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Abstract

Though conceptually distinct from other behavior problems, indirect aggression (IA) is correlated with physical aggression and is linked to oppositional defiant disorder and conduct disorder from childhood to adolescence. Thus, IA could be part of the clinical picture of children with identified conduct problems (CP). However, trajectories of IA have not been studied in children with CP. In the present study, we evaluated and compared the mean trajectory of IA from 7 to 14 years of age in children with (n = 328;47.6% girls) and without (n = 320; 51.3% girls) early clinically significant CP using both parent and teacher ratings. We then examined if sub-groups of children distinguished themselves by their use of IA over time and tested for sex differences. Latent growth models showed that children with CP used IA at higher rates over time than children without CP. Regardless of this higher frequency, the use of IA in both groups of children was best described by down-turned curvilinear trajectories peaking at 10 years of age. Growth mixture models showed that children without CP, according to parent and teacher ratings, and children with CP, according to parent ratings, both followed two trajectories of IA over time, with, respectively, 10% to 14% of them following a high trajectory. As for sex differences, the use of IA of boys and girls without CP did not differ, but differences emerged for children with CP, with girls using IA more frequently. The clinical implications of the findings are discussed.

Keywords

Indirect aggression; Trajectories; Conduct problems; Sex differences

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Speaking about others behind their backs or gossiping are frequent examples of indirect aggression (IA). Despite the increase in scientific interest in IA over the last two decades, parents and teachers still perceive this form of aggression as less serious than physical aggression (Swit, 2019; Yoon et al., 2016). They are also less likely to intervene in a conflict involving IA in comparison to one involving physical aggression (Swit, 2019). Yet, IA may have deleterious repercussions on the development of children, such as the emergence or aggravation of internalizing problems and externalizing problems (Card et al., 2008). These consequences are most often seen in children frequently or persistently using IA over time (Cleverley et al., 2012), which concerns from 5% to 35% of children (e.g., Boutin et al., 2017; Vaillancourt et al., 2007). Such an elevated use of IA was reported to be mostly observable among children already presenting a high level of oppositional and conduct problems (CP) (Keenan et al., 2008). However, to our knowledge, no study to date has looked at how IA develops from childhood to adolescence in children with CP, neither compared their mean IA trajectory to that of typically developing children in order to evaluate if the presence of CP influences IA's development over time. Consequently, this is what this study opted to do.

IA's Development

IA refers to behaviors intended to harm victims through the peer group, such as spreading rumors, telling their secrets to others, encouraging others to avoid them. As a result, the victim's reputation or social status is greatly affected (Bjorkqvist et al., 1992a). With some distinctions, two other terms referring to similar behavior (Archer & Coyne, 2005) are also used in this field of research: relational aggression (Crick & Grotpeter, 1995) and social aggression (Cairns et al.,

1989). In accordance with our methodology, we chose the term IA, but reviewed studies using any of the three constructs.

The first manifestations of IA are quite rudimentary (e.g., threatening a peer to not be friends anymore) and are observed around 4-5 years of age (Crick et al., 2004) when children better understand non-verbal language, social relations, and their peers' intentions (Kaukiainen et al., 1999). As such, the first theorists posited that IA's use would increase from childhood until approximately adolescence (Bjorkqvist et al., 1992c).

In that regard, empirical studies in community samples are mixed. Some studies showed increasing IA use in elementary school-aged girls (Kawabata et al., 2012; Murray-Close et al., 2007), while others showed decreasing IA use from third (Ehrenreich et al., 2014) or sixth grade (Orpinas et al., 2015) to 12th grade for both boys and girls. Another study found a decreasing use of IA from third to sixth grade for boys but a stable use for girls (Spieker et al., 2012). According to many researchers, the explanation of these conflictual results is that IA use follows a curvilinear trajectory (Boutin et al., 2017; Ettekal & Ladd, 2015; Karriker-Jaffe et al., 2008) peaking in preadolescence, around age 11 (Bjorkqvist et al., 1992a) or 13 (Karriker-Jaffe et al., 2008). Thus, from childhood to adolescence, there appears to be a decreasing trend in IA use, with some increases in preadolescence, maybe more so for girls (Fite & Pederson, 2018).

Trajectories of IA in Community Samples

Studies have also aimed at identifying sub-groups of children based on their use of IA over time. Those studies have found between two to four trajectories of IA in community samples, suggesting that the use of IA in childhood and adolescence is heterogeneous.

Two studies using data from the National Longitudinal Survey of Children and Youth have found two trajectories of IA respectively from 4 to 8 years of age (Cote et al., 2007) and

from four to ten years of age (Vaillancourt et al., 2007): one increasing trajectory (32% and 35% of the sample) and one low and stable trajectory (68% and 65% of the sample). Using data from the same survey, Pagani et al. (2010) examined boys and girls separately and identified for both four trajectories starting at different levels of IA from 4 to 11 years old: two low and stable trajectories, one moderately high and one high trajectory. Taken together, these studies suggest the existence of sub-groups of children who exhibit increasing or high stable levels of IA during childhood. However, in an American sample of elementary school aged boys and girls, Underwood et al. (2009) observed a low stable trajectory adopted by 55% of their sample and a high decreasing trajectory followed by 45% of their sample. Therefore, in this study, no sub-groups of children seemed to use IA in an increasing or stable high fashion.

With different American and Canadian adolescent samples, studies have shown three trajectories of IA. Each identified a low-decreasing (from 30% to 55% of their sample), a mean-decreasing (from 39% to 66% of their sample) and a high-decreasing (17% and 7%) (Ehrenreich et al., 2014; Orpinas et al., 2015) or high-stable trajectory (5%) (Cleverley et al., 2012). As such, adolescents seem to display different levels of IA early on but decreasing use over time.

In short, previous studies have shown variability in trajectories of IA from childhood to adolescence. There may be multiple sources of this variability, including sex differences, and, as mentioned earlier, differences in the level of CP displayed by participants themselves.

IA in Children with CP

Although distinct from other behavior problems (Vaillancourt et al., 2003), IA is correlated with physical and verbal aggression (Card et al., 2008) and is linked to oppositional defiant disorder and conduct disorder from childhood to adolescence (Aizpitarte et al., 2017). Previous studies also showed IA as an indicator of an externalizing behavior factor (Loeber et

al., 2009; Tackett et al., 2013). IA could thus be part of the clinical picture of children with identified CP. However, not much is known about the use of IA behaviors in these children. Using data from the Pittsburgh Girl Study (girls from 7 to 14 years old), Keenan and colleagues (2010) showed that high scores of IA (one standard deviation above the mean) were proportionally more common among girls with conduct disorder than among girls without this disorder. Ackermann et al. (2019) studied IA use in youths presenting conduct disorder and in typically developing youths. The results of this large European multi-site survey show higher levels of IA use in the group with conduct disorder. Further, girls in the group with conduct disorder had higher IA levels than boys did, a sex difference that was not observed in the group without conduct disorder. Marsee et al. (2014) also showed the same difference in IA use between boys and girls in their sample of detained adolescents (12-19 years old), a difference not shown in their community sample (11-18 years old). Moreover, they found that there was a substantial number of detained girls (25%) showing high levels of IA with low levels of physical aggression (an important symptom of CP), a combination that was rare among detained boys (6.5%). Since, the latter two studies are cross-sectional and Keenan et al. (2010) studied CP's development but not IA's, no assumptions can be made regarding the development of IA use over time in children with CP.

Sex Differences in IA Trajectories

Regardless of the presence of CP, differences in the use of IA over time between boys and girls could be expected. For reasons such as the socialization they receive, the cost-benefit balance of using IA over other forms of aggression, and the greater importance they devote to friendship and close relationships, girls prefer IA to more direct forms of aggression (Archer & Coyne, 2005; Loflin & Barry, 2016). As such, IA is particularly important in girls' aggressive

repertoire. Many studies report differences between girls' and boys' trajectories of IA, but we cannot necessarily conclude that girls are more at risk of following a high trajectory of IA as results are mixed. Some studies showed an increase in IA use over time only for girls (Kawabata et al., 2012; Murray-Close et al., 2007). Spieker et al. (2012) showed a higher intercept and stable use of IA for girls compared to a lower intercept and declining use for boys. Other studies did not report any significant differences between girls' and boys' trajectories of IA (Karriker-Jaffe et al., 2008; Underwood et al., 2009). As for the proportion of boys and girls in each trajectory of IA, studies using data from the National Longitudinal Survey of Children and Youth (Cote et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007) observed a higher percentage of girls than boys following a high trajectory of IA from 4 to 11 years of age, while in a sample of adolescents from 12 to 18 years old, boys seemed more at risk (Orpinas et al., 2015). These mixed findings suggest that the evaluation of sex's impact on trajectories of IA is essential.

