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3-Year Iatrogenic Effects Associated With Aggregating High-Risk Adolescents in Cognitive–Behavioral Preventive Interventions

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This article focuses on 3-year outcomes associated with a preventive intervention trial in which high-risk youth were aggregated into cognitive–behavioral groups. Analyses of covariance and latent growth modeling revealed that the intervention contributed to 3-year escalations in self-reported smoking and teacher-reported delinquency. Interactions between participants' characteristics (i.e., initial status, age, and gender) and intervention were also tested. A statistically reliable interaction was found, suggesting that those with initially low levels of delinquency were especially affected by the peer intervention group. Implications of these iatrogenic effects are discussed with respect to aggregating high-risk youth in selected prevention trials.

Linking developmental and intervention research is a basic goal of developmental psychopathology and prevention science (Cicchetti & Toth, 1992; Dishion & Patterson, 1999; Reid, 1993). The advantages to this linkage are obvious. Developmental research can point the way—for example, to factors that serve as precursors to significant developmental outcomes. These precursors then become promising targets for preventive interventions. Dishion and Patterson (1999) discussed this strategic effort as "model-building," an iterative process where the outcomes of intervention research inform the next stage of developmental research, confirming or disconfirming causal hypotheses with quantitative data.

The influence of peers on adolescent problem behavior is powerful, and the linkage between developmental and prevention science is especially relevant to understanding that influence. Multiagent, multimethod, and longitudinal data redundantly point to the central role of deviant peers in the emergence of substance use and delinquency in early to middle adolescence (e.g., Dishion & Loeber, 1985; Elliot, Huizinga, & Ageton, 1985; Patterson, 1992). Studies of friendship interactions reveal that deviant talk embedded in positive affect defines a process of "deviancy training," which is found to be longitudinally associated with escalations in drug use (Dishion, Capaldi, Spracklen, & Li, 1995), serious delinquency (Dishion, Spracklen, Andrews, & Patterson, 1996; Poulin, Dishion, & Haas, 1999), and violent behavior (Dishion, Eddy, Haas, Li, & Spracklen, 1997).

From a model-building perspective, association with deviant peers might be targeted (via family management) and peer process could be utilized (in peer intervention groups) to promote positive behaviors and reduce negative behaviors in young adolescents. Dishion and Andrews (1995) tested this hypothesis by randomly assigning high-risk youth to a parent-only intervention, a teen-only intervention, a combination of both, or control conditions. The cognitive behavioral peer intervention was associated with observed reductions in parent–child conflict and skill acquisition. However, they discovered 1-year iatrogenic effects as a result of participation in the peer intervention group (by itself or combined with parent intervention). More specifically, youth had increased rates of self-reported smoking and teacher-reported problem behavior over the 1-year follow-up period, when compared to controls.

An important issue in clinical psychology (Chambless & Hollon, 1998; Smith & Sechrest, 1991) and prevention science (Kellam & Van Horn, 1997) is identification of participant subgroups that are most affected by an intervention. Clearly, not all participants will respond equally to an intervention. To optimize matches between the participants' characteristics and the treatment or prevention approach, it is critical to identify personal characteristics associated with responsiveness to a given intervention.

Youth adjustment (i.e., initial status) prior to the implementation of an intervention is one possible factor that might explain how participants would respond to an intervention. For example, Kellam, Rebok, Ialongo, and Mayer (1994) found that the most aggressive first-graders (ages 6–7) showed the best improvement

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following a school-based primary preventive intervention. In the context of a peer intervention group, youth might react differently to the treatment, depending on their initial level of problem behavior.

Age may be another useful variable when considering the effectiveness of an intervention. In general, older youth tend to react less positively to therapy than younger youth (Weisz, Weiss, Alicke, & Klotz, 1987). Also, when the intervention targeting high-risk youth is delivered in an homogenous group format, age should be considered. Youth are particularly at risk for escalation in delinquent behavior and initiation to substance use in early adolescence (Dishion, Poulin, & Medici Skaggs, 2000). This particular age is a period in which young adolescents are especially vulnerable to peer influence, making peer intervention groups potentially ill-advised.

A third personal characteristic to consider is gender. Reviews of treatment experiments with children and adolescents suggest that girls tend to react more positively to treatment than boys, particularly during adolescence (Weisz, Weiss, Han, Granger, & Morton, 1995).

This article extends previous reports on these data (e.g., Dishion & Andrews, 1995; Dishion, McCord, & Poulin, 1999) by (a) analyzing the long-term effects of the Adolescent Transitions Program (ATP) peer intervention group on self-reported smoking and teacher-reported delinquency among high-risk youth, (b) examining the unique role of participants' characteristics and treatment effectiveness, and (c) using latent growth modeling (LGM) to formally test the contribution of the peer intervention to iatrogenic growth in problem behavior (Muthén & Curran, 1997). The participating youth and their teachers were interviewed each year over a 3-year period following the intervention. Both mean-level analysis and LGM are used here to examine the effects of the peer intervention group on delinquency and substance use.

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Method

Participants and Design

Participants were 158 at-risk families in the ATP field experiment. The sample consisted of 83 boys and 75 girls between the ages of 11 and 14 (*M* age 12). The children were enrolled in Grades 6 to 8 (*M* = Grade 7); 95% of the participants were European American.

Families participating in the interventions were self-referred and learned about the program from a number of sources, including newspaper advertisements, community flyers, school counselors, and other community professionals. Recruitment ads did not specify that direct interventions would be offered. The nature of the families' involvement was fully explained during the first telephone contact.

After parent inquiry, a telephone interview was conducted using a 10-question screening instrument (Bry, McKeon, & Pardina, 1982). Parents were asked about 10 dimensions of child risk: closeness to parents, emotional adjustment, academic engagement, involvement in positive activities, experience-seeking, problem behaviors, the child's substance use, peer substance use, family substance use history, and stressful life events. On the basis of research by Bry et al., four of the previously mentioned risk factors were selected as the cutoff for admission to the clinical trial; 50% of the referred families were excluded because they did not meet these screening criteria.

