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EMPIRICAL RESEARCH

An Examination of the Reciprocal Relationships Between Adolescents' Aggressive Behaviors and Their Perceptions of Parental Nurturance

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Abstract This study examined reciprocal relationships between adolescents' perceptions of parental nurturance and two types of adolescent aggressive behaviors (indirect and direct aggression) using a transactional model. Three waves of longitudinal data were drawn from the Canadian National Longitudinal Survey of Children and Youth. The sample included 1,416 (735 female) adolescents who were 10- and 11-year-olds at Time 1 and became 14-and 15-year-olds at Time 3. The findings failed to support reciprocal effects, but confirmed parental effects at different ages for girls and boys. For girls, perceptions of parental nurturance at age 10 were negatively associated with both indirect and direct aggression at age 12. For boys, perceptions of parental nurturance at age 12 were negatively associated with both aggressive behaviors at age 14. Future research should continue to investigate reciprocal effects in parent-adolescent relationships to identify developmental periods where the effect of adolescents' or their parents' behavior may be stronger.

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Introduction

Research has shown that the determinants of adolescent aggression are diverse and range from genetic to environmental factors, such as peer influence and socialization in the family (Dodge et al. 2006). Within the domain of socialization in the family, parenting behaviors have received much attention as a correlate of adolescent aggressive behaviors. Most studies have examined maladaptive parenting practices, such as harsh discipline (Prinzie et al. 2006), coercion (Reid et al. 2000), and physical punishment [see Gershoff (2002) for a meta-analytic review], in relation to adolescent aggression. Relatively less research has focused on the role of positive parenting behaviors, such as nurturance and warmth. This study aimed to address this gap in the literature by examining the relationship between adolescents' perceptions of parental nurturance and two different forms of aggression, indirect and direct aggression.

This study makes several contributions to the research on parenting and adolescent aggression. A unique contribution of this study is its examination of reciprocal effects between parental nurturance and adolescent aggression in a transactional model. Another strength of the study is its consideration of both indirect and direct aggression. Extensive research has distinguished between these two types of aggression (Crick and Grotpeter 1995; Galen and Underwood 1997; Lagerspetz et al. 1988); however, still less is known about the development of indirect aggression. Previous findings in the aggression literature suggested that boys exhibit more direct aggression than girls and there are trivial sex differences in indirect aggression (see Card et al.

2008 for a meta-analytic review); yet relatively few studies focused on the development and maintenance of indirect aggression during adolescence. Thus, this study contributes to the literature on adolescent aggression by distinguishing between direct and indirect aggression with a model that examines reciprocal relationships with parental nurturance.

Parental Nurturance and Adolescent Aggression

Nurturance is a highly salient aspect of parenting. Nurturance involves "pervasive attention, emotional investment, and behavior management" by caregivers to foster children's social and emotional development (Dishion and Bullock 2002, p. 231). Dimensions of parenting, such as warmth, responsiveness, and acceptance are related to, but not the same as, parental nurturance (see Maccoby and Martin 1983 for a discussion). Moreover, the examination of these constructs within a typological approach (i.e., parenting styles) does not distinguish between the warmth and the control dimensions in relation to child or adolescent developmental outcomes. Little is known about the relationship between parental nurturance and aggression during adolescence as most research has examined this relationship during childhood. Findings for children suggest a negative association between parental nurturance and problem behaviors [see Booth et al. (1994) for an example]. The expectation that this association should extend to adolescence is warranted but should be tested.

Attachment theory (Bowlby 1969) provides some basis for understanding the relationship between nurturance and aggression during adolescence. Secure attachment refers to a sense of security that allows adolescents to engage in the outside world and know that they will always be welcomed when they return to their parents for safety (Bowlby 1988). In this regard, secure attachment is a closely related construct to parental nurturance because it denotes parents' physical and emotional nurturing behaviors, including comforting and reassuring when the adolescent is overwhelmed or frightened. The concept of secure attachment has been used to explain the occurrence of adolescent problem behaviors. Research in this area suggests that adolescents who are securely attached to their parents are less likely to have mental health and problem behaviors than their peers [see Moretti and Peled (2004) for a review]. More recently, several researchers have argued that the lack of a secure base can lead to indirect, as well as direct, aggression [see Michiels et al. (2008) for a heuristic model of the link between parenting and relational aggression].

According to Bowlby (1969, 1988), a threat to feelings of security creates anxiety and generates anger, which may lead to disturbances in behavior. From this perspective, it is possible that lack of parental nurturance during adolescence may predict an increase in aggressive behaviors because adolescents may be feeling unsafe, fearful, and angry, which, in turn, may increase their likelihood to engage in aggressive behaviors. Bowlby acknowledged both the mother's and the child's contributions to their relationship. Specifically, the initial characteristics of a child can influence the way the mother cares for the child. From this perspective, it is also possible that parental nurturance is sensitive to the presence of adolescents' aggression. For example, Brunk and Henggeler (1984) conducted an experimental investigation with mothers who were observed in a play situation with an adolescent confederate who had been instructed to engage in behaviors that were characteristic of conduct disorder. The results indicated that mothers were more likely to ignore the confederate's behavior, and give disciplining commands, including threat of punishment, rather than engage in nurturing behaviors such as helping and praising. Thus, it seems reasonable to argue that parents may react to adolescent aggression by decreasing their nurturing behaviors. On a related note, the findings from a recent study indicated that mothers reported lower levels of negative affect, such as anger and sadness, when imagining their child engaged in relational (indirect) aggression as compared to physical (direct) aggression (Werner et al. 2006). These findings suggest that parents can also distinguish between indirect and direct aggression, and have a differential response to these two different types of adolescent aggressive behaviors.