The Present Study

In the closing remarks of their recent chapter on developmental trajectories of relational aggression, Fite and Pederson (2018) emphasize the need for longitudinal studies following the same individuals over several years in order to compare results across different sub-samples of children and adolescents, to examine sex differences in trajectories of IA, and to evaluate how IA changes for underrepresented groups. In accordance with these recommendations, the present study proposes to evaluate IA's development using 7 years of longitudinal data, from 7 to 14 years of age, collected in a sample of children with and without clinically significant CP at study inception. Using both parent and teacher ratings, three objectives were pursued. The first objective was to establish the mean trajectory of IA use and test for differences between children with and without CP. According to past studies, we hypothesized that the frequency of IA use for

children with CP would be higher than for children without CP and thus their trajectory would be higher, although we did not make specific hypotheses regarding the shape of their trajectory. As for children without CP, we assumed to find a down-turned curvilinear trajectory. The second objective was to evaluate the heterogeneity of IA use in children with CP and without CP by the identification of different trajectories of IA use over time. Past studies led us to hypothesize that we would find heterogeneity in IA use of children without CP leading to the identification of more than one trajectory. We hypothesized, however, that we would not identify a high IA trajectory in children without CP as we assumed that children persistently using IA over time would be those with early identified CP. As for these children (i.e., with CP), we made no assumptions regarding the number and shape of their IA trajectories. Lastly, we wanted to evaluate if there were sex differences in the trajectories of IA. As results of past studies on children from community samples are mixed, we only hypothesized that girls with CP would follow higher trajectories of IA than boys with CP.

Methodology

Participants

Participants are 328 children with (47.6% girls) and 320 without (51.3% girls) early clinically significant CP. Data used in this study is from an ongoing longitudinal study on the evolution of early-onset CP among girls and boys. Participants were recruited from 2008 to 2010 in elementary schools from eight school boards from four regions of Quebec (Canada). To obtain a large number of children with clinically significant CP, two strategies were employed. The majority of children with CP was recruited from among the students receiving psychosocial services for behavioral problems at schools. All girls less than 10 years of age and approximately one out of four boys were randomly selected and invited to participate in the study (participation

rate = 75.1%). These children were assessed by a parent and a teacher using the DSM-Oriented Scales for Conduct Problems or for Oppositional Defiant Problems of the ASEBA (Achenbach & Rescorla, 2001). To be included in our CP group, they had to score above the clinical threshold of the scales (above the 98th percentile) based on either parent or teacher report (n = 274; 44% girls). The other children with CP were recruited through a complementary strategy, which consisted of systematic screenings in classes to identify children who presented behavior problem symptomatology but who were not signaled to school professionals by teachers. A multi-gated method of screening was used and was applied to 881 students from first to third grade in schools located in disadvantaged neighborhoods, according to an index of the Ministry of Education (Gouvernement du Québec, 2013) (participation rate = 71.5%). Parents and teachers also completed the aforementioned scales of the ASEBA (Achenbach & Rescorla, 2001). This allowed the identification of 54 children (65% girls) who scored above the clinical threshold on the scales and were therefore included in the study. The children in the group without CP were randomly selected among children assessed during the systematic screening procedure and who scored below the clinical threshold.

The first seven waves (T1 to T7) of the longitudinal project, which opted for a repeated measures design at 12-month intervals, were used for the present study. Participation rates varied at each wave ranging from 100% in T1 to 87.5% in T7. No significant difference was identified between the participants (i.e., data on five or more time points; n = 567) and those who seem to have abandoned the study (i.e., no data since T4; n = 40) in terms of demographics (sex, socioeconomic status, type of family, mother's level of education), IA scores and CP scores. At T1, participants were on average 8.4 years old (SD = 0.93; age 6 to 10). At T6, last time point for

parental data on IA, they were 13.2 years old (*SD* = 0.96; age 11 to 15), and at T7, last time point for teacher data on IA, they were 14.3 years old (*SD* = 0.95; age 12 to 16).

Measures

Indirect Aggression. IA was assessed by 10 items (e.g., "Tells bad or false stories about others") from the Direct and Indirect Aggression Scales (Björkqvist et al., 1992b). Parents and teachers rated children's IA behaviors on a 5-point scale: 0 (*never*), 1 (*rarely*), 2 (*sometimes*), 3 (*often*) and 4 (*very often*). A mean score for each informant was used. Higher scores indicate higher use of IA. The original instrument encompasses three scales (physical aggression, verbal aggression and IA) developed and identified through factor analyses on samples of children aged 8 to 15 (Björkqvist et al.,1992a; Lagerspetz et al., 1988). Using middle childhood aged samples, the three-factor structure was reproduced by Carroll and Shute (2005). Regarding the internal consistency, using parent ratings Vaillancourt et al. (2007) obtained Cronbach's alphas (α) ranging from 0.75 (age 4) to 0.80 (age 10), and using teacher ratings Valles and Knutson (2008) obtained an α of 0.92 in a sample of children aged 4-11. In the present study, the internal consistency was excellent (parents: α from 0.86 to 0.92; teachers: α from 0.92 to 0.94).

Conduct Problems. CP were evaluated at study inception using the DSM-oriented scales for oppositional problems and CP from the parent and teacher versions of the ASEBA (Achenbach & Rescorla, 2001). The oppositional problems scale (e.g., "Argues a lot") has five items for both parent and teacher versions and the CP scale (e.g., "Breaks rules at home, school, or elsewhere") has 17 items in the parent version and 13 items in the teacher version. Items were scored on a 3-point scale ranging from 0 (*not true*) to 2 (*very true or often true*). Strong evidence for the convergent and discriminative validity of these scales has been shown in a large clinical sample of children and adolescents (Nakamura et al., 2009), as well as high reliability with

Cronbach's α of 0.86 and 0.89 respectively for the oppositional problems and CP DSM-oriented scales. In the present study, Cronbach's α varied from 0.85 to 0.93 and cross-informant agreement was higher than in previous studies (oppositional problems scale $r = 0.57$, CP scale $r = 0.60$ vs., respectively, $r = 0.32$ and $r = 0.39$ in Achenbach & Rescorla, 2001). This may be explained by the fact that most children in the CP group were receiving services at school rending both teachers and parents aware of the children's behaviors.

Procedure

After having received approval from the Université de Sherbrooke ethics committee, data was collected by graduate-level research assistants having received a 3-day training. Each year, research assistants met parents in their home and presented them with a description of the study and a consent form that authorized the research team to contact the child's teacher. The teacher assessment was obtained over the telephone. For all the questionnaires used in the longitudinal study, the mean duration of parental interviews was 90 min and 30 min for teacher interviews. Parents and teachers received compensation for their participation.

Analytical Strategies

The recruitment strategy used resulted in a large age span between participants (e.g., age 6-10 at T1). Considering the developmental objectives of this study, we restructured the data by the age of participant instead of assessment time points. To do so, we calculated every participants' chronological age at T1 by considering the date of birth and the date of parental interview. For the remaining time points, considering the average interval between time points was 0.98 year ($SD = 0.07$), we added a year to the age calculated for T1. Data from each assessment were then classified according to these ages. We obtained too few IA scores for participants aged six ($n =$

3) and 15 (n = 90). As such, we used data from age 7 to age 14 (available IA data at each age according to each informant are provided in Table 1).

In order to evaluate the mean trajectory of IA in our sample (objective 1), latent growth models for each informant were tested in Mplus 8.1 (Muthén & Muthén, 1998-2018) using bootstrapping analysis (n = 5000). This robust testing method provides more valid estimates when variables are nonnormally distributed. Missing data were treated with Full information maximum likelihood, which does not impute data but allows all participants with information to contribute to the estimated model, not just those with complete data. Following the benchmarks proposed by Kline (2011), the quality of adjustment of each model was judged by a set of model fit indices: (a) the overall χ^2 (looking for a non-significant value; however χ^2 is affected by large samples and often comes out significant), (b) the comparative fit index (CFI; a value of 0.90 or higher), (c) the Tucker-Lewis index (TLI; a value of 0.90 or higher), (d) the root mean square error of approximation (RMSEA; a value of 0.08 or lower), and (e) the standardized root mean squared residual (SRMR; a value of 0.08 or lower). We tested and compared intercept only models, linear models and quadratic models. We then verified the presence of significant variance on the growth parameters, indicating a heterogeneous use of IA within the sample, and evaluated if the model varied according to CP status (used as the grouping variable). By using model constraints, we tested if the release of a latent growth factor or its variance would significantly improve the fully constrained model using chi-square difference testing.