All families were informed fully of the random assignment component of the intervention trial. They were also told that, after their admission to the study, they would be assigned to one of four conditions: (a) parent only, (b) teen only, (c) parent and teen, and (d) self-directed change. Using a cluster sampling approach to achieve random assignment, this procedure provided families a pre-established order to each of the four intervention conditions until all conditions were filled.

Boys and girls received assignments separately to assure equal distribution of gender across conditions. The interventions were carried out repeatedly for four cohorts over the course of 2 years (1988–1990), with approximately 30 families from each cohort (seven to eight families in a group).

Initially, the hypothesis was that the self-directed change condition was equivalent to a control group. However, videotape curriculums alone were found to produce short-term change in young children's problem behavior (Webster-Stratton, Kolpacoff, & Hollingsworth, 1988). To examine this possibility, a quasi-experimental control group of 39 youngsters (22 boys, 17 girls) was recruited using the same procedures described for the intervention families. All control families were screened for risk status, and families who met the risk criteria were selected as the control group. These families received no intervention, but were assessed at the same time intervals as the intervention families.

Table 1 describes the demographic characteristics of the sample for each condition. The sample was primarily low income, with approximately 25% of the families having an annual income of less than $10,000 and more than 50% of them receiving some type of government financial assistance. On the other hand, the sample was moderately well-educated, with more than 50% of the mothers and 45% of the fathers having some college education. The ethnic composition of the sample was representative of the study community, and no statistically reliable differences emerged between demographic indicators and intervention condition.

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Table 1. *Sample Demographics by Condition*

Demographic	Parent Only	Teen Only	Parent and Teen	Self-Directed	Control	Total
Sample Size	26	32	31	29	39	158
Child's Age (*M*)	12.6	12.5	12.3	12.3	12.4	12.4
Family Status						
Percentage Single-Parent	52.0	39.4	51.6	37.9	38.5	43.3
Percentage Two-Parent	48.0	60.6	48.4	62.1	61.5	56.7
M Number of Children in Home	2.2	2.4	2.0	2.1	2.2	2.2
Mdn Income Range	$10,000–14,999	$20,000–24,999	$10,000–14,999	$15,000–19,999	$10,000–14,999	$15,000–19,999
Percentage Not High School Graduate						
Mother	29.2	15.2	6.7	3.4	18.4	14.3
Father	9.1	38.9	23.5	12.5	18.2	21.4
Percentage With Financial Assistance	56.0	57.6	61.3	55.2	59.0	58.0
Mother CBCL *t* Scores						
Externalizing Scale	64.7	63.8	61.0	63.0	60.9	62.7
Internalizing Scale	60.6	61.6	61.4	62.5	60.1	61.1

Note: CBCL = Child Behavior Checklist.

The conditions were also compared on the relative risk status of children, using the mother's report on the Child Behavior Checklist (CBCL) externalizing and internalizing scales (Achenbach, 1992). All the conditions were approximately one standard deviation from the mean on externalizing problems (see Table 1). A multivariate analysis of variance was conducted to determine if mean values on these two scales varied by intervention condition, gender, or both (interaction effect). No significant differences were found, and no significant differences emerged across any of the CBCL subscales (e.g., aggression, delinquency) by condition, gender, or both.

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Intervention Overview

The ATP intervention phase involved 12 weekly 90-min sessions and was completed in about 3 to 4 months (depending on holidays). All families were initially visited in their homes by their group therapists. All sessions were based on structured curriculums and accompanying videotapes (Dishion & Kavanagh, in press). The parent focus intervention targeted parent–family management practices and communication skills. The teen focus intervention targeted early adolescent self-regulation and prosocial behavior in the context of parent and peer environments.

Parent focus. The parent focus curriculum was based on four key family management skills: monitoring, positive reinforcement, limit-setting, and problem solving (Patterson, 1992). The cognitive–behavioral parent groups were skill-based, focusing on supporting parenting skills appropriate for young adolescents. Groups optimally consisted of eight families (8 to 16 group members), and the content of the sessions was pre-established by the curriculum.

Each session began with some discussion of home practices during the previous week, followed by the therapist's introduction of a family management skill. Considerable time within each session was allocated to exercises, role-play, and discussion focused on family management issues and skills. The group intervention was buttressed by three individual consultation sessions with each family. Parent coleaders were used to facilitate role-play, build motivation, and provide a bridge between the therapist and client.

Teen focus. The teen focus curriculum focused on enhancing the teenagers' regulation of their prosocial and disruptive behavior in the context of parent and peer environments. In an effort to enhance young adolescents' self-regulation, a key component to this intervention, several sets of skills were targeted:

1. Self-monitoring and tracking.
2. Prosocial goal-setting.
3. Developing peer environments supportive of prosocial behavior.
4. Setting limits with friends.
5. Problem-solving and communication skills with parents and peers.

Teenagers were responsible for defining their own behavior-change goals. By their own initiative, at least 75% selected some aspect of improved school performance. Other goals included abstinence from drug experimentation and improved family relations.

The approach to the weekly session was structured, with the curriculum determining the focus of each meeting. The groups consisted of seven to eight teenagers, equally divided by gender. Eight peer groups were formed: four in the peer intervention group only condition and four in the parent and peer intervention groups condition. Few of the participants knew each other prior to participating in the intervention. Sessions began by discussing home practices and events that occurred during the previous week. Therapists then introduced a new skill or topic for the week, followed by role-play and discussion. Groups ended with a home practice assignment for the coming week.

Self-directed change. The self-directed change intervention did not involve weekly group meetings or therapist contact. These families received only the intervention materials that accompanied the parent focus and teen focus interventions, which consisted of six newsletters and five brief videotapes. These materials covered the informational content of the group sessions and highlighted critical skills of the parent and teen focus intervention programs. Materials were mailed on a biweekly basis and videotapes were made available to the parent and child for viewing.