Reciprocity Between Parental Nurturance and Adolescent Aggression

Although the reciprocal nature of parent–child relationships has long been recognized (see Sears 1951), Bell's control systems model was the first model to be empirically tested (Bell and Chapman 1986). Bell's model suggests that parents and children react to each other's behaviors with a certain upper and lower limit of tolerance, based on previous interactions. For example, when children display a problem behavior, parents may react in an aversive way, indicating that their upper limit of tolerance has been reached. This aversive reaction may, in turn, exceed the upper limit of children's tolerance and lead to increases in their problem behavior. Similarly, it is possible that, when adolescents exhibit aggressive behaviors, parents may decrease their nurturing behaviors leading, in turn, to increases in adolescent aggression.

Due to methodological advances, such reciprocal models, including transactional models [see Sameroff and MacKenzie (2003) for a review], have recently become popular in developmental research. Several studies have confirmed full reciprocal influences between parents and

adolescents in the maintenance of problem behaviors. For example, Stice and Barrera (1995) found that parental support at Time 1 was not only negatively associated with adolescent substance abuse after 1 year at Time 2, but parental support at Time 2 was also negatively related to adolescents' substance abuse at Time 1. However, full reciprocity was not observed between parental support and externalizing symptoms (i.e., rule-breaking and aggressive behaviors; Stice & Barrera). More recently, full reciprocal associations between parenting practices, such as supervision (poor) and involvement (low), and conduct problems were found from childhood to adolescence in a sample of boys (Pardini et al. 2008).

Other studies have emphasized child effects. For example, although Kerr and Stattin (2003) showed that there was a reciprocal relationship between adolescent behavior and parents' reactions between the ages of 14 and 16, the adolescent effect was found to be stronger compared to the parental effects. This finding provides support for Maccoby's (2002) suggestion that as children go through adolescence, parents' influences on children start to diminish compared to adolescents' influences on parents.

It is also possible that certain parenting behaviors are more open to change and less influential on children outcomes. For example, although Jang and Smith (1997) found reciprocal relationships between poor parental supervision and delinquency, indicating mutual influences, they found only child effects for low affective ties, which suggested that parent–adolescent affective relationships were less influential on adolescent delinquent behaviors than vice versa. Similarly, adolescent externalizing and internalizing problem behaviors were found to predict parenting, as indicated by low responsiveness, less knowledge about whereabouts and activities, and poor quality of the parent/child relationship within a 1-year interval (Reitz et al. 2006). More recently, researchers have found that higher physical and relational aggression of adolescents between the ages of 12 and 19 at Time 1 were associated with increases in adolescents' perceptions of their mothers' use of psychological control 2 years later (Albrecht et al. 2007). Child effects were also confirmed in adolescent clinical samples. For example, using a clinic-referred sample of boys between the ages of 7 and 12 who were followed up annually for 5 years, researchers found a stronger influence of adolescent conduct disorder behavior on parental supervision (poorer) than of parental supervision on adolescent conduct disorder (Burke et al. 2008). These findings provide support for the idea that child effects may be stronger than parental effects during adolescence in the absence of reciprocal effects.

Recently, in a 6-year prospective study using a large community sample of girls between the ages of 7 and 12, researchers found only parental effects between parental warmth and conduct disorder, after controlling for the effects of socioeconomic status and ethnicity (Hipwell et al. 2008). In contrast, child effects were observed between use of parental punishment and conduct disorder. It appears that the presence of child effects versus parental effects may depend on both child's age and the specific parenting behavior. It is possible that some parenting behaviors, such as punishment, may be more prone to child effects, and that the child effects may become stronger compared to parental effects as children move toward late adolescence.

In contrast to the above-mentioned studies, other researchers who examined reciprocal effects found neither parent nor child effects. For example, using data from the Minnesota Twin Family Study, researchers failed to find reciprocal effects between parent–adolescent conflict and externalizing problem behaviors over a 3-year interval (Burt et al. 2006). Similarly, no evidence of reciprocity was observed between maternal overreactive discipline and toddler's externalizing problem behaviors over a two and a half year period (O'Leary et al. 1999). Overall, these findings indicate the presence of mixed findings in the literature. Clearly, there is a need for further research in order to elucidate the reciprocal effects between parenting and adolescent behaviors.

Research Purpose and Hypotheses

The present study aimed to test a transactional model between adolescents' perceptions of parental nurturance and two aggressive behaviors (i.e., indirect and direct aggression) over a four-year period (from 10–11 years of age to 14–15 years of age). From a transactional perspective, the association between parental nurturance and adolescent aggression is conceptualized as a dynamic process in which perceptions of parental nurturance and adolescent aggression continuously change through reciprocal processes (i.e., mutual influence) over time. More specifically, the development or the maintenance of adolescent problem behavior can occur as a result of lack of perceptions of parental nurturance. At the same time, a decrease in perceptions of parental nurturance can be a reaction to adolescent aggression. These parent–adolescent transactions may reinforce aggressive behaviors over time. Finally, it should also be noted that the nature of the transactions between parental nurturance and adolescent aggression separately for boys and girls may also differ as a function the type of aggression (indirect and direct aggression).

