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Pragmatism in modeling peer influence: Dynamics, outcomes, and change processes

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Abstract
This paper reviews the model-building approach to developmental psychopathology as it applies to understanding the influence of peers on adolescent problem behavior. Considerable longitudinal evidence suggests that deviant peer involvement is prognostic of escalations in various forms of problem behavior, including substance use, delinquent behavior, and violence. Most convincing, however, are data from randomized intervention trials that show alarming iatrogenic effects for aggregating high-risk peers. This paper shows that intervention research can also clarify the role of parents in reducing deviant peer involvement. Results from a 4-year prevention trial are reported for a community sample of multiethnic middle school youth. Random assignment to family-centered services in a school Family Resource center produced reduced growth in deviant peer involvement. The extensiveness of the parenting intervention was correlated with reduced growth in deviant peer involvement, especially among high-risk youth. Findings are discussed with respect to developmental theory and the design of future intervention trials that clarify the role of adults in structuring the emerging adolescents' world of peers.

An argument could be made that developmental psychopathology is a pragmatic scientific process (Dishion & Patterson, 1999). Developmental psychopathology emphasizes the conjoint consideration of etiology and intervention effectiveness in theory development. Developmental theories of causal sequencing are substantially fortified when validated by model-driven interventions (Cicchetti & Toth, 1992). These interventions identify targets in advance and anticipate outcomes that are guided by developmental theory. The model-building process is iterative: the results of both developmental (i.e., passive longitudinal) and intervention studies are reciprocally informative (Dishion & Patterson, 1999; Forgatch, 1991). Each successive finding potentially redefines the next measurement, developmental study, or intervention study (see Figure 1).

Investigations of peer influence exemplify the promise of this approach. Developmental models are tested, and causal paths are identified and targeted for intervention. Extant research provides strong support for a path between involvement with antisocial peers and growth in adolescent delinquency. The high covariation between adolescent problem behavior and deviant peer affiliation is not always viewed as causal, however. Behavior geneticists, for example, might argue that much of this covariation is the result of an active gene–environment correlation, in that antisocial youngsters seek the company of similar others (Deater–Deckard & Bullock, in press; Gottfredson & Hirschi, 1990; Harris, 1995; Hirschi, 1969; Scarr & McCartney,

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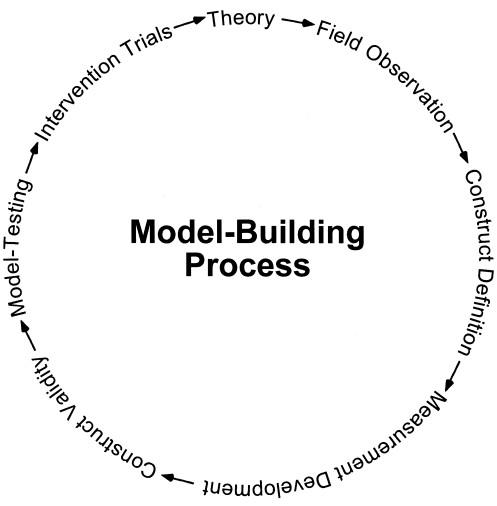


Figure 1. An overview of the model-building process.

1983). The current study extends previous findings regarding the causal link between affiliation with antisocial peers and adolescent problem behavior by examining the direct path between parenting practices and adolescent peer association. Specifically, examination was done of the extent to which deviant peer influence can be reduced by systematically targeting parenting behavior via a randomized, public school based prevention trial.

Involvement with a deviant peer network is repeatedly found to be highly predictive of adolescent problem behavior (Dishion, French, & Patterson, 1995; Elliott, Huizinga, & Ageton, 1985) and, more specifically, growth in problem behavior (Patterson, 1993). Studies are rare that examine the temporal dynamics of peer effects, disentangling peer selection from influence. Elliott and Menard (1996) document the reciprocal links among peer influence, deviant peer selection, and adolescent problem behavior, concluding that peer effects on problem behavior exceed those expected by mere selection alone. Similar findings and conclusions were presented by Keenan, Loeber, Zhang, Stouthamer–Loeber, and van Kammen (1995).

Other peer researchers provide evidence that some adolescents are more influenced by deviant peers than others (Vitaro, Tremblay, Kerr, Pagani, & Bukowski, 1997). In particular, adolescents characterized as moderately delinquent at Time 1 were those most changed as a function of deviant peer contact at Time 2. Interestingly enough, the highly disruptive adolescents were not influenced by exposure to deviant peer influences. These data suggest that membership in an antisocial peer group may differentially impact adolescent behavioral maladjustment. It is possible, then, that interventions designed to reduce the impact of deviant peer association may also be differentially effective, depending on the adolescent's prior level of adjustment.