Quasi-experimental control. Families participating in the control group received no intervention and were contacted by project staff for assessment purposes only. These families completed assessment batteries identical to the intervention families.

Differential retention. Two concerns when evaluating intervention outcomes were the level of the client's engagement in the intervention and the retention of participants in assessments across intervention conditions. There was equivalent attendance by parents (69%) and teenagers (71%) at the group ses-

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sions across the intervention conditions; seven parents did not attend any group session, compared with two of the youth who did not. Ironically, the intervention condition with the lowest level of engagement was the one requiring the least involvement: Only 47% of the families in the self-directed change condition viewed videotapes, as scheduled.

A more critical threat to the internal validity of an experimental intervention study was retaining families in assessment. In this study, families were invited to participate in the termination and follow-up assessments, regardless of their attendance in the intervention conditions. At termination, retention was quite high, with 93% of the child interviews completed and 91% of the teacher ratings completed. Retention rates did not vary significantly by condition.

Similarly, for 1-year follow-up, 89% of the youth completed interviews and 88% of the teacher ratings were obtained; no variation emerged in retention across condition. At 2-year follow-up, 89% of the child interviews and 83% of the teacher ratings were completed; at 3-year follow-up, 85% of child interviews were completed and 79% were completed for teacher ratings. Retention did not vary by condition at these two phases.

There were no differences in baseline measures between those who completed either the 3-month or the 1-year follow-up from those who did not complete them. However, those people who did not complete the 1-year follow-up had, on average, higher teacher ratings for delinquency at the 3-month follow-up compared to those who had completed the 1-year follow-up. Furthermore, those participants for whom we were missing teacher ratings at the 2-year follow-up had significantly higher levels of smoking and teacher-rated delinquency at baseline, 3-month follow-up, and 1-year follow-up, compared to those on whom we had 2-year follow-up teacher ratings.

Assessment Phases

After screening, consent to participate, and random assignment, the youth completed baseline assessments in the form of an individual interview, questionnaire completion, and the collection of school information. Each participating youth was paid $10 per hour of assessment and teachers were paid $8 for each student CBCL completed.

On completion of intervention, youth participated in a termination assessment. One year after the termination assessment, they were brought to the research center for a 1-hr interview focusing on the child adjustment at that time. The youth participated in a similar interview 2 and 3 years after termination. In addition, teacher ratings were collected from schools at each phase.

Measurements

Tobacco use. During structured interviews, youth were asked to report on the frequency of their tobacco use over the past 3 months. Because the distribution of these frequencies was highly skewed (skewness = 7.68 and kurtosis = 69.52 at baseline), a loglinear transformation was applied (log + 1) to make them more appropriate for outcome analyses. Expired air carbon monoxide levels were also assessed and showed high predictive validity of the youth-reported smoking frequency (r from .47 to .62 across assessment phases).

Delinquency. Teacher ratings on the revised CBCL were collected to assess change in youth delinquent behavior. The raw score of the delinquent behavior subscale was used, with all teachers blind to the ATP intervention. Although the same teachers provided the ratings at baseline and termination, different teachers completed the CBCL at the subsequent yearly assessment phases. The internal consistency for the delinquent behavior subscale was acceptable (Cronbach's alpha from .81 to .85 across assessment phases).

Analysis Strategy

In analyzing outcome, of primary interest was examination of the effect of youth exposure to a peer intervention group on change in their problem behavior over a 3-year time period. The peer group only condition and the parent and peer combined condition were consolidated and referred to as the peer intervention group (n = 64). No differences were found across the outcomes when comparing these two conditions at each assessment phase. The self-directed change condition and the quasi-experimental control condition were also combined and are referred to as the control group (n = 68). These two conditions were not statistically different on any of the outcome variables analyzed at each assessment phase. The participants who were assigned to the parent only condition are not included in the analyses reported here.

Two strategies were adopted to analyze the long-term effect of the intervention. First, for every outcome, analyses of covariance (ANCOVAs) were conducted separately for each postintervention wave, controlling for the baseline levels of the outcome. Second, individual growth trajectories (slopes) over time were estimated using LGM methodology (Duncan & Duncan, 1995; Stoolmiller, 1995). Muthén and Curran's (1997) systematic analysis strategy was used to examine interactions between participants' characteristics and treatment effectiveness. As in most longitudinal studies, data were missing. The SPSS (Jöreskog & Sörbom, 1989) missing value analysis

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procedure was used to determine the missing value patterns. For the LGM models, AMOS was used to compute full information maximum-likelihood-estimates in the presence of missing data (Arbuckle, 1996, 1997; Muthén, Kaplan, & Hollis, 1987).

Results

Tobacco Use

Table 2 presents the means and standard deviations of youth reports of smoking as a function of the peer intervention group, from baseline to the 3-year follow-up. The ANCOVAs revealed that, at termination, the youth exposed to the peer intervention groups reported using tobacco more frequently than the controls, $F(1, 118) = 7.14$, $p < .01$. This effect persisted at 1-year follow-up, $F(1, 114) = 4.15$, $p < .05$. For the 2-year follow-up, a statistically marginal intervention effect was observed, $F(1, 110) = 3.28$, $p < .08$. Finally, the ANCOVA revealed a statistically reliable effect for the 3-year follow-up, $F(1, 105) = 4.48$, $p < .05$. These results suggest that exposure to the peer intervention group led to an increase in youth frequency of smoking and that this effect persisted 3 years after the intervention.

The use of structural equation modeling (SEM) to model iatrogenic growth in young adolescent smoking proceeded in several steps (Muthén & Curran, 1997). The control and peer intervention groups were analyzed separately, estimating the fit of the model uniquely for each group. The results of these two steps are summarized in Table 3, showing statistically reliable variation, as well as growth in both the control and peer intervention groups. Initial status and growth were correlated in the control group ($r = .38$, $p < .001$), but not the intervention group ($r = .08$, *ns*). The next step was to analyze the two groups simultaneously, with the inclusion of a separate slope factor analyzed for the peer intervention group, representing the iatrogenic effect. The results of these analyses are summarized in Figure 1, showing the unstandardized parameters in the model, as well as the fit indexes.

