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Early risk predictors of girls' indirect aggression from childhood to early adolescence in an at-risk sample

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## Abstract

The present study aimed first to examine the trajectories of indirect aggression among girls from disadvantaged neighborhoods from childhood ( $M_{\text{age}} = 8.38$ ,  $SD = .91$ , range = 6.58–10.25) to early adolescence ( $M_{\text{age}} = 11.28$ ,  $SD = .93$ , range = 9.33–13.83), after controlling for physical aggression. Second, it aimed to identify possible individual, family, and peer risk factors, assessed in the early school years, which predispose subgroups of girls to use indirect aggression in an intense and persistent way. Three trajectories of indirect aggression were identified: 18.9 % ( $n = 57$ ) of the girls followed a trajectory that started out at the mean and then increased (“mean-increasing”), 44.5 % ( $n = 134$ ) of the girls followed a trajectory that started out at the mean and then decreased (“mean-decreasing”), and 36.5 % ( $n = 110$ ) of the girls followed a trajectory that started out below the mean and then decreased (“low-decreasing”). Results from univariate analyses suggest that individual, family and peer risk factors predicted membership in the subgroup of girls who use indirect aggression more frequently and increasingly. However, in multivariate analyses, only the individual factor of surgency/ extraversion predicted membership in this subgroup of girls. Hostile parent–child relationships also differentiated girls in the “mean-decreasing” group from the “low-decreasing” group. Interventions aimed at changing negative temperamental tendencies and interpersonal experiences with family and peers may break the cycle that reinforces frequent and persistent use of indirect aggression.

**Keywords:** Indirect aggression, Social aggression, Relational aggression; Risk factors; Psychosocial factors; Longitudinal studies; Elementary school students; Girls

## Early risk predictors of girls' indirect aggression from childhood to early adolescence in an at-risk sample

Efforts to understand and prevent childhood aggression have been predominantly guided by a male-model with a focus on physical aggression (PA). In recent years, there has been significant interest on more subtle forms of aggression intended to harm others by damaging the victim's interpersonal relationships. Different terms have been used to define these behaviors. Indirect aggression (IA) is characterized by actions, such as spreading rumors about the victim, revealing her secrets or excluding her from the social group, that are inflicted through peers, without direct verbal confrontation with the victim (Björkqvist et al., 1992a; Lagerspetz et al., 1988). Relational aggression (Crick, 1995, 1996; Crick and Grotpeter, 1995) encompass both direct and indirect expressed rejection of the victim. Social aggression (Cairns et al., 1989; Underwood, 2003) has a larger set of behaviors that also include non-verbal social behaviors, including facial expressions of disdain (Underwood, 2003). Despite these distinctions, the terms describe highly related constructs, emphasizing emotional or relational harm rather than actual physical harm (Archer and Coyne, 2005; Heilbron and Prinstein, 2008). The term IA, retained here, is associated with the methodology of the original instrument (Björkqvist et al., 1992b) and includes studies on relational and social aggression.

Recently, Ostrov and Godleski (2010) proposed an integrative model for understanding the development of subtypes of aggression in childhood. Their model expands on existing social-cognitive and gender schema models to describe a series of steps that lead to the preferred use of gender-norm aggressive behaviors by girls and boys. The model posits that interpretation of cues, based on previous gender-relevant experiences and memories, may generate possible behavioral responses that are more consistent with children's gender identity and past experiences. Girls are often oversocialized with regard to expectations for aggressive behavior in that mothers and

teachers frequently encourage girls not to engage in direct aggression (Maccoby, 1998). Peer groups can also be instrumental in shaping females' gender roles. For example, peers react less favorably to assertiveness and PA when demonstrated by girls as opposed to boys (Fagot and Hagan, 1985). Peers also tend to play in same-sex groups, within which children punish and criticize behaviors that are inconsistent with gender-role identification (Maccoby, 1998). As a result, Zahn-Waxler and Polanichka (2004) conclude that girls are more likely to mask their anger and to anticipate negative consequences for direct aggressive behavior.

Within this perspective, the use of IA may be a strategy of choice for girls in that it pertains to salient social patterns of behavior that are more typical to their gender. In other words, because girls' friendship patterns are more intimate and exclusive than those of boys and because girls are better at interpreting the social context and the emotional cues of others, girls will preferably engage in more indirectly aggressive behaviors than physically aggressive behaviors (see Murray-Close et al., 2016). This hypothesis has been confirmed in prior research on large sample of middle childhood children (Putallaz et al., 2007). Actually, despite the lack of robust gender differences in IA (Card et al., 2008), several researchers have emphasized the importance of moving beyond a focus on mean-level differences in IA to instead explore within group differences in developmental trajectories, mechanisms, and predictors associated with such conduct (Ostrov and Godleski, 2010; Underwood, 2003).

Evidence from several longitudinal studies also highlights meaningful developmental differences in the use of IA for children. Studies have found that a subgroup of school-age children, composed mainly of girls, use IA more frequently and persistently (Côté et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007). Girls on these high trajectories appear to differ in important ways from those on the less aggressive developmental paths. Indirectly aggressive girls have been found to be at heightened risk of experiencing serious psychosocial adjustment

problems, such as peer rejection (Heilbron and Prinstein, 2008), symptoms of anxiety and depression (Spieker et al., 2012; Underwood et al., 2011), and delinquency and drug use (Card et al., 2008; Skara et al., 2008).

From a prevention and early intervention perspective, it is important to identify distinctive groups of IA users from early childhood to early adolescence and, in particular, investigate possible individual, family, and peer risk factors that predispose some girls—such as those who use IA in a frequent and persistent manner—to engage in pathways characterized by maladjustment. This is the main goal of our study.

### **Developmental Trajectories of Indirect Aggression**

Previous studies on developmental trajectories show that IA emerges early in children's development and is more common during childhood than adolescence (Cleverley et al., 2012; Vaillancourt et al., 2007). Its use is relatively stable for most elementary school-aged children, but remains heterogeneous across individuals, making it possible to identify subgroups characterized by distinct trajectories. Moreover, several studies examining gender differences have reported a greater number of girls in the high trajectories (Côté et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007). There was from 56.5 % to 57.6 % of girls and from 42.3 % to 43.5 % of boys in those high trajectories. Only Pagani et al. (2010) found a much higher number of girls in their high trajectory (82.2 % of girls vs. 17.8 % of boys).