When examining the longitudinal influence of peers on deviant behavior, then, it is necessary to control for both past behavior and other competing social factors. Dishion and Medici Skaggs (2000) used generalized estimation equations to predict monthly "bursts" in substance use. Bursts were defined as significant changes in a youth's substance use, compared to his or her average use. Substance use was assessed by combining the monthly reports of parents and youth, taking the maximum score as the index of monthly use. In these analyses of monthly variation, changes in substance use were associated with changes in exposure to substance-using peers for both adolescent boys and girls.

Although findings such as these suggest that peers influence problem behavior, they do not elucidate the mechanism of influence. The current research looks at the friendships of adolescent boys and girls to better understand the processes that impact adolescent socialization. This work began with a rather simplistic view of peer dynamics. It started with a matching law paradigm, which is a quantitative framework for understanding choice and preference (McDowell, 1988). The central concept of the matching law is that choices and behavior preferences reflect the relative rate of reinforcement one receives for that behavior. To understand deviancy, the relative rate of reinforcement is modeled for deviant behavior (or talk) over the reinforcement rates for all other possible behaviors. In this sense, there is little cognitive processing required to be "trained for deviancy."

Direct observations of dyadic friendship interactions fit the matching law paradigm

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(Dishion, Spracklen, Andrews, & Patterson, 1996). More importantly, the rate and duration of deviant talk within friendship interactions uniquely predicted escalation in substance use, delinquency, and violent behaviors in adolescence (Dishion, Andrews, Kavanagh, & Soberman, 1996; Dishion, Capaldi, Spracklen, & Li, 1995; Dishion, Eddy, Haas, Li, & Spracklen, 1997) and aggression toward an intimate partner in young adulthood (Capaldi, Dishion, Yoerger, & Clark, 1999).

A more general score of deviant friendship process was created to describe the adolescents' time with friends, the level of friends' antisocial behavior, and observed deviant talk. This more general construct of deviant friendship process was a powerful mediator among early antisocial behavior, deviant peer involvement, and a generalized construct of substance abuse, sexual precocity, and criminal behavior in young adulthood (Patterson, Dishion, & Yoerger, 2000). More recently, a 5-year stability correlation of .53 was found for deviant friendship process measured in early and late adolescence (Dishion & Owen, 2002). Interestingly, deviant friendship process was prognostic of early-onset substance use, but not overall substance use in adulthood. However, an interaction term between prior substance use and the deviant friendship process was uniquely predictive of needle injection of illicit substances and marijuana abuse in young adulthood (Dishion & Owen, 2002).

These longitudinal data are compelling, although by scientific conventions, they are not convincing for inferring causality (Cook & Campbell, 1979). The synergy between developmental and intervention research is most apparent in the use of interventions that experimentally test developmental models.

The usefulness of intervention trials for testing developmental models is not entirely dependent on confirmatory hypotheses. In fact, disconfirmatory findings can be a powerful guide to understanding human behavior (Meehl, 1978). In this study, the hypothesis was that the influence of peers could be harnessed to support prosocial behavior. In structured, cognitive–behavioral groups for high-risk young adolescents, peer support for goal setting, resisting social influences for drug use, and problem solving were emphasized. The intervention was anticipated to reduce problem behavior, and positive affects of the adolescent peer group intervention were found on direct observations of parent–adolescent interaction (Dishion & Andrews, 1995). Unexpectedly, however, iatrogenic effects that lasted up to 3 years following the intervention trial were also found for self-reported smoking and teacher-reported delinquent behavior (Dishion, McCord, & Poulin, 1999).

In a follow-up study, videotapes of the teen focus treatment groups were reviewed to identify the mechanism by which high-risk youth influenced each other's substance use during the intervention. Again, deviant peer process, illustrated by reinforcement of rule-breaking talk in the group, predicted iatrogenic growth in smoking and delinquency (Poulin et al., 2001). Conversely, connectedness to intervention peer counselors was associated with attenuated growth in smoking and problem behavior, and peer rejection was negatively associated with increases in self-reported smoking. The deviant peer process in the peer-aggregated groups occurred primarily before and after the formal treatment session and during breaks, suggesting that harmful side effects of an intervention can emerge from components that most therapists consider incidental or unimportant.

A reanalysis of a prevention experiment conducted over 50 years ago provides additional confirmation of the risk of aggregating deviant peers (McCord, 1992), with elevated rates of negative life outcomes in the intervention group being almost entirely due to the youth being sent to summer camps. These data suggest that peer processes are tremendously important to the development of delinquent behavior during early adolescence and that this influence is causal.

The compelling link between peer processes and problem behavior is consistent with extant hypotheses regarding the salience of "outside-the-home socialization" (Harris, 1995), and it supports the contention that peer groups are powerful agents of cultural transmission. The possible similarity of peer group members and a desire to participate in similar acts creates a unifying framework that may

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magnify preexisting similarities among group members (Kandel, 1986; Rowe, Woulbroun, & Gulley, 1994) and perhaps intensify group influence as well.