There is evidence that individuals are more susceptible to influences at transition periods (Caspi and Moffitt 1991). As such, we include a transitional period in this study. The period around 10 and 11 years of age can be considered as the end of childhood and beginning of adolescence during which children may be more open to influences from diverse sources, such as parents. Previous research has

documented that parent–adolescent relationships transform around this period (Collins and Laursen 2004) and this transformation may, in turn, influence adolescent behavior in different contexts [see Laird et al. (2003) for an example]. Consequently, early adolescence is an important period for studying the reciprocity between parent and child behavior. It is possible that perceptions of high parental nurturance lower children's aggressive behavior more at age 10–11 than at age 14–15. Conversely, child effects (aggression predicting low parental nurturance) are likely greater during mid-adolescence at age 14–15 compared to late childhood or early adolescence because, as children mature physically and cognitively, they have more opportunities to exert power or influence on their parents.

Method

Source of Data

The longitudinal data for this study were drawn from the ongoing Canadian National Longitudinal Survey of Children and Youth (NLSCY) survey which is designed to collect information about children's development and well-being from birth to adulthood, based on a stratified probabilistic sample design. The NLSCY, which is jointly conducted by Statistics Canada and Human Resources and Social Development Canada (HRSDC), began in December 1994, with follow-up surveys administered biennially. Children who were living in institutional settings and in households located in the Yukon, Nunavut, and Northwest Territories were excluded from the sample. There were 22,831 children from newborn to 11-year-olds in the first cycle (Statistics Canada and HRDC 1995). Approximately 97% of the children in the NLSCY were Canadian by birth, and spoke French or English and approximately 91% of them learned English or French as their first language.

The person most knowledgeable (PMK) about the child, usually the biological mother, provided information about the child's household context during a face-to-face or telephone interview using computer-assisted interviewing (CAI). The PMK's permission was obtained to administer a self-report questionnaire for children who were 10 years old and older. These children were asked to complete the questionnaire in a private setting to ensure confidentiality. Data collection in the household took approximately two hours, including the interview with the PMK (Statistics Canada and HRDC 1998).

Sample

Two longitudinal cohorts of children were selected from Cycles 3 through 6 of the NLSCY for this study. The first cohort consisted of children who were 10 and 11 years old in Cycle 3 (1998–1999) and became 14 and 15 years old by Cycle 5 (2002–2003). The second cohort consisted of children who were 10 and 11 years old in Cycle 4 (2000–2001) and became 14 and 15 years old by Cycle 6 (2004–2005). There were no systematic differences between the children in two different cohorts based on socio-demographic variables. The longitudinal attrition rate for the sample from ages 10-11 to ages 12–13 was small (9%), as was the attrition rate from ages 12–13 to ages 14–15 (8%). These attrition rates were previously examined and it was shown that the children who remained in the survey had a higher level of socioeconomic status (SES) than children who did not remain in the study; however, the effect size was small. With respect to key variables in the study, children who remained in the survey tended to report less indirect and direct aggressive behaviors than children who withdrew from the survey at one point; however, the effect of these differences were from trivial to small. No statistically significant differences were found for the parental nurturance scores.

The sample included 1,416 children between the ages of 10 and 15 years, with complete data. Of these children, 52% were female, 87% were living with their biological parents, and 66% were living in a household with an income greater than or equal to $50,000; only 8% were living in a household with an income less than $30,000. For 93% of the children, the PMK was the mother of the child, and 65% of the PMKs reported having education beyond high school; 9% of the PMKs had less than secondary schooling.

Measures

Parental Nurturance

Adolescents' perceptions of parental nurturance were assessed with six items that were taken from the Parenting Questionnaire (Lempers et al. 1989). The response scale for each item (e.g., "my parents smile at me") ranged from 0 (*never*) to 4 (*always*), with higher scores indicating more nurturing behaviors perceived by the adolescent. The estimate for ordinal coefficient alpha (Zumbo et al. 2007) was high for both girls' and boys' sample at 10–11, 12–13, and 14–15 age groups ($\alpha = .89, .93, .95$ for girls and $\alpha = .87, .90, .93$ for boys).

Indirect Aggression

Adolescents' reports of indirect aggression were assessed by five items that were originally used as ratings of child behavior while angry (Lagerspetz et al. 1988). These five items were later incorporated in The Direct and Indirect

Aggression Scales (DIAS; Björkqvist et al. 1992b), which exists in both peer- and self-report formats, and has been used with children and adolescents from different cultures, including Finland, Poland, and the United States (Österman et al. 1994). The response scale for each item (e.g., "when I am mad at someone, I tell that person's secrets to a third person") ranged from 0 (*never* or *not true*) to 2 (*often* or *very true*), with higher scores indicating more indirect aggression. The estimate for ordinal coefficient alpha was good for both girls' and boys' sample at 10–11, 12–13, and 14-15 age groups ($\alpha = .82, .87, .86$ for girls and $\alpha = .83, .79, .86$ for boys).