In this analysis, the parameters for the control group form the basis for which the iatrogenic effect is estimated. The mean intercept ($M = 0.82$, $cr = 5.84$, $p < .01$) and mean slope ($M = 0.46$, $cr = 5.05$, $p < .01$) were significant (cr = critical ratio). The iatrogenic mean slope was also significant ($M = 0.34$, $cr = 2.18$, $p < .05$). About 43% of the growth in smoking within the peer intervention group can be attributed to the intervention. The intercept ($D = 2.31$, $cr = 7.05$, $p < .01$) and slope variance ($D = 0.29$, $cr = 2.92$, $p < .01$) for the control group were significant, as was the iatrogenic slope variance ($D = 0.48$, $cr = 2.13$, $p < .05$). The standardized estimated correlation between the intercept and the control group slope was positive, but marginally significant ($r = .23$, $cr = 1.85$, $p < .10$), suggesting that initial smoking status was positively related to growth in smoking in the control group. The model presented an adequate fit (NFI = Normed Fit Index; CFI = Comparative Fit Index) to the data, as indicated by the various fit indexes (NFI = .90, CFI = .93) and the chi-square test statistics, $\chi^2 (19, N = 68 \text{ and } 64) = 63.91$, $p = .00$.

In the next stage of analysis, the relation between the initial levels of smoking on the magnitude of the iatrogenic effect was examined. As in the previous step, the control group did not contain the iatrogenic slope factor. The estimated correlation between the intercept and the control group slope was positive, but marginally significant ($r = .35$, $cr = 1.89$, $p < .10$), suggesting that initial smoking status was positively related to growth in smoking for the control group. The intercept for the peer intervention group was not significantly related to the iatrogenic slope factor ($r = –.15$, $cr = –.62$, *ns*). Thus, the increased growth in smoking that resulted from the intervention was not related to the participants' level of smoking prior to the intervention.[1] The model fit to the data was similar to the other basic two-group model, NFI = .90, CFI = .93, $\chi^2 (18, N = 68 \text{ and } 64) = 63.56$, $p = .00$.

Finally, participants' characteristics (i.e., age and gender) were included in the model. Our primary interest with these variables was to examine the extent to which they predicted the iatrogenic slope. Neither age nor gender significantly predicted the iatrogenic slope factor.[2]

Delinquency

Table 4 provides the means and standard deviations of teacher ratings of delinquent behavior from baseline to the 3-year follow-up, as a function of the peer intervention group. ANCOVAs controlling for baseline levels of delinquency revealed no significant effect at termination. One year after the termination assessment, youth who participated in the peer intervention

[1] Another way to examine the interaction between initial status and treatment is to determine if the increase in the frequency of smoking that results from the peer intervention group is attributable to nonsmokers who initiated use. At baseline, the proportion of participants who had not smoked was 70.9% and 71.9% for the control group and the peer intervention group, respectively. Of the baseline nonsmokers for the control group, three started smoking by the 3-month follow-up (6.3%), and for the peer intervention group, seven of the nonsmokers started (15.2%). Of the baseline nonsmokers for the control group, eight started smoking by the 1-year follow-up (16.7%), and for the peer intervention group, 14 of the nonsmokers started (30.4%). These proportions were, respectively, 20.8% and 41.3% at the 2-year follow-up, and 27.1% and 45.7% at the 3-year follow-up. Clearly, nonsmokers in the peer intervention group at baseline were more likely to become smokers.

[2] At each wave, participants were also asked to report on the frequency of their use of alcohol, marijuana, and other substances over the past 3 months. No significant interventions effects were observed for these substances, although the trends were clearly in the same direction as tobacco use.

Table 2. *Frequency (Log + 1) of Adolescent Tobacco Use by Intervention Condition and Phase*

	Baseline			Termination			1-Year Follow-Up			2-Year Follow-Up			3-Year Follow-Up		
Condition	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***
Peer Intervention	63	0.88	1.70	61	1.19	2.02	58	1.88	2.61	56	2.20	2.87	52	3.14	3.28
Control	66	0.83	1.60	63	0.63	1.41	62	1.18	2.31	59	1.66	2.65	58	2.24	2.84

Table 3. *Results of the Latent Growth Modeling of Iatrogenic Effects*

	Variance		*M* Level	
	Intercept	**Slope**	**Intercept**	**Slope**
Self-Reported Smoking				
Control Group	1.85*	.30*	.70*	.47*
Peer Intervention Group	2.67*	.78*	.89*	.80*
Teacher-Reported Delinquency				
Control Group	6.85*	.53	2.36*	.25
Peer Intervention Group	4.15*	1.04*	2.47*	.61*

*$p < .05$.

