

Controlling Parenting and Physical Aggression During Elementary School

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The goal of the present study was to examine whether controlling parenting contributes to the problem of physical aggression. Developmental trajectories of children's physical aggression were modeled from yearly teachers' ratings, from ages 6 to 12. Multinomial logistic regressions ($N = 1,508$) served to identify risk factors that distinguish children who display different levels of physical aggression throughout grade school. Results revealed that being a boy and having a reactive temperament were important child predictors. Parental separation and an early onset of motherhood were also significant risk factors. Finally, mothers' controlling parenting increased the odds of following the highest trajectory of physical aggression, above and beyond the previous risk factors.

Children who hit, kick, and fight with others are more than merely disruptive and display physical aggression. Although we do not necessarily worry when toddlers use their physical force against someone to express their anger or get something they want, we generally feel more anxious when we see older (and stronger) adolescents display similar fighting behaviors. The present study addresses the precursors of high childhood physical aggression.

Childhood Physical Aggression

It is still often thought that physical aggression starts and peaks during adolescence (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002; U.S. Surgeon General, 2001). This common view stems from research that focused on offense records, with data limited to adolescents and adults. Recent longitudinal studies that started to measure aggression among younger

populations (see Tremblay & Nagin, 2005, for a review) reveal that physical aggression starts early in infancy in that its frequency increases until about 3 years of age and then declines up to adolescence (Broidy et al., 2003; Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007; Nagin & Tremblay, 1999; National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN], 2004; Tremblay et al., 2004). These developmental findings suggest that (a) physical aggression is a *natural* behavior in social interactions during early childhood and (b) it is replaced over time by more sophisticated alternatives (Tremblay, 2003). The key developmental task is thus about self-regulation (Paus, 2005; Tremblay & Nagin, 2005).

Whereas most preschoolers do learn to control their aggressive reactions and use alternative strategies to reach their goals, not all do. In fact, studies examining the different developmental trajectories among the population of elementary school children consistently report that a small group of children (about 5%) follow a high and stable trajectory of physical aggression (Broidy et al., 2003; Nagin & Tremblay, 1999; NICHD ECCRN, 2004). These children show a high level of physical aggression as toddlers and do not learn as well to self-regulate. Rather, they persist in using physical aggression up to their adolescence and adulthood.

Though childhood physical aggression is a specific problem, it is rarely measured as such because most

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measures target a wider range of disruptive behaviors. For example, in the Child Behavior Checklist (Achenbach & Edelbrock, 1983) Aggression scale, only 2 of the 23 items clearly refer to fighting behaviors. The use of such broad measures confounds physical aggression with other troublesome behaviors such as hyperactivity and opposition (Tremblay, Loeber, Charlebois, Larivée, & Leblanc, 1991). Though these problems do tend to correlate (e.g. Hinshaw, Lahey, & Hart, 1993; Kerr, Tremblay, Pagani-Kurtz, & Vitaro, 1997), they do not necessarily develop the same way over time. In fact, Nagin and Tremblay (1999) showed that among boys who displayed a chronic path of physical aggression, only half of them were also chronically oppositional and only 13% were also chronically hyperactive. Furthermore, these different problem behaviors do not equally predict later aggression. Nagin and Tremblay found that although opposition led to covert delinquency (e.g., stealing), physical aggression led to overt and more violent forms of delinquency.

In sum, physical aggression is a specific problem behavior that a small group of children fail to inhibit. And although physically aggressive behaviors are natural and common among toddlers, it becomes worrisome when older children fail to self-regulate. Indeed, physical aggression in grade school is a major risk factor for violence in adolescence and adulthood (Broidy et al., 2003). It is also associated with many other concurrent and later problems, such as social rejection (Coie, Lochman, Terry, & Hyman, 1992; Dodge, 1983), academic problems (e.g., DeRosier, Kupersmidt, & Patterson, 1993; Vitaro, Brendgen, Larose, & Tremblay, 2005), depression (Panak & Garber, 1992), and alcohol and drug abuse (e.g., Dobkin, Tremblay, & Sacchitelle, 1997).

Given the number and the severity of problems associated with childhood physical aggression, a large body of research has been conducted to identify its antecedents. The characteristics of both the children (e.g., sex, temperament) and their family (e.g., family status, parents' education) have been examined. In addition to these stable factors, parental practices have also been associated with children's antisocial behaviors.

Controlling Parenting

When reviewing the parenting literature, one soon realizes that the criterion constructs tend to be broad, such as "adjustment" or "externalizing" problems. Similarly, on the predictors' side, parenting measures tend to be multifaceted, such as harsh (e.g., Patterson, Reid, & Dishion, 1992) or authoritative (Baumrind,

1967, 1971, 1978) parenting. Harsh parenting refers to inconsistency and hostile discipline (e.g., physical punishment), and, not surprisingly, it has been associated with externalizing problems in children (Conger, Neppl, Kim, & Scaramella, 2003; Deater-Deckard & Dodge, 1997; Dodge, Bates, & Pettit, 1990). Regarding the promotion of child adaptation, authoritative parenting (i.e., provision of structure in a warm and democratic way) has often been found to be a useful construct (e.g., Baumrind, 1967, 1978; Dornbush, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Maccoby & Martin, 1983).

Though such typologies have been fruitful in generating consistent findings, it is valuable to isolate their components and explore their unique effects. For example, Steinberg, Elmen, and Mounts (1989) "unpacked" the authoritative construct (i.e., acceptance, behavioral control, and psychological autonomy) and showed that each component made an independent contribution to school success. This study brought renewed scientific attention to the parental dimension of psychological control (vs. psychological autonomy), which needs to be distinguished from behavioral control (Barber, 1996). The provision of structure (e.g., guidelines, limits) inherent to behavioral control fosters healthy development. In contrast, the power assertion (e.g., pressure, intrusion) inherent to psychological control (also called *controlling* parenting) is detrimental for children (see Barber, 2002, and Grolnick, 2003, for reviews). The main goal of the present study was to examine the relationship between two specific constructs, controlling parenting and childhood physical aggression, while taking into consideration important background variables.

