Prediction of Early-Onset Deviant Peer Group Affiliation

A 12-Year Longitudinal Study

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Context: Deviant peer group involvement is strongly related to onset, aggravation, and persistence of conduct problems during adolescence.

Objective: To identify early childhood behavioral profiles that predict early-onset deviant peer group involvement.

Design: A 12-year longitudinal study of behavioral development.

Setting: Fifty-three inner-city elementary schools in a large Canadian city.

Participants: A total of 1037 boys in kindergarten from low socioeconomic neighborhoods.

Main Outcome Measures: Annual self-reported deviant peer group involvement from 11 to 17 years of age.

Results: Kindergarten boys were at highest risk of following an early adolescence trajectory of deviant peer group affiliation if they were hyperactive, fearless, and low on prosocial behaviors but much less at risk if they scored high on only 2 of these dimensions. Family adversity had no main effect but substantially increased the risk of following an early adolescence trajectory of deviant peer group affiliation for boys with a profile of hyperactivity, fearlessness, and low prosocial behaviors.

Conclusions: Kindergarten boys from low socioeconomic areas who are hyperactive, fearless, infrequently prosocial, and raised in adverse family environments are at much heightened risk of engaging in deviant peer groups early in their development. Boys at high risk can be identified as early as kindergarten and should be targeted for preventive intervention.

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BEING PART OF A DEVIANT PEER group is associated with the onset, persistence, and aggravation of conduct problem symptoms during adolescence[1-5] and substance use.[6,7] Adolescents who join deviant peer groups are also at increased risk of injury, incarceration, and even death.[8] Findings from recent longitudinal studies[3,9-12] have shown that involvement in deviant peer groups increases the likelihood and frequency of physical aggression and violence, even after controlling for prior conduct problems or selection effects.

The present study investigates the predictive value of childhood behavioral profiles (eg, hyperactivity, fearlessness, and prosociality) on the developmental course of deviant peer group affiliation during adolescence. In addition, this study examines the effect of early family adversity in interaction with these behavioral profiles on the likelihood of deviant peer group affiliation. This article builds on previous work that identified 3 developmental trajectories of affiliation with deviant peer groups.[9] Two at-risk pathways were described as early adolescence and middle adolescence deviant peer group trajectories (**Figure 1**). Findings suggested that a quarter of the sample followed either one of these trajectories. Individuals who followed these 2 trajectories between the ages of 11 and 17 years accounted for most of the violent acts during this period. At each assessment, individuals on the early adolescence trajectory had the highest frequency of violence. Not much is known about early childhood predictors of deviant peer group trajectories, but studies[9,11,13,14] suggest that they share many risk factors with violent and nonviolent conduct problem symptoms.

Recent findings related to individual and contextual factors leading to violence imply significant interactions between temperamental and contextual factors, such as family adversity.[15-20] Children raised in a family environment characterized by young mothering, nonintact family, and poverty and who display individual risks, such as neuropsychological deficits or difficult temperament, are more at risk of showing conduct disorder symptoms during adolescence.[21-24] These individual-environment interactions appear to trigger a develop-

mental trajectory that has been identified as early-onset persistent type, as opposed to late-onset or adolescent-limited type, which is triggered more generally by contextual factors during adolescence.[22,25,26] In a cross-fostering analysis of criminality, Cloninger et al[27,28] found that adopted children who had a congenital predisposition (ie, biological parents were criminals) and postnatal predisposition (ie, inadequate parenting practices on the part of their adoptive parents) were more likely to become criminals as adults compared with children who displayed only 1 risk. Raine[29] found that 70.2% of all violence in their cohort was committed by children who displayed both family adversity and individual risks. Recently, important studies on the role of reduced autonomic activity and antisocial behavior have been published. These studies[19] are closely linked to research on the personality dimensions of psychopathy. This field of research has emphasized the role of hyperactivity, fearlessness, and lack of prosociality as enduring individual differences and temperament markers of future antisocial behavior and social selection of deviant peers.[17,30,31] These dimensions of temperament were shown to be highly heritable and relatively stable over time[32-34] and are the basis of more complex higher-order personality traits that appear later in life such as conscientiousness, neuroticism, and agreeableness.[34-37] In many studies,[21,33,38,39] high levels of hyperactivity and impulsivity in childhood have been related to conduct problems during adolescence. Because hyperactive children are more likely to be caught in a coercive cycle in their relationship with their parents[40] or to be rejected by their peers,[41-43] they may be more prone to use aggression in their relationships. Other studies[33,44,45] have found that fearlessness or low levels of anxiety increase the risk of later conduct problems. Finally, antisocial behavior has also been linked to lack of prosociality and helpfulness.[17,33,46-49] Children who are less empathic and helpful tend to be less concerned by distress and the negative effects they have on others.[50] Although many studies[51,52] have linked a given behavioral dimension, such as hyperactivity, to early conduct problems, some studies[30,33,53] suggest that taking 2 or even 3 dimensions into account can increase the predictive power. Past studies have provided some understanding of predictors of deviant peer group membership.[11,13,14,54] However, these studies[9,14] are of limited value when planning early prevention efforts because they assessed predictive factors at the end of the elementary school years or in middle school, when, in the worst cases, deviant peer group association has been or is about to be initiated.