Direct Aggression

Adolescents' reports of direct aggression were measured by six items. Five of these items were taken from the Ontario Child Health Study (OCHS; Offord et al. 1989) and one item belonged to the Antisocial Behavior Questionnaire used in the Montreal Longitudinal and Experimental Study (Tremblay et al. 1994). The response scale for each item (e.g., "I get into many fights") ranged from 0 (*never* or *not true*) to 2 (*often* or *very true*), with higher scores indicating more direct aggression. The estimate for ordinal coefficient alpha was good for both girls' and boys' sample at 10–11, 12–13, and 14–15 age groups ($\alpha = .86, .89, .90$ for girls and $\alpha = .88, .85, .90$ for boys).

It should be noted that a single-factor structure was found separately for both direct and indirect aggression scales by Statistics Canada (1995), and was confirmed for this particular sample as part of a larger measurement study (Arim et al., manuscript in preparation).

Data Analysis

Structural equation modeling (SEM), with crossed-lagged effects, was used to examine the direction of effects between adolescents' perceptions of parental nurturance and aggressive behaviors in the transactional models. The analyses were performed using the LISREL 8.80 program (Jöreskog and Sörbom 2006a), with polychoric correlations and asymptotic variance/covariance matrices computed in PRELIS 2.80 (Jöreskog and Sörbom 2006b). The diagonally weighted least squares (DWLS; Jöreskog and Sörbom 2001) method of estimation was used because of its ability to handle violations of multivariate normality associated with the ordinal nature of the variables (Jöreskog 2002).

The models were run separately for boys and girls, for each of the adolescent self-reported problem behaviors (i.e., four models in total) in an attempt to recognize possible differences in the manifestation of these behaviors between boys and girls. Simple inferences were made regarding the direction of effects (i.e., parent or child effects) depending on the strength of the crossed-lagged paths (i.e., from parental nurturance to adolescent aggressive behavior or vice versa). According to the transactional model, full reciprocal relationships can be observed when crossed-lagged paths at a developmental time are statistically significant.

Following the two-step method in SEM (Anderson and Gerbing 1988), the relationships between the observed variables and their hypothesized latent variables were evaluated in the measurement model prior to examining the structural paths between parental nurturance and each of the problem behaviors. Thus, a good fit of the measurement models to the data was first ensured before testing the transactional models. The fit of the models was evaluated using four global goodness-of-fit statistics with recommended criterion values (Hu and Bentler 1999): (a) Satorra-Bentler scaled Chi-Square statistically should be non-significant (SBS χ^2; Satorra and Bentler 1994), (b) the root mean square error of approximation should be less than or equal to .06 (RMSEA; Steiger 2000), (c) the comparative fit index should be .95 or higher (CFI; Bentler 1990), and (d) the standardized version of the Root Mean Squared Residual should be less than or equal to .08 (SRMR; Jöreskog and Sörbom 2001).

Results

Descriptive Statistics

Ordinal scales do not have a standard unit of measurement or a point of origin (Guilley and Uhlig 1993); thus, descriptive statistics, such as means and standard deviations on such variables cannot be meaningfully interpreted. Therefore, they are not reported in this study. An inspection of the frequency histograms and skewness and kurtosis values indicated a clear deviation from a normal distribution for all items across all three scales. Polychoric correlations between all items at each age group, separately for each gender and problem behavior are presented in the "Appendix".

The Indirect Aggression Scale

The girls' structural model suggested a good fit to the data (SBS χ^2 (484) = 608.05, $p < .001$; RMSEA = .02; CFI = .997; SRMR = .05). As can be seen in Fig. 1a, a statistically significant negative association (with a small effect) was observed between perceptions of parental nurturance and indirect aggression over time. Perceptions of parental nurturance showed a relatively higher stability than indirect aggression. Perceptions of parental nurturance at age 10 were negatively associated with indirect aggression at age 12, suggesting parental effects. None of the other crossed-lagged paths were statistically significant. The findings failed to