When research on externalizing problems focuses on finite parenting variables instead of typologies, the lack of both warmth and behavioral control (two components of authoritative parenting) has arisen as important risk factor (Rothbaum & Weisz, 1994; Serbin & Karp, 2004; Tremblay, 1995). In comparison, there is little work examining the lack of psychological autonomy, probably because the renewed interest in this dimension is recent and because it has been thought to relate mostly with internalizing problems (e.g., Barber, Olsen, & Shagle, 1994; Siqueland, Kendall, & Steinberg, 1996). Yet, some recent work suggests that psychological control relates to externalizing problems as well. For example, a meta-analysis found that coercive control and low synchrony (analogous to psychological control) were significant risk factors for children's externalizing problems (Rothbaum & Weisz, 1994).

Controlling Parenting and Physical Aggression

A few studies on psychological control did examine its relation to externalizing problems, but the majority was conducted with adolescents (Barber & Olsen, 1997; Conger, Conger, & Scaramella, 1997; Eccles, Early, Frasier, Belansky, & McCarthy, 1997; Herman, Dornbush, Herron, & Herting, 1997; Mason, Cauce, Gonzales, & Higara, 1996). In essence, positive correlations were found between maternal psychological control and adolescents' tendency to show antisocial or delinquent behaviors, such as stealing, using drugs, and damaging property.

We are aware of three studies that focused on young children. One of them analyzed data from the 1970 British Cohort Study, a large population survey (Thompson, Hollis, & Richards, 2003). The authors extracted an "authoritarian" scale (e.g., "A child should not talk back to his parents"). The outcome measure was children's conduct problems (e.g., steals, fights, disobeys), also rated by mothers. Results of logistic regressions revealed that children whose mothers were more controlling when they were 5 years old were more likely to display severe conduct problems (top 7%), both concurrently and 5 years later.

A recent study targeted the construct of physical aggression and explored its precursors. In this project of the NICHD ECCRN (2004), mothers reported how much their children displayed aggressive behaviors (e.g., fights, attacks, destroys) from ages 2 to 8, and developmental trajectories were modeled. Among the putative familial risk factors, maternal reports of less democratic attitudes were associated with higher trajectories of child aggression.

Only one study specifically pinpoints the concepts of both physical aggression and psychological control. It was conducted with nursery school-age children in Russia (Hart, Nelson, Robinson, Olsen, & McNeilly-Choque, 1998). The authors extracted a maternal psychological control scale following the definition by Barber (1996); e.g., "I am less friendly when my child doesn't see things my way") and found that it correlated significantly with children's overt physical aggression (e.g., hits, kicks, pushes), as rated by their preschool teachers.

Finally, additional evidence of the detrimental effect of controlling parenting on children's externalizing problems comes from studies on autonomy support, the opposite of psychological control. These studies on autonomy support are anchored in self-determination theory (SDT; Deci & Ryan, 1980, 1985, 1991, 2000). In SDT, autonomy refers to volition or the full endorsement of one's actions, and it is posited as

an essential psychological need, along with competence and relatedness. Autonomy is thus a distinct concept from independence (Chirkov, Ryan, Kim, & Kaplan, 2003), and the satisfaction of this universal need was found to relate to better self-regulation, well-being, and performance in several life domains (Deci & Ryan, 2000). In the family context, studies indicated that maternal autonomy support positively relates to children's self-regulation, learning, and adjustment (e.g., Grolnick, Gurland, DeCoursey, & Jacob, 2002; Grolnick & Ryan, 1989; Joussemet, Koestner, Lokes, & Landry, 2005).

SDT is in line with Barber (1996, 2002) and other parenting researchers (e.g., Baumrind, 1971) by pointing to the undermining and pathogenic effects of controlling parenting (Grolnick, 2003; Ryan, Deci, & Grolnick, 1995; Ryan, Kuhl, & Deci, 1997). Growing up in an environment that thwarts the need for autonomy may pave the way for physical aggression because it is associated with negative affect and poor self-regulation (e.g., Assor, Roth, & Deci, 2004), central psychological factors in children's aggression (e.g., Eisenberg, Fabes, Nyman, Bernzweig, & Pinuelas, 1994). SDT thus offers an interesting perspective to the study of physical aggression, as it pertains to the "social psychology of self-regulation" (Ryan, 1995, p. 421).

Present Study

The present project brings together methodological strengths of the aforementioned studies. Similarly to Hart et al. (1998), we pinpointed the constructs of controlling parenting and childhood physical aggression (teacher rated). An additional strength is the use of developmental trajectories of physical aggression, similarly to the project of NICHD ECCRN (2004). This group-based approach permits us to identify children who do not show normative levels of physical aggression over time. The central goal of this study was thus to explore whether controlling parenting represents a risk to follow the problematic path of chronic physical aggression, above and beyond children's characteristics and sociodemographic background. Predictors such as the child's sex and temperament, the family status, socioeconomic indexes, and maternal characteristics were selected for their empirical significance. Finally, because familial risk factors are sometimes found to have a differential impact on children, we examined whether the role played by family status and parenting styles was moderated by children's characteristics.