The present study investigates prospectively how behaviors (hyperactivity, fearlessness, and prosociality) in kindergarteners and family adversity are related to differences in trajectories of involvement in deviant peer groups. As described recently, personality traits are involved in niche building that promotes continuity and stability.[34] As children seek or end up in peer environments that correlate with their traits, these peer groups can promote the persistence of trait-correlated behaviors by reducing opportunities for change. To our knowledge, this is the first study that specifically investigates the effect of early individual-environment interactions (behavioral profile vs family adversity) on the selection of peer contexts that facilitate conduct problems and violence. We hypothesized that boys who initiate a deviant peer group trajectory during early adolescence are more likely to display the following profile during kindergarten: high hyperactivity, high fearlessness, and low prosociality. We also hypothesized that the risk increases when boys with this profile live in a context of high family adversity, since it may not provide an optimal socialization environment for boys with an at-risk profile.

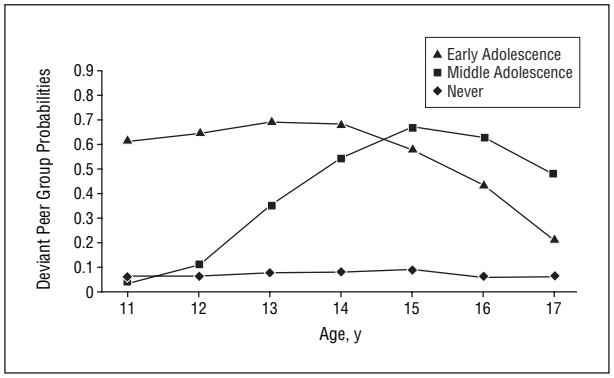

Figure 1. Developmental trajectories of deviant peer group affiliation throughout adolescence. Adapted from Lacourse et al.[9]

METHODS

STUDY PARTICIPANTS

Boys who participated in this research project were part of a longitudinal study that began in 1984. Eighty-seven percent of kindergarten teachers agreed to participate in the study and rated the behavior of 1161 boys. To control for cultural effects, the boys were included in the study if both their biological parents were born in Canada and their mother tongue was French. A total of 1037 French-speaking boys from kindergarten classes in 53 schools in low socioeconomic areas of Montreal, Quebec, participated in the study. Children had to be 5 years old before October of the year they entered kindergarten. Boys were assessed in kindergarten and between the ages of 11 and 17 years.

In this sample, 969 boys had at least 1 data point and 62 had missing data on the predictor variables. A total of 937 subjects were included in the analyses. The number of boys at each assessment ranged from 934 at the age of 11 years to 792 at the age of 17 years. A total of 73.8% had 7 data points, and only 9.3% had less than 3 data points. Attrition analysis identified only 1 variable in all the risk factors included in this study that could distinguish the boys who had less than 3 data points. These boys were more likely to come from a context of high family adversity (11.2% vs 7.1%; $\chi^2=3.94$; $P=.05$). Although the effect of family adversity is small, we cannot conclude that the data are missing completely at random; they are more likely to be missing at random. The estimation procedure used in this study accommodates data that are missing at random when the variables related to the missing data patterns are entered as covariates in the analysis. Our study uses an estimation procedure in the presence of missing data similar to the procedure used in hierarchical linear models.[55]