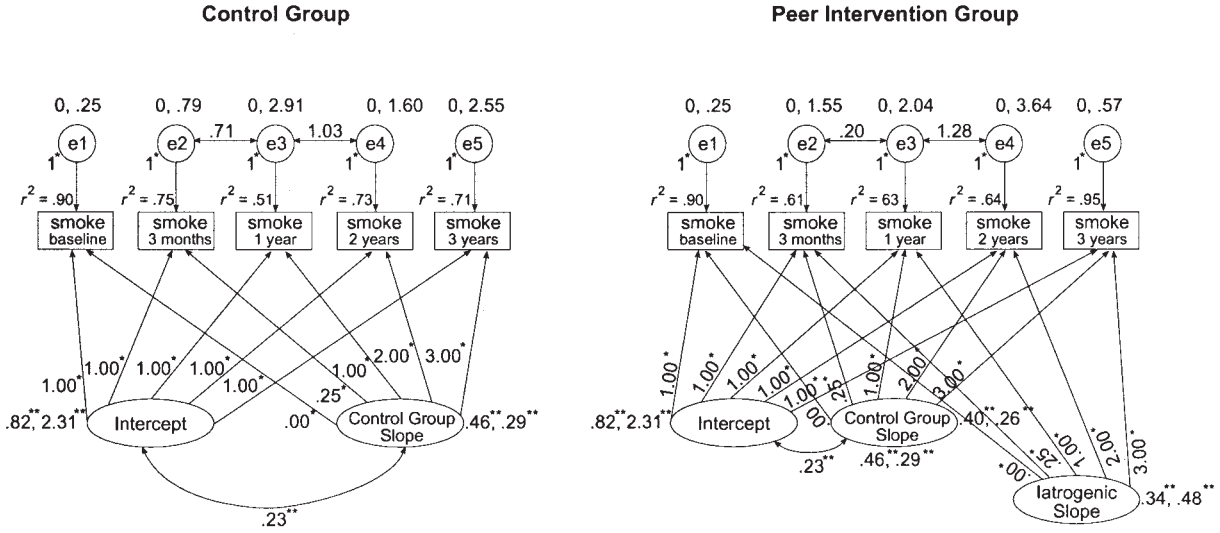

Figure 1. Simultaneous two-group analysis of iatrogenic growth in tobacco use. ***Goodness-of-Fit Indexes:*** **$\chi^2 = 63.91$; degrees of freedom = 20; probability = .00; NFI = .90; CFI = .93; * = fixed; ** = constrained to be equal.**

group actually showed a statistically significant increase in delinquency, compared with the controls, $F(1, 109) = 3.87$, $p < .05$. This trend persisted at 2-year follow-up, $F(1, 99) = 2.78$, $p < .10$, and at 3-year follow-up, $F(1, 95) = 3.61$, $p < .06$.

Again, we used SEM to determine whether the peer group intervention also produced a significant iatrogenic effect in comparison to the control group. The results of the separate LGM analyses of the control and peer intervention group are provided in Table 3. Of interest, the peer intervention group showed statistically reliable growth, as well as variation in growth, whereas the control group did not. Growth and initial status were uncorrelated in both groups.

Similarly, a two-group analysis was performed, with the addition of an iatrogenic effect associated with the peer intervention group. This analysis revealed that the parameter representing normal growth ($M = .23$, $cr = 1.33$, $p > .10$) was not significant, but the iatrogenic mean slope was marginally significant ($M = 0.43$, $cr = 1.74$, $p < .10$). About 64.5% of the growth in delinquency within the intervention group can be attributed to the intervention.

The next step in the two-group analysis was to allow the intercept to predict the iatrogenic slope. The results of this analysis are summarized in Figure 2, including unstandardized parameters for the control, peer intervention groups, and the iatrogenic effect.

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Table 4. *Teacher Report of Delinquency by Intervention Condition and Phase*

	Baseline			Termination			1-Year Follow-Up			2-Year Follow-Up			3-Year Follow-Up		
Condition	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***
Peer Intervention	60	2.35	3.08	57	2.72	3.23	55	3.55	4.25	47	3.06	3.33	47	3.91	3.89
Control	68	2.31	3.31	62	2.53	3.61	61	2.54	3.24	59	2.22	3.55	41	3.34	3.81

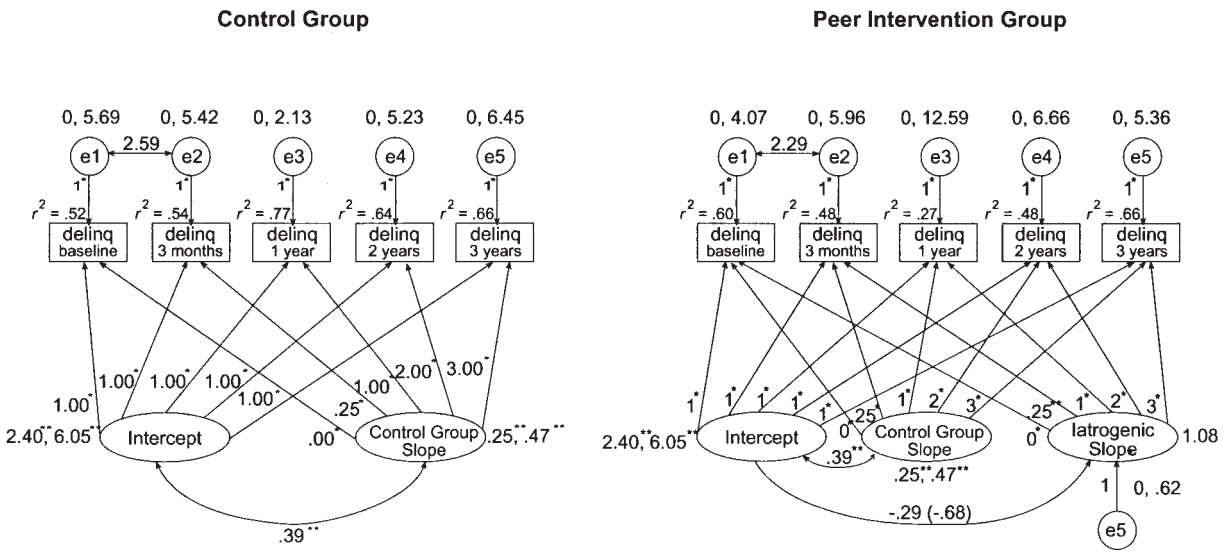

Figure 2. Simultaneous two-group analysis of iatrogenic growth in delinquent behavior at school. ***Goodness-of-Fit Indexes:*** **χ^2 = 24.80; degrees of freedom = 20; probability = .21; NFI = .95; CFI = .99; * = fixed; ** = constrained to be equal; ( ) = standardized coefficient.**

This analysis revealed that the mean intercept value (M = 2.40, cr = 8.95, $p < .01$) was significant; however, as in the previous step, the parameter representing normative growth (M = .25, cr = 1.48, *ns*) was not significant. The intercept variance (D = 6.05, cr = 4.31, $p < .01$) was significant, but the normative slope variance (D = 0.47, cr = 1.13, $p < .10$) and the iatrogenic slope variance (D = 0.62, cr = 1.03, $p > .10$) were not significant, suggesting that most members of the intervention group experienced positive growth in delinquency (46 out of the 64 members).