Method

Participants

This longitudinal study started in 1986–1987, when kindergarten children ($N = 6,397$) were randomly selected from all French-speaking schools in the Canadian province of Québec. Toward the end of the kindergarten year (mean age = 6 years, $SD = 0.3$ year), teachers and parents were asked to rate participants' behavior with the Social Behavior Questionnaire (SBQ; Tremblay et al., 1991). From the pool of children who had both teacher and parent ratings ($N = 4,659$), 1,000 boys and 1,000 girls were selected at random and constituted a representative sample for follow-up. This population-based sample was used in the present study ($N = 1,993$).

This sample of children was predominantly White and French speaking. When children were first assessed, a majority (83%) were primarily living with both of their biological parents. The remaining children were living with their mother (10% mother only; 4% with mother and her spouse), and 3% were living in other family arrangements (e.g., father, adoptive parents). According to the Canadian socioeconomic index for occupation, these families were mainly middle class (Blishen, Carroll, & Moore, 1987). At the birth of their first child, mothers were, on average, 24.6 years old and fathers were 26.9 years old. At the beginning of the study, mothers and fathers had completed an average of 12 years of education.

Procedure and Measures

Dependent Variable: Physical Aggression

Every spring from kindergarten to Grade 6, teachers rated participants' behavior with the SBQ (Tremblay et al., 1991). The physical aggression subscale asks how often (0 = *never*, 1 = *sometimes*, or 2 = *often*) a participant fights with other children; how often she or he kicks, bites or hits them; and how often she or he bullies or intimidates others. Internal consistency for this 3-item scale was high, with Cronbach's alphas ranging from .81 to .88 over assessment ($M = 0.83$). We used the seven yearly scores to model children's developmental trajectories of physical aggression (see Data Analysis below).

Attrition. All participants were included in the trajectories analyses because the analyses were conducted using maximum likelihood estimation (Jones, Nagin, & Roeder, 2001). The maximum likelihood estimate of a parameter is the value that is most likely to have resulted in the observed data. When data are missing, the likelihood is computed separately for

cases with complete data on only some variables and for cases with complete data on all variables. These two likelihoods are then maximized together to find the estimates.

Of the 1,993 participants, 443 (22.2%) had physical aggression data on all seven assessments, 678 (34%) had six, 495 (24.5%) had five, 249 (12.5%) had four, 89 (4.5%) had three, 28 (1.4%) had two, and 11 (0.6%) had only one. In third grade, teachers completed the SBQ for girls only (there were thus aggression data missing for boys at Time 4).

Independent Variables

Temperament. When their children were 6 and 7 years of age, mothers filled out the Dimensions of Temperament Survey (Lerner, Palermo, Spiro, & Nesselroade, 1982). Mothers indicated whether each item applied or not to their child (1 or 0). We selected the Reactivity Subscale (six items) because it reflects the construct of anger/frustration, an emotional aspect of temperament that tends to be associated with externalizing problems (e.g., Eisenberg et al., 2001). Examples of items are "When my child reacts to something, his/her reaction is intense" and "Sunlight bothers my child's eyes." An average reactivity score was computed for each participant, across both years (Cronbach's $\alpha = .72$, $M = 2.79$, $SD = 1.51$).

Mother and family characteristics. Information about the family was gathered through mothers' questionnaires, at the beginning of the study. The selected familial characteristics were mothers' age at birth of their first child, their education level in number of years, and their occupational prestige (Blishen et al., 1987). This socioeconomic index measure is based on the average income and education associated with occupations in Canada. Finally, mothers also reported with whom the child was living. From this information, a binary variable was constructed to identify whether the child was living with both of his biological parents at age 6. All the family information was gathered during the 1st year of the study (and the 2nd, to complete missing education data). The variables mentioned above have been shown to relate to physical aggression (e.g., Nagin & Tremblay, 1999) and behavioral problems in general (Huesmann, Eron, Lefkowitz, & Walder, 1984; Velez, Johnson, & Cohen, 1989). These demographic data were available for fathers, but when both mothers' and fathers' data were entered in the same model, only the maternal characteristics were found to contribute significantly.

Parenting. Two parenting dimensions were extracted from mothers' answers to the Emotional Climate for Children Questionnaire (Falender &

Mehrabian, 1980). The original aim of this 46-item scale was to measure parental attitudes that were thought to elicit feelings of pleasure, dominance, and stimulation in the child. For the present study, we created two scales assessing mothers' own experience and attitude in child rearing, they are the following: (a) their dissatisfaction (vs. pleasure) and (b) their controlling attitude (vs. autonomy support). Eight items per construct were selected on the basis of a factor analysis and theory (Barber, 2002; Deci & Ryan, 2000).

Answer options for these two scales ranged from 1 (*strongly agree*) to 4 (*strongly disagree*), and mean scores were computed for each scale. The Dissatisfaction Scale consisted of the following eight items: "I look forward to the time when my child requires less care and attention from me" (+); "Having a child has been a very large burden for me" (+); "When I've finished my day's work, I need time away from my child" (+); "Staying at home with a child is more boring than I thought it would be" (+); "I like to be with my child" (-); "Having a child to care for is a lot of fun" (-); "It is very interesting to spend time watching my child" (-); "When I have free time, I'd rather be with my child than read a book" (-).

The Controlling Scale consisted of the following eight items: "My child must try every food I serve" (+); "My child should be aware that what I say goes" (+); "I think my child should comply with all my requests" (+); "I have tried to teach my child early who makes the decisions in our family" (+); "I try not to insist that my child always obey me" (-); "My child can make the decision not to eat food he really dislikes" (-); "I don't like to place a lot of rules on my child" (-); "One of the worst things a parent can do is insist that the child obeys their every command" (-).