An ecological approach to modeling emphasizes both direct and indirect effects on adjustment (Bronfenbrenner, 1989; Dishion & Patterson, 1999). In the model of problem behavior, family management, in general, and parent monitoring, in particular, are believed to impact deviant peer involvement (Dishion et al., 1995; Patterson, Reid, & Dishion, 1992). Family management refers to the parents' monitoring, limit setting, positive reinforcement, relationship building, and problem solving. Contrary to the predictions of group socialization theorists (e.g., Harris, 1995; Rowe et al., 1994), it is hypothesized that strengthening family management practices among caregiving adults will reduce deviant peer exposure. In short, parenting is important in social development.

Previous longitudinal studies are limited in their capacity to demonstrate the causal influence of parenting. Structural equation models indicate that at ages 13–14, deviant peer involvement and parent monitoring are correlated at about .8 (Dishion et al., 1995). This level of multicolinearity limits the capacity for testing the unique effect of parental monitoring on later adolescent problem behavior within a multivariate equation. Therefore, it is necessary to intervene in parenting practices to determine whether changes in parenting behavior will impact deviant peer connections.

The goal of this research was to examine the effects of a family-centered prevention strategy on deviant peer affiliation. Assessed yearly from sixth to ninth grade, the hypothesis was that:

1. A multilevel, family-centered intervention would significantly reduce growth in deviant peer affiliation over the course of 4 years, from the 1st year of middle school to the 1st year of high school.

2. Reduced growth in deviant peer involvement would be correlated with the intensity of the parents' contact with the multilevel, family-centered intervention.

Methods

Participants

Recruitment from three middle schools in a metropolitan community resulted in 671 youth participants and their families. This geographic area was chosen because of demographic information that indicated a diverse community population and a high risk for crime. The sample was age 11 (sixth grade) at the first assessment and age 14 (ninth grade) at the fourth assessment. Gender representation across both cohorts was approximately equal (51% female). The ethnic makeup of the sample included 41% European American, 32% African American, and 27% other ethnic groups combined, which is representative of the schools' populations.

Recruitment

A two-stage recruitment strategy was used. For the universal school study, a joint letter from the project and the school principal, including teacher endorsement of the study, was sent to parents and caregivers of all sixth graders. Phone calls or home visits were made when necessary to secure consent and to answer questions; 90% of all sixth graders across both cohorts were recruited.

An invitation letter and a project brochure were part of the recruitment process. The brochure included a section indicating that the recipient family might be chosen at random to be part of a group to receive additional information and resources designed to benefit middle school families.

Regardless of their agreement to participate, families were paid $10 for allowing a home visit to explain the study. The recruitment netted 69% of families with at-risk youth and 55% of those with youth identified as high risk; only two families refused to participate after an initial home visit. No differences existed in recruitment rates by youth gender, ethnicity, or school.

Procedures

Following a year of pilot work to establish collaborative relationships and learn about the

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ecology of the targeted schools, all sixth grade students were invited to participate in the school study. The youth were asked to complete a survey in their core (homeroom) classes that included assessment of problem behaviors, drug use, and deviant peer relations. After the initial survey, participating students were annually assessed by survey in the school setting through ninth grade. Students who moved from host schools were followed to their new school and the survey questions were administered either by mail or in person at their homes.

Retention

Data from cohort 1 shows approximately 85% youth participation at each of the three yearly follow-up school assessments; in two yearly follow-up assessments, 60% of families with at-risk youth and approximately 45% of families with high-risk youth participated. No significant differences existed by youth gender, family ethnicity, school, or condition for either the school or family assessments. Collection for cohort 2 is still underway.

Deviant peer involvement score

Four self-report items were used for this indicator, which remained the same over the 3-year follow-up period. The youth were asked, "In the last week, did you spend time with friends who (a) get into trouble, (b) fight a lot, (c) take things that are not theirs, or (d) smoke cigarettes or chew tobacco?" The alpha for these four items was consistently above .78 for all 4 years.

Identification of risk

A multiple-gating procedure was used successively and proactively to identify students for the selected and indicated family intervention (Cronbach & Glesar, 1965; Dishion & Patterson, 1993; Loeber & Dishion, 1987; Loeber, Dishion, & Patterson, 1984). A teacher rating measure (Teacher Risk Perception), based on an instrument developed in previous research to screen for risk in middle schools (Soberman, 1994), was used for risk identification.

The teacher rating measure included 16 items (1 = *low risk*, 5 = *high risk*), with criteria such as classroom behavior, attitude regarding school, negative mood, tobacco use, involvement with troublesome or substance-using peers, and acceptance by peers. Risk status was predicted using the mean of the 16 items; the standardized item alpha was .91. Children with the top 50 risk scores from each school, along with any students who scored 3.0 or greater on the smoking questions, were assigned to the high-risk group. For each participating school, the specific cutoff points were adjusted to select the males and females of highest risk within each ethnic group, which reflected the demographic distribution of the larger community in the final risk sample.