For the second objective, a growth mixture model was tested for each group of children according to their CP status, and for each informant. Models from one to five classes were estimated using random input data. To select the proper number of classes, the models were compared using the following indices: the Bayesian Information Criterion (BIC; looking for the

lowest value), the entropy (looking for the highest value), the Vuong-Lo Mendell-Rubin Likelihood Ratio Test (LMR-LRT; has to be significant) and the percentage of individuals per trajectory (at least 5%). We chose the model meeting the highest number of criteria.

Finally, to determine if our results were the same for girls and boys, we evaluated if the mean trajectory of children with CP and the mean trajectory of children without CP were sex invariant by using model constraints to test if the release of a latent growth factor or its variance would significantly improve the fully constrained model using chi-square difference testing. In our growth mixture models, we tried using the "knownclass" option to identify groups by sex and test group differences. Unfortunately, it resulted in some very small classes and difficulty with convergence, preventing trustworthiness in interpretation of such data. Instead, we checked if there was a difference in the distribution of boys and girls in each trajectory.

Results

Descriptive Statistics

Even though there was some variability in mean scores of IA from age 7 to age 14 according to parental and teacher reports (see Table 1), the peak age of IA use seemed to be around 9- 11 years of age, allowing anticipation of a curvilinear growth of IA in time. The distribution on IA was asymmetrical with a positive skewness value (i.e., many participants tend to cluster on the low end of the scale; see Table 1), which is in line with the aforementioned development of IA with a majority of children using IA at low levels. As for correlations (available by demand to the authors), IA scores correlated with each other at every age, for both informants. Being a girl was correlated with higher IA scores at 13 and 14 years old according to parents and at 11 and 12 years old according to teacher. Finally, having CP was positively correlated with IA scores from 7 to 14 years old (both informants).

Objective 1

Before testing for differences in the mean trajectory of IA of children with and without CP, a mean trajectory of IA was drawn for the whole sample. Both models, using parent and teacher ratings, fit the data well (parent: $\chi^2 = 44.38$, $dl = 24$, $p = 0.007$, CFI = 0.99, TLI = 0.99, RMSEA = 0.04 [0.02, 0.05], SRMR = 0.07; teacher: $\chi^2 = 49.27$, $dl = 26$, $p = 0.004$, CFI = 0.97, TLI = 0.97, RMSEA = 0.04 [0.02, 0.05], SRMR = 0.04) and resulted in similar down-turned curvilinear trajectories (i.e., quadratic growth; see Fig. 1). In each model, the variance of every latent growth factor was significant, thus suggesting heterogeneity in use of IA over time.

Part of this variance can be explained by child CP. Indeed, children with and without CP varied significantly in their use of IA. According to parental report (see Fig. 1), children with CP had a significantly higher initial level of IA use compared to children without CP (intercept mean value of 0.72 vs. 0.38; $\Delta \chi^2$ 161.02 (1, $n = 648$), $p < 0.001$) and that initial level varied more among children with CP than among children without CP (variance of intercept of 0.18 vs. 0.07; $\Delta \chi^2$ 5.31 (1, $n = 648$), $p = 0.02$). However, they did not significantly differ in term of their change in IA use over time. Even though children without CP followed a stable trajectory of IA and children with CP followed a slightly down-turned curved trajectory, this difference was non-significant. According to teacher report (see Fig. 1), children with and without CP also significantly differed in terms of their initial levels of IA, with CP children using IA more frequently at 7 years old (intercept mean value of 0.97 vs. 0.22; $\Delta \chi^2$ 301.84 (1, $n = 648$), $p <$ 0.001). Both groups followed a non-significantly different down-turned curvilinear trajectory.

Objective 2

Our second objective was to evaluate variation in IA use of children with and without CP over time. Regarding children with CP, significant variance was identified on the intercept and

quadratic latent growth factors of the parent model. As such, growth mixture analyses were performed and showed that the best fitting model suggested two trajectories (see Fig. 2; the fit indices for one- to five-trajectory models are presented below the figure): a high-increasing trajectory (quadratic mean value non-significant) followed by 45 children (13.7%) and a high-decreasing trajectory followed by 283 children (86.3%). The "high" label corresponds to an intercept higher than one standard deviation above the IA mean of children without CP (i.e., normative) at 7 years of age. According to teacher report, no interpersonal variation in the IA use of children with CP was identified (non-significant variance on the latent growth factors).

As for children without CP, both parent and teacher ratings showed significant variance on the latent growth factors. The growth mixture analyses then showed, according to both informants, that children without CP can be sub-divided in two different trajectories of IA depicted in Fig. 3 (the fit indices for one- to five-trajectory models are presented below the figure). According to parent report, 39 children (12.2%) without CP followed a high-stable trajectory (both the slope and quadratic mean values were non-significant) of IA from 7 to 14 years of age, while the remaining 281 children (87.8%) followed a low slightly decreasing trajectory. According to teacher report, a majority of children without CP followed a low-increasing then decreasing trajectory (n = 288; 90.0%), while 10.0% (n = 32) followed a high-decreasing then increasing trajectory. Thus, according to both parent and teacher ratings, around one in ten typically developing children followed a high IA trajectory over time, with intercept values two standard deviations above the mean.

Objective 3

In order to respond to our third objective, we tested if the results obtained were the same for girls and boys. First, sex differences were tested on the mean trajectory of IA of children with

CP and on the mean trajectory of children without CP. According to both parental and teacher report, girls and boys with CP differed in their use of IA. According to parent ratings, boys had a more pronounced down-turned curvilinear trajectory than girls, which was shown by a significantly higher negative quadratic mean value (-0.012 vs. -0.008; $\Delta \chi^2$ 4.12 (1, n = 328), $p <$ 0.04). As such, boys desisted from IA use over time more than did girls (see Fig. 4). According to teacher ratings, girls had a higher initial level of IA use at 7 years of age compared to boys (intercept mean value of 1.03 vs. 0.89; $\Delta \chi^2$ 6.13 (1, n = 328), $p < 0.04$; see Fig. 4). This finding was also reported by parents, but it was only marginally significant (intercept mean value of 0.76 vs. 0.67; $\Delta \chi^2$ 3.10 (1, n = 328), $p = 0.08$). Regarding children without CP, girls and boys did not differ in their mean trajectory of IA use over time according to both informants.

Second, as mentioned, it has not been possible to test for sex differences in our growth mixture models. As such, we looked at the distribution of girls and boys in each trajectory. Among children with CP, there were significantly more girls (n = 28; 62.2%) than boys (n = 17; 37.8%) in the high-increasing trajectory of IA, $\chi^2(1) = 4.495$, $p = 0.034$, while no difference emerged in the low trajectory according to parental report. Among children without CP, there was no sex distribution difference on either trajectory according to both parent, $\chi^2(1) = 1.06$, $p =$ 0.30, and teacher ratings, $\chi^2(1) = 0.02$, $p = 0.88$.

Discussion

The present study examined the development of IA from 7 to 14 years of age in children with and without early clinically significant CP. According to both parental and teacher reports, results showed that children with CP used IA more frequently than children without CP, but both groups of children had a similar down-turned curvilinear mean trajectory illustrated by an increase in IA use until 10 years of age followed by a decrease. This result did not vary between

girls and boys without CP. However, for children with CP, girls seemed more at-risk than boys in their mean use of IA, with either a higher frequency at 7 years old (according to teachers) or a slower desisting trajectory over time (according to parents) than boys. Also, results showed interpersonal variance among children with CP in their use of IA over time, according to parent ratings, with a majority using IA in a slow decreasing way and a minority (13.7%), with significantly more girls than boys, using IA increasingly. As for children without CP, parent and teacher ratings each showed a two-trajectory model as the best fitting model, both with an equivalent number of girls and boys in each trajectory, and both with a high trajectory of IA use over time followed by around 10% of children.