For the Dissatisfaction Scale, Cronbach's alphas were .74 at Time 1 (T1) and .76 at Time 2 (T2). The internal consistency was lower for the Controlling Scale, with Cronbach's alphas of .62 at T1 and .61 at T2 (across both years: $\alpha = .76$, $M = 2.53$, $SD = 0.40$). In order to increase the reliability of both scales, we computed total scores across ages 6 and 7 by averaging the individual item scores across the two times of measurement (Dissatisfaction: Cronbach's $\alpha = .84$, $M = 1.3$, $SD = 0.37$; Controlling: Cronbach's $\alpha = .76$, $M = 2.53$, $SD = 0.40$).

Parental antisociality. When children were 15.5 years of age, each parent's psychological difficulties was assessed with the Diagnostic Interview Schedule (Robins, Helzer, Croughan, Williams, & Spitzer, 1981). The measure of antisociality used lifetime count of positive adult behavior problems (*Diagnostic and*

Statistical Manual of Mental Disorders [DSM], third edition, revised criteria; American Psychiatric Association, 1987). These symptoms are grouped under 10 categories, such as failure to conform to social norms of lawful behavior, irritable and aggressive behavior, failure to plan ahead, and impulsive behavior.

Antisociality data were available for 1,136 mothers, who did not differ systematically from mothers in the larger group. Though antisociality scores were available for 875 fathers, they were not used in the following analyses to prevent the use of a smaller and unrepresentative sample (separation rate of only 6% vs. 17%).

Data Preparation and Data Analysis

We made all independent factors binary variables by transforming continuous risk factors into categorical factors: a high-risk group (top tertile) versus a low-risk group (below 66th percentile). For maternal antisociality, the high-risk group comprised the top 12% of mothers with more positive adult symptoms (i.e., two or more). Although dichotomization of risk factors does not necessarily diminish statistical power (Farrington & Loeber, 2000), it simplifies the interpretation of logistic regressions. The results of the analyses were substantively identical when risk factors were entered in their continuous form.

The central statistical analyses consisted of two main steps. First, we identified the developmental trajectories of physical aggression using a semiparametric mixture model, explained elsewhere (e.g., Nagin, 1999; Roeder, Lynch, & Nagin, 1999). In the second step, we examined how the putative predictors help distinguish each aggression trajectory from one another using multinomial logistic regressions. We also tested whether the family status and parenting measures interacted with children's characteristics (temperament, sex) in their influence on childhood physical aggression.

Results

Childhood Physical Aggression

Developmental Trajectories Description

We identified groups of children showing distinct patterns of aggression over time using a semiparametric mixture model. This model allows identifying population heterogeneity because its parameters are free to differ across groups (Nagin & Tremblay, 1999). Models with two to four groups were estimated, based on the Bayesian information criterion (BIC).

Outputs from semiparametric mixture model estimation include the shape of each trajectory (patterns of stability and variations); the estimated proportion of the population belonging to each of them; and, at the individual level, the estimated posterior probability of participants belonging to each trajectory group. Thus, for each child, the model coefficients are used to calculate the probability that he or she belongs to each group. The posterior probabilities are on a scale of 0–1, where a child rated by teachers as highly aggressive should have a probability of belonging to a high-aggression group that is near 1, whereas his or her probability to belong in a low-aggression trajectory should be closer to 0.

Developmental Trajectories Findings

The model with four trajectories was identified as best fitting the data (BIC criteria; Nagin, 2005). Figure 1 depicts the four trajectory groups, along with the estimated proportion of children in each group (total $N = 1,993$). The first group of children displayed almost no physical aggression throughout grade school. They were estimated to account for approximately 33% of the sample. The second, largest group (approximately 45% of the sample) showed a stable trajectory of low levels of physical aggression. In the third group, some children (approximately 16%) showed a moderate level of aggression trajectory, with a slight and gradual decline over time. In the fourth group, a small number of children (approximately 6%) followed a trajectory of a high level of

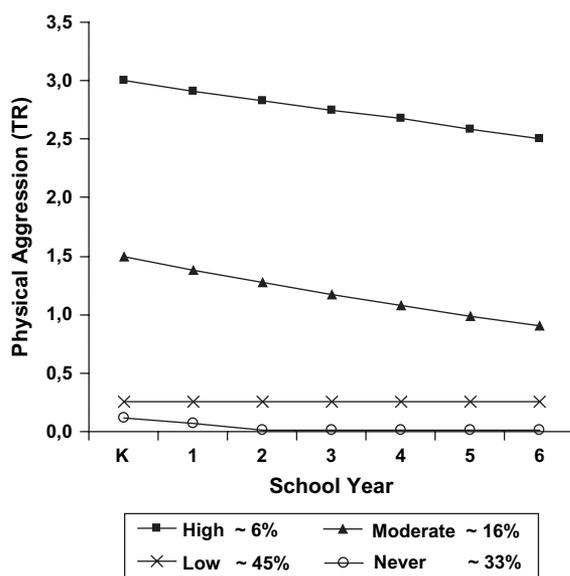


Figure 1. Trajectories of physical aggression from kindergarten to sixth grade.

aggression that also slowly declined from 6 to 12 years of age. As expected, boys and girls differed in their likelihood to follow these different physical aggression trajectories. Specifically, the estimated percentages in the never-, low-, moderate-, and high-aggression trajectory groups were, respectively, 18%, 46%, 25%, and 11% for boys, and 48%, 44%, 7%, and 1% for girls. These results are similar to those obtained by Broidy et al. (2003), who modeled developmental trajectories with this sample (along with five other data sets), but for boys and girls separately.

Predictors of High Physical Aggression

Preliminary Analyses

Table 1 shows the zero-order correlations of all predictor variables, and Table 2 reports the prevalence (percentage) of the putative risk factors in the population and within each of the four trajectory groups. These bivariate analyses reveal that all risks factors were in the predicted direction and that, with the exception of occupational status and maternal antisociality, all factors were significantly associated to physical aggression group membership.