Despite variations in sources, populations, and study length, recent longitudinal studies have mostly identified two or three developmental trajectories. More specifically, in a population subsample consisting of 413 girls, Yuan et al. (2014) identified a high-risk group (9.7 %) of girls following a trajectory wherein the level of peer-rated IA started out at the mean and then increased from ages 12 to 14 (“mean-increasing group”). The other girls in this study followed either a trajectory in which the level of IA started out above the mean and then decreased (“high-

decreasing group”; 6.8 %), or a trajectory in which the level of IA started out below the mean and remained stable over time (“low-stable group”; 83.5 %). Cleverley et al. (2012) also observed a high-risk group: 4.6 % of their sample of 2338 youths (50 % girls) between the ages of 10 and 15 followed a “high-stable” trajectory. Most of the other youths in the sample followed either a “mean-decreasing” (65.5 %) or “low-decreasing” trajectory (29.9 %) according to self-report. Alternately, three other studies have identified two trajectories of IA, including a high-risk group. In a sample of 1401 children (47 % girls), Vaillancourt et al. (2007) found that, according to parents’ reports, 35 % of the children followed a “high-increasing” trajectory between the ages of 4 and 10. Using the same sample, Côté et al. (2007) examined the joint trajectories of PA and IA. Of the 1183 children in their sample (percentage of girls unknown), 32 % followed a “high-increasing” trajectory of IA from ages 4 to 8. Lastly, in a study conducted by Underwood et al. (2009), which used teachers’ reports instead of parents’ reports, 45 % of the 255 children (52 % girls) in the sample followed a “high-decreasing” trajectory of IA between the ages of 9 and 13. In these three studies, the other children in the samples followed a “low- stable” or a “low-decreasing” trajectory of IA. However, extending Underwood et al. (2009) findings in youth ages 9 to 18, Ehrenreich et al. (2014) recently identified three trajectory groups for IA: low (37 %), medium (45.8 %), and high-decreasing (17.2 %) trajectories for youths in grades 3 through 12.

These findings have greatly enhanced our knowledge on the development of IA. However, few studies have focused on children younger than age 9, even though IA is known to be used from an earlier age. Indeed, studies have shown that the rudimentary behaviors of ostracizing and denigration are found as early as age 4 (Côté et al., 2007; Tremblay, 2000; Vaillancourt et al., 2007), hence the importance of examining these trajectories at least from the start of schooling (Cleverley et al., 2012). Moreover, few studies to date have controlled for the effect of PA. Yet, indirect and physical aggression have been found to be highly correlated (e.g., significant

correlation of .76 among 0–18 years-old; Card et al., 2008), although they represent two distinct forms of aggression (Vaillancourt et al., 2003). In line with these ideas, Cleverley et al., (2012) concluded that it is difficult to identify the specific trajectories of IA without accounting for PA. In addition, findings from recent studies indicate that across different samples (i.e., community, voluntary residential treatment), girls are more likely than are boys to be classified as IA users, but not as PA users (Marsee et al., 2014). Girls are also more likely to be found in high trajectories of IA (Côté et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007) and, inversely, less likely to be found in high trajectories of PA (Ehrenreich et al., 2014). These results suggest that a subgroup of girls is especially likely to be involved in frequent and persistent use of IA. Yet, only two studies to our knowledge have examined trajectories separately for boys and girls (Pagani et al., 2010; Yuan et al., 2014). However, the high correlation between IA and PA was not taken into account in these studies. As a result, in the present study, we decided to specifically look at girls' development of IA when their PA was taken out of the equation and to identify possible risk factors that distinguish high-risk girls from other girls.

### **Individual, Family and Peer Risk Factors**

Developmental theories on childhood aggressive behavior problems now assume a series of successive stages that start with an inadequate social response to early risk factors, interacting with further developmental difficulties and eventually cumulating to delinquency (Moffitt et al., 2001; Patterson et al., 1989). Studying girls' development of IA thus requires a similar evaluation of individual (e.g., temperament) as well as environment risk factors (e.g., family and peer factors) that have consistently been found as predictors of frequent and persistent use of aggression (Murray-Close et al., 2016).

Longitudinal studies have shown that, at the individual level, young girls—especially more extroverted, as compared to more inhibited, girls—have the greatest difficulty controlling their



emotions (Bowie, 2010; Park et al., 2005). In fact, there is a positive relationship between poor emotion regulation and low inhibition during childhood and higher levels of IA among girls (Park et al., 2005). Indirect aggression has also been positively related to anger in provoking situations (Marsee and Frick, 2007) but also to sociability (Tackett et al., 2014). However, we do not know if these temperamental traits have prospective effects on change in the level of use of IA over time.

Aside from these temperamental traits, girls who use IA may show a lack of empathy (Kaukiainen et al., 1999). However, the findings of the two longitudinal studies having examined this relationship were contradictory. Zahn-Waxler et al. (2005) found that showing empathy at age 7 was significantly related to lower levels of IA at age 13, whereas Vaillancourt et al. (2007) found that showing prosocial behavior, including empathy, at age 2 increased the likelihood of following a “high-increasing” as opposed to a “low-stable” trajectory of IA from ages 4 to 10. These authors explain their findings by stating that empathy could be a sophisticated social skill needed to use IA effectively. They also mention that young girls are more likely to be bi-strategic with their peers: they will tend to use both coercive and prosocial strategies. However, it should be noted that the latter finding was significant but weak, and so further studies are needed to better understand the role that empathy plays in IA.