Mean IA Use from 7 to 14 Years of Age

To our knowledge, this is the first study to show how IA develops from childhood to adolescence in children already identified with clinically significant CP. Results concerning the mean trajectory of IA showed that compared to typically developing children, children with CP used IA at a higher frequency from seven to 14 years old. As children with behavioral problems generally act more aggressively than children from community samples (Marsee et al., 2011) and as youth with CP have higher means of IA than youth without CP according to the cross-sectional study of Ackermann et al. (2019), this result was expected. However, the way IA develops over time in children with CP was unknown. Our study showed that, in general, children with CP initially increase their use of IA until 10 years old and then desist, a trajectory of use also observed in community samples in past studies (Ettekal & Ladd, 2015; Karriker-Jaffe et al., 2008). Because no significant difference was identified between children with CP and without CP on the slope and quadratic mean values of their mean trajectory of IA, according to both parental and teacher report, our results support this observation. As such, having CP does

not seem to influence the growth of IA over time. Thus, it suggests that both groups of children could be influenced by similar developmental factors when they use IA. Since by its nature, IA is social, and its use is often justified by social needs like the desire to be included or to conform to the group's behaviors (Owens et al., 2000), social factors' influence may overcome that of individual or familial factors in IA's development. More studies disentangling the relative influence of etiological factors of IA versus CP will be needed to better understand the similarities and differences in that regard.

More generally, even if a curvilinear use of IA has not been identified in all previous studies, the fact that IA use decreases over adolescence seems quite widely accepted. Multiple explanations regarding this are possible. On one hand, IA behaviors get more sophisticated with time because of increasing cognitive capabilities and social intelligence (Underwood et al., 2018). As such, it is possible that young adolescents' use of IA remains high but is simply more difficult to observe for parents and teachers. On the other hand, since IA is seen as an effective strategy to climb the social hierarchy and be popular (Owens et al., 2000; Pronk & Zimmer-Gembeck, 2010), maybe the more social hierarchies are in place the less the need to use IA in order to obtain or maintain a high social status is felt (Fite & Pederson, 2018).

Trajectories of IA Use from 7 to 14 Years of Age

Following the evaluation of mean IA use over time in children with CP, we sought to examine if there was interpersonal variance among these children regarding their IA behaviors, a question unanswered by past studies. Our results were unfortunately inconclusive in this respect as parent ratings showed significant variance and teacher ratings did not. This can be linked to the way teachers perceive children with significant CP. Indeed, children with CP may be judged based on their behaviors and be described by teachers as being defiant, challenging and

problematic (Moses, 2010; Orsati & Causton-Theoharis, 2013). As a result, they are often clustered in groups or described broadly with terms such as “them” and “those kids” (Orsati & Causton-Theoharis, 2013). By considering them as a group, teachers might not see much variability in these children and rate their behaviors accordingly, precluding the identification of variance among children with CP. Future studies will be needed to explore this.

Yet, according to parental report, children with CP showed interpersonal variance in IA use and followed two trajectories over time, a high-increasing and a high-decreasing trajectory describing a majority of these children (13.7% vs. 86.3%). The possibility of heterogeneity in IA use over time among children with CP is a novel contribution to the literature and will need to be replicated in future studies. However, children with CP adopting a trajectory of increasing IA use could be more at risk of poor outcomes than those who desist in time, because the combination of IA and overt aggression (i.e., a core characteristic of CP) is associated with worst outcomes than the manifestation of only one form of aggression (Crick et al., 2006). This sub-group of youth would thus be in most need of psychosocial services to help them manage their aggressive behaviors to prevent unfavorable outcomes.

We also sought to investigate if the heterogeneity of IA use among community children identified in past studies would be replicated in our analyses. More precisely, we had the hypothesis that we would find some interpersonal variance of IA use over time in children without CP, but that we would not find a high IA trajectory, as we thought this trajectory identified in community samples (Cleverley et al., 2012; Cote et al., 2007; Pagani et al., 2010; Vaillancourt et al., 2007) was maybe followed by the few children with elevated levels of CP. Like past studies (Cote et al., 2007; Underwood et al., 2009; Vaillancourt et al., 2007), our results, according to both parent and teacher ratings, showed a two-trajectory model with a

majority of children without CP following a low trajectory of IA use in time. Contrary to expectations however, both the parent and teacher models identified a high trajectory of IA (i.e., with starting values of two standard deviations above the mean) followed by approximately 10% of children without CP. This result is important as youth following a high trajectory of IA are at risk for future maladjustment (Cleverley et al., 2012). Even more importantly, due to the absence of clinical CP, children following a high trajectory of IA could represent a sub-group of at-risk youth unidentified as in need of mental health services due to the fact that IA behaviors are not evaluated in traditional assessment instruments (Loeber et al., 2009; Marsee et al., 2014). Future studies will need to evaluate if adopting a high IA trajectory could be uniquely linked to impairment for both children with and without identified CP, in the objective to clarify the meaningful contribution IA could have in the identification of children in need of psychosocial interventions (Keenan et al., 2008). It will also be important to look at what predicts adoption of high IA trajectories to better inform prevention efforts.

Sex Differences

Since IA is particularly salient in girls' aggressive repertoire and past studies on trajectories of IA identified differences between girls and boys, our final objective was to evaluate if our models of IA trajectories were sex invariant. As hypothesized, girls with CP fare worse in terms of IA behaviors over time than boys with CP. Indeed, their mean use of IA decreased slower than boys' according to parental report, their initial value of IA was higher than boy's according to teacher report, and they were overrepresented in the high-increasing trajectory of IA use over time. This result is coherent with results of Ackermann and colleagues (2019) showing higher scores of IA in CP girls versus CP boys, and Marsee and colleagues (2014) showing higher scores of IA in detained girls as opposed to detained boys. In both

studies, and as in this study, this sex difference was unobserved in typically developing youth. Indeed, according to our results with both informants, girls and boys without CP seem similar in their use of IA over time, either when looking at their mean trajectory or their distribution on IA trajectories. Card and colleagues' important meta-analysis on differences in the frequency of IA use by boys and girls (2008) concluded the same thing as have studies on trajectories of IA in community samples (Ehrenreich et al., 2014; Karriker-Jaffe et al., 2008; Underwood et al., 2009). This sex difference found only in children with already identified CP thus reinforces the idea that IA represents an indicator of or manifestation of CP of great importance for girls, and as such is important to document by mental health services, especially since IA is linked to more impairment in girls than in boys (Keenan et al., 2008). More studies will be needed comparing behaviorally disturbed boys' and girls' use of IA over time to replicate this finding.

Limits, Strengths and Conclusion

The results of the present study need to be interpreted in light of some limitations. One of which is the loss of participants (i.e., too few participants aged 6 years old and 15 years old to be included in the analyses) and the variant number of participants at each age due to the restructuration of the database by age instead of assessment time points. This could impair our statistical power to detect significant differences between participants. Still concerning the analyses, the trajectories shown here reflect tendencies that best fit and described our data, but do not represent the full variability that may be present in IA use in each participant. Also, reaching adolescence, parent and teacher ratings may not be the best way to assess IA, because youth IA behaviors are more sophisticated and hard to observe (Underwood et al., 2018). However, trajectory analyses restrict the use of a single measure in time, and parents and teachers represent good informants for children's IA behaviors. Furthermore, the use of two informants strengthens

the findings of this study, as the great majority of our results were confirmed in both parent and teacher ratings. Another strength is that half of the children with CP were girls, which is rare in studies of children with CP, making it possible to test for sex differences. Moreover, the present study enhances knowledge on IA by showing how it develops from childhood to adolescence in children with CP at study inception, which had not previously been done. The comparison of mean IA use in children with CP to that of typically developing children is also novel finding in the field of IA research. This comparison has allowed us to observe that IA use is more frequent for children with CP over time, but that the shapes of the trajectories are not different. Still, the trajectories presented in this study might be influenced by multiple factors, such as demographics and youth and family characteristics, that were not controlled. Thus, future studies will be needed to explore the potential influence of such factors on the growth of IA over time.

Our results showed that sub-groups of children, either with or without CP, followed high trajectories of IA. However, IA behaviors are rarely assessed in schools, as no items on this type of aggression are included in behavior ratings instruments typically used (Loeber et al., 2009), such as the ASEBA (Achenbach & Rescorla, 2001), and intervention research to address IA and guide clinicians in this endeavor is still in its infancy (Leff et al., 2018). Moreover, if a child does not present CP in addition to their high IA use, there is a great possibility that they will not be offered mental health services (Marsee et al., 2014). Therefore, considering that IA is linked (over and above other behavioral problems) to detrimental outcomes, such as anxiety, depression, delinquency, drug use and risky sexual behaviors (Boutin et al., 2018; Card et al., 2008; Cleverley et al., 2012), it will be crucial for school behavior specialists to start considering not only children's more noticeable behavioral difficulties but also their problematic social interactions involving IA.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. Burlington: University of Vermont, Research Center for Children, Youth, & Families.