Missing Data

When maternal antisociality was assessed, children were 15 years old (missing $n = 857$). Among early potential risk factors, the three variables for which there were more missing data are maternal covariates (Table 1): onset of motherhood, educational level, and occupational prestige (missing $n = 254, 54,$ and 246 , respectively). Only 5 participants had missing data for these three covariates, 67 had missing information on two of them, and 407 had data missing on only one of these maternal variables. Patterns of missing data by trajectories reveal that the participants with one or more missing data points ($n = 485$) were in the high-aggression trajectory (41.4%), followed by the moderate and low (29.5% and 26.9%, respectively) and the “never” (17.5%) trajectories. Because a high proportion of participants on higher aggression trajectories were not included in the logistic regressions, the effects reported below may be underestimated.

Regressions Description

Multinomial logistic regressions were performed to identify the risk factors that significantly predict the different physical aggression trajectories. All logistic regressions were weighted by posterior

Table 1
Bivariate Correlations Among Predictor Variables

	1	2	3	4	5	6	7	8
1. Child's sex ^a (<i>N</i> = 1,993)	—							
2. Family status ^b (<i>N</i> = 1,982)	.04	—						
3. Child's temperamental reactivity ^c (<i>N</i> = 1,993)	.04	.08**	—					
4. Age onset of motherhood ^c (<i>N</i> = 1,739)	.00	-.14**	-.07**	—				
5. Mother's education ^c (<i>N</i> = 1,937)	-.01	-.03	-.19**	.27**	—			
6. Mother's occupational prestige ^c (<i>N</i> = 1,747)	-.02	-.05	-.10**	.24**	.52**	—		
7. Mother's controlling parenting ^c (<i>N</i> = 1,992)	.02	.07**	.11**	-.11**	-.09**	-.05*	—	
8. Mother's dissatisfaction in parenting ^c (<i>N</i> = 1,991)	.01	.07**	.15**	.10**	.10**	.05	.07**	—
9. Mother's antisocial symptoms (<i>N</i> = 1,136; children aged 15 years)	-.05	.11**	.08**	-.08**	-.05	-.09**	.04	.11**

^aFor child's sex, 1 indicates boys and 0 indicates girls. ^bFor the family status, 1 indicates separated and 0 indicates intact. ^cVariable in its continuous form.

p* < .05. *p* < .01 (two-tailed tests).

probabilities to correct for potential uncertainty in trajectory group assignment.

We examined the relative contribution of eight early child and familial characteristics, entered together in the model (*N* = 1,508): child's sex and reactive temperament, parental separation, early onset of motherhood, maternal low education and low occupational prestige, and maternal controlling parenting and dissatisfaction. The role of maternal antisociality was tested in supplemental analyses because (a) there were many missing responses in this variable and its inclusion would result in a substantial drop in the sample size in the multinomial logistic regression analyses and (b) it was not significantly related to either the main predictor (i.e., controlling parenting) or the trajectory groups.

In a third step, two-way interactions were performed to test whether children's sex or tempera-

ment moderated the familial environment measures of separation and maternal dissatisfaction and controlling attitude. None of these interaction terms emerged as a significant predictor when entered in the multinomial logistic regressions, suggesting that the role played by separation or parenting styles on childhood aggression was not moderated by the child's sex or temperament. We thus returned to the model without interactions and report the results below.

Regressions Findings

Multinomial logistic regressions served to identify which factors help distinguish aggression trajectories from each other. Results reveal that when entered together in the same model, five of the eight early child and familial characteristics

Table 2
Proportion (%) Meeting Each Criterion for the Risk Index by Physical Aggression Trajectory Group

Risk factors	Aggression trajectory groups					χ^2 joint test of significance (<i>df</i> = 3)	<i>p</i> value
	Total sample (<i>N</i> = 1,993) (%)	Never (<i>n</i> ~ 649) (%)	Low (<i>n</i> ~ 899) (%)	Moderate (<i>n</i> ~ 318) (%)	High (<i>n</i> ~ 126) (%)		
Child							
Male	50.0	27.2	50.8	78.7	89.4	319.3	< .0001
Reactive temperament	36.8	28.7	34.5	51.5	57.8	73.8	< .0001
Parents separated	17.1	12.6	15.4	25.2	31.8	45.1	< .0001
Mother							
Early motherhood	33.3	29.6	31.7	40.4	49.0	21.3	< .0001
Low education	40.8	38.8	39.3	45.7	49.2	8.5	< .05
Low occupational prestige	33.3	32.5	32.9	35.7	35.1	1.1	.78
Controlling	32.3	28.2	31.5	37.2	46.9	21.1	< .001
Dissatisfied	30.1	27.8	29.2	33.8	39.1	8.9	< .05
Antisociality	11.6	9.7	11.7	15.3	13.8	3.8	.28

emerged as significant risk factors. The strongest association with differential trajectory memberships was the child's sex, $\chi^2 = 188.25$, $df = 3$, $p < .0001$, followed by the child's temperament, $\chi^2 = 40.56$, $df = 3$, $p < .0001$. Parental separation was also associated with a significant increase in the risk for following higher aggression-level trajectories, $\chi^2 = 14.18$, $df = 3$, $p < .01$. Finally, among the maternal sociodemographic features examined, the only significant risk factor was mothers' young age at the birth of their first child, $\chi^2 = 8.65$, $df = 3$, $p = .03$. Finally, a controlling parenting style was also associated with higher aggression trajectories, $\chi^2 = 10.54$, $df = 3$, $p = .01$, whereas the dissatisfaction variable did not remain a significant risk factor when all predictors were considered together. The inclusion of both parenting measures in the regression model did not affect the other risk factors reported, suggesting that parenting did not mediate the relation between children's aggression trajectories and other risk factors.