Families were invited to participate in a family assessment if they had youth who showed at-risk and high-risk behaviors. The level of intensity of the family assessment varied with the level of risk for the student. Parents of at-risk families completed a multiagent (youth, caregivers, teacher) questionnaire assessment. High-risk families completed the same multiagent assessment, along with a multimethod (observations, questionnaires, and interviews) assessment. Both covered areas of family context, family management and relations, youth problem behaviors, school adjustment, emotional regulation, substance use, and peer relations.

Intervention

The Adolescent Transitions Program is best described as a "tiered" strategy: each level of intervention builds on the previous level. Designed for delivery within a middle school setting (Dishion & Kavanagh, in press), this multilevel family intervention model comprehensively links the "universal," "selected," and "indicated" family interventions in a way that titrates the intervention intensity with the needs and motivation of the family.

At the universal level, all students participated in the 6-week class curriculum and at-home activities, which were sent to parents during the fall of seventh grade. These were designed to develop and enhance family management skills. The Family Check-Up (FCU)

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selected intervention was directed to families who were defined by teacher ratings as being at risk or high risk. Initiated by the parent consultant, the FCU followed a family assessment in which randomly assigned intervention families were invited to participate in the feedback portion of the FCU. If they declined, families were offered a variety of other options, including telephone contact. Occasionally, families who declined initially later agreed to the FCU, often as a reaction to a school difficulty.

In motivational interviewing, assessment feedback is used to isolate discrepancies between the parents' goals and their current adjustment pattern. The focus of the selected FCU was to address the parents' particular stage in their parenting changes, following the motivational interviewing approach described by Miller and Rollnick (1991). Based on the results of the assessment, parents were given feedback on their youth's behavior and deviant peer involvement and their family management.

Depending on motivation and need, the third level of family intervention was the indicated family intervention, which offered a menu of options, including brief consultations on family management, parent groups (Dishion et al., 1995), family therapy, and community referral.

The entire family-centered intervention was delivered via the Family Resource center (FRC) with a professionally trained family therapist (typically, master's level), referred to as the parent consultant. The difference between the risk and nonrisk families was the active recruitment for intervention involvement throughout grades 7 and 8.

Regardless of risk, all participants were informed of intervention options available in the FRC. Each contact a family had with the parent consultant was recorded according to time spent, purpose (measuring intensity), and method (in person or by phone). Figure 2 provides an overview of the experimental intervention design. Note that the proactive approach anticipated that a certain percentage of families would decline participation.

Analyses

Outcome analyses were approached in a stagewise fashion. First was the level of parent engagement in the interventions over the seventh and eighth grades offered through the FRC (with respect to receiving the FCU), as well as the total amount of therapist time. Second, an "intention to intervene" design was used to examine the difference in deviant peer involvement between the control and intervention groups. Designed as a prevention strategy, the peak interest of the field experiment was in the effectiveness of the family intervention to curtail growth in deviant peer involvement, as detected by an omnibus main effect of treatment. This a priori hypothesis was tested with no restrictions made on the sample. Third, the level of risk of the youth was correlated along with FRC contact time, and there was a reduction in growth in the intervention group. The testing protocol was outlined by Muthén and Curran (1997), and we used the data imputation procedure in the AMOS program (Arbuckle, 1997).

Results

Engagement

The majority of the intervention activity occurred in the seventh and eighth grades of middle school, with the original expectation that 75% of the families would opt for the FCU. This high level of engagement was anticipated because families would have already completed the family assessment, which is a major portion of the time commitment. Figure 3 reveals that engagement in the FCU was less than expected, with about 30% of the families completing this selected intervention. However, 32% of the families did engage in some form of contact with the FRC parent consultant. Only 37% of the families declined any participation as they underwent an assessment.

In addition to the FCU, some families continued to work with the parent consultant to support their parenting practices. Figure 4 summarizes the number of hours of contacts

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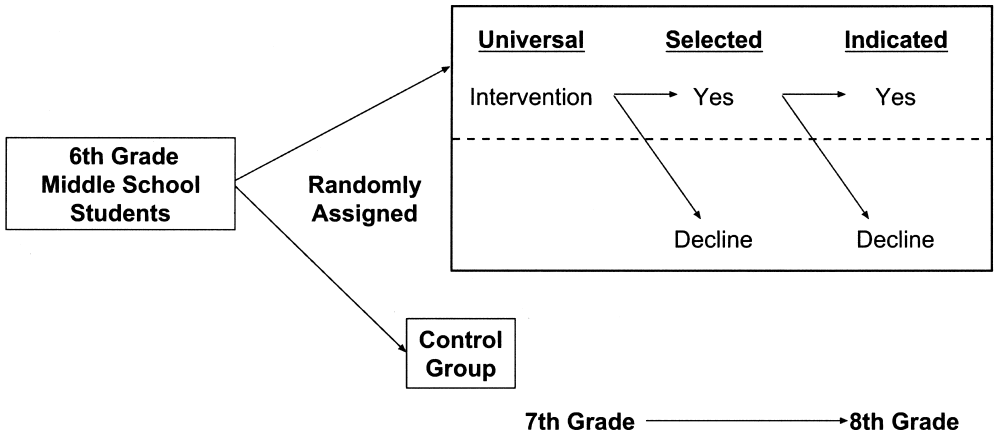


Figure 2. Multilevel prevention design for the Adolescent Transitions Program.