In analyzing the impact of the youths' initial levels of delinquent behavior at school, a negative correlation with growth was found (r = –.68, cr = –2.17, $p < .05$). The increased growth in delinquency that resulted from the peer intervention group was more pronounced for the youth who presented a low level of delinquency prior to the intervention. In contrast, the estimated correlation between the intercept and the control group slope was not significant (r = .23, cr = 0.62, *ns*), suggesting that initial delinquent status was positively, but not significantly related to normative growth in delinquency. The model presented a good fit to the data, as indicated by the various fit indexes (NFI = .95, CFI = .99) and the chi-square test statistics, χ^2 (20, N = 68 and 64) = 24.80, p = .21.

Finally, participants' characteristic variables (i.e., age, gender) were included in the model. Neither age nor gender significantly predicted the iatrogenic slope.

Discussion

These analyses suggest that there was a statistically reliable iatrogenic effect on self-reported smoking and teacher-reported delinquency that extended to 3 years following the peer intervention. For several reasons, it is possible that the estimate of this effect is somewhat conservative: (a) the groups were videotaped and supervised in an effort to minimize interactions encouraging problem behavior in the group; (b) the cognitive behavior peer intervention did result in improvements in targeted skills, as well as observed interactions with parents (Dishion & Andrews, 1995); and (c) statistical power was limited in this study because of the small sample size in each group. Moreover, the effect was observed with the ratings provided by the teachers, who were unaware of the youths' intervention conditions, ruling out the possibility that the iatrogenic effects simply reflect changes or bias in the youth reports (Campbell & Stanley, 1963).

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A first step in understanding these iatrogenic effects was to examine interactions between participants' characteristics and intervention. Three variables were considered: initial status, age, and gender. The LGM analyses revealed a statistically reliable interaction for the youths' initial levels of delinquency and the iatrogenic effect, indicating that youth with initially low levels of delinquency seemed to be especially harmed by the peer intervention group.

These findings on iatrogenic effects are not an anomaly. In a meta-analysis of treatment studies with juvenile delinquents, Lipsey (1992) reported that 29% of reviewed experiments resulted in negative effects (i.e., better outcomes for the control condition). In the same vein, a review of studies evaluating the effectiveness of rehabilitation strategies with delinquents by Lab and Whitehead (1988) showed that over half the experiments resulted in no effect or negative findings. Although to a lesser extent, negative effects have also been observed in primary prevention mental health programs for children and adolescents (Durlak & Wells, 1997) and in clinical trials conducted with that population (Kazdin & Weisz, 1998). The issue is more serious when considering that studies showing harmful effects may be underrepresented in scientific journals as a result of publication biases that favor studies with positive results (Allison, Faith, & Gorman, 1996; Dickersin, 1997).

As emphasized by Kazdin and Weisz (1998), a systematic review is needed of treatment and prevention experiments resulting in deleterious effects, and more important, of the circumstances and the mechanisms associated with these effects. A better understanding of the treatment and prevention strategies that present some risk is critical for clinical practice and for the design of prevention programs.

Treatment factors, such as who administers the treatment, modality, philosophy, and orientation, format of sessions, and so forth, should be considered when attempting to understand negative effects (Lipsey, 1992). The findings reported here suggest that the use of an homogeneous group format in delivering treatments or preventive interventions to high-risk youth might be a factor that contributes to the deleterious effects mentioned in the literature.

Beyond an appealing advantage of reaching a large number of participants with minimum resources, peer intervention groups are set up for their potentially inherent therapeutic qualities. They could provide a positive influence to support goal attainment, usually set in place by promoting cooperation among group members, either through group reward systems or task interdependence (Atwood & Osgood, 1987). These groups provide a context in which youth can practice the learned skills, especially when the intervention involves the acquisition of new social skills.

However, several examples exist of randomized treatment experiments involving homogeneous groups of high-risk youth that resulted either in no change or in increased rates of problem behavior. One comes from the guided group interaction approach (a popular form is the positive peer culture; Vorrath & Brendtro, 1985), used mostly with juvenile delinquents and criminal offenders. Participants in this intervention are aggregated for a series of sessions in which the group processes are used as an agent of change. In a school-based randomized experiment, Gottfredson (1987) found that high school students exposed to the group intervention showed an increase in delinquent behavior, whereas elementary school students exhibited no change.

A classic case of iatrogenic effects in prevention research is the Cambridge-Somerville Youth Study (McCord, 1978, 1992). The high-risk youth exposed to this 2-year multicomponent intervention showed more negative life outcomes 30 years later, when compared to their matched control. In a recent examination of this data, McCord (1997) found that youth who participated in two consecutive summer camp interventions were 10 times more likely to experience negative life outcomes.

Another disturbing finding comes from an evaluation of a buddy system intervention with juvenile delinquents (O'Donnell, 1992). An iatrogenic effect (i.e., increase in arrest rate) was observed for 86.8% of the youth with prior arrests and was more deleterious for those who participated in the intervention for more than 1 year. As reported by O'Donnell, the program involved several group activities among the participants, which provided the youth with opportunities to form new friendships. Other examples of the ineffectiveness of peer intervention groups in reducing problem behavior are provided by Fang, Stanton, Li, Feigelman, and Baldwin (1998) and Feldman (1992).

Understanding of the deleterious effects resulting from peer intervention groups could be enlightened by linking prevention science with developmental research on adolescent problem behavior. Longitudinal studies repeatedly show that association with deviant peers is the strongest correlate of escalation in problem behaviors in adolescence (Dishion & Loeber, 1985; Elliot et al., 1985; Patterson & Dishion, 1985).