Follow-up contrasts were conducted to compare the four different physical aggression trajectories to one another. Table 3 lists the variables that emerged as significant risk factors for each contrast, with effect sizes reported as odds ratios (e.g., a reactive temperament is associated with a twofold increase in children's risk to follow the moderate vs. the low trajectory).

Examining the set of contrasts, we can see that being a boy differentiates all physical aggression trajectories from one another. In general, having a reactive temperament also helps distinguish higher level aggression trajectories from lower level aggression trajectories, but the high and moderate trajectories do not differ on this factor. Along with parental separation, an early onset of motherhood also increases the risk, for children, to show a moderate or a high level of aggression instead of low or no aggression. Finally, controlling parenting was found to increase the odds, for children, to follow the highest trajectory of physical aggression, as opposed to each of the other three trajectories. Maternal controlling parenting does not help in differentiating among the lower level aggression trajectories.

It is informative to examine the contrasts between adjacent trajectories (low vs. never, moderate vs. low, high vs. moderate). Only the child characteristics (being a boy and having a reactive temperament) distinguish children who demonstrate a low level of physical aggression from children who never behave aggressively at school. In addition to these child factors, parental separation helps differentiating children who show a moderate level of physical aggression from children who display some but little aggression. Finally, being a boy and having a controlling mother increases the risk, for children, to follow

Table 3
Predictors Contributing Significantly in Distinguishing Among Physical Aggression Trajectories

Low vs. never	Moderate vs. never	High vs. never
Male: 2.8*** (2.2–3.6)	Male: 10.0*** (6.6–14.0)	Male: 25.0*** (11.1–49.0)
Reactive: 1.3* (1.0–1.7)	Reactive: 2.7*** (1.9–3.9)	Reactive: 3.2*** (1.9–5.5)
	Separation: 1.9** (1.2–3.1)	Separation: 2.9** (1.5–5.4)
	Young mother: 1.5* (1.0–2.2)	Young mother: 2.0* (1.1–3.4)
		Controlling: 2.3** (1.4–3.8)
	Moderate vs. low	High vs. low
	Male: 3.5*** (2.4–4.9)	Male: 8.3*** (4.0–17.4)
	Reactive: 2.0*** (1.5–2.8)	Reactive: 2.4*** (1.5–4.1)
	Separation: 1.6* (1.1–2.5)	Separation: 2.4** (1.3–4.4)
		Young mother: 1.8* (1.1–3.0)
		Controlling: 2.1** (1.3–3.5)
		High vs. moderate
		Male: 2.4* (1.1–5.3)
		Controlling: 1.8* (1.0–2.9)

Note. Effect sizes are reported as the increase in the odds ratio (95% confidence interval). All putative predictors were included in these multinomial regression analyses, that is, child's sex and temperament; parental separation; maternal age, education, socioeconomic status, and controlling and dissatisfied parenting ($N = 1,508$).

* $p < .05$. ** $p < .01$. *** $p < .001$.

the problematic path of high-aggression trajectory rather than the moderate-aggression trajectory.

Supplemental Analyses

Additional multinomial logistic regressions were conducted to predict physical aggression trajectories within the subsample for which maternal antisociality data were available ($n = 918$). Before including maternal antisociality in the model, analyses revealed that only three of the five previously significant predictors remained significant in this reduced sample: (a) being a boy, $\chi^2 = 114.08$, $df = 3$, $p < .0001$; (b) having a reactive temperament, $\chi^2 = 27.00$, $df = 3$, $p < .0001$; and (c) having a controlling mother, $\chi^2 = 8.07$, $df = 3$, $p = .04$. Parental separation and early motherhood did not remain significant risk factors in this subsample. Next, when maternal antisociality was included in the model, the pattern of results remained essentially the same. Maternal antisociality did not emerge as a significant predictor and did not affect differences between trajectory groups in regard to the remaining significant predictors.

Discussion

Overview

The main goal of the study was to examine the relationship between psychological control and childhood physical aggression, above and beyond more traditional risk factors. Results revealed that kindergarten children whose mothers were more controlling were at higher risk to follow the high and stable trajectory of physical aggression during grade school. This association was independent of the effects of other important risk factors, namely, being a boy, having a reactive temperament, a young mother, and separated parents.

Contrasts revealed that in general, the latter four risk factors contributed in distinguishing nearly all trajectories from one another. Child characteristics (being a boy and reactive) served to predict both the presence (low vs. never) and the levels of physical aggression. The familial variables of parental separation and early motherhood were also associated with higher aggression trajectories, but they lost their predictive power in the supplemental analyses. We cannot reach any firm conclusion about the loss of these effects.

Controlling Parenting

Having a controlling mother represented an additive risk but only in distinguishing the highest path of

physical aggression from the others, perhaps by impeding self-regulation capacity (e.g., Grolnick & Ryan, 1989). Finally, two-way interactions indicated that children's sex and temperament did not moderate the role played by separation, early motherhood, and controlling parenting on childhood aggression, suggesting that these familial variables represent a comparable risk for all children.

The apparently detrimental effect of mothers' controlling attitude on childhood violence is consistent with prior studies. In their study with Russian preschoolers, Hart et al. (1998) had found a positive correlation between mothers' controlling tactics and children's physical aggression in day care. When Thompson et al. (2003) analyzed data from a large British survey, they found that having a controlling mother was related to more conduct problems, both concurrently and 5 years later. Finally, the NICHD ECCRN (2004) assessed physical aggression from 2 to 8 years of age and found that mothers' authoritarian beliefs were associated with higher odds, for children, to follow higher trajectories of physical aggression.