When first assessed in kindergarten, 67% of our study participants lived with both parents and 24% lived with their mothers only. The mean (SD) age of parents at the birth of the child was 25.4 (4.8) years for mothers and 28.4 (5.6) years for fathers. The mean (SD) number of school years completed by the parents was 10.5 (2.8) years for the mothers and 10.7 (3.2) years for the fathers. The educational level of mothers and fathers in

Table 1. Proportions of Boys in Kindergarten Behavioral Profiles

Profile	No. (%) of Boys (N = 966)
1 (+ Hyperactivity, + fearlessness, – prosociality)	123 (12.7)
2 (+ Hyperactivity, + fearlessness, + prosociality)	114 (11.8)
3 (+ Hyperactivity, – fearlessness, – prosociality)	106 (10.9)
4 (+ Hyperactivity, – fearlessness, + prosociality)	88 (9.1)
5 (– Hyperactivity, + fearlessness, – prosociality)	144 (14.9)
6 (– Hyperactivity, + fearlessness, + prosociality)	169 (17.4)
7 (– Hyperactivity, – fearlessness, – prosociality)	112 (11.6)
8 (– Hyperactivity, – fearlessness, + prosociality)	110 (11.4)

this sample is lower than a representative sample of the Quebec population. The mean (SD) number of years of education in Quebec at that time was 12.0 (2.6) years for mothers and 12.2 (3.8) years for fathers. The mean family income, when the boys were 10 years old, was lower than that for families with children in Canada that year.[53]

MEASURES

Deviant Peer Group Affiliation

As part of the 7 annual assessments from ages 11 through 17 years, participants were asked the following question: "During the past 12 months, were you part of a group or a gang that did reprehensible acts?" Use of such a dichotomous item to measure deviant group membership has a long tradition in criminologic studies of gangs and delinquent peer effects.[3,13] Criterion validity was supported by a moderate to strong association of deviant peer group affiliation with measures of delinquency, such as person offenses, property offenses, drug sales, and drug use.[3,5] Affiliation with a deviant peer group at the age of 11 years is significantly correlated ($P<.001$) with self-reported measures of drug use ($r=0.23$), theft ($r=0.37$), vandalism ($r=0.28$), and number of friends being arrested by the police ($r=0.37$). It is also correlated with teachers' reports of physical aggression ($r=0.18$) and opposition ($r=0.18$) and with classmates' reporting of physical aggression ($r=0.21$). Prevalence of deviant peer group affiliation varies from the age of 11 to 17 years in the following fashion: 12.3%, 13.4%, 16.9%, 19.0%, 19.2%, 15.1%, and 10.1%, respectively.

Childhood Behavioral Profiles

Teachers rated boys' behavior in kindergarten with 28 items from the Social Behavior Questionnaire and 10 items from the Prosocial Behavior Questionnaire. Hyperactivity was assessed using 2 items: restless, runs about or jumps up and down; and does not keep still, squirmy, or fidgety (Cronbach $\alpha=.89$). Fearlessness was assessed using 3 items that were inversely coded: worried, fearful (afraid of new things), and cries easily (Cronbach $\alpha=.71$). Prosociality was assessed using 10 items: tries to stop quarrels, invites bystanders to join in, tries to help someone hurt, helps pick up things someone else dropped, praises work of less able children, shows sympathy toward someone who made a mistake, helps children having difficulty with a task, helps children who are sick, comforts crying or upset children, and helps clean up mess made by someone else (Cronbach $\alpha=.92$). Teachers were asked to rate boys during the spring of their kindergarten year when these teachers had already known the boys for more than 6 months. Teachers had to indicate on a Likert-type scale whether the items did not apply (0), applied sometimes (1), or applied often (2). The correlations between these dimensions were low, not greater than 0.13. Descriptive statistics for these dimensions were hyperactivity (mean=1.39, median=1, mode=0, SD=1.44), fearlessness (mean=1.47, median=1, mode=0, SD=1.57), and prosociality (mean=8.08, median=8, mode=10, SD=4.98).

