings," the procedure has been effective in motivating high-risk students to participate and in improving their social status with classmates.

The family relationship training component consists of a 22-week program designed to build parenting skills, enhance communications, and enhance family cohesiveness. The component addresses areas of family functioning that have been found to relate to serious antisocial behavior: (1) parenting-management methods including inconsistent discipline style, reliance on coercion, and low monitoring; (2) emotional atmosphere of the systemic family organization, including low emotional cohesiveness, negative emotional atmosphere, and low emotional congruity among members; and (3) poor family problem-solving and coping skills including "defensiveness" in family interaction, divergence and disagreement about values, inefficient use of family resources when facing a problem, and deviant shared values. Thus, we expect that several aspects of family organization and collective functioning should be modified.
Evaluation Design
The two goals of MACS are to obtain a better understanding of the processes through which aggressive and antisocial behavior develops in children and how to prevent the development of such behaviors.

Our field study was designed as a true experiment with four conditions as illustrated in Figure 1: a control condition of four schools and three different intervention conditions. Each intervention condition represents a more intensive and comprehensive level of intervention. Children in four schools receive only the general enhancement treatment; in another four schools both the general enhancement intervention and the small-group intervention are applied; and in the last four schools the general enhancement treatment, the small-group treatment, and the family treatment are all administered. This "stairstep" design allows us to address the important but unanswered question of how much intervention in which domains is necessary to prevent or mitigate aggression and violence in the highest-risk portion of this population. The experiment's design, which enables us to test the incremental value of each prevention component compared with an intervention without that component, is an efficient methodology for estimating the relative effects of all treatments within one study.

Sixteen schools are participating in this project, with four randomly assigned to each condition. The schools were first placed into blocks on the basis of their ethnic composition and geographic location. The four blocks were Chicago Hispanic, Chicago African American, Aurora Hispanic, and Aurora mixed. Random assignment to condition was then completed within each block.

School selection. Schools were recruited for participation through an extensive application and screening process that included distribution of brochures, telephone contacts, and meetings with teachers, parents, administrators, and local parent groups. The final selection of elementary schools was determined by factors such as the level of commitment by teachers and school personnel to the project goals, the percentage of children from low-income and minority families, and the feasibility of continuing a long-term intervention and follow-up program in the particular schools. (One of the Chicago schools was replaced because of changes in administrative staff before the first year of intervention. After the third year of intervention, one additional school was replaced because of problems with the administration. In Aurora also, one of the original schools was replaced before the treatment started because of changes in the school administration.)

Assessment procedures and measures. The general assessment plan (displayed in Table 1) calls for a pre-assessment to take place during the spring of the year preceding the first year of intervention. Postassessment data are collected in the spring of the second year of intervention. Follow-up data are collected when the child is in the eighth grade. Process assessments and intermediate assessments are completed at various points during the two-year period. Special cases have produced some deviations from this plan, however. For example, all children in all grades were pretested on level of aggression at the start of the study. However, a few schools had to be replaced in the study, in which case the spring pre-assessments had to be done in the early fall.

Measures are administered individually for children in grade 1, and in groups for children in grade 2 and above in their regular school classroom. In classrooms with Spanish-speaking children, bilingual measures that had been translated and back-translated are used, and children are permitted to choose the language of testing. Many of the measures used had been previously validated, but a few were validated with our own pilot studies. The measures fall into a few major categories. The peer-nomination scales are well-validated measures of aggression and other behav-
Table 1. Intervention and assessment summary

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Each cell shows grade, fall assessment, intervention, spring assessment.
P = peer nominations of aggression.
C = teacher CBC ratings.
B = behavior observations.
G = general assessments by self-report questionnaire (G1 = part 1, G2 = part 2).
T = teacher's predictions of peer-nominations.
F = follow-up assessment.
Y = late treatment (Y1 = part 1, Y2 = part 2).
X = early treatment (X1 = part 1, X2 = part 2).
*Intervention cells.

Behavioral Checklist (CBC) ratings of aggression and other behaviors are well-validated measures based on teachers' observations. In addition, observations of children's aggression and other behaviors in the classrooms (and of teachers' responses) were obtained by "blind" raters. Thus, we obtained measures of aggression and other behaviors from four separate sources: peers, teachers, the child, and trained observers.