When assessing childhood physical aggression, the present study built on these prior studies by combining their respective methodological strengths. Physical aggression was measured by independent informants (teachers), similarly to the study of Hart et al. (1998). In addition, the repeated measurements throughout grade school allowed us to model the developmental trajectories children tend to follow over time, in line with the study of NICHD ECCRN (2004). We also used a population-based sample, similarly to Thompson et al. (2003).

The assessment of children and their families is another asset of this study. Our central goal was to examine whether mother's psychological control predisposes children to display physical aggression, but it was crucial to do so in the context of other precursors of aggression. By testing a host of potential risk factors in the same statistical model, we examined their additive and joint effects, as well as their potentially confounding effect on the predicted association between maternal psychological control and childhood physical aggression.

Risk Factors

Before discussing further the relationship between controlling parenting and childhood physical aggression, we first review each of the significant risk factors. From the eight putative risk factors examined in the present study, five were found to distinguish children who followed higher from lower level physical aggression trajectories.

Child's Sex

Among these precursors, child's sex had the largest discriminative power, with boys being more likely to display aggression physically than girls. The higher level of physical aggression in males than in females has been established in several studies (e.g., Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Moffitt, Caspi, Rutter, & Silva, 2001; Tremblay, 2000). Recent studies have indicated that boys are already more physically aggressive than girls in toddlerhood (Baillargeon et al., 2007; Côté, Vaillancourt, Leblanc, Nagin, & Tremblay, 2006), but that the gap between boys and girls becomes gradually larger over the preschool and elementary school years. During these developmental periods, girls were found to have faster rates of decline in physical aggression and faster rates of rise in indirect (social) aggression than boys (Côté et al., 2006).

Child's Temperament

The other child characteristic tested in our model, reactive temperament, was also found to be a significant risk factor for higher physical aggression. In general, kindergarten children who were described by their mothers as reacting promptly and intensely to stimuli and frustration were more likely to display aggression during grade school. This reactive temperament measure reflects higher "dispositional anger" and/or deficits in emotional self-regulation, essential properties to predict aggression (Eisenberg et al., 1994; Rubin, Hastings, Chen, Stewart, & McNichol, 1998). Though temperament and parenting clearly influence each other, our results suggested that temperament does contribute to aggression in a direct manner because its effect remained significant when parenting variables were added in the model. Results revealed no interaction effect either, suggesting that a reactive temperament consist of a risk factor for all children, regardless of their mothers' parenting attitude.

Family Status

Results from the main analysis revealed that parental separation before age 6 is associated with an increase in children's risk to show higher levels of aggression during grade school. These findings are consistent with prior studies showing the negative impact of early parental separation on the development of physical aggression (Côté et al., 2007; NICHD ECCRN, 2004; Tremblay et al., 2004). Though pre- or postdivorce circumstances can have deleterious

impact (e.g., economic decline, frequent moves; Amato, 2000), it seems that the impact of parental separation takes place very early, even after having controlled for sociodemographic variables (Côté et al., 2007; NICHD ECCRN, 2004; Tremblay et al., 2004). Finally, the link between separation and children's physical aggression may be moderated by other factors. For example, Jaffee, Moffitt, Caspi, and Taylor (2003) showed that for children of antisocial fathers, having an intact family is actually an additional risk for conduct problems. It is unfortunate that we could not test this potential interaction effect in our study due to missing data.

Maternal Age

The only maternal sociodemographic aspect that remained significantly associated with higher physical aggression trajectories in the main analysis was an early onset of motherhood. Children whose mothers had their first child at a young age were more likely to follow the moderate- or high-aggression trajectories than children of older mothers. The link between young maternal age and children adjustment problems has been documented in previous studies (e.g., Côté et al., 2007; Nagin & Tremblay, 1999; Tremblay et al., 2004). The present study did not explain why women who start to have children earlier appear to have difficulty in helping their children learn how to regulate their physically aggressive behaviors. This risk may not be due to mothers' age per se but due to its association with problematic circumstances and behaviors, such as poor health habits (e.g., prenatal smoking), mothers' own self-regulation deficits (e.g., criminality history), inadequate parental behavior, and lack of supporting network. Lower occupational prestige and lower education level were both associated with childhood aggression in bivariate analyses, but contrary to mother's age, these two factors did not remain significant when tested along with other precursors in the model. The age at which women start to have children is probably a good proxy for these other adversity factors, all of which play a role in impeding children's capacity to self-regulate aggressive gestures.

Parenting

In addition to child and parent characteristics, two parenting dimensions were examined. First, a factor called "dissatisfaction" reflected exasperation and a lack of enjoyment as a mother. Though bivariate analyses showed that it was significantly related to children's risk to display aggression in grade school,

maternal dissatisfaction did not emerge as a significant risk factor when tested along with other precursors. Its negative effect on aggression may be explained by other covariates, such as an early onset of motherhood. It is also possible that the dissatisfaction measure was a poor indicator of lack of warmth or acceptance, a classic risk factor (e.g., Rothbaum & Weisz, 1994). Although some mothers may feel burdened by their role and enjoy it less than others, this may not translate into a rejecting or cold attitude toward their child.

Controlling parenting. The degree to which mothers require submission from their children was of special interest in the present study. A high level of power assertion (vs. autonomy support) exerted by mothers was associated with an increase in the odds, for children, to follow the path of chronically high physical aggression. In comparison to abusive parenting or hostile discipline (Deater-Deckard & Dodge, 1997), a controlling attitude does not seem as harsh or even damaging. Yet, it seems that simply valuing obedience and preventing children to express their ideas could seriously impede their adjustment, even in a different context (i.e., school). Detrimental effects were detected even though our scale, similarly to the one used by Thompson et al. (2003), did not reflect the more extreme and malicious aspects of psychological control such as manipulation, guilt induction, and conditional love (e.g., Barber, 1996; Hart et al., 1998).