As for family risk factors, a negative parent–child relationship appears to have an effect on IA. Spieker et al. (2012) showed that the presence of mother-child conflict, hostility, and a lack of sensitivity in early childhood predicted a high level of IA at around age 9. Similarly, Côté et al. (2007) and Vaillancourt et al. (2007) studies showed that a hostile parent–child relationship at age 2 increased the likelihood of following a “high-increasing” as opposed to a “low-stable” trajectory of IA from ages 4 to 10. Only Park et al.’s study (2005) reported a non-significant relationship between maternal hostility and subsequent IA. Their study, in contrast to the other

three studies, did not measure trajectories of IA, which may explain the difference in their findings. Moreover, in a meta-analysis of 48 studies, Kawabata et al. (2011) found a significant and positive effect size ( $r = .11, p < .01$ ) between harsh maternal parenting and IA. Thus, overall, these findings appear to suggest a relationship between experiencing aggressive behaviors at home and engaging in aggressive behaviors with peers.

The peer environment can also have a significant impact on IA, given the social dynamics inherent in this form of aggression. Indeed, malicious gossip and social exclusion is inflicted through peers. Thus, girls who hold a prominent position within their peer group may be more likely to use IA, as confirmed by studies conducted by Orue and Calvete (2011) and Kuppens et al. (2009). These authors found that, among girls, being liked by peers during childhood (age 8) and pre-adolescence (ages 10–13) was significantly and positively related to IA 6 months to 2 years later. Yet, girls who use aggressive behaviors also expose themselves to peer rejection and, in turn, appear to react to this rejection by using IA. Indeed, Werner and Crick (2004) found that high levels of peer rejection from ages 8 to 10 predicted high levels of IA 1 year later among girls. The results of these studies suggest that girls who use IA have a rather controversial social status, that is, they are well liked by some peers and rejected by others, and that social status is a factor that can predispose girls to use IA (Underwood, 2003).

Although these studies have helped enhance our knowledge on the risk factors related to IA, most of them (six of ten) did not take into account the strong correlation between IA and PA. As a result, it is not possible to identify the unique contribution of these risk factors when it comes to the development of IA. Moreover, some studies did not measure the predictive effect of the risk factors over time (Bowie, 2010; Park et al., 2005; Zahn-Waxler et al., 2005). Thus, it is difficult to conclude that there is a significant relationship between a given risk factor and a change in the level of IA over time. Lastly, most of these studies focused on only one or two

types of risk factors, mainly individual and family risk factors. To our knowledge, no study to date has examined individual-, family-, and peer-related risk factors simultaneously, which makes our understanding of the risk factors associated with girls' IA incomplete.

### **The Present Study**

To address these gaps in the current literature, the first goal of our study was to examine the trajectories of IA among girls from childhood to early adolescence, after controlling for PA. Secondly, we aimed to identify possible individual-, family-, and peer-related risk factors, assessed in the early school years, associated with group membership. Following developmental theories of aggression, we expected that a subgroup showing frequent and persistent IA would be characterized by more temperamental, family, and peer risks, even after controlling for PA. Specifically, based on the literature review, it appeared that girls who presented higher levels of negative affectivity, had more difficulty regulating their emotions, and were more extraverted would follow trajectories involving higher levels of IA over time. Girls in more unstable families and experiencing negative parenting at home were expected to be more likely to follow trajectories with higher levels of IA. Because IA children may be accepted by many peers yet rejected by their victims, it was unclear if peer rejection or acceptance (or both) would increase the risk for IA over time.

Although a handful of studies have begun examining risk factors associated with elevated use of IA from childhood to early adolescence, research has yet to examine the role of risk factors from three different ecological domains (individual, family, peers) in longitudinal studies of girls from disadvantaged neighborhoods. Thus, the present study extends previous research in several ways. First, one of the main strengths of our study is the fact that we controlled for the effect of PA in the trajectory analysis, allowing us to examine the development of IA independently of PA. A second strength is the inclusion of risk factors from three different ecological domains,

allowing us to examine the influence of specific personal and contextual factors that may have different roles in the increase or decrease of IA during childhood. Third, the participants were aged less than 10 years of age at Time 1 (T1), which is younger than in most studies examining the trajectories of IA. Considering that the use of IA begins to develop during early childhood (Côté et al., 2007; Tremblay, 2000), an examination of its development should start at an early age and extend over several measurement times in order to capture as clearly as possible the development of this phenomenon. Lastly, the sample used in the analysis only included girls. Because girls tend to use IA more than PA to express their anger and seek revenge, and because girls are more strongly affected by this form of aggression than by PA (Verlaan et al., 2012), IA appears to be a particular issue for girls. This choice was also based on the results of previous studies showing a higher prevalence of girls in the high-risk trajectory of IA (Côté et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007). Studying girls specifically made it possible to examine the development of IA among them, as well as the risk factors that distinguished some girls from others, leading to more accurate findings than if we had only controlled for the effect of gender or if both indirect and physical aggression trajectories overlapped.

## **Method**

### **Participants and Procedure**

Participants were 347 French-speaking Canadian elementary school girls aged less than 10 years of age at initial recruitment (T1), their teachers, and their principal caretaker (299, 86.2 % mothers). The girls were recruited from disadvantaged neighborhoods in eight school boards in four different administrative regions in the province of Quebec. The participating children were predominantly born in Canada (320, 92.2 %) and half (172; 49.6 %) were living in a two parents household. Ninety-two (26.5 %) mothers had not completed high school. A revised SES scale asked families about their income in categories starting at less than C\$6,000 to more than

C\$150,000. This variable was weighted in order to introduce an equal distance between each unit. The median family annual income was between C\$50,000 and C\$59,999 in this sample, significantly lower than the 2009 median provincial income (\$64,420 CAD; Statistics Canada, 2015), and 42.7 % ( $n = 148$ ) of these girls were receiving special education services for behavioral or emotional problems at school at T1.