Family Adversity

Six variables were used to index family adversity: (1) mothers' occupational status, (2) fathers' occupational status, (3) mothers' educational level (number of years in school), (4) father's educational level (number of years in school), (5) mothers' age at the birth of their first child (age in years), and (6) family structure (intact or not intact). This index reflects the quality of the family environment during the boys' kindergarten year.[56] Boys who scored higher than the 75th percentile were coded 1, thus suggesting that they live in a family with multiple disadvantages.

Physical Aggression

We also used physical aggression as a control variable, since it was found to be predictive of the outcome in other studies.[13,14] Physical aggression in kindergarten was assessed using the following 3 items: fights with other children; kicks, bites, or hits other children; and bullies or intimidates other children (Cronbach $\alpha=.78$).

Statistical Analyses

Statistical analyses used in this study build on previous results.[9] A semiparametric mixture model was used to single out these trajectories.[57,58] We used a person-oriented approach also similar to a previous study.[53] A cutoff at the median score of the 3 behavioral scales was used to create 8 orthogonal behavioral profiles. Boys below the 50th percentile were considered low on a specific dimension, whereas boys at or above the 50th percentile were considered high on a specific dimension. The prevalence of participants in each profile is presented in **Table 1**.

This approach reduces potential multicollinearity by reducing correlation across the 3 dimensions. The 7 dummy-coded behavioral profiles were first entered into the group-based trajectory analysis to describe the proportion of boys in each profile who followed an early adolescence, middle adolescence, or never deviant peer group trajectory. In a second step, the 7 behavioral profiles and family adversity were simultaneously included in the trajectory analysis as main and interaction effects while controlling for the main and potential interaction effect of physical aggression. Specifically, they were added as covariates, predicting the probability of trajectory group membership. This probability is specified to follow a multinomial logit function. The multinomial logit function is a well-suited statistical model for linking these profiles to the 3 distinct developmental trajectories.[59] This model is a generalization of the more common logistic regression model in which the outcome is a dichotomous variable.

RESULTS

We began by investigating the predictive power of the 8 kindergarten behavioral profiles in terms of the likelihood of the boys following an early adolescence or middle adolescence trajectory from the ages of 11 to 17 years. The proportion of boys within each behavioral profile who followed a deviant peer group trajectory was computed using coefficients from the multinomial regression model.

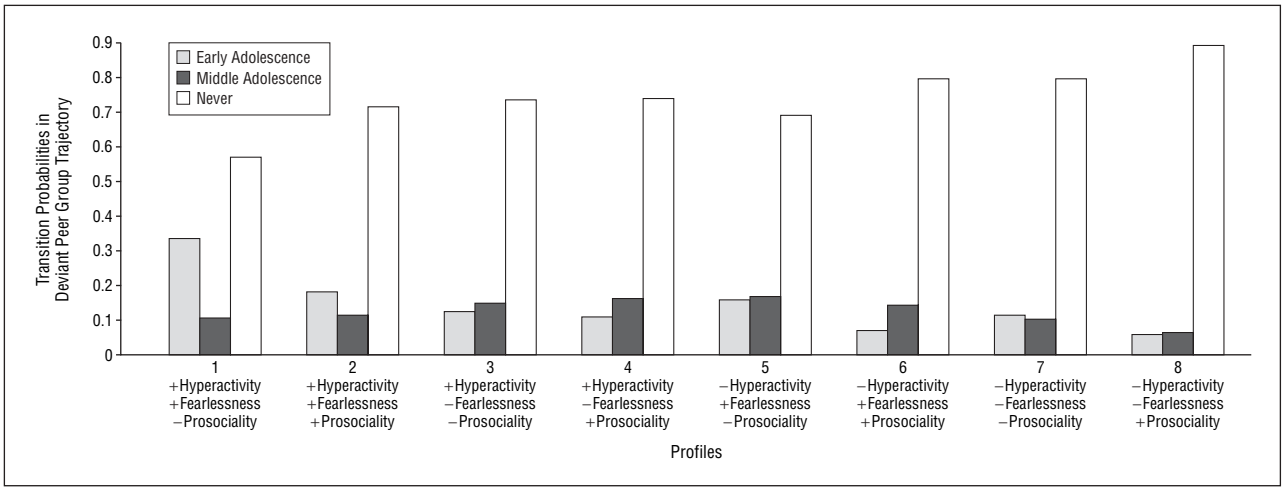

Figure 2. Proportion of boys in kindergarten behavioral profiles who followed an early or middle adolescence deviant peer group trajectory.