Ackermann, K., Kirchner, M., Bernhard, A., Martinelli, A., Anomitri, C., Baker, R., Baumann, S., Dochnal, R., Fernandez-Rivas, A., Gonzalez-Madruga, K., Herpertz-Dahlmann, B., Hervas, A., Jansen, L., Kapornai, K., Kersten, L., Kohls, G., Limprecht, R., Lazaratou, H., McLaughlin, A.,… Freitag, C. M. (2019). Relational aggression in adolescents with conduct disorder: Sex differences and behavioral correlates. *Journal of Abnormal Child Psychology, 47*(10), 1625-1637. https://doi.org/10.1007/s10802-019-00541-6

Aizpitarte, A., Atherton, O. E., & Robins, R. W. (2017). The co-development of relational aggression and disruptive behavior symptoms from late childhood through adolescence. *Clinical Psychological Science, 5*(5), 866-873. https://doi.org/10.1177/2167702617708231

Archer, J., & Coyne, S. M. (2005). An integrated review of indirect, relational, and social aggression. *Personality and Social Psychology Review, 9*(3), 212-230. https://doi.org/10.1207/s15327957pspr0903_2

Björkqvist, K., Lagerspetz, K. M., & Kaukiainen, A. (1992a). Do girls manipulate and boys fight? Developmental trends in regard to direct and indirect aggression. *Aggressive Behavior, 18*(2), 117-127. http://doi.org/ 10.1002/1098-2337%281992%2918:2%3C117::AID-AB2480180205%3E3.0.CO;2-3

Björkqvist, K., Lagerspetz, K. M. J., & Östermann, K. (1992b). *Direct and indirect aggression scales*. Vaasa: Abo Akademi University, Department of Social Sciences.

Björkqvist, K., Österman, K., & Kaukiainen, A. (1992c). The development of direct and indirect aggressive strategies in males and females. In K. Björkqvist & P. Niemela (Eds.), *Of mice and women: Aspects of female aggression* (pp. 51-64). San Diego: Academic Press.

Boutin, S., Verlaan, P., Denault, A.-S., & Déry, M. (2017). Early risk predictors of girls' indirect aggression from childhood to early adolescence in an at-risk sample. *Sex Roles: A Journal of Research, 76*(3-4), 175-187. https://doi.org/10.1007/s11199-016-0656-4

Boutin, S., Denault, A.-S., Verlaan, P., & Déry, M. (2018). Agression indirecte à l'âge scolaire primaire et comportements de prise de risque durant le secondaire chez les filles. [Indirect aggression at the primary school age and behaviors of risk in high school for girls.]. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement, 50*(4), 226-237. https://doi.org/10.1037/cbs0000107

Cairns, R. B., Cairns, B. D., Neckerman, H. J., Ferguson, L. L., & Gariépy, J.-L. (1989). Growth and aggression: I. Childhood to early adolescence. *Developmental Psychology, 25*(2), 320-330. https://doi.org/10.1037/0012-1649.25.2.320

Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender differences, intercorrelations, and relations to maladjustment. *Child Development, 79*(5), 1185-1229. https://doi.org/10.1111/j.1467-8624.2008.01184.x

Carroll, P., & Shute, R. (2005). School peer victimization of young people with craniofacial conditions: A comparative study. *Psychology, Health & Medicine, 10*(3), 291-304. https://doi.org/10.1080/13548500500093753

Cleverley, K., Szatmari, P., Vaillancourt, T., Boyle, M., & Lipman, E. (2012). Developmental trajectories of physical and indirect aggression from late childhood to adolescence: Sex

differences and outcomes in emerging adulthood. *Journal of the American Academy of Child & Adolescent Psychiatry, 51*(10), 1037-1051. https://doi.org/10.1016/j.jaac.2012.07.010

Cote, S. M., Vaillancourt, T., Barker, E. D., Nagin, D., & Tremblay, R. E. (2007). The joint development of physical and indirect aggression: Predictors of continuity and change during childhood. *Development and Psychopathology, 19*(1), 37-55. https://doi.org/10.1017/S0954579407070034

Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development, 66*(3), 710-722. https://doi.org/ 10.2307/1131945

Crick, N. R., Ostrov, J. M., Appleyard, K., Jansen, E. A., & Casas, J. F. (2004). Relational aggression in early childhood: "You Can't Come to My Birthday Party Unless...". In M. Putallaz & K. L. Bierman (Eds.), *Aggression, antisocial behavior, and violence among girls: A developmental perspective* (pp. 71-89). New York: Guilford Publications.

Crick, N. R., Ostrov, J. M., & Werner, N. E. (2006). A longitudinal study of relational aggression, physical aggression, and children's social–psychological adjustment. *Journal of Abnormal Child Psychology, 34*(2), 127-138. https://doi.org/10.1007/s10802-005-9009-4

Ehrenreich, S. E., Beron, K. J., Brinkley, D. Y., & Underwood, M. K. (2014). Family predictors of continuity and change in social and physical aggression from ages 9 to 18. *Aggressive Behavior, 40*(5), 421-439. https://doi.org/10.1002/ab.21535

Ettekal, I., & Ladd, G. W. (2015). Costs and benefits of children's physical and relational aggression trajectories on peer rejection, acceptance, and friendships: Variations by aggression subtypes, gender, and age. *Developmental Psychology, 51*(12), 1756-1770. https://doi.org/10.1037/dev0000057

Fite, P. J., & Pederson, C. A. (2018). Developmental trajectories of relational aggression. In S. M. Coyne & J. M. Ostrov (Eds), *The development of relational aggression* (pp. 49-60). New York: Oxford University Press.

Gouvernement du Québec. (2013). *Indices de défavorisation 2012-2013 [Deprivation indices 2012-2013]*. Québec, Canada: Ministère de l'Éducation.

Karriker-Jaffe, K. J., Foshee, V. A., Ennett, S. T., & Suchindran, C. (2008). The development of aggression during adolescence: Sex differences in trajectories of physical and social aggression among youth in rural areas. *Journal of Abnormal Child Psychology, 36*(8), 1227-1236. https://doi.org/10.1007/s10802-008-9245-5

Kaukiainen, A., Bjorkqvist, K., Lagerspetz, K., Osterman, K., Salmivalli, C., Rothberg, S., & Ahlbom, A. (1999). The relationships between social intelligence, empathy, and three types of aggression. *Aggressive Behavior, 25*(2), 81-89. https://doi.org/10.1002/%28SICI%291098-2337%281999%2925:2%3C81::AID-AB1%3E3.0.CO;2-M

Kawabata, Y., Tseng, W.-L., Murray-Close, D., & Crick, N. R. (2012). Developmental trajectories of Chinese children's relational and physical aggression: Associations with social-psychological adjustment problems. *Journal of Abnormal Child Psychology, 40*(7), 1087-1097. https://doi.org/10.1007/s10802-012-9633-8

Keenan, K., Coyne, C., & Lahey, B. B. (2008). Should relational aggression be included in DSM-V?. *Journal of the American Academy of Child & Adolescent Psychiatry, 47*(1), 86-93. https://doi.org/10.1097/chi.0b013e31815a56b8

Keenan, K., Wroblewski, K., Hipwell, A., Loeber, R., & Stouthamer-Loeber, M. (2010). Age of onset, symptom threshold, and expansion of the nosology of conduct disorder for girls. *Journal of Abnormal Psychology, 119*(4), 689-698. https://doi.org/10.1037/a0019346

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford Press.

Lagerspetz, K. M. J., Björkqvist, K., & Peltonen, T. (1988). Is indirect aggression typical of females? Gender differences in aggressiveness in 11-to 12-year-old children. *Aggressive Behavior, 14*(6), 403-414. https://doi.org/10.1002/1098-2337(1988)14:6<403::AID-AB2480140602>3.0.CO;2-D

Leff, S. S., Waasdorp, T. E., & Mehari, K. R. (2018). An updated review of existing relational aggression programs. In S. M. Coyne & J. M. Ostrov (Eds.), *The development of relational aggression* (pp. 283-317). New York: Oxford University Press.