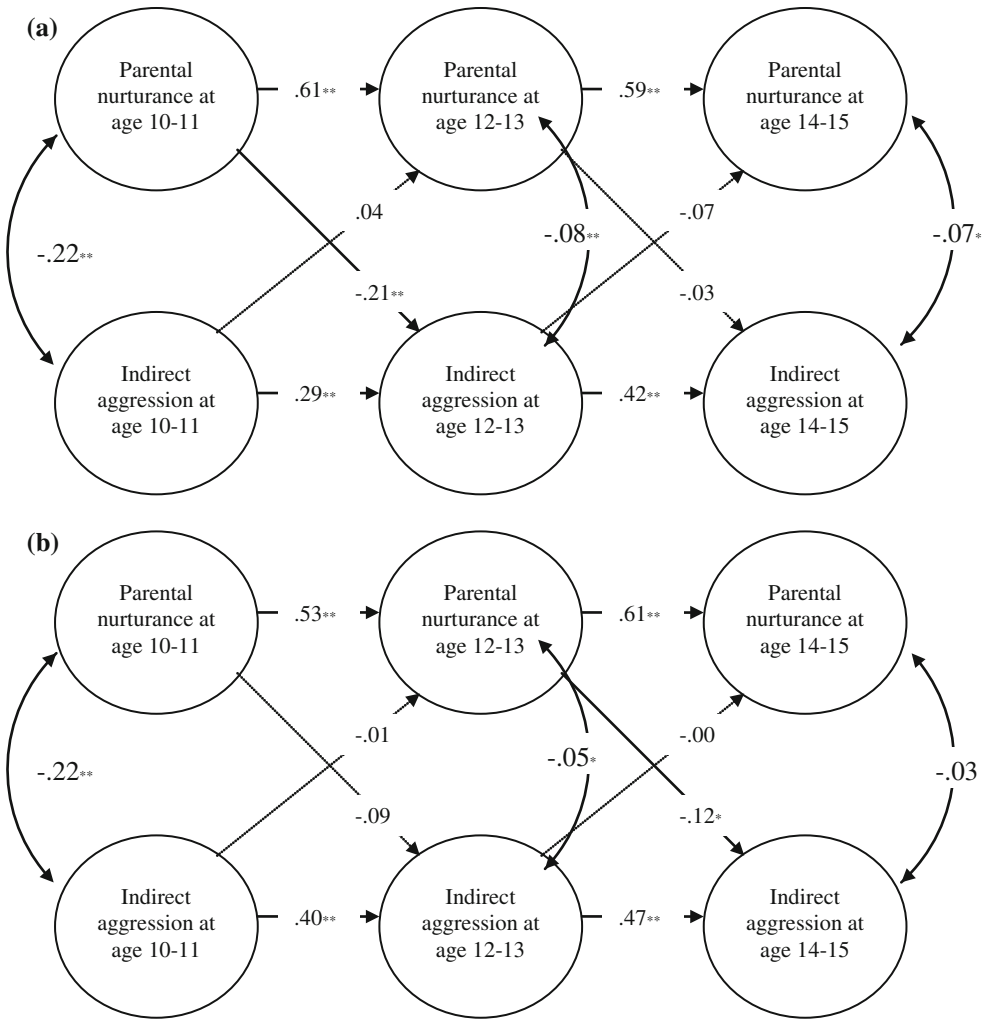

Fig. 1 **a** The results for the transactional model between perceived parental nurturance and girls' indirect aggression ($n = 735$). **b** The results for the transactional model between perceived parental nurturance and boys' indirect aggression ($n = 681$) *Note*: Completely standardized values are reported. The statistically significant crossed-lagged paths are shown in *solid arrows*. * $p < .05$. ** $p < .01$

confirm reciprocal relationships between parental nurturance and girls' indirect aggression.

The boys' structural model also suggested a good fit to the data (SBS χ^2 (484) = 568.92, $p < .001$; RMSEA = .02; CFI = .997; SRMR = .05). As can be seen in Fig. 1b, similar to girls' indirect aggression model, a statistically significant negative association (with a small effect) was observed between perceptions of parental nurturance and indirect aggression over time, except for at age 14. Both parental nurturance and indirect aggression showed stability over time. Perceptions of parental nurturance at age 12 were negatively associated with indirect aggression at age 14. None of the other crossed-lagged paths were statistically significant. The findings failed to confirm reciprocal relationships between perceptions of parental nurturance and boys' indirect aggression.

The Direct Aggression Scale

The girls' structural model suggested a good fit to the data (SBS χ^2 (583) = 632.71, $p < .001$; RMSEA = .01; CFI = .999; SRMR = .06). As can be seen in Fig. 2a, a statistically significant negative association (with a small effect) was observed between adolescents' perceptions of parental nurturance and direct aggression over time. Perceptions of parental nurturance showed a relatively higher stability than direct aggression. Perceptions of parental nurturance at age 10 were negatively associated with direct aggression at age 12, suggesting parental effects. None of the other crossed-lagged paths were statistically significant. The findings failed to confirm reciprocal relationships between parental nurturance and girls' direct aggression.