Table 2. Multinomial Logistic Regression: Kindergarten Behavioral Profiles and Family Adversity Predicting Deviant Peer Group Trajectories

	OR (95% CI)	
	Early Adolescence vs Never	Middle Adolescence vs Never
Family adversity	0.87 (0.46-1.63)	0.90 (0.44-1.49)
Profiles		
1 (+ Hyperactivity, + fearlessness, – prosociality)	6.68 (1.84-24.29)	2.69 (0.51-14.30)
2 (+ Hyperactivity, + fearlessness, + prosociality)	3.78 (1.02-14.01)	2.51 (0.54-11.59)
3 (+ Hyperactivity, – fearlessness, – prosociality)	2.77 (0.69-11.13)	3.10 (0.70-13.74)
4 (+ Hyperactivity, – fearlessness, + prosociality)	2.09 (0.48-9.12)	3.35 (0.77-14.59)
5 (– Hyperactivity, + fearlessness, – prosociality)	3.81 (1.05-13.87)	3.49 (0.84-14.59)
6 (– Hyperactivity, + fearlessness, + prosociality)	1.46 (0.36-5.99)	2.72 (0.66-11.13)
7 (– Hyperactivity, – fearlessness, – prosociality)	2.32 (0.58-9.30)	2.25 (0.36-8.76)
8 (– Hyperactivity, – fearlessness, + prosociality)	NA	NA
Family adversity and profile 1	4.18 (3.31-13.87)	1.54 (0.13-18.92)

Abbreviations: CI, confidence interval; NA, not applicable; OR, odds ratio.

Unless specified otherwise in the text, significance tests ($\alpha = .05$) were used to compare the 7 risk profiles with the no-risk profile. Three profiles were significantly more likely to follow an early adolescence trajectory. As presented in **Figure 2**, 33% of boys who displayed profile 1 (+ hyperactivity, + fearlessness, – prosociality), 18% in profile 2 (+ hyperactivity, + fearlessness, + prosociality), and 15% in profile 5 (–hyperactivity, + fearlessness, –prosociality) followed an early adolescence trajectory. At the opposite end of the spectrum, only 5% of the group that did not show any of the 3 dimensions associated with risk followed this trajectory. Using contrast analysis, we found that the proportion of boys following an early adolescence trajectory was significantly higher for those displaying all 3 risk factors (profile 1) compared with all other behavioral profile groups. No kindergarten behavioral profile was significantly related to the middle adolescence trajectory.

In another model, we introduced family adversity in interaction with the 7 profiles while controlling for physical aggression in kindergarten as the main and interaction effect with family adversity and also the 7 profiles. Since physical aggression did not show any significant effect on the trajectory probabilities, it was eliminated from this model. In a final model presented in **Table 2**, profile 1 (+ hyperactivity, + fearlessness, – prosociality; odds ratio [OR], 6.68), profile 2 (+ hyperactivity, + fearlessness, + prosociality; OR, 3.78), and profile 5 (– hyperactivity, + fearlessness, – prosociality; OR, 3.81) remained significantly related to the early adolescence trajectory. No main effect of family adversity was seen on trajectory group membership, but a significant interaction effect (OR, 4.18) was seen between behavioral profile 1 (+ hyperactivity, + fearlessness, – prosociality) and family adversity. In **Figure 3**, 55% of boys who displayed profile 1 (+ hyperactivity, + fearlessness, – prosociality) and lived in high family adversity compared with 26% of boys who displayed the same profile and lived in a low family adversity environment followed an early adolescence trajectory. Kindergarten boys who displayed the no-risk behavioral profile in either type of family environment were far less likely to follow an early or middle adolescence trajectory (approximately 5%).