Given the oversampling of these girls, following the trajectory analyses, a chi-square test was performed to verify whether these girls were uniformly distributed in the trajectories or not. This test was significant,  $\chi^2(2) = 12.66$ ,  $p = .002$ . Consequently, the effect of receiving special education services was controlled for in the subsequent regression analyses. Four measurement times at 12-month intervals, from 2008 to 2011, were used in our study: Time 1 (T1: 347 girls;  $M_{age} = 8.38$  years,  $SD = .91$ , range = 6.58–10.25), Time 2 (T2: 324 girls; attrition rate = 6.6 %;  $M_{age} = 9.25$  years,  $SD = .93$ , range = 7.33–11.25), Time 3 (T3: 324 girls; attrition rate = 6.6 %;  $M_{age} = 10.25$  years,  $SD = .93$ , range = 8.42– 12.25) and Time 4 (T4: 316 girls; attrition rate = 8.9 %;  $M_{age} = 11.28$  years,  $SD = .93$ , range = 9.33–13.83). The child's parent assessed family stability, temperament, PA, empathy, IA, reception of special services, and the parent– child relationship, in this order. Teachers evaluated children's peer rejection and acceptance.

## **Measures**

### *Indirect Aggression (Time 1 to Time 4)*

IA was assessed by the parent using the Direct and Indirect Aggression Scales (DIAS; Björkqvist et al., 1992b). This instrument consists of 24 items aimed at assessing how often aggressive behaviors are used by the child in conflict situations or in times of anger. It consists of three scales, including the IA scale (12 items, e.g., “Tells bad or false stories about the other one?”; “Tells the other one's secrets to a third person?”). The frequency of behaviors is assessed

on a 5-point Likert scale ranging from 0 (*never*) to 4 (*very often*). The mean of the items was calculated, with a higher score indicating that the child often used IA. In the present study, the internal consistency was very good:  $\alpha_{T1} = .90$ ,  $\alpha_{T2} = .90$ ,  $\alpha_{T3} = .91$ , and  $\alpha_{T4} = .92$ .

### *Risk Factors and Control Variables*

We assessed three categories of risk factors at Time 1. (a) Individual-related risk factors included the child's temperament and empathy. (b) Family-related risk factors focused on the quality of the parent-child relationship and family stability. (c) Peer-risk factors involved peer rejection and acceptance. We also included two control variables: (a) physical aggression across the four time periods assessed and (b) receipt of special education services at Time 1.

*Temperament.* The child's temperament was assessed using the Children's Behavior Questionnaire – Short Form (Putnam and Rothbar, 2006), completed by the parent. This questionnaire consists of 94 items distributed over 15 scales. The parent indicates whether or not each item corresponds to the child, using a 7-point Likert scale ranging from 1 (*extremely untrue*) to 7 (*extremely true*). The mean of the items was calculated for each subscale. The higher the score, the greater the extent to which the child presented the given temperamental trait. As suggested by the authors, the 15 scales can be grouped together under three different factors, namely, negative affectivity (sadness, discomfort, fear, frustration, and difficulty to soothe; 31 items;  $M = 4.22$ ,  $SD = .87$ ), effortful control (inhibitory control, attentional focusing, low-intensity pleasure, and perceptual sensitivity; 26 items;  $M = 5.25$ ,  $SD = .69$ ), and surgency/extraversion (high-activity level, impulsivity, high intensity pleasure seeking, and low shyness; 25 items;  $M = 4.57$ ,  $SD = .89$ ). The internal consistency of the three factors used in this study was very good: negative affectivity:  $\alpha = .87$ ; effortful control:  $\alpha = .82$ ; surgency/extraversion:  $\alpha = .87$ .

*Empathy.* Empathy was assessed using an instrument drawn from two questionnaires: the Social Competence Scale (SCS; Conduct Problems Prevention Research Group, 1995) and the Peer-Estimated Empathy scale (PEE; Kaukiainen et al., 1995). This instrument was completed by the parent ( $M = 3.31$ ,  $SD = .88$ ) and consisted of 15 items; eight items from the PEE (e.g., “Comforts others when they are sad”) and seven items from the SCS (e.g., “Provide help, share materials, and act cooperatively with others”). The frequency with which the child showed empathetic behavior was assessed using a 6-point Likert scale ranging from 0 (*almost never*) to 5 (*almost always*). The mean of the items was calculated. The higher the score, the greater the child’s capacity for empathy. The internal consistency was excellent ( $\alpha = .93$ ).

*Quality of the Parent–Child Relationship.* This variable was assessed using the Parental Acceptance-Rejection Questionnaire developed by Rohner (1991). This parental self-report questionnaire aims to assess the parent’s perceptions regarding his/her own behaviors of acceptance or rejection towards the child. It consists of a total of 60 items distributed over four scales: warmth (20 items;  $M = 3.83$ ,  $SD = .21$ ), hostility (15 items;  $M = 1.63$ ,  $SD = .38$ ), neglect (15 items;  $M = 1.32$ ,  $SD = .24$ ), and rejection (10 items;  $M = 1.39$ ,  $SD = .33$ ). The items are rated on a 4-point Likert scale ranging from 1 (*almost always true*) to 4 (*almost never true*). The mean of the items was calculated for each subscale. The higher the score, the more problematic the parent’s behavior (with the exception of the warmth scale). The internal consistency of three of the scales was good: warmth ( $\alpha = .81$ ), hostility ( $\alpha = .83$ ) and rejection ( $\alpha = .73$ ). However, it was weaker for the neglect scale ( $\alpha = .60$ ).

*Family Stability.* Family stability was assessed using two variables drawn from the Quebec Child Mental Health Survey (Valla et al., 1992), namely, family type and number of moves. Family type is a categorical variable indicating whether the family is intact, a blended family or a single-parent family. In the present study, this variable was dichotomized (0 = not intact; 1 =

intact) to facilitate the interpretation of the results. Number of moves is a continuous variable indicating the number of times the family has moved since the child was born ( $M = 2.20$ ,  $SD = 2.38$ , range = 0–14).

*Peer Rejection and Acceptance.* Peer rejection and acceptance were assessed by the teacher, who indicated how many of the child's peers "dislike or reject" and "like and accept" the child on a 5-point rating scale: 1 = very few (fewer than 25 %); 2=few (about 25 %); 3=about half (50 %); 4=most (about 75 %), and 5 = almost all (more than 75 %). The items were drawn from the Teacher Ratings of Peers and Social Skills scale developed by Dishion and Kavanagh (2003).