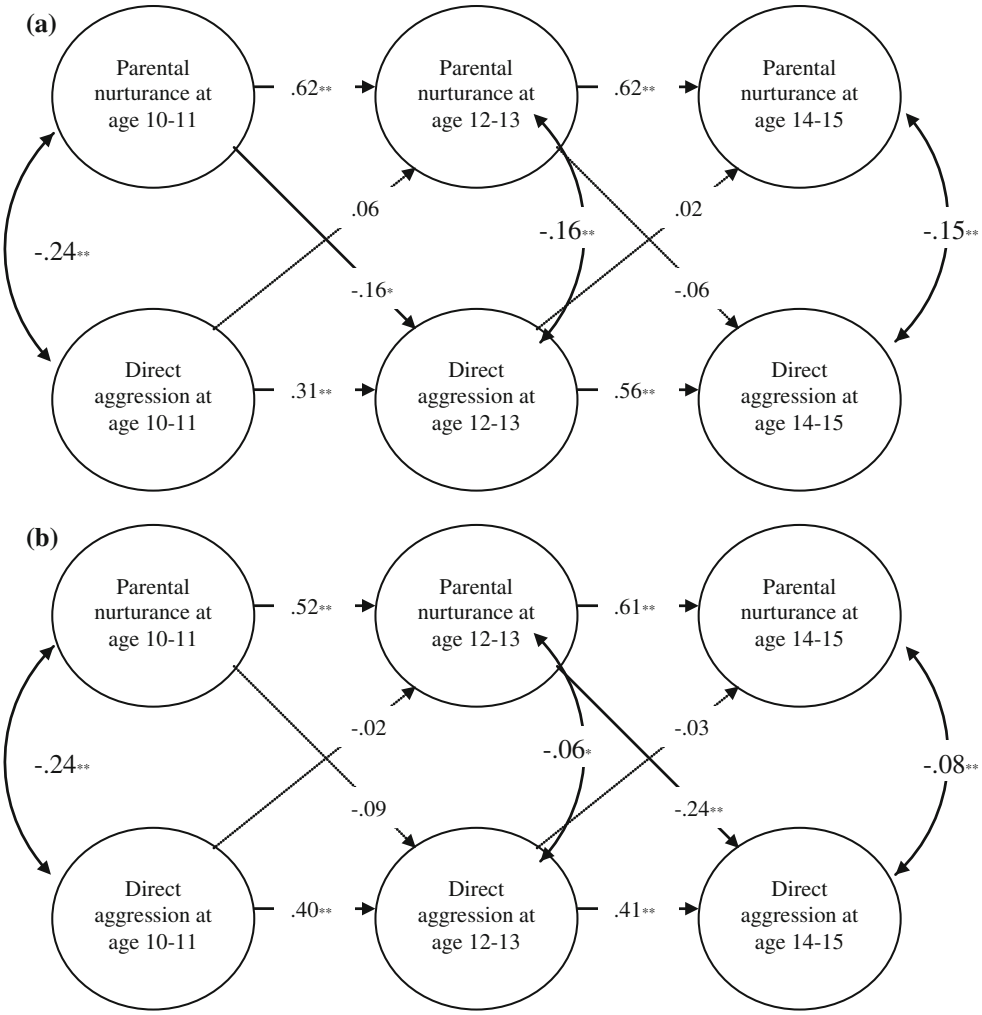

Fig. 2 **a** The results for the transactional model between perceived parental nurturance and girls' direct aggression ($n = 735$). **b** The results for the transactional model between perceived parental nurturance and boys' direct aggression ($n = 681$). *Note*: Completely standardized values are reported. The statistically significant crossed-lagged paths are shown in *solid arrows*. * $p < .05$. ** $p < .01$

The boys' structural model also suggested a good fit to the data (SBS χ^2 (583) = 758.11, $p < .001$; RMSEA = .02; CFI = .995; SRMR = .06). As can be seen in Fig. 2b, similar to girls' direct aggression model, a statistically significant negative association (with a small effect) was observed between adolescents' perceptions of parental nurturance and direct aggression over time. Both parental nurturance and direct aggression showed moderate stability over time. Perceptions of parental nurturance at age 12 were negatively associated with direct aggression at age 14. None of the other crossed-lagged paths were statistically significant. The findings failed to confirm reciprocal relationships between perceptions of parental nurturance and boys' direct aggression.

Discussion

The main objective of this study was to test a transactional model between perceptions of parental nurturance and two different types of aggressive behavior across early to middle adolescence. Overall, the results favored parental effects rather than child effects, showing that, in this sample, adolescents' aggressive behaviors did not influence adolescents' perceptions of parental nurturance, but increases in perceptions of parental nurturance predicted decreases in adolescent aggressive behaviors. These findings are in line with the view that parents continue to influence their children's development throughout adolescence (Collins et al. 2000). A difference in the timing of parental influence as perceived by adolescents was observed between the models for boys and girls. Moreover, a higher stability was observed for adolescents' perceptions of parental nurturance than adolescent aggressive behaviors in each of the models.

Perceptions of parental nurturance at age 10 influenced girls' direct and indirect aggression at age 12. This age period marks the onset of pubertal development in girls (Fechner 2003). In accordance with this statement, the findings from a recent NLSCY-based study indicated that 5% of the girls and 3% of the boys in the sample (which included children from the sample of the present study as

well) reported having entered puberty by age 10 (Arim et al. 2007). Puberty represents a transition period with rapid developmental changes in adolescents, including physical, psychosocial, and cognitive changes (Susman and Rogol 2004). It is possible that these rapid changes make adolescents a vulnerable population to diverse influences, including parental influences. From this perspective, perceptions of positive parental influences, such as parental nurturance, may act as a protective factor to reduce the likelihood of engaging in problem behaviors because parents' nurturing behaviors may eliminate adolescents' feelings of insecurity, fear, and anger, which are known as risk factors for the occurrence of problem behaviors (Allen and Land 1999). In line with this assertion, a recent study indicated that early maturing girls (defined by having their first period before age 12) who reported low parental nurturance were more likely to engage in both physical and relational aggression (Mrug et al. 2008).

For girls in this study, parental effects (as perceived by adolescents) seem to be stronger during the transition from 10–11 to 12–13 years (early adolescence) as opposed to the time period from 12–13 to 14–15 years (middle adolescence). It is possible that the later period (i.e., middle adolescence) may be marked by the formation and strengthening of other social influences, such as peer context, which may lead to a decrease in parental influences. For boys, given that they enter puberty approximately 2 years later than girls (Arim et al. 2007), the later influence of perceptions of parental nurturance on boys' problem behaviors that was found in this study (at age 12 and at age 14) may indicate that boys, like girls, can benefit from positive parenting behaviors, such as parental nurturance, to reduce the maintenance of aggressive behaviors at the onset of puberty.

Although pubertal development may seem to be a plausible explanation, there can be other explanations (e.g., social factors) for the presence of parental nurturance effects at these age groups. The developmental changes during adolescence, including pubertal development, occur at a time when most adolescents are making a transition from elementary to secondary school. According to a stage-environment fit perspective (Eccles et al. 1993), adolescents whose social environments are responsive to their needs are less likely to experience negative psychosocial outcomes, such as depression and delinquency. For example, Gutman and Eccles (2007) found that adolescents who reported more positive identification with their parents from Grade 7 through graduation from high school were less likely to have depression. In accordance with these findings, the results from this study indicated that perceptions of parental nurturance, which can be an indicator of a developmentally appropriate family environment, are associated with a decrease in negative outcomes, such as aggressive behaviors.