Limitations and Future Directions

Some of the limitations of our study pertain to the assessment of parental attitudes. Extracted scales from already existing questionnaires are less exact than scales developed to target the desired construct at the start of a study. For example, our Dissatisfaction Scale aimed to tap the construct of cold or rejecting parenting, but this approximate measure did not generate strong results. Similarly, although our Controlling Scale reflects the controlling vs. autonomy-support dimension, it does not capture the whole range of psychologically controlling behaviors. Finally, a related drawback of our study is the absence of a behavioral control scale. Indeed, poor monitoring and permissiveness are associated with problems in child adjustment, particularly with externalizing problems (Loeber & Dishion, 1983; Maccoby & Martin, 1983; McCord, 1979; Olweus, 1980). Unfortunately, it was impossible to measure this construct from the available data.

A second type of limitations concerns unavailable precursors. Though a host of valuable data were collected when the study started in the 1980s, partici-

pants were already 6 years old. At present, research has informed us that some earlier factors play a critical role in children's self-regulation and aggression. For example, early infant temperament and prenatal environment (e.g., mother's smoking) are strongly related to children's physical aggression (Huijbregts, et al., 2006; Tremblay et al., 2004). Though parents' antisocial personality was assessed, it was done only when children were 15 years of age, resulting in many missings for mothers and even more for fathers. This high attrition by middle adolescence is not uncommon, especially with fathers, and could have been avoided had we collected these data earlier. Further, the nonsignificant relationship between maternal antisociality and child physical aggression suggests that our DSM-based measure might have been less than optimal in terms of construct validity. It may have lacked specificity, as only 1 of the 10 symptoms categories specifically refers to aggressive behaviors.

Likewise, due to the absence of observational data, we can only speculate about how controlling parenting translates in actual parental behaviors. For example, future research could explore the possibility that psychological control relates to harsher punishment, known to predict externalizing problems (e.g., Conger et al., 2003). Alternatively, perhaps psychological control is closer to relational aggression (e.g., Nelson & Crick, 2002) than to the physical aggression involved in harsh punishment. Studies could explore other practices as well, such as manipulative tactics (e.g., love withdrawal; Barber, 1996, 2002) and autonomy-supportive practices (e.g., conveying empathy, providing rationales; Koestner, Ryan, Bernieri, & Holt, 1984; Reeve & Jang, 2006).

Third, an important limitation to keep in mind is the correlational nature of the study. Clearly, correlational work cannot rule out the reciprocal effect of children's characteristics on their parents and on their later development, even when conducted early in children's lives. We believe that more studies are needed to study these associations more closely. Observational studies that examine sequences of behaviors, such as child responses to the use of a controlling parental strategy (e.g., Crockenberg & Litman, 1990) are promising. Testing experimentally if reduction in psychological control positively affects children also seems to be a worthy endeavor.

Fourth, though our study provides additional evidence that controlling parenting may contribute to the problem of childhood physical aggression, it did not provide information about the psychological mechanisms involved. The variables that are the most frequently suggested as potential mediators in the literature are children's negative affect and its

self-regulation. Indeed, controlling mothers may inadvertently support the child's aggression by focusing on obedience (*external* regulation) and preventing children from developing self-regulatory skills. Moreover, a rigid and controlling stance may also instigate more anger in children, thereby amplifying the self-regulation task. Although negative affect and self-regulation problems are seen as essential properties in predicting children's aggression (e.g., Eisenberg et al., 1994), they are also known to ensue psychological control (e.g., Assor et al., 2004; Barber, 2002; Grolnick, 2003).

Observational research with toddlers suggests that controlling parenting negatively affects young children's aggression by increasing their negative affect. A recent prospective study found that coercive parenting at 4 months predicted baby boys' tendency to express negative affect at 9 months, which predicted conduct disorder symptoms at age 8, both directly and via coercive parenting (Morrell & Murray, 2003). Similarly, in a frustration task study, mothers' preemptive interference increased their toddlers' distress, which predicted aggressive gestures. This relation between toddlers' distress and aggression was also found to be stronger when maternal interference was high (Calkins & Johnson, 1998). A similar pattern of effects was observed among Chinese school children. An authoritarian parenting style was associated with children's lower social functioning, as well as with higher dispositional anger and lower effortful control. This latter self-regulation measure was also found to mediate the relation between authoritarian parenting and poorer social functioning (Zhou, Eisenberg, Wang, & Reiser, 2004).

The dimension of psychological control versus autonomy thus seems worthy of the recent attention it is receiving in the parenting literature and warrants further exploration. Perhaps, the controlling dimension has an important effect because it starts early and/or remains in the parent-child relation for many years. Assessing parenting over time and using time-varying covariates or model joint trajectories can prove to be very informative. Another valuable research avenue is to identify the precursors of controlling parenting. Although the role of parental psychopathologies (such as antisociality) does need to be addressed, it is also important to search for factors that can push relatively healthy parents to exert power onto their children. Perceived pressure is a precursor that has been identified: pressure from the context (e.g., poverty), from the child (e.g., difficult temperament), or from the parent himself or herself (e.g., ego involvement; see Grolnick and Apostoleris, 2002, for a review). It is noteworthy that

controlling parenting and children's physical aggression share common risk factors. In our study, controlling parenting did not mediate the effect of other aggression precursors (e.g., difficult temperament); it represented an additional risk factor.

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