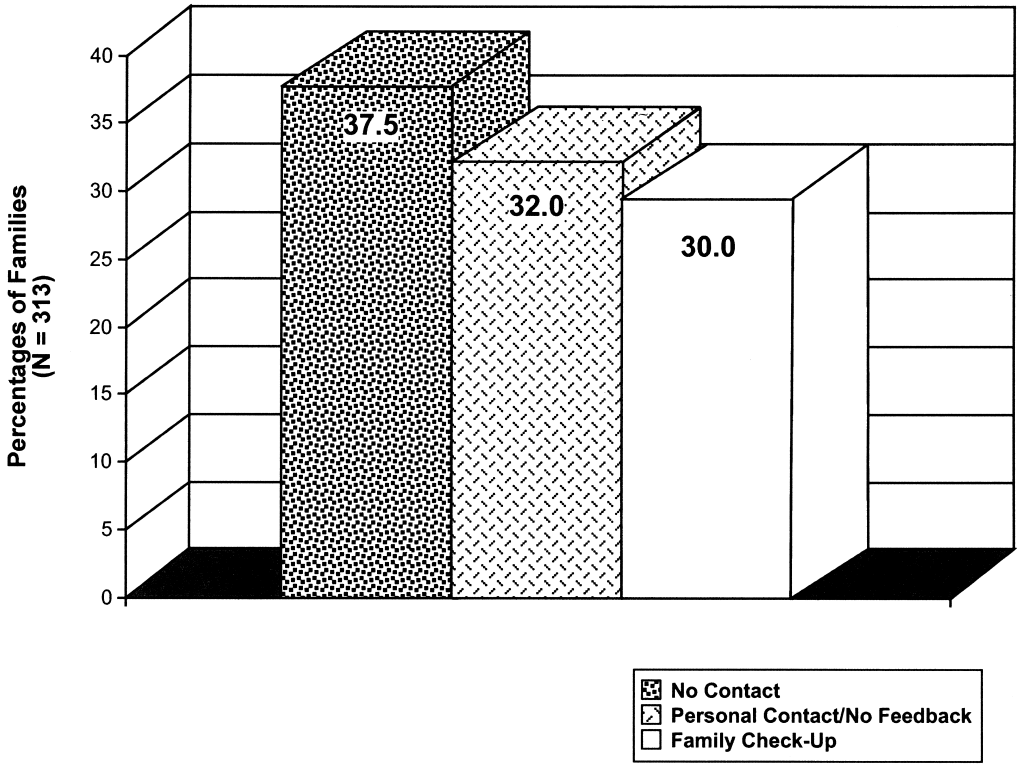


Figure 3. Percentage of the intervention group having contact with a parent consultant.

over the 2-year window during which interventions were offered. As can be seen, 42% of the families had less than 1 hr of contact. However, 12.1% had more than 10 hr of professional contact in that 2-year window.

Impact

Figure 5 shows the average levels of deviant peer involvement at the three levels of risk for both the experimental and control groups.

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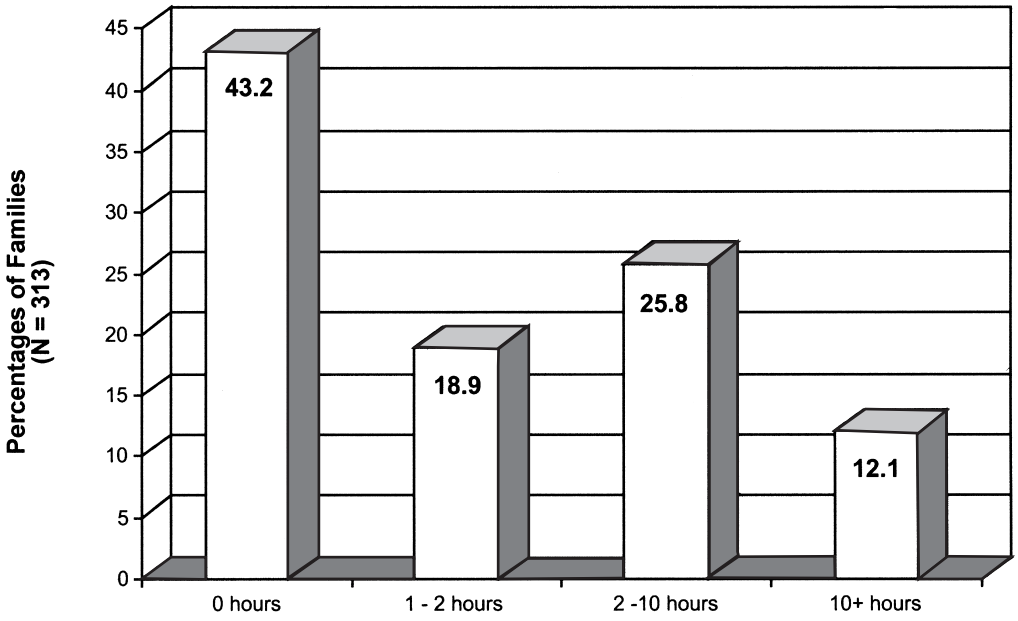


Figure 4. Distribution of parent consultant time.