*Physical Aggression (T1 to T4).* PA was assessed by the parent using four items (the ones assessing PA only) from the aggressive behavior scale in the Child Behavior Checklist (CBCL; Achenbach and Rescorla, 2001): "Cruelty, bullying, or meanness to others"; "Destroys things belonging to his/her family or others"; "Gets in many fights"; and "Physically attacks people", rated from 0 (*not true*) through 1 (*somewhat or sometimes true*) to 2 (*very true or often true*). This questionnaire assesses the presence of problem behaviors over the previous 6 months. The mean of the four items was calculated. For the modified scale used in the present study, the internal consistency reliabilities were  $\alpha_{T1} = .82$ ,  $\alpha_{T2} = .76$ ,  $\alpha_{T3} = .70$ , and  $\alpha_{T4} = .78$ .

*Special Educational Services (T1).* Given the sampling method we used, it was important to make sure the results were not influenced by whether or not the child was receiving special educational services for behavioral problems. To do so, the parent was asked the following question: "During the last year, was your child met by a specialist or professional at school for emotional or behavioral problems?" (0 = no, 1 = yes).



## **Procedure**

For each assessment (T1 to T4), home interviews were scheduled at the parent's convenience. Parents were presented with a full description of the study and then signed a consent form including agreement to obtain information about the child's behaviors from classroom teachers. The mean duration of parental interviews was 90 min for all the questionnaires used in the longitudinal study. Interviews and testing were performed by graduate-level research assistants, all of whom underwent a formal 3-day training session. The teacher assessment was obtained over the telephone, with structured interviews of approximately 30 min. Parents and teachers received compensations for their participation.

## **Analytical Strategies**

For the first study goal, the trajectories were identified in two steps using Mplus 7.1 (Muthén and Muthén, 1998–2013). In step 1, we identified an average trajectory of IA, controlling for PA as a time-varying covariate. The fit of the model was assessed using the following fit indices: the chi-square value (non-significant), the Comparative Fit Index (CFI; above .90) and the Root Mean Square Error of Approximation (RMSEA; below .08). In the presence of significant variance around the intercept and slope, the next step was to conduct latent growth class analysis to identify distinct subgroups of girls with similar levels of IA over time. Several models were tested, starting with a one-trajectory model and going up to a four-trajectory model. All these models were estimated using random input data. To identify the appropriate number of IA trajectories, the models were compared using the following fit indices: the Bayesian Information Criterion (BIC; the lowest possible value), the Vuong-Lo Mendell-Rubin (LMR) Likelihood Ratio Test (significant, meaning that the model was significantly better with  $n$  trajectories than with  $n-1$  trajectories) and the percentage of individuals per trajectory (at

least 5 %). As it can be difficult to meet all these criteria, we chose the model meeting the highest number of criteria and the one that was the most parsimonious.

Next, in order to identify which individual, family, and peer risk factors predicted group membership, multinomial logistic regressions were performed in SPSS 20 to estimate the effect of each predictor on the probability of being in one or the other IA trajectory. These regression analyses were conducted in two steps, in which the dependent variable was the categorical variable representing the trajectories of IA. In Step 1, we conducted univariate logistic regression analyses with only one risk factor at a time. In Step 2, the factors found to discriminate between subgroups were all entered in a multivariate logistic regression to identify the factors that best discriminated the high-risk group. Whereas the univariate analyses made it possible to identify the risk factors associated with membership in the high-risk trajectory group, the multivariate analysis made it possible to determine which factors were the most important.

## **Results**

### **Descriptive Statistics**

Before conducting the analysis, we looked for multicollinearity between the independent variables. The correlational analysis (see online supplement) showed that, despite significant correlations between the variables (the highest being between hostility and parental rejection,  $r = .73$ ), there was no multicollinearity. Moreover, we noted that all independent variables measured at T1 correlated significantly with IA from T1 to T4 ( $r = .14$  to  $.45$ ), suggesting a possible relationship between the risk factors under study and IA. In addition, IA was fairly stable over time, with correlations ranging from  $.64$  to  $.79$  (see Table 1). Furthermore, as expected, the correlations between IA and PA were significant across the years ( $r = .37$  to  $.62$ ). Both types of aggression, and particularly PA, tended to decrease from one measurement time to the next.

## **Modeling the Trajectories of Indirect Aggression**

Step 1 of the analysis showed that the baseline linear model of IA was excellent,  $\chi^2(17) = 61.397, p < .001$  (RMSEA = .093, CFI = .940); the linear model was better than the quadratic model. The variances around the intercept and the slope were significant, suggesting heterogeneity in the sample: Girls did not all follow a similar trajectory of IA from T1 to T4. Consequently, in step 2, we performed latent growth class analysis, including PA scores as control variables. A three-class model (in which the intercept variance was freely estimated) met all our criteria pertaining to the fit indices and in particular the lowest BIC value.

These three trajectories are presented in Fig. 1. As can be seen in this figure, the first subgroup of girls followed a trajectory that started out at the mean and then increased ( $n = 57, 18.9\%$ ), ending at one standard deviation above the mean. This was the “mean-increasing” trajectory. A second subgroup of girls followed a trajectory that started out at the mean and then decreased ( $n = 134, 44.5\%$ ). This was the “mean-decreasing” trajectory. Lastly, a third subgroup of girls followed a trajectory that started out below the mean and then decreased ( $n = 110, 36.5\%$ ). This was the “low-decreasing” trajectory, which consisted of girls who rarely used IA during the elementary school years.

### **Risk Factors at T1 Associated with the Trajectories of IA**

To identify the risk factors that predicted the girls’ membership in one of the three trajectories we identified, in particular the “mean-increasing” trajectory, two analyses were conducted: (a) the “mean-increasing” and “mean-decreasing” trajectories were compared to the “low-decreasing” trajectory and (b) the “mean-decreasing” trajectory was compared to the “mean-increasing” trajectory. To do so, multinomial logistic regression analyses were used in

which the estimates are the exponential coefficients representing the odds ratio of being in a group compared to another. Odds ratios appear in Table 2.