As the students moved to new schools and classrooms, we replaced the peer nominations in some cases with the teachers' predictions of peer nominations, a well-validated measure. In addition to these measures based on observations of "others," we also obtained an extensive battery of self-report measures, denoted as general assessment measures in Table 1. These included measures of cognition, contextual factors, family interactions, and many other variables. We also collected self-report and trainer-report process information on each intervention session in each condition, and we collected a variety of observer ratings on school and neighborhood conditions. Finally, we obtained extensive demographic, census tract, school record, and other archival information on each child in the study.

Baseline Data

The 16 schools selected for participation contained a population of 5,204 children. Parent permission was obtained through a procedure involving both rewards for children and follow-up contact with parents who had not given permission. We were able to achieve an overall permission rate of 86%, resulting in an initial sample of 4,507 children (see baseline date for composition of this sample). The sample is ethnically diverse, with about 40% African-American children and about 40% Hispanic children, and is generally economically deprived. Thus, the intervention is being tested on the kind of population considered at high risk.

The analyses begin with a description of the baseline aggression scores for all students in grades 1–6 from all 16 initial project schools (n = 4,124). Figure 2 presents the distribution of peer-nominated aggression scores and teacher’s CBC scores for

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Figure 2. Distribution of aggression scores for children in initial sample.

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The frequency distribution of peer-nominated aggression scores by ethnicity is plotted in Figure 3 and by gender in Figure 4 for only those children in the initially targeted grades (first, second, and fourth). For the African-American children, the distribution of scores is substantially less skewed than for the Caucasian and Hispanic children, and the mean aggression score is higher. The situation is also similar for boys and girls.

Figure 3. Distribution of aggression scores by gender for children in intervention sample.

Figure 4. Distribution of aggression scores by ethnicity for children in intervention sample.

With regard to the distribution of aggression scores across ethnic groups, one must note that low economic status in this sample is related to ethnic status. While there is, of course, substantial individual variation, on the average our subjects are clearly quite poor; the “free-lunch” rates in the schools ranged from a high of 82% to a low of 25%. However, as Figure 5 displays, free-lunch status varies significantly across ethnic groups, \( \chi^2 = 226.6, df = 2, P < .0001 \) with African Americans having the highest percentage qualifying for free lunch and Caucasians the least. Additionally, low economic status is correlated with greater child aggression. Thus, the higher average scores on aggression displayed by the African-American children in our sample can be attributed to the higher proportions of these children in the lower economic status group.
sample are possibly a consequence mostly of their greater economic deprivation and its associated risk factors.

Figure 6 provides, by gender, additional baseline comparisons of the entire project schools' population to national rates for clinical levels of aggression and other psychopathologies. Generally, the assumption is that anyone scoring above the 95th percentile for their gender (indicated by the horizontal shaded bar) has a clinically serious problem. The bars illustrate the percentage of the sample boys or girls scoring above the 95th percentile for their gender on national norms for each CBC subscale. The numbers above the bars are the odds ratios (ORs) comparing the sample percentage above the clinical cut-off and the national norm. As shown, there are far more boys and girls in the schools targeted by the intervention who have elevated clinical-level scores than one would expect from national norms.

What about age trends in aggression in this population? Figure 7 shows the mean scores on peer-nominated aggression as a function of gender and grade for the intervention sample. As expected, an analysis of variance (ANOVA) revealed a main effect for gender with boys more aggressive ($F[1,1915] = 141.3$, $P < .001$); for grade with older children more aggressive ($F[2, 1921] = 18.1$, $P < .001$); and a significant gender by grade interaction ($F[2,1915] = 4.30$, $P < .014$). These results mean that boys increase in aggression by a sizeable amount between grades 1 and 2, much more than do girls.

Finally, we examine the extent to which children in our four intervention groups were comparable at the start of our study. In Figure 8 we present data on four characteristics: ethnic composition; SES as measured by free-lunch status; initial level of aggressive behavior; and initial normative beliefs about aggression, that
is, the extent to which the children thought that various kinds of aggressive behavior and aggressive retaliation were "OK" for them.17

Figure 8 indicates no substantive differences on any of these four important characteristics across the four conditions. This is not surprising as we blocked the schools on ethnicity and aggression before randomly assigning them to conditions.