Loeber, R., Pardini, D. A., Hipwell, A., Stouthamer-Loeber, M., Keenan, K., & Sembower, M. A. (2009). Are there stable factors in preadolescent girls' externalizing behaviors? *Journal of Abnormal Child Psychology, 37*(6),777-791. https://doi.org/10.1007/s10802-009-9320-6

Loflin, D. C., & Barry, C. T. (2016). 'You can't sit with us:' Gender and the differential roles of social intelligence and peer status in adolescent relational aggression. *Personality and Individual Differences, 91*, 22-26. https://doi.org/10.1016/j.paid.2015.11.048

Marsee, M. A., Barry, C., Childs, K., Frick, P., Kimonis, E., Centifanti, L., Aucoin, K., Fassnacht, G., Kunimatsu, M., & Lau, K. S. (2011). Assessing the forms and functions of aggression using self-report: Factor structure and invariance of the peer conflict scale in youths. *Psychological Assessment, 23*, 792-804. https://doi.org/10.1037/a0023369

Marsee, M. A., Frick, P. J., Barry, C. T., Kimonis, E. R., Munoz Centifanti, L. C., & Aucoin, K. J. (2014). Profiles of the forms and functions of self-reported aggression in three adolescent samples. *Development and Psychopathology, 26*(3), 705-720. https://doi.org/10.1017/s0954579414000339

Moses, T. (2010). Being treated differently: Stigma experiences with family, peers, and school staff among adolescents with mental health disorders. *Social Science & Medicine, 70*(7), 985-993. https://doi.org/10.1016/j.socscimed.2009.12.022

Murray-Close, D., Ostrov, J. M., & Crick, N. R. (2007). A short-term longitudinal study of growth of relational aggression during middle childhood: Associations with gender, friendship intimacy, and internalizing problems. *Development and Psychopathology, 19*(1), 187-203. https://doi.org/10.1017/S0954579407070101

Muthén, L. K., & Muthén, B. O. (1998-2018). *Mplus User's Guide* (7th ed.). Los Angeles: Authors.

Nakamura, B. J., Ebesutani, C., Bernstein, A. & Chorpita, B. F. (2009). A psychometric analysis of the Child Behavior Checklist DSM-Oriented Scales. *Journal of Psychopathology and Behavioral Assessment*, *31*(3), 178-189. https://doi.org/10.1007/s10862-008-9119-8

Orpinas, P., McNicholas, C., & Nahapetyan, L. (2015). Gender differences in trajectories of relational aggression perpetration and victimization from middle to high school. *Aggressive Behavior, 41*(5), 401-412. https://doi.org/10.1002/ab.21563

Orsati, F. T., & Causton-Theoharis, J. (2013). Challenging control: Inclusive teachers' and teaching assistants' discourse on students with challenging behaviour. *International Journal of Inclusive Education, 17*(5), 507-525. https://doi.org/10.1080/13603116.2012.689016

Owens, L., Shute, R., & Slee, P. (2000). "Guess what I just heard!": Indirect aggression among teenage girls in Australia. *Aggressive Behavior, 26*(1), 67-83. https://doi.org/10.1002/(SICI)1098-2337(2000)26:1<67::AID-AB6>3.0.CO;2-C

Pagani, L. S., Japel, C., Vaillancourt, T., & Tremblay, R. E. (2010). Links between middle-childhood trajectories of family dysfunction and indirect aggression. *Journal of Interpersonal Violence, 25*(12), 2175-2198. https://doi.org/10.1177/0886260509354886

Pronk, R. E., & Zimmer-Gembeck, M. J. (2010). It's "mean," but what does it mean to adolescents? Relational aggression described by victims, aggressors, and their peers. *Journal of Adolescent Research, 25*(2), 175-204. https://doi.org/10.1177/0743558409350504

Spieker, S. J., Campbell, S. B., Vandergrift, N., Pierce, K. M., Cauffman, E., Susman, E. J., Roisman, G. I., & The NICHD Early Child Care Research Network. (2012). Relational aggression in middle childhood: Predictors and adolescent outcomes. *Social Development*, *21*(2), 354-375. https://doi.org/ 10.1111/j.1467-9507.2011.00631.x

Swit, C. S. (2019). Differential associations between relational and physical aggression: Why do teachers and parents perceive these behaviors differently? *Early Child Development and Care*. https://doi.org/10.1080/03004430.2019.1621304

Tackett, J. L., Daoud, S. L. S. B., De Bolle, M., & Burt, S. A. (2013). Is relational aggression part of the externalizing spectrum? A bifactor model of youth antisocial behavior. *Aggressive Behavior, 39*(2), 149-159. https://doi.org/10.1002/ab.21466

Underwood, M. K., Beron, K. J., & Rosen, L. H. (2009). Continuity and change in social and physical aggression from middle childhood through early adolescence. *Aggressive Behavior, 35*(5), 357-375. https://doi.org/10.1002/ab.20313

Underwood, M. K., Ehrenreich, S. E., & Meter, D. J. (2018). Methodological approaches to studying relational aggression. In S. M. Coyne & J. M. Ostrov (Eds.), *The development of relational aggression* (pp. 61-75). New York: Oxford University Press.

Vaillancourt, T., Brendgen, M., Boivin, M., & Tremblay, R. E. (2003). A longitudinal confirmatory factor analysis of indirect and physical aggression: Evidence of two factors over time? *Child Development, 74*(6), 1628-1638. https://doi.org/10.1046/j.1467-8624.2003.00628.x

Vaillancourt, T., Miller, J. L., Fagbemi, J., Cote, S., & Tremblay, R. E. (2007). Trajectories and predictors of indirect aggression: Results from a nationally representative longitudinal study of Canadian children aged 2-10. *Aggressive Behavior, 33*(4), 314-326. https://doi.org/10.1002/ab.20202

Valles, N.-L., & Knutson, J. F. (2008). Contingent responses of mothers and peers to indirect and direct aggression in preschool and school-aged children. *Aggressive Behavior, 34*(5), 497-510. https://doi.org/10.1002/ab.20268

Yoon, J., Sulkowski, M. L., & Bauman, S. A. (2016). Teachers' responses to bullying incidents: Effects of teacher characteristics and contexts. *Journal of School Violence, 15*(1), 91-113. https://doi.org/10.1080/15388220.2014.963592

Table 1

Indirect aggression means from seven to 14 years old according to parents and teachers

	Parent						Teacher					
	n	Min-Max	Mean	*SD*	Skew	*SE*	*n*	Min-Max	Mean	*SD*	Skew	*SE*
IA age 7: Total sample	134	0-2	0.45	0.40	0.96	0.21	135	0-3.5	0.50	0.71	1.86	0.21
Boys	69	0-2	0.45	0.41	1.14	0.29	69	0-3.5	0.53	0.79	1.94	0.29
Girls	65	0-1.6	0.45	0.38	0.73	0.30	66	0-2.1	0.47	0.62	1.53	0.30
With CP	58	0-2	0.59	0.44	0.77	0.31	59	0-3.5	0.85	0.86	1.11	0.31
Without CP	76	0-1.2	0.35	0.32	0.75	0.28	76	0-1.6	0.22	0.37	2.03	0.28
IA age 8: Total sample	332	0-4	0.58	0.54	1.65	0.13	314	0-3.2	0.70	0.72	0.98	0.14
Boys	167	0-4	0.58	0.58	2.01	0.19	158	0-3.2	0.74	0.73	0.99	0.19
Girls	165	0-2.2	0.57	0.49	1.02	0.19	156	0-3	0.67	0.71	0.96	0.19
With CP	165	0-4	0.75	0.61	1.45	0.19	157	0-3.2	1.06	0.75	0.49	0.19
Without CP	167	0-2.1	0.41	0.38	1.15	0.19	157	0-2	0.34	0.47	1.56	0.19
IA age 9: Total sample	538	0-2.8	0.59	0.55	1.12	0.11	513	0-3.6	0.70	0.74	1.25	0.11
Boys	270	0-2.1	0.58	0.49	0.92	0.15	258	0-3.1	0.65	0.68	1.10	0.15
Girls	268	0-2.8	0.61	0.61	1.18	0.15	255	0-3.6	0.74	0.80	1.29	0.15
With CP	263	0-2.8	0.84	0.60	0.66	0.15	249	0-3.6	1.03	0.76	0.82	0.15
Without CP	275	0-2	0.36	0.36	1.31	0.15	264	0-3.2	0.38	0.56	2.25	0.15
IA age 10: Total sample	607	0-2.5	0.60	0.55	1.06	0.10	579	0-4	0.74	0.74	1.20	0.10
Boys	307	0-2.5	0.57	0.53	1.09	0.14	294	0-4	0.70	0.70	1.24	0.14
Girls	300	0-2.5	0.62	0.57	1.03	0.14	285	0-3.9	0.78	0.78	1.14	0.14
With CP	304	0-2.5	0.83	0.60	0.64	0.14	296	0-4	1.06	0.80	0.81	0.14