Although the findings from this study failed to provide support for reciprocal effects between perceptions of parental nurturance and adolescent aggression, they do not necessarily reject a bidirectional association between adolescents' perceptions of parenting and problem behaviors. Statistically, parental effects (as perceived by adolescents) were observed in the presence of child effects in the model. Given our use of adolescent-reported measures of parental nurturance and aggressive behaviors, it is very likely that child effects were confounded with parental effects. For example, aggressive adolescents might tend to perceive their parents more negatively [see Yoon et al. (1999) for a meta-analytic review]. Alternatively, it is possible that the reciprocal relationships between perceived parental nurturance and problem behavior were established in childhood, but remained stable during adolescence. Thus, statistically significant associations between perceived parental nurturance and adolescent aggression could not be observed due to established stable interactions between parents and adolescents. Accordingly, both boys and girls, perceived their parents' nurturance as very stable across the three age groups.

Regarding the stability in aggressive behaviors, in contrast to boys, girls' indirect and direct aggression at age 12 showed relatively less stability. This may be a result of this age period being a developmental transition period for girls (but not for boys). It is possible that girls' scores during this time are showing less stability because they are more influenced by their environment, including the effects of their parents and peers, which may decrease or increase their likelihood of engaging in different problem behaviors. Alternatively, girls may be learning other types of problem behaviors during this period, including indirect aggression (Björkqvist et al. 1992a). Our findings are comparable to the results from a longitudinal study that also showed lower stabilities for overt (direct) and relational (indirect) aggression in Grade 6–7 girls than boys (Cillessen and Borch 2006).

The stability in perceptions of parental nurturance and adolescent aggression may be a reason for not detecting statistically significant crossed-lagged effects because the latter is estimated after controlling for stability effects (Hoyle 2007). Another conceptual reason for the lack of reciprocal effects could be that parents may not know about their children's problem behavior during adolescence, especially if these behaviors usually occur outside the home. For example, in this study, indirect aggression was assessed by adolescents' reports of behaviors in manipulating their friendships. It is very likely that parents may not be aware of their adolescent's manipulation of friendships because such behaviors often take place away from parents, particularly in older ages when parents have less opportunity to supervise their adolescent children. In line

with this argument, our findings, regardless of gender and age, indicated that the negative association between perceived parental nurturance and indirect aggression was less strong in magnitude than that of perceived parental nurturance and direct aggression.

The finding of parental effects suggests that adolescents' perceptions of parental nurturance are influential in the maintenance of adolescent problem behaviors. It appears that, as adolescents go through puberty, perceptions of parental nurturance may have a positive influence in reducing the likelihood of both girls' and boys' indirect and direct aggression. These findings highlight the need to promote positive parenting in adolescence, including strengthening parents' use of nurturing behaviors and adolescents' awareness of their parents' behaviors, to decrease the potential occurrence of problem behaviors. Moreover, although boys did not demonstrate much change in their levels of direct and indirect aggression, some change in girls' direct and indirect aggression was observed at age 12–13, indicating a transition period. These findings indicate that both changes within the adolescent and in the environment, such as perceptions of high versus low nurturance, result in changes in adolescent problem behaviors. Thus, another important implication for prevention and intervention is that both parents and adolescents should be supported during adolescents' developmental transition periods. This also highlights the importance of adopting a developmental-contextual framework in which both adolescents and their interactions with their family are considered in tailoring prevention and intervention programs. As an example, the results from the Earlscourt Girls Connection (EGC) intervention program for aggressive girls suggested that focus on girls' developmental changes as well as salient relationship contexts, such as family and peers, resulted in decreases in problem behaviors, such as delinquency (Pepler et al. 2004). Our findings lend support to the importance of such programs aimed at strengthening parental nurturance as a means of decreasing adolescent aggressive behaviors.

Limitations, Strengths, and Future Directions

Several limitations of this study need to be noted as they provide directions for future research. First, only adolescent self-report data were used in this study. As previously discussed, the reliance on adolescent self-report data may be a reason why child effects were not observed in this study. Future research may examine this possible explanation by replicating this study with parent reports of parental nurturance and comparing the results with adolescent self-report data. Second, the two-year intervals may have been too long for us to detect statistically significant negative relationships between parental nurturance and adolescent aggression given the rapid developmental changes that may occur during this period. Gollob and Reichardt (1987) indicated that shorter or longer time-lags in longitudinal data collection could result in different effects. It would be worthwhile to replicate this study with one-year intervals. Third, the use of a global measure of parental nurturance may have weakened the ability to detect statistically significant negative associations between parental nurturance and adolescent aggression. More specifically, a domain-based assessment of parental nurturance with more sensitive items assessing nurturance in specific contexts could have revealed a more precise relationship between parental nurturance and adolescent aggression. Finally, we also acknowledge that the observed parental effects (as perceived by adolescents) are small in size, possibly due to other variables (e.g., maternal depression, peer influences) that were not accounted for in our transactional models.