CONCLUSIONS

We have described a multidimensional program aimed at preventing the emergence of antisocial behavior in inner-city youths through simultaneously modifying the individual student's cognition and beliefs and changing the school climate and the family environment. The current study is aimed at deriving a better

Figure 7. Age trends for peer-nominated aggression in intervention sample.

Figure 8. Baseline demographic and outcome measures by assigned condition.
LESSONS LEARNED

Building Support and Developing Relationships
- Before the start of the program, much work must be done to prepare all the participants, including the research staff, members of the target community, school personnel, the subjects and their parents.
- Attention to the special needs of persons in the target areas helps build the trust of local community leaders.

Improving Intervention and Evaluation
- Participation of teachers, parents, and others can be enhanced by inducements such as course credit for attending training sessions, reimbursement for travel costs, or money to purchase needed equipment, books, or classroom items.
- Prevention and intervention programs targeting students living in inner-city transient-neighborhoods must address the ethnic and linguistic differences across a community's heterogeneous population. MACS employs Spanish-speaking interviewers and translates assessments into Spanish to address its large sample of native Hispanic population.
- Unexpected prevention and intervention programs offered by other groups to schools may interfere with the evaluation design. Assurances must be negotiated with the school administration before the intervention begins to control the presence of these other programs while your program is still active.
- Pre-existing environmental and demographic differences among school and community settings can affect intervention effectiveness. Gathering relevant data about the neighborhoods and communities where members of the study sample live (e.g., census of households, economic development, placement of parks, and recreational centers, etc.) is important. Such data can be incorporated in the analyses to control for differences in neighborhood settings.
- With a multi-year intervention, many children in the original sample will move or change schools. Other sources of information such as district level school, criminal justice, and public health records can be used to track these children. Tracking participants in these other databases requires collecting an adequate number of individual identifiers on each child early in the intervention process.

Underlying Principles
- Prevention programs must be multidimensional in design. Changes in individual cognitions, peer relations, school environment, and family dynamics are necessary before lasting reductions in individual-level aggression can be achieved.
- Prevention programs must occur early in life before aggressive scripts and attributions and the resulting aggressive behavior become crystallized.

understanding of the causes of aggression and antisocial behavior and how to prevent it by testing and evaluating this intervention program. The focus on the child's cognitions as the critical locus of individual change provides a theoretical foundation for believing there will be long-term generalized effects. However, these cognitions are learned and maintained in multiple settings, including the classroom, school, and family. Therefore, the conditions for the learning of aggression present in some of these settings must also be changed.

The evaluation design adopted will test the underlying theoretical model and the intervention program derived from the model. The evaluation also provides estimates of the differential benefits of extending the intervention beyond the individual to include the classroom, the peer group, and the family. Given the importance of multiple contexts in the development of aggression, we expect that the most intrusive, costly, and extensive intervention would be most effective for all children because it would have an impact on more of the relevant components of the children's developmental environment. We expect that, unless context can be shifted, few long-term individual changes will be found. However, we also expect that, unless individual cognitive changes in the child occur, environmental changes will not have much effect.

The results to date demonstrate that the sample in this intervention study is highly at risk for developing serious violent and antisocial behavior. In fact, many of the children in the sample already display serious aggressive behavior. Whether the intervention can institute sufficient changes in cognitions and in the contextual factors that promote aggression to lead to a reduction in aggression remains to be seen.

Many lessons have also been learned during the initial years of this project that should help other investigators embarking on similar community and epidemiologic research. We have listed some of these lessons in the Lessons Learned box. In general, a great deal of preparation on the part of the research staff, members of the target community, school personnel, the subjects, and their parents is essential before the start of the project. This is necessary in order to obtain the cooperation of the subjects and those responsible individuals in the different milieux from which the subjects' families come. After the intervention has been initiated, continued resources need to be allocated to maintain the cooperation of the entire sample, especially among those in the control groups who realize no immediate benefits from the research program. Because it is important to build the trust of the local community leaders, attention must also be paid to the special needs of persons residing in the targeted areas. Language differences must be addressed and economic hardships encountered by participating families must be met to ensure consistent and continued cooperation.

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