The work conducted by Dishion and colleagues over the past 5 years has focused on identifying a social process within friendships that was associated with escalation in problem behaviors (Dishion et al., 1996). They found that antisocial dyads reacted positively to rule-breaking discussions, whereas nondeviant dyads reacted positively to normative discussions. This contingent response to deviancy was labeled "deviancy training".

The deviancy training process was uniquely related to growth in delinquency, violence, and substance use over a 5-year time span, after controlling for the youths' level of antisocial behavior and the parents' observed discipline practices (Dishion et al., 1995, 1996, 1997). Observed in naturally formed friendships of an-

tisocial adolescents, it might also take place among youth aggregated in treatment or prevention groups, thwart the assumed therapeutic benefits of the group setting, and potentially result in harmful effects. This hypothesis is still speculative at this point and will have to be empirically supported.

Fortunately, all group sessions in this study were videotaped and the material is currently being coded. These data will be used to identify the formation and the development of friendship networks within each group over the 12 sessions. The display of rule-breaking talk (e.g., substance use-related issues) during the session and group reactions will also be studied. Once related to individual changes in outcome variables, this observational data may help understand the underlying processes associated with the iatrogenic effects.

The evidence reported here is sufficiently alarming to warrant reconsideration of any grouping of high-risk youth in clinical, educational, or correctional settings. Additional data exists, however, that indicate that peer intervention group experiments may result in beneficial effects, especially when the groups also include prosocial youth (Feldman, 1992; Hudley & Graham, 1993; Tremblay, Pagani-Kurtz, Masse, Vitaro, & Pihl, 1995; Vitaro, Brendgen, & Tremblay, this issue).

In designing interventions targeting young high-risk adolescents, consideration of the ecology of intervention strategies—in particular, minimizing deleterious contacts with other high-risk children—is imperative. Outcomes for these youth will be optimized by alternative intervention strategies. The key principle when thinking about such interventions is to mobilize caregiving adults (Dishion & Kavanagh, in press).

The plethora of family intervention outcome studies strongly supports mobilizing and training caregivers to reduce or prevent serious adolescent problem behavior (Patterson, Dishion, & Chamberlain, 1993). Essential are interventions that provide mainstay for the leadership role of caregivers in providing the guidance, support, and structure necessary to reduce problem behavior during the critical adolescent transition.

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References

Achenbach, T. M. (1992). New developments in multiaxial empirically based assessment of child and adolescent psychopathology. In J. C. Rosen & P. McReynolds (Eds.), *Advances in psychological assessment* (Vol. 8, pp. 75–102). New York: Plenum.

Allison, D. B., Faith, M. S., & Gorman, B. S. (1996). Publication bias in obesity treatment trials. *International Journal of Obesity and Related Metabolic Disorders, 20,* 931–937.

Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling: Issues and techniques* (pp. 243–277). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Arbuckle, J. L. (1997). AMOS users' guide (Version 3.6) [Computer software]. Chicago: SmallWaters Corporation.

Atwood, R. O., & Osgood, D. W. (1987). Cooperation in group treatment programs for incarcerated adolescents. *Journal of Applied Social Psychology, 17,* 969–989.

Bry, B. H., McKeon, P., & Pardina, R. J. (1982). Extent of drug use as a function of number of risk factors. *Journal of Abnormal Psychology, 91,* 273–279.

Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. In N. L. Gage (Ed.), *Handbook of research teaching* (pp. 171–246). Chicago: Rand McNally.

Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology, 66,* 7–18.

Cicchetti, D., & Toth, S. L. (1992). The role of developmental theory in prevention and intervention. *Development and Psychopathology, 4,* 489–493.

Dickersin, K. (1997). How important is publication bias? A synthesis of available data. *AIDS Education and Prevention, 9,* 15–21.

Dishion, T. J., & Andrews, D. W. (1995). Preventing escalation in problem behaviors with high-risk young adolescents: Immediate and 1-year outcomes. *Journal of Consulting and Clinical Psychology, 63,* 538–548.

Dishion, T. J., Capaldi, D., Spracklen, K. M., & Li, F. (1995). Peer ecology of male adolescent drug use. *Development and Psychopathology, 7,* 803–824.

Dishion, T. J., Eddy, J. M., Haas, E., Li, F., & Spracklen, K. (1997). Friendships and violent behavior during adolescence. *Social Development, 6,* 207–223.

Dishion, T. J., & Kavanagh, K. (in press). *Adolescent problem behavior: An intervention and assessment sourcebook for working with families in schools.* New York: Guilford.

Dishion, T. J., & Loeber, R. (1985). Male adolescent marijuana and alcohol use: The role of parents and peers revisited. *American Journal of Drug and Alcohol Abuse, 11,* 11–25.

Dishion, T. J., McCord, J., & Poulin, F. (1999). When interventions harm: Peer groups and problem behavior. *American Psychologist, 54,* 755–764.

Dishion, T. J., & Patterson, G. R. (1999). Model building in developmental psychopathology: A pragmatic approach to understanding and intervention. *Journal of Clinical Child Psychology, 28,* 502–512.

Dishion, T. J., Poulin, F., & Medici Skaggs, N. (2000). The ecology of premature autonomy in adolescence: Biological and social influences. In K. A. Kerns, J. M. Contreras, & A. M. Neal-Barnett (Eds.), *Family and peers: Linking two social worlds* (pp. 27–45). Westport, CT: Praeger.

Dishion, T. J., Spracklen, K. M., Andrews, D. W., & Patterson, G. R. (1996). Deviancy training in male adolescent friendships. *Behavior Therapy, 27*(1), 373–390.

Duncan, T. E., & Duncan, S. C. (1995). Modeling the processes of development via latent variable growth curve methodology. *Structural Equation Modeling, 2,* 187–213.