First, the univariate regression analyses revealed that 10 of the 12 risk factors predicted group membership in one or another trajectory. As for the individual risk factors, and temperamental traits in particular, the greater the extent to which the girls presented negative affectivity, the more likely they were to belong to the “mean-increasing” or “mean-decreasing” trajectory compared to the “low-decreasing” trajectory. The same results were observed for the temperamental trait of surgency/extraversion, whereas they went in the opposite direction for the temperamental trait of effortful control. As for empathy, the greater the extent to which the girls showed empathy, the more likely they were to belong to the “low-decreasing” trajectory as opposed to the other two trajectories. As for family risk factors, the greater the extent to which girls experienced parental hostility, neglect, and rejection, the less likely they were to belong to the “low-decreasing” trajectory compared to the other two trajectories. Coming from an intact family and having moved less often during their life made girls more likely to belong to the “low-decreasing” trajectory as opposed to the “mean-increasing” trajectory. With regard to the peer risk factors, the greater the extent to which a young girl was liked by her peers, the more likely she was to belong to the “low-decreasing” or “mean-decreasing” trajectories as opposed to the “mean-increasing” trajectory.

In sum, girls presenting higher traits of negative affectivity and surgency/extraversion, but lower levels of effortful control and empathy were more likely to be in the higher aggression trajectory groups. Within the family domain, those living in families headed by parents displaying more dysfunctional parenting practices were also more likely to be in the higher aggression trajectory groups, and those living in more instable families were more likely to be in

the increasing aggression trajectory group. Furthermore, girls in the increasing aggression trajectory group had lower means than their female counterparts did in terms of peer acceptance.

Second, in the multivariate model when all the significant independent variables were entered into a single analysis, only two variables remained significant: (a) extraverted girls had a 1.67 higher odds of belonging to the “mean-increasing” trajectory compared to the “low-decreasing” trajectory and (b) girls who experienced higher levels of parental hostility had a 4.05 higher odds of belonging to the “mean-decreasing” trajectory compared to the “low-decreasing” trajectory.

### **Discussion**

The present study examined the trajectories of IA among 347 girls, assessed four times at 12 months intervals from childhood (T1:  $M_{age} = 8.38$ ) to early adolescence (T4:  $M_{age} = 11.28$ ). The results support previous research showing that girls are likely to follow distinct developmental trajectories. Our results confirm the existence of a unique subgroup of girls (“mean-increasing”) who use malicious and exclusionary behaviors with peers through the elementary school years, putting them at risk for serious adjustment problems (Côté et al., 2007; Pagani et al., 2010; Underwood et al., 2011; Vaillancourt et al., 2007).

Girls with surgency/extraversion temperamental tendencies were at higher odds of following a path characterized with elevated use of IA. Thus, temperament traits characterized by dominant, pleasure-seeking behaviors at school entry serve as a risk factor for higher levels of IA use across elementary school years—a time when the peer relationships and the need for acceptance become increasingly salient. Hostile parent– child relationships also differentiated girls in the “mean-decreasing” group from the “low-decreasing” group.

## Trajectories of IA Over the Elementary School Years

Three trajectories emerged from our study: 18.9 % ( $n = 57$ ) of the girls in our sample followed a trajectory that started out at the mean and then increased (“mean-increasing”; high-risk), 44.5 % ( $n = 134$ ) of the girls followed a trajectory that started out at the mean and then decreased (“mean-decreasing”), and 36.5 % ( $n = 110$ ) of the girls followed a trajectory that started out below the mean and then decreased (“low-decreasing”). More importantly, we found that almost one in five girls used IA in a frequent and persistent way, with their use increasing over the elementary school years. Three similar trajectories have been identified in most studies examining the trajectories of IA. The number of girls in our at-risk trajectory group was slightly higher compared to other studies, a finding which might reflect the disadvantaged background or the oversampling of girls with behavioral problems in our study. However, earlier studies (Côté et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007; Yuan et al., 2014) have observed a similar trajectory of IA which started out at the mean or below the mean and then increased over time.

A “mean-decreasing” trajectory was also identified in three of the six reviewed studies (Cleverley et al., 2012; Underwood et al., 2009; Yuan et al., 2014). However, contrary to the present study, the “decreasing” trajectories in these studies started out above the mean rather than at the mean, which can probably be explained by the use of another respondent than the parent or the fact that PA was not controlled for in these studies. Our results nevertheless highlight the importance of examining this subgroup of young girls who could continue to use IA over the long term or develop other psychosocial problems in times of stress, such as when they are undergoing pubertal changes or during school transitions.

The “low-decreasing” or stable trajectory was identified in all of the reviewed studies (Cleverley et al., 2012; Côté et al., 2007; Pagani et al., 2010; Underwood et al., 2009;

Vaillancourt et al., 2007; Yuan et al., 2014). Given that this “below the mean” trajectory was replicated in every study, and in different age groups and respondents, this indicates that there are a substantial number of girls who hardly ever use IA during the elementary school years, thus disqualifying these behaviors as common or normal for “all” girls.

The fact that our sample included mainly girls from unprivileged neighborhoods and that we controlled for PA in the analyses may explain the differences in the means of IA and in the number of children identified in each of the groups compared to other studies. Despite these differences, the trajectories of IA are fairly constant from one study to another. Clearly, our results confirm the existence of a unique subgroup of girls who use malicious and exclusionary behaviors with peers through the elementary school years.

### **Individual, Family, and Peer Risk Factors**

With regard to individual risk factors, the results of all the univariate regression analyses revealed significant differences between, on the one hand, the “mean-increasing” and “low-decreasing” trajectories and, on the other hand, the “mean-decreasing” and “low-decreasing” trajectories. More specifically, girls who presented higher levels of negative affectivity, had more difficulty regulating their emotions, were more extraverted, and were less empathetic at T1 tended to follow trajectories involving higher levels of IA over time. These findings are generally in line with those of previous studies (Bowie, 2010; Park et al., 2005; Zahn-Waxler et al., 2005).