Using latent growth modeling, significant growth in deviant peer involvement for all students in cohort 1 was detected. The results shown in Figure 5, however, seem to indicate that the growth is most pronounced in the ninth grade, especially for moderate- and high-risk students in the control group. In comparison, the intervention group appeared to have decreased its involvement with deviant peers.

To formally test the statistical reliability of these trends, the growth in deviant peer involvement within the intervention group was compared to that in the control group (Muthén & Curran, 1997); the results are summarized in Figure 6. The growth in deviant peer involvement for the intervention youth was reliably less than that of the control group ($CR = -1.99$, $p < .05$). The standardized correlation of −.34 between the intercept and growth for the intervention group indicates that those youth in the intervention group who were initially the highest in deviant peer involvement showed the least growth over the 4 years ($p < .05$).

Finally, the covariation between the parents' engagement in the family intervention service and reduced growth in deviant peer involvement was examined. The results summarized in Figure 7 show that the number of FRC contacts correlated with less growth in deviant peer involvement. This was modeled only for the intervention group, because only a few in the control group sought FRC contacts. Moreover (see Figure 5), the level of risk was inversely associated with change only in the intervention group. The correlations between the initial level of risk, as rated by teachers ($r = -.43$, $p < .001$) and the initial level of deviant peer involvement ($r = -.34$, $p < .001$) shows that the highest risk youth grew the least in deviant peer involvement. The FRC appears to have served the function of engaging those families most in need of intervention, with the anticipated effect of reducing involvement with deviant peers.

Discussion

There is evidence for the causal link between deviant peer association and growth in adolescent problem behavior. A theoretically driven, school-based intervention trial was implemented to test the degree to which changes in parenting behavior affected deviant peer association. Results support the hypothesis that

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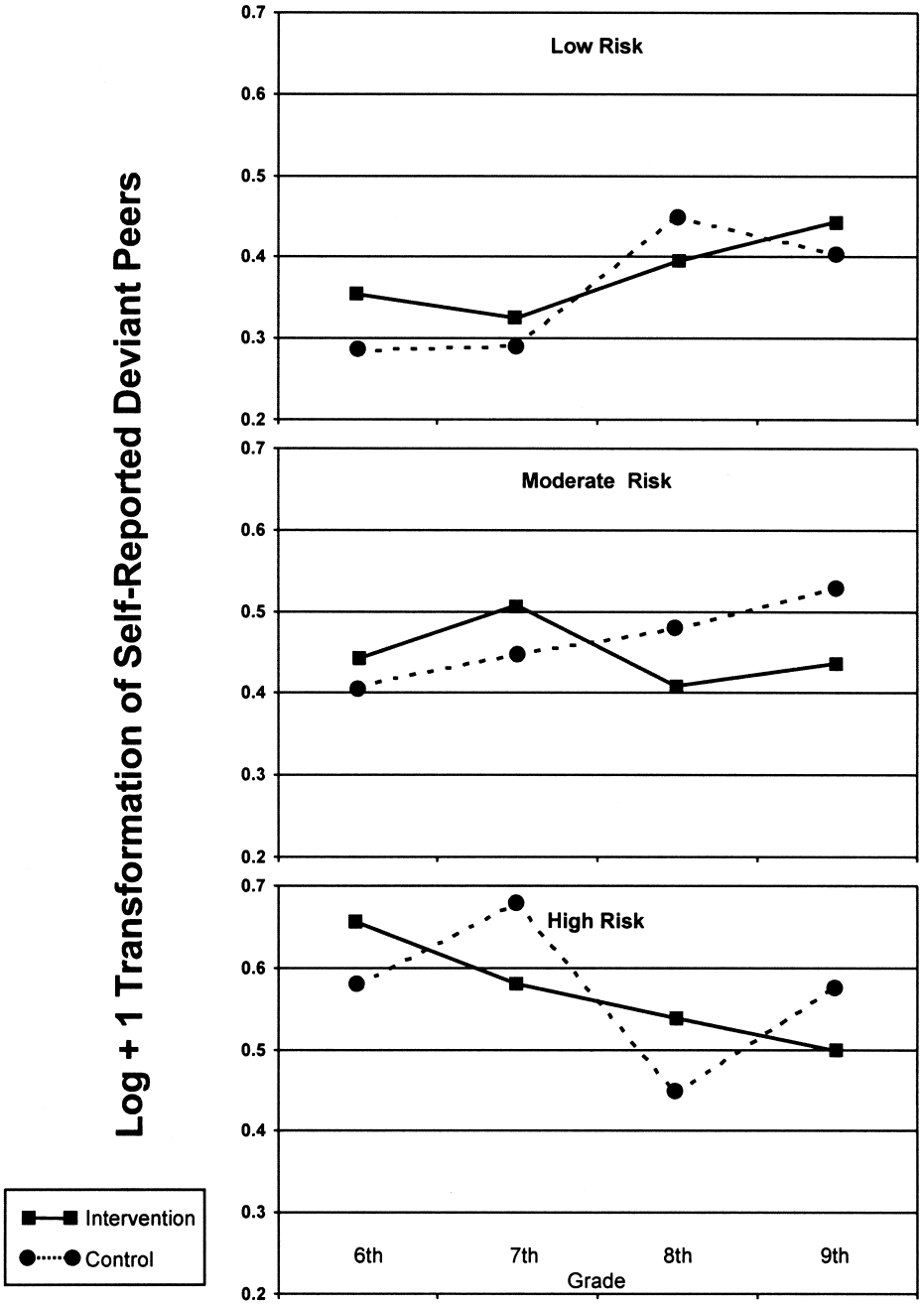