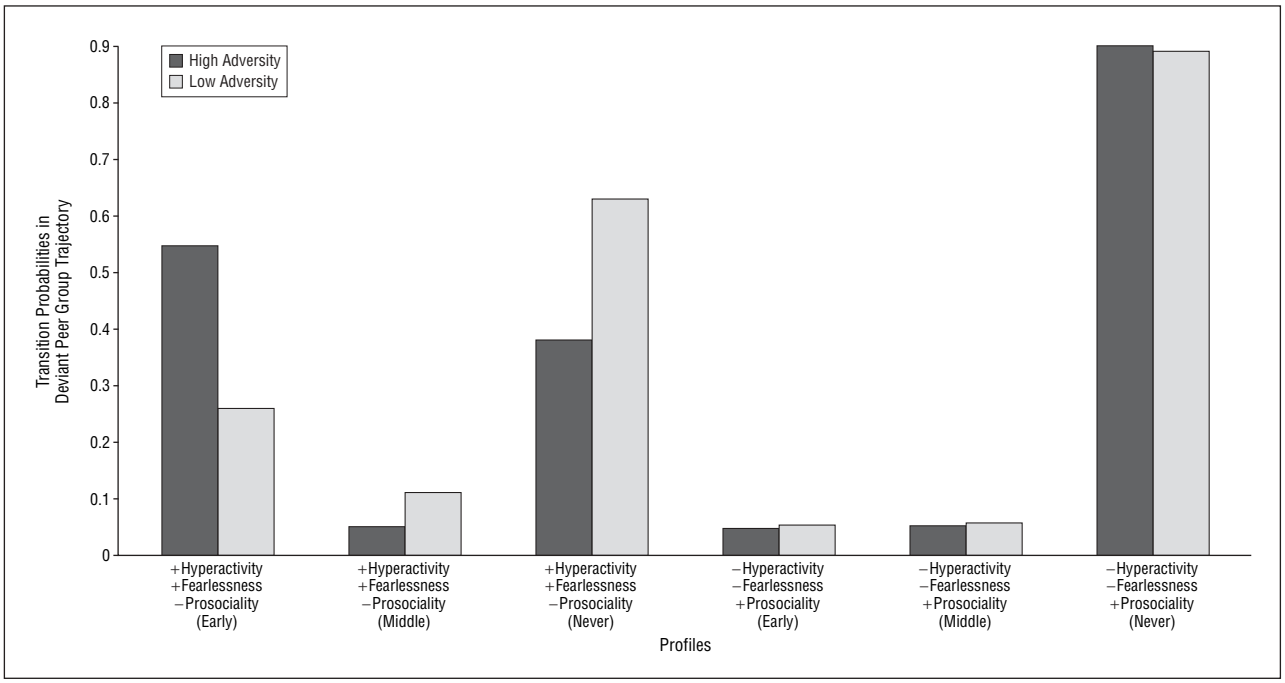

Figure 3. Proportions of boys in kindergarten behavioral profiles, with and without family adversity, who followed an early or middle adolescence deviant peer group trajectory.

COMMENT

The aim of the present study was to identify behavioral profiles during the kindergarten years that are strongly associated with an early-onset deviant peer group affiliation. Within a person-oriented framework,[53,60] we highlighted an interaction between teacher-rated kindergarten behavioral profiles and family adversity as described by parents. This study confirms key findings from other longitudinal studies[3,11,13,61,62] that suggest that childhood behaviors and family environment are related to deviant peer group involvement during adolescence. However, this study is the first one to show that behaviors assessed by teachers as early as kindergarten are predictive of an early-onset deviant peer group trajectory.