As for family risk factors, concerning the variables pertaining to the parent–child relationship, the results of the univariate regression analyses also showed differences between the “mean-increasing” and “low-decreasing” trajectories and, conversely, between the “mean-decreasing” and “low-decreasing” trajectories. More specifically, girls who experienced parental hostility and parental neglect or rejection were more likely to belong to the “mean-increasing” or “mean-decreasing” trajectories of IA. These findings are in line with those of previous studies, in

particular Kawabata et al.'s meta-analysis (2011). This study also examined family instability in an exploratory manner. With respect to this factor, however, differences were only found between the “mean-increasing” and “low-decreasing” trajectories. More specifically, girls who came from non-intact families and who experienced a higher number of moves were more likely to belong to the “mean-increasing” as opposed to the “low-decreasing” trajectory of IA throughout the elementary school years. Overall, our results suggest that girls following the “mean-increasing” trajectory may have been exposed to greater family dysfunction during their childhood (Pagani et al., 2010).

As for the peer risk factors, peer rejection did not appear to predict membership in any of the trajectories, whereas peer acceptance predicted the girls' membership in the “mean-decreasing” trajectory as opposed to the other two trajectories. It should be noted that this variable was the only variable that significantly distinguished membership in the “mean-increasing” and the “mean-decreasing” trajectories of IA. Girls who were better liked by their peers were 1.3 times more likely to belong to the “mean-decreasing” trajectory than to the “mean-increasing” trajectory. Considering these findings and those in the literature pointing to a significant positive relationship between peer acceptance and IA (Kuppens et al., 2009; Orue and Calvete, 2011), girls who hold a prominent position in their peer group could be predisposed to using IA. However, peer acceptance appears to subsequently have a protective effect, increasing the likelihood of following a trajectory in which the use of IA decreases over time. Being liked by one's peers could therefore be associated with a decrease in IA over time.

As for the multivariate regression analysis, the temperamental trait of surgency/extraversion appeared to be the factor that most strongly predicted girls' membership in the “mean-increasing” trajectory (1.7 times more likely) compared to the “low-decreasing” trajectory. Very few studies have examined the associations between temperament, especially



extraversion, and IA. A recent study by Tackett et al. (2014), in contrast to the present study, showed that IA was associated with lower levels of extraversion. However, this study was cross-sectional and the age range in their sample was very wide (6–18 years of age), which could also explain why our findings are divergent.

Yet, the literature on temperament shows that extraversion is positively associated with externalizing problems, such as aggressive behavior (Rothbart, 2007). This temperamental trait refers to girls who are impulsive, seek high intensity pleasure, and are not shy (Putnam and Rothbart, 2006). Girls with high levels of surgency/extraversion may have difficulty regulating their distress when faced with relationship issues, resulting in acting out behavior such as IA. Also, these characteristics are similar to those of the social profile of young girls who use IA. Indeed, these girls are described by their peers as being popular, being well integrated into a social network in which they hold a prominent position, and seeking excitement (Owens et al., 2000; Verlaan et al., 2012). As suggested by Atherton et al. (2016), extraversion may not necessarily promote the use of IA in childhood, but it may provoke certain responses from their peers that are rewarding and increase surgency temperamental tendencies over time. Further research is needed to clarify this relationship.

With regard to family risk factors, a hostile parent–child relationship appears to be the factor that most strongly predicted membership in the “mean-decreasing” trajectory (4.0 times more likely) compared to the “low-decreasing” trajectory. This finding is in line with those reported in Kawabata et al.’s meta-analysis (2011), which examined various parental practices and found the greatest effect size between harsh maternal parenting and IA. Experiencing this type of relationship appears to increase the likelihood that girls will use IA. The fact that this risk factor was not shown to significantly predict membership in the “mean-increasing” trajectory group can possibly be explained by the stronger predictive power of surgency/extraversion.

Further studies are needed to examine the joint effect of individual and family predictors in the development of IA.

### **Limitations and Future Research Directions**

The results of our study have several limitations that merit attention. First, the parents' answers were used to measure IA, whereas it is usually better to use peer reports (Crick, 1996) because teachers and parents may be less aware of who uses IA. However, sociometric measures can present several difficulties for researchers, in particular with regard to parental consent and the challenges posed in longitudinal studies. In fact, Kuppens et al. (2009) demonstrated that parents' report correlated with a latent factor based on peers' and teachers' reports (T1  $r = .20$  and T2  $r = .47$ ) and that it was a more stable measure than the teachers' report. Yet, it would be interesting in future studies to look at whether subgroups of girls are replicated across different respondents. Second, as for any study using latent growth class analysis, the variable used to predict membership in the subgroups of girls was assessed on the basis of the probability of belonging to each subgroup, whereas it was treated as an absolute variable. Future research could use both variables to verify if the risk factors associated with increasing use of IA throughout the elementary school years are the same or not. It should also be noted that this sample mainly included girls from disadvantaged backgrounds and over-represented girls with behavioral problems, with the aim of ensuring the potential presence of IA. Consequently, this oversampling may affect the generalizability of the findings. However, in four of the five studies that included measures of socio-economic status, the latter was not a significant predictor of IA among children (Côté et al., 2007; Park et al., 2005; Spieker et al., 2012; Underwood et al., 2009). Whether or not the same subgroups of girls are found in at-risk versus normative samples could at least deserve more research attention.

## **Practice Implications**

From an intervention standpoint, these findings can help practitioners who intervene with girls who use IA to better identify these girls and to assess the degree of risk in their individual, family, and peer portrait (Leff et al., 2010; Verlaan and Turmel, 2010). Indeed, according to Hinshaw (2002), the systematic examination of risk factors is a prerequisite for the development of preventive intervention strategies. Because these girls have been found to be particularly at risk for negative relational experiences with peers (Heilbron and Prinstein, 2008) and with family (Kawabata et al., 2011; Pagani et al., 2010), the examination of those predictors unique to this group of girls is important in order to better identify these girls and help prevent them from following a trajectory of maladjustment. More specifically, for girls with high tendencies toward extraversion, engaging in IA may provide increases in rewarded status and admiration from peers. This may, in turn, boost their motivation to seek out pleasurable, rewarding experiences more generally (Atherton et al., 2016). Taken together, interventions aimed at changing negative temperamental tendencies and interpersonal experiences with family and peers may break the cycle that reinforces the use of frequent and persistent use of IA. These interventions need to happen at school entry because behaviors are already taking place at that young age.