Figure 5. Intervention effects on self-reported deviant peers.

prevention strategies aimed at strengthening parental monitoring reduce growth in adolescent deviant peer involvement for moderate- and high-risk youth.

Parents who sought treatment appeared to develop skills that protected high- and at-risk adolescents from affiliating with the deviant peers. For low-risk youth, however, the prevention efforts may have had little effect for parents who already employ strong monitoring skills. These findings support the ecologically based contention that the larger context

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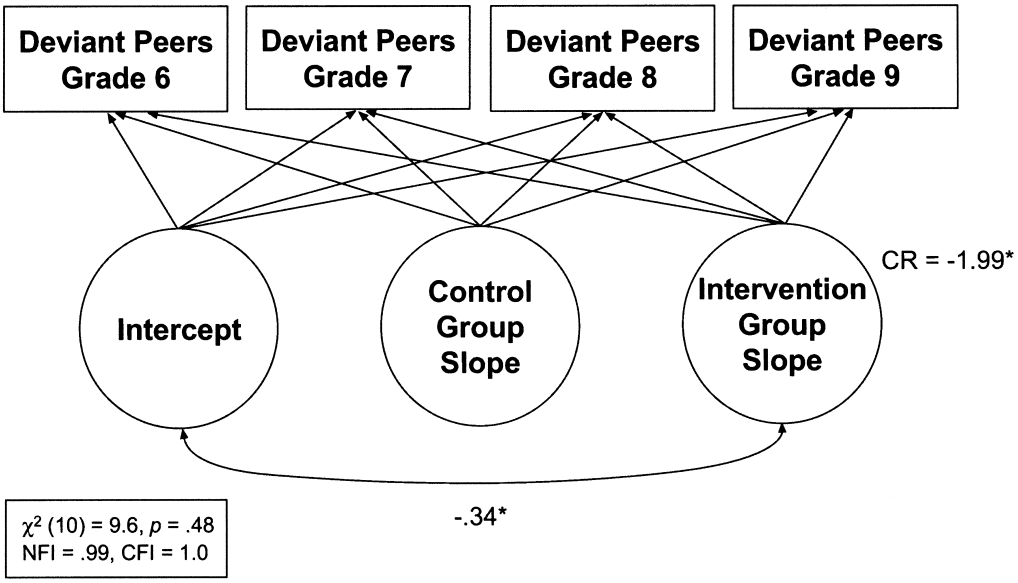


Figure 6. Prevention effect on self-reported deviant peers.