Specifically, we found that a behavioral profile characterized by high hyperactivity, high fearlessness, and low prosociality is by far the best predictor of early affiliation with deviant peers. A similar profile was shown to be predictive of early-onset antisocial behavior and conduct disorder in numerous studies.[17,19,44,49,53] As noted in some theoretical models,[63] affiliation with deviant friends and conduct problems share the same set of predictors in childhood. The results from the present study suggest that they may share a common origin that begins before school entry.[64] Our results also support an expansion of social and personality theories suggesting that combinations of lower-order traits related to underlying higher-order traits of neuroticism, conscientiousness, and agreeableness might play a function in the type or quality of social grouping of children and adolescents.[34] These groupings may be present from early childhood onward. As suggested by previous studies,[30,44,65] the role of fear is important in preventing or enhancing antisocial behaviors. Our results indicate that this may also be the case for early affiliation with deviant peer groups.[66] Boys who are fearless take more risks and may be less sensitive to the negative reaction most other children have to their deviant behaviors. A lack of prosociality has also been described as an important dimension of an antisocial profile.[17,45,47,67] Children who lack empathy, are not helpful, and have hyperactivity or low levels of anxiety are also more likely to get involved early on in deviant peer groups. This dimension is central to the concept of psychopathy. The lack of sympathy and empathy for others might predispose boys to become more violent offenders within deviant peer groups. This hypothesis should be tested more thoroughly in future studies.

Behavioral characteristics in kindergarten do not predict the onset of deviant peer group affiliation after early adolescence.[22] Events that happen later in the lives of these boys possibly trigger deviant peer involvement in late adolescence. Predictors that are more proximal to the outcome, such as having gang members in the community or in the family,[14] school failure,[14] low self-esteem and depression, or other stressful life events, may better explain why some youth initiate deviant peer group involvement during middle adolescence.

Family adversity did not show any main effect on the outcome variable. This suggests that family adversity in low socioeconomic areas might not be a sufficient risk for following a deviant peer group trajectory during adolescence. On the other hand, it appears to be an important moderator of the relationship between kindergarten behavioral profiles and early deviant peer group association. High hyperactivity, high fearlessness, and low prosociality combined with high family adversity increased the probability of following an early-onset trajectory by a factor of 2 when compared with boys with the same profile raised in low–family adversity environments. This important interaction has not been highlighted in previous studies. An

environment of high family adversity might increase the likelihood of coercive parenting styles, lack of rule setting, and poor supervision, which represent an inadequate socialization context for boys with hyperactivity, fearlessness, and few prosocial behaviors. Bad neighborhoods, within which these families foster their children, could also increase the risk of early affiliation with structured gangs.[13,68] Parenting practices and neighborhood characteristics should be investigated in future studies as important mediator or moderator variables. However, antisocial personality disorder in parents could also be an important component of deviant peer group affiliation and conduct problems through genetic, biological, and environmental influences.[69,70]

Some study limitations need to be mentioned. First, although the present study has shown the importance of individual risk factors in the likelihood of following a distinctive deviant peer group trajectory during adolescence, we cannot rule out the fact that other unmeasured risk factors may play a role. For example, the behavioral dimensions we measured are most likely related to both genetic factors[32,69,71-73] and parental practices.[46,74] Second, the study used data on deviant groups only during the preadolescence and adolescence period. It is clear that this phenomenon starts before the age of 11 years[41,64,75] and that future research should focus on developmental trajectories of early childhood affiliation with deviant siblings and friends. Third, the use of a general measure of deviant peer group affiliation is not optimal. Although this item is a valid measure of deviant group membership,[9] some risk factors may differentiate violent gang members from other types of deviant friends, such as those who smoke marijuana. Our measure could not take this qualitative heterogeneity into account. Fourth, because our sample is restricted to French-Canadian white boys from poor neighborhoods of Montreal, our findings might not extend to populations with other socioeconomic backgrounds. A replication of this study should include samples from different continents where deviant peer groups and their more extreme form, street gangs, are more prevalent. Cultural differences in onset, desistance, and shapes of deviant peer group trajectories could make these parameters vary in important ways. On the other hand, we would expect that early behavioral predictors would be the same, since more distal socialization agents are less active at an early age.

Our findings strongly support the idea that early primary prevention is necessary to reduce the negative impact of early affiliation with deviant peer groups. Development of prevention programs that target both individual and family risk factors early in childhood have successfully reduced the likelihood of deviant peer group involvement. Recent findings of randomized prevention experiments show that reduced involvement in deviant peer groups reduces the likelihood of following a trajectory of more frequent violent behaviors during adolescence.[76] During their first contact with at-risk families, professionals such as physicians, psychiatrists, and psychologists could easily assess children who display these multiple risks and direct these children and their families to a prevention program at a younger age, considering that intervention programs that try to reduce gang involvement in adolescence are generally ineffective.[77,78]

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