## **Conclusion**

The present findings help to better understand what distinguishes girls who are more likely to use IA frequently and persistently throughout the elementary school years. From a research standpoint, we now know which risk factors seem to be most important in this assessment and have a better understating of how these behaviors unfold in girls' development.

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Table 1

*Descriptive Statistics for Indirect and Physical Aggression from T1 to T4*

	IA T1	IA T2	IA T3	IA T4	PA T1	PA T2	PA T3	PA T4
IA T1	-							
IA T2	.68**	-						
IA T3	.66**	.73**	-					
IA T4	.64**	.70**	.79**	-				
PA T1	.49**	.43**	.40**	.49**	-			
PA T2	.37**	.51**	.40**	.42**	.65**	-		
PA T3	.45**	.43**	.52**	.52**	.69**	.64**	-	
PA T4	.39**	.45**	.51**	.62**	.60**	.55**	.67**	-
<i>n</i>	344	324	323	315	346	329	324	315
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max	2.92	2.58	3.25	2.75	2.00	2.00	1.50	2.00
<i>M</i>	0.67	0.63	0.63	0.60	0.33	0.25	0.21	0.18
<i>SD</i>	0.59	0.56	0.57	0.60	0.46	0.38	0.33	0.34

*Note.* IA = Indirect aggression. PA = Physical aggression. Time 1 (T1) = 6-10 years-old ( $M_{age} = 8.38$ ); Time 2 (T2) = 7-11 years-old ( $M_{age} = 9.25$ ); Time 3 (T3) = 8-12 years-old ( $M_{age} = 10.25$ ); Time 4 (T4) = 9-113 years-old ( $M_{age} = 11.38$ ).

\*  $p < .05$ . \*\*  $p < .01$ .

Table 2

*Odds ratio of Trajectory Membership from T1 Predictors*

Trajectories	Univariate			Multivariate		
	I vs. L	D vs. I	D vs. L	I vs. L	D vs. I	D vs. L
<i>Individual risk factors at T1</i>						
Temperament:						
Negative affectivity	<b>1.61*</b>	0.97	<b>1.56**</b>	1.26	0.94	1.18
Effortful control	<b>0.48**</b>	1.00	<b>0.48**</b>	0.87	0.75	0.65
Surgency/Extraversion	<b>1.81**</b>	0.79	<b>1.42*</b>	<b>1.67*</b>	0.79	1.31
Empathy	<b>0.50**</b>	1.19	<b>0.60**</b>	0.83	1.14	0.95
<i>Family risk factors at T1</i>						
Parent-child relationship:						
Warmth	0.57	0.81	0.46	-----	-----	-----
Hostility	<b>4.23**</b>	0.97	<b>4.12**</b>	1.72	2.35	<b>4.05*</b>
Neglect	<b>4.95*</b>	1.10	<b>5.00**</b>	2.72	0.93	2.53
Rejection	<b>3.25*</b>	0.67	2.18	0.87	0.41	0.36
Family stability:						
Non-intact family	<b>2.25*</b>	0.65	1.46	1.66	0.65	1.08
Number of moves	<b>1.17*</b>	0.91	1.07	1.06	0.97	1.03
<i>Peer risk factors at T1</i>						
Peer rejection	1.31	0.84	1.09	-----	-----	-----
Peer acceptance	<b>0.71*</b>	<b>1.31*</b>	0.93	0.82	1.30	1.06

*Note.* I = Mean-increasing. D = Mean-decreasing. L = Low-decreasing. Time 1 (T1) = 6=10 years-old ( $M_{age} = 8.38$ )

\*  $p < .05$ . \*\*  $p < .01$ .

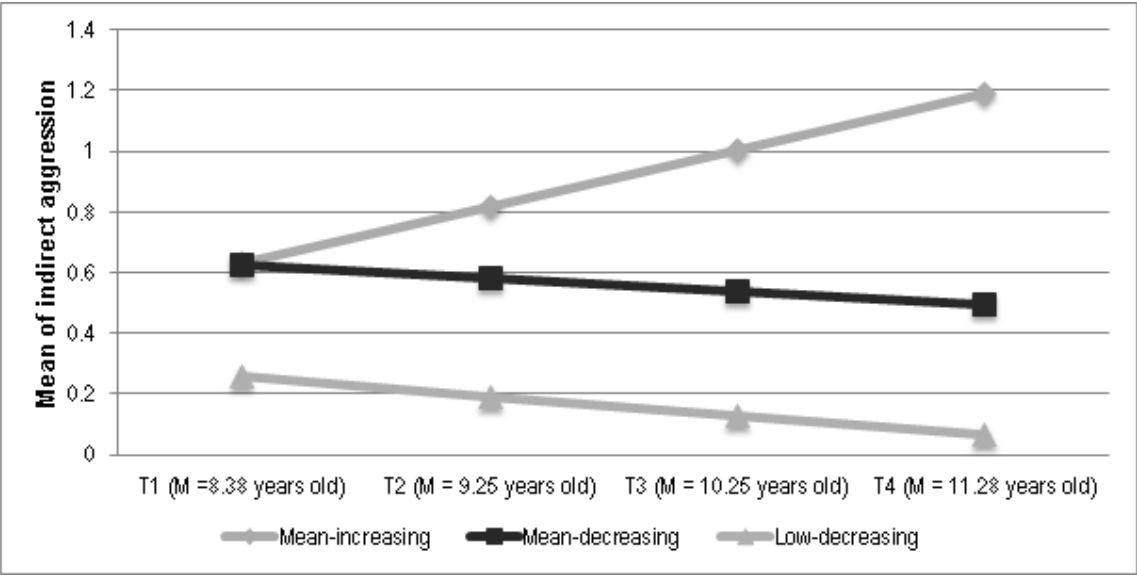


Figure 1. Trajectories of girls' use of indirect aggression from Time 1 to Time 4 (n = 301)