Without CP	303	0-2.2	0.36	0.38	1.37	0.14	283	0-2.4	0.40	0.48	1.4	0.15
IA age 11: Total sample	601	0-3.3	0.58	0.57	1.33	0.10	569	0-3.7	0.72	0.73	1.38	0.10
Boys	306	0-3	0.55	0.56	1.47	0.14	288	0-3.6	0.66	0.66	1.41	0.14
Girls	295	0-3.3	0.60	0.58	1.21	0.14	281	0-3.7	0.78	0.79	1.29	0.15
With CP	301	0-3.3	0.81	0.63	0.86	0.14	283	0-3.7	1.00	0.79	1.05	0.15
Without CP	300	0-2.9	0.34	0.38	1.94	0.14	286	0-3.6	0.44	0.55	1.86	0.14
IA age 12: Total sample	588	0-2.9	0.56	0.59	1.33	0.10	548	0-4	0.73	0.81	1.20	0.10
Boys	301	0-2.9	0.52	0.55	1.34	0.14	286	0-3.4	0.66	0.72	1.16	0.14
Girls	287	0-2.8	0.61	0.63	1.29	0.14	262	0-4	0.80	0.89	1.13	0.15
With CP	297	0-2.9	0.80	0.66	0.85	0.14	274	0-4	1.07	0.87	0.73	0.15
Without CP	291	0-2.1	0.32	0.36	1.49	0.14	274	0-3	0.39	0.57	1.95	0.15
IA age 13: Total sample	454	0-3.4	0.54	0.62	1.46	0.12	548	0-3.8	0.58	0.76	1.82	0.10
Boys	234	0-2.7	0.48	0.55	1.48	0.16	282	0-3.6	0.55	0.68	1.85	0.15
Girls	220	0-3.4	0.61	0.67	1.37	0.16	266	0-3.8	0.62	0.84	1.73	0.15
With CP	238	0-3.4	0.76	0.69	1.00	0.16	276	0-3.8	0.90	0.88	1.25	0.15
Without CP	216	0-2.2	0.30	0.40	2.05	0.17	272	0-2.4	0.26	0.43	2.45	0.15
IA age 14: Total sample	272	0-3.8	0.52	0.64	1.85	0.15	425	0-3.8	0.51	0.70	1.95	0.12
Boys	141	0-2.3	0.43	0.52	1.50	0.20	217	0-3.8	0.51	0.69	1.98	0.17
Girls	131	0-3.8	0.62	0.74	1.78	0.21	208	0-3.5	0.51	0.72	1.93	0.17
With CP	137	0-3.8	0.79	0.74	1.33	0.21	224	0-3.8	0.80	0.81	1.38	0.16
Without CP	135	0-1.7	0.25	0.35	1.91	0.21	201	0-2.1	0.19	0.35	2.53	0.17

Note. Min-Max: Minimum and maximum values on the scale; Skew = Skewness

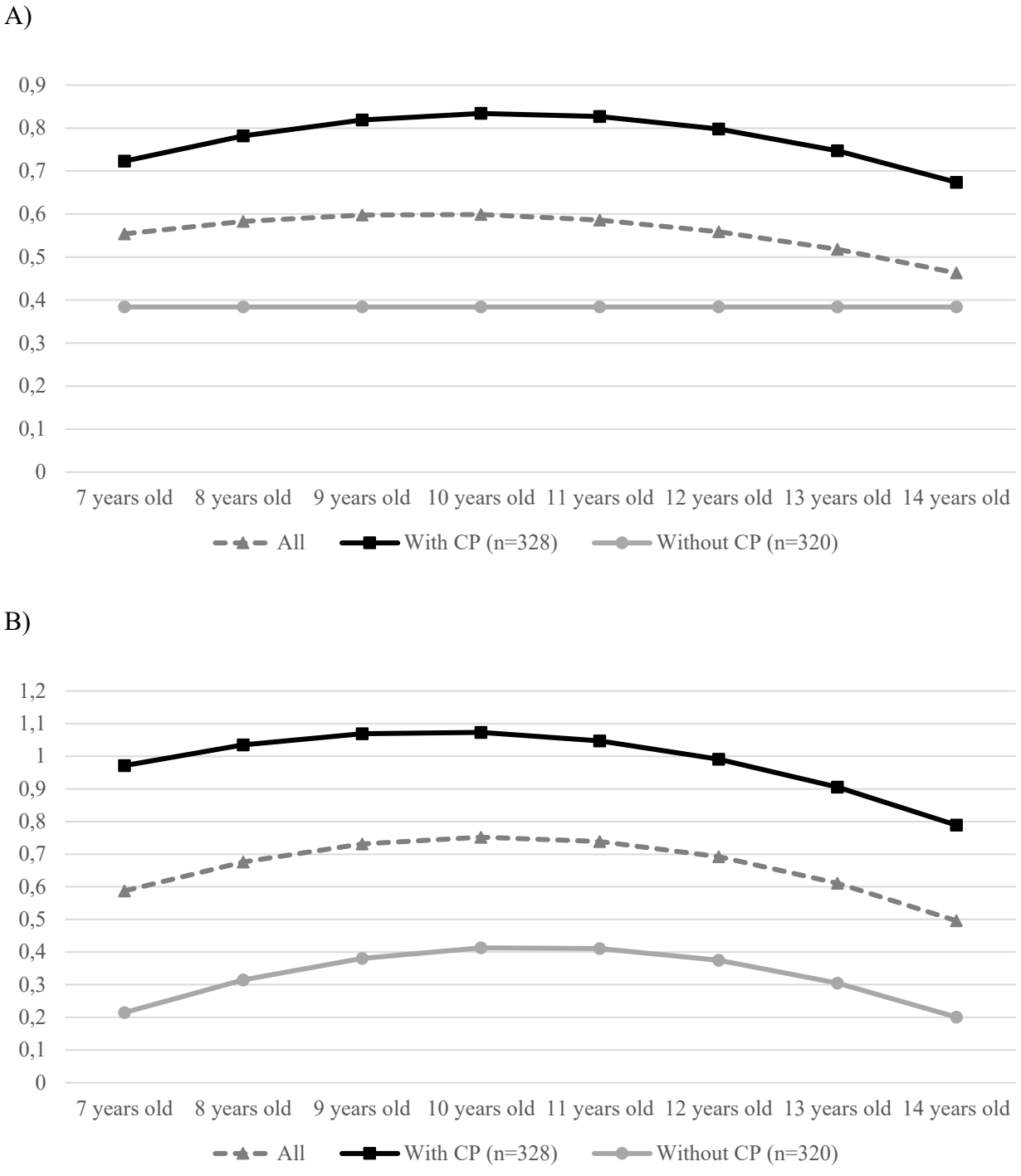

Figure 1. Mean trajectory of IA of children with and without CP according to parental report (A) and teacher report (B)