Durlak, J. A., & Wells, A. M. (1997). Primary prevention mental health programs for children and adolescents: A meta-analytic review. *American Journal of Community Psychology, 25,* 115–152.

Elliot, D. S., Huizinga, D., & Ageton, S. S. (1985). *Explaining delinquency and drug use.* Beverly Hills, CA: Sage.

Fang, X., Stanton, B., Li, X., Feigelman, S., & Baldwin, R. (1998). Similarities in sexual activity and condom use among friends within groups before and after a risk-reduction intervention. *Youth & Society, 29,* 431–450.

Feldman, R. A. (1992). The St. Louis experiment: Effective treatment of antisocial youth in prosocial peer groups. In J. McCord & R. E. Tremblay (Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 233–252). New York: Guilford.

Gottfredson, G. D. (1987). Peer group interventions to reduce the risk of delinquent behavior: A selective review and new evaluation. *Criminology, 25,* 671–714.

Hudley, C., & Graham, S. (1993). An attributional intervention to reduce peer-directed aggression among African–American boys. *Child Development, 64,* 124–138.

Jöreskog, K. G., & Sörbom, D. (1989*). Lisrel 7: A guide to the program and applications (2nd ed.).* Chicago: SPSS Inc.

Kazdin, A. E., & Weisz, J. R. (1998). Identifying and developing empirically supported child and adolescent treatments. *Journal of Consulting and Clinical Psychology, 66,* 19–36.

Kellam, S. G., Rebok, G. W., Ialongo, N., & Mayer, L. S. (1994). The course and malleability of aggressive behavior from early first grade into middle school: Results of a developmental epidemiologically-based preventive trial. *Journal of Child Psychology and Psychiatry, 35,* 259–281.

Kellam, S. G., & Van Horn, Y. V. (1997). Life course development, community epidemiology, and preventive trials: A scientific structure for prevention research. *American Journal of Community Psychology, 25,* 177–188.

Lab, S. P., & Whitehead, J. T. (1988). An analysis of juvenile correctional treatment. *Crime and Delinquency, 34,* 60–83.

Lipsey, M. W. (1992). Juvenile delinquency treatment: A meta-analytic inquiry into the variability of effects. In T. D. Cook, H. Cooper, D. S. Corduroy, H. Harman, L. V. Hedges, R. J. Light, T. A. Lewis, & F. Hostler (Eds.), *Meta-analysis for explanation: A casebook* (pp. 83–125). New York: Russell Sage Foundation.

McCord, J. (1978). A thirty-year follow-up of treatment effects. *American Psychologist, 33,* 284–289.

McCord, J. (1992). The Cambridge-Somerville Study: A pioneering longitudinal–experimental study of delinquency prevention. In J. McCord & R. E. Tremblay (Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 196–206). New York: Guilford.

McCord, J. (1997). *Some unanticipated consequences of summer camps.* Paper presented at the biennial meeting of the Society for Research in Child Development, Washington, DC.

Muthén, B. O., & Curran, P. J. (1997). General longitudinal modeling of individual differences in experimental designs: A latent variable framework for analysis and power estimation. *Psychological Methods, 2,* 371–402.

Muthén, B. O., Kaplan, D., & Hollis, M. (1987). On structural equation modeling with data that are not missing completely at random. *Psychometrika, 52,* 431–462.

O'Donnell, C. (1992). The interplay of theory and practice in delinquency prevention: From behavior modification to activity settings. In J. McCord & R. E. Tremblay (Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 209–232). New York: Guilford.

Patterson, G. R. (1992). Developmental changes in antisocial behavior. In R. D. Peters, R. J. McMahon, & V. L. Quinsey (Eds.), *Aggression and violence throughout the life span* (pp. 52–82). Newbury Park, CA: Sage.

Patterson, G. R., & Dishion, T. J. (1985). Contributions of families and peers to delinquency. *Criminology, 23,* 63–79.

Patterson, G. R., Dishion, T. J., & Chamberlain, P. (1993). Outcomes and methodological issues relating to treatment of antisocial children. In T. R. Giles (Ed.), *Effective psychotherapy: A handbook of comparative research* (pp. 43–88). New York: Plenum.

Poulin, F., Dishion, T. J., & Haas, E. (1999). The peer influence paradox: Relationship quality and deviancy training within male adolescent friendships. *Merrill-Palmer Quarterly, 45,* 42–61.

Reid, J. B. (1993). Prevention of conduct disorder before and after school entry: Relating interventions to development findings. *Development and Psychopathology, 5,* 243–262.

Smith, B., & Sechrest, L. (1991). Treatment of aptitude × treatment interactions. *Journal of Consulting and Clinical Psychology, 59,* 233–244.

Stoolmiller, M. (1995). Using latent growth curve models to study developmental processes. In J. M. Gottman (Ed.), *The analysis of change* (pp. 105–138). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Tremblay, R. E., Pagani-Kurtz, L., Masse, L. C., Vitaro, F., & Pihl, R. O. (1995). A bimodal preventive intervention for disruptive kindergarten boys: Its impact through mid-adolescence. *Journal of Consulting and Clinical Psychology, 63,* 560–568.

Vorrath, H., & Brendtro, L. K. (1985). *Positive peer culture*. Chicago: Aldine.

Webster-Stratton, C., Kolpacoff, M., & Hollingsworth, T. (1988). Self-administered videotape therapy for families with conduct-problem children: Comparison with two cost-effective treatments and a control group. *Journal of Consulting and Clinical Psychology, 56,* 558–566.

Weisz, J. R., Weiss, B., Alicke, D. M., & Klotz, M. L. (1987). Effectiveness of psychotherapy with children and adolescents: A meta-analysis for clinicians. *Journal of Consulting and Clinical Psychology, 55,* 542–549.

Weisz, J. R., Weiss, B., Han, S. S., Granger, D. A., & Morton, T. (1995). Effects of psychotherapy with children and adolescents revisited: A meta-analysis of treatment outcome studies. *Psychological Bulletin, 117,* 450–468.

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