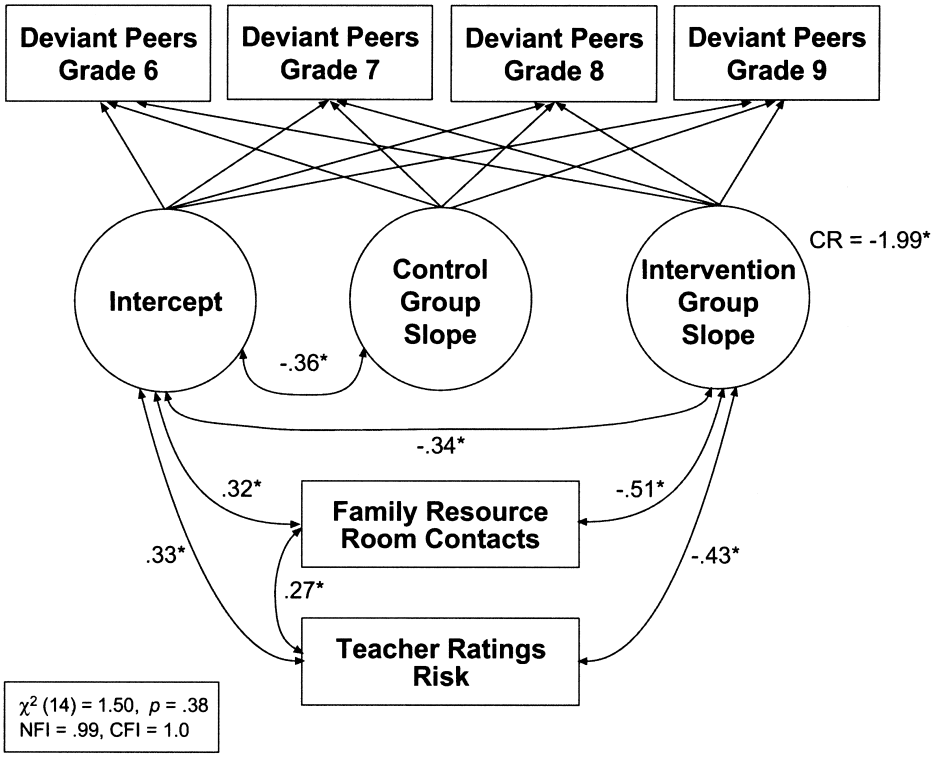


Figure 7. Correlates of prevention effect on self-reported deviant peers.

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in which the youth is embedded is a critical factor to consider when understanding developmental and change processes.

Perhaps more importantly, these results showed that the extent to which parents accessed the FRC mediated growth in deviant peer affiliation. Parents who were most involved in the prevention program had children who were least likely to increase their deviant peer involvement. This ongoing program of research will help provide more definitive evidence regarding the specific changes parents made after having contact with the FRC. Given the central focus placed on monitoring practices in the prevention program, these findings provide preliminary evidence for the contribution of parenting to deviant peer association. As such, they represent an essential and productive iteration on our pragmatic model-building loop.

The Adolescent Transitions Program intervention trials were designed to test hypotheses that emerge from this continually evolving model of normative and antisocial development. This circular paradigm emphasizes a feedback loop based upon findings at each stage of the process (theory, field observation, construct definition, measurement development, construct analysis, model testing, experimental field trials, and model revision). Models are pragmatic, parsimonious, and predictive of variations in behavior and, most importantly, they lead to the development of effective interventions (Dishion & Patterson, 1999). Insights gained from the current trials will now be fed into a theory stage in which the hypotheses will become further refined.

Such a pragmatic approach to model building stipulates that the strongest evidence for causal processes in development emerges from experimental designs, and that among the most productive designs are the theoretically based intervention studies (Dishion & Patterson, 1999). This approach is particularly commensurate with the discipline of developmental psychopathology, given its explicit focus on the interface between normative and atypical development (Cicchetti, 1984, 1993; Sroufe, 1990). By testing developmental theory with intervention designs and subsequently updating the original theory with causal information gained from clinical trials, the study of normative and atypical development becomes fundamentally linked. In the initial part of this article several potential benefits to this approach were discussed, among the most important being the promise this strategy holds for disentangling the unique causal contributions made by factors with very high levels of colinearity.

A number of steps are planned to strengthen the model-building efforts presented here. Clearly, direct measures of changes are needed in parenting practices that result from the prevention trials. These measures would provide clear evidence for the causal link between parenting and deviant peer affiliation. Initial efforts to model correlated change in monitoring with deviant peer involvement were unsuccessful due to problems in the analysis of change in monitoring practices. On a scale of 1–5 (5 = *high monitoring*), the mean response of youth to the self-report monitoring scale was 4.6, leaving a ceiling effect that reduced the ability to assess change in parent monitoring practices.

This barrier exemplifies another issue that is clarified when integrating intervention and developmental research. When conducting passive longitudinal studies, the ability of a measure to reflect change is often ignored, as model testing often rests on random parameters of association. However, when conducting intervention studies, the reality is that some measures are more "sensitive to change" (see Eddy, Dishion, & Stoolmiller, 1998). Coding is now underway of family interactions of structured home observations where monitoring interactions were elicited for videotape recording (see Dishion & Bullock, 2001).

We are optimistic that interventions can be designed that target parents and affect peer associations in early adolescence. This finding is consistent with the general idea that during sensitive periods of development, adults structure the environments within which youngsters develop their social networks (Parke, MacDonald, Beitel, & Bhavnagri, 1988).

Not only would it be useful to follow up on this finding, but more systematic studies should be done of interventions where

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adults—most often parents and primary caregivers—are provided with tools and opportunities to affect their child's development of a social network that has a positive impact on his or her social development. Especially useful would be a comparison of such a "family-centered" strategy with those that emphasize proximal parenting practices. In this way, intervention and developmental research can be used to disentangle the key aspects of the role of parents in structuring the child's world of peers.

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