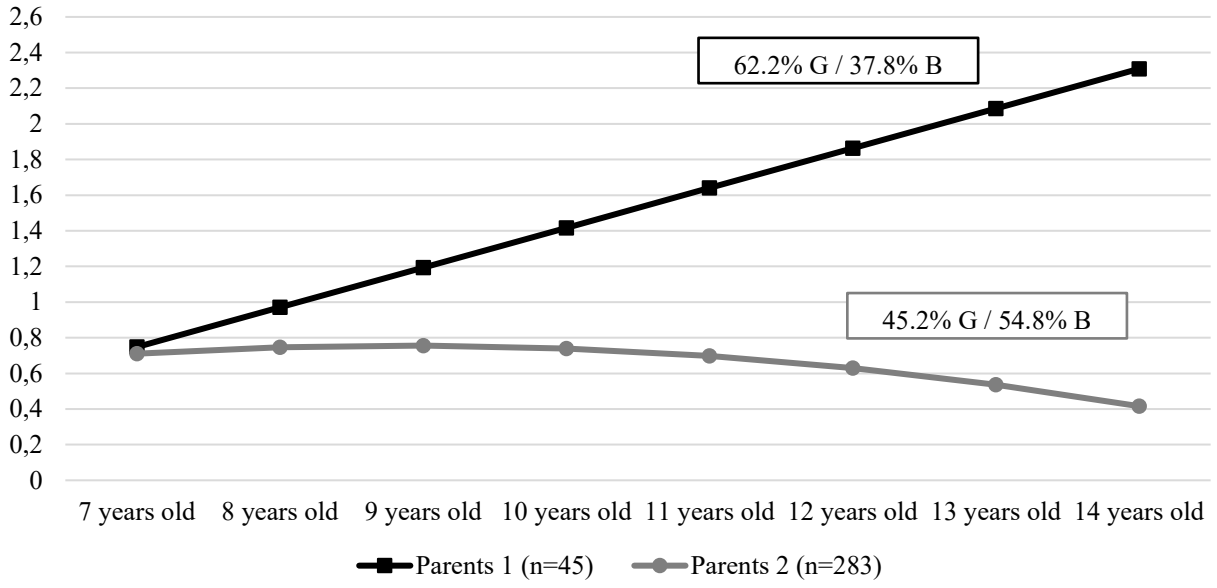

Figure 2. Trajectories of IA of children with CP according to parental report with the distribution of girls (G) and boys (B) in each trajectory

Note. Fit indices: 1-trajectory model: BIC = 2695.12; 2-trajectory model: BIC = 2652.96, LMR-LRT: p = .02, entropy = 0.80; 3-trajectory model: BIC = 2650.88, LMR-LRT: p = .77, entropy = 0.74; 4-trajectory model: BIC = 2649.05, LMR-LRT: p = .12, entropy = 0.77, one trajectory with lower than 5%; 5-trajectory model: BIC = 2646.58, LMR-LRT: p = .13, entropy = 0.78.

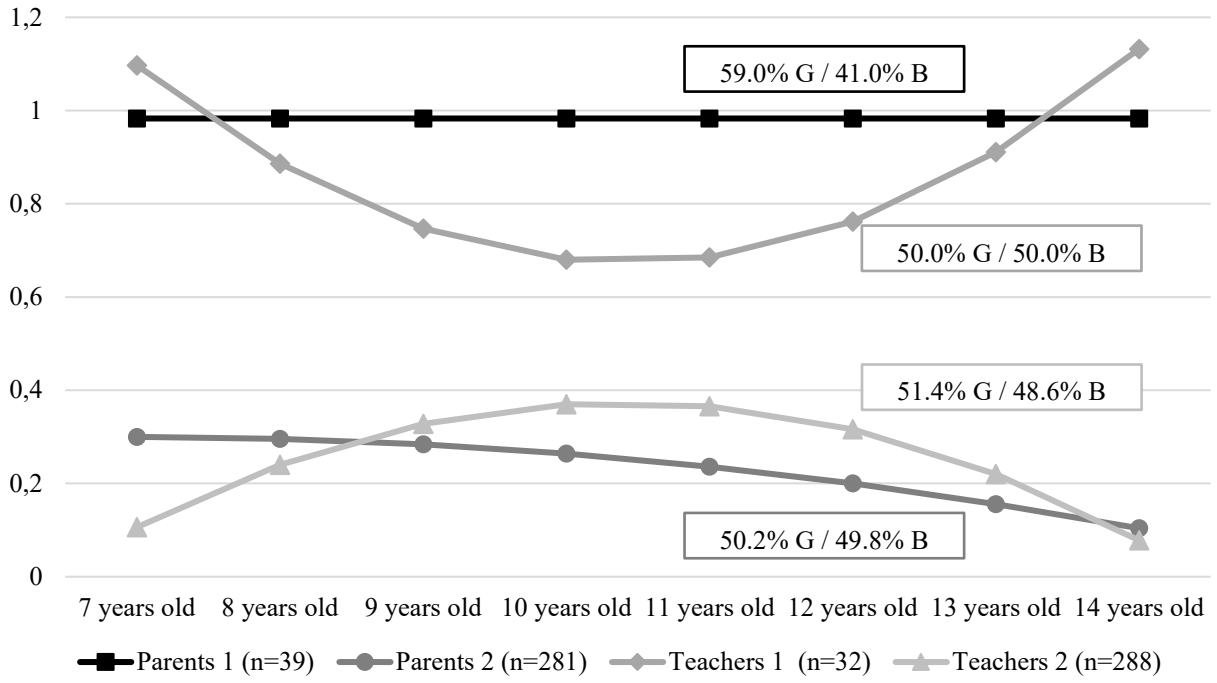

Figure 3. Trajectories of IA of children without CP according to parent and teacher report with the distribution of girls (G) and boys (B) in each trajectory

Note. Fit indices: *Teacher report*: 1-trajectory model BIC = 2375.04; 2-trajectory model: BIC = 2204.88, LMR-LRT: p = .03, entropy = 0.95; 3-trajectory model: BIC = 2139.40, LMR-LRT: p = .18, entropy = 0.95; 4-trajectory model: BIC = 2162.48, LMR-LRT: p = .50, entropy = 0.54, one trajectory with lower than 5%; 5-trajectory model: BIC = 2185.55, LMR-LRT: p = .50, entropy = 0.38, two trajectories with lower than 5%. *Parent report*: 1-trajectory model BIC = 706.81; 2-trajectory model: BIC = 606.04, LMR-LRT: p = .002, entropy = 0.94; 3-trajectory model: BIC = 628.46, LMR-LRT: p = .55, entropy = 0.93; 4-trajectory model: BIC = 652.19, LMR-LRT: p = .50, entropy = 0.97, two trajectories with lower than 5%; 5-trajectory model: BIC = 643.97, LMR-LRT: p = .42, entropy = 0.94, three trajectories with lower than 5%.

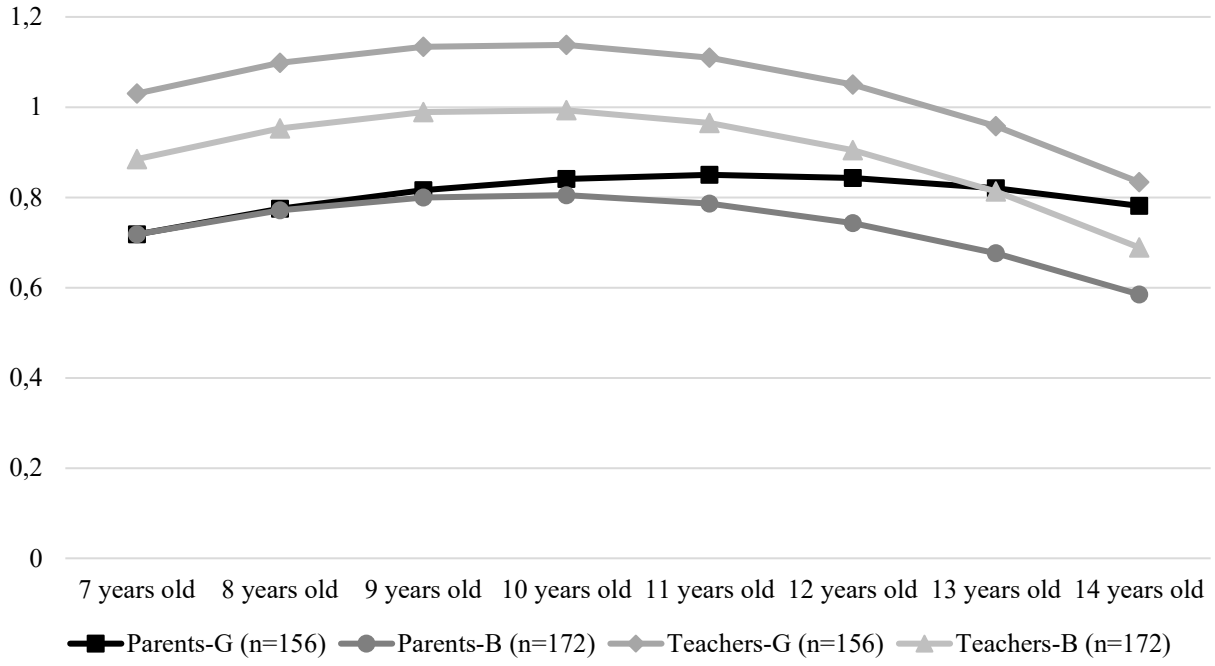

Figure 4. Mean trajectory of IA of girls (G) and boys (B) with CP according to parent and teacher report