Despite these limitations, the findings from this study contribute to the growing body of literature that recognizes both directions of influence in parent–adolescent relationships. A major strength of this study is that the ordinal nature of the observed variables (i.e., items in the parental nurturance and indirect and direct aggression scales) has been taken into account in analyses. Previous research has shown that when the data is non-normal and categorical, the use of Pearson correlations and maximum likelihood estimation create high level of bias in parameter estimates, standard errors, and factor intercorrelations (DiStefano 2002). Future studies should pay attention to such threats in order to produce accurate interpretations of the results based on categorical data. Another strength of this study is that three waves of data were used to examine the reciprocal effects between perceived parental nurturance and adolescent problem behaviors. In addition, the models were tested separately for boys and girls in an attempt to recognize differences in the measurement of problem behaviors between boys and girls (i.e., lack of invariance of indirect and direct aggression scores across gender). Finally, the inclusion of indirect aggression is another important strength of this study, as relatively few studies focused on the development and maintenance of indirect aggression during adolescence. Previous researchers have noted that the style of the transaction and subsequent outcomes may be influenced by the interaction between parent and child characteristics (Magnusson 1988). In this study, both parental nurturance and adolescent aggression can be considered as parent and child characteristics, respectively. However, a strategy in future research with transactional models can be to account for multiple parent and child characteristics, such as parental nurturance in depressed mothers or aggressive behaviors in children with disabilities. From a developmental perspective, models that can capture the full emergence of a problem behavior and its stability or change over time will be

invaluable for identifying the developmental period(s) in which the child (or the environment) is more influential.

In summary, there is still much to learn about the nature of the relationship between parenting and adolescent problem behaviors. In examining reciprocal relationships between adolescents' perceptions of parental nurturance and two types of adolescent aggressive behaviors, this study provided support for parental effects at different ages for girls and boys. Future research is needed to refine the application of transactional models with particular consideration of parent and child characteristics, as well as their combined effects on their reciprocal interactions within broader social contexts. Although this study moves us forward in our conceptualization and understanding of parent-adolescent relationships, there are clearly factors that warrant further examination before we can truly understand the reciprocal nature of the parent-adolescent relationships.

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Appendix

Polychoric correlations between all items at each age group, separately for each gender and aggressive behavior (see Tables 1, 2, 3, 4, 5, 6).

Table 1 Polychoric correlations between the parental nurturance and the indirect aggression scale items at age 10

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	IA1	IA2	IA3	IA4	IA5
PN1	–	.52	.49	.46	.56	.54	−.23	−.13	−.23	−.14	−.19
PN2	.47	–	.45	.46	.50	.46	−.20	−.16	−.22	−.18	−.16
PN3	.53	.47	–	.58	.55	.56	−.23	−.19	−.23	−.15	−.21
PN5	.56	.49	.60	–	.54	.59	−.24	−.16	−.15	−.10	−.23
PN6	.57	.49	.61	.60	–	.67	−.23	−.17	−.26	−.19	−.21
PN7	.58	.45	.59	.62	.70	–	−.27	−.23	−.21	−.20	−.22
IA1	−.23	−.17	−.22	−.19	−.16	−.24	–	.49	.51	.58	.54
IA2	−.26	−.20	−.29	−.21	−.23	−.19	.52	–	.40	.44	.46
IA3	−.27	−.15	−.25	−.26	−.24	−.26	.54	.35	–	.48	.51
IA4	−.27	−.20	−.26	−.22	−.18	−.25	.59	.50	.60	–	.47
IA5	−.18	−.10	−.20	−.23	−.18	−.18	.41	.35	.42	.46	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance, *IA* indirect aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1

Table 2 Polychoric correlations between the parental nurturance and the indirect aggression scale items at age 12

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	IA1	IA2	IA3	IA4	IA5
PN1	–	.52	.57	.54	.57	.51	−.10	*−.03*	−.13	−.07	−.11
PN2	.63	–	.53	.57	.62	.54	−.10	−.14	−.21	−.12	−.17
PN3	.57	.65	–	.62	.65	.66	−.15	−.10	−.23	−.11	−.11
PN5	.66	.65	.70	–	.64	.65	−.10	−.13	−.15	−.12	−.19
PN6	.68	.67	.67	.74	–	.71	−.10	−.12	−.23	−.13	−.21
PN7	.71	.67	.71	.74	.80	–	*−.04*	−.06	−.15	−.10	−.16
IA1	−.25	−.26	−.16	−.17	−.21	−.26	–	.36	.36	.53	.25
IA2	−.24	−.28	−.24	−.08	−.19	−.26	−.57	–	.29	.40	.44
IA3	−.19	−.24	−.19	−.14	−.20	−.21	.70	.55	–	.48	.57
IA4	−.22	−.20	−.24	−.20	−.27	−.24	.60	.52	.55	–	.54
IA5	−.11	−.12	−.11	*−.04*	−.07	*−.06*	.53	.49	.52	.53	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance, *IA* indirect aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1. Italicized coefficients are not statistically significant

Table 3 Polychoric correlations between the parental nurturance and the indirect aggression scale items at age 14

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	IA1	IA2	IA3	IA4	IA5
PN1	–	.68	.56	.62	.65	.65	−.11	−.19	−.07	−.09	−.23
PN2	.75	–	.67	.74	.75	.71	−.15	−.08	−.12	−.12	−.19
PN3	.64	.70	–	.70	.66	.69	−.10	*−.06*	−.08	−.09	−.16
PN5	.71	.80	.74	–	.76	.78	−.11	−.11	−.14	−.14	−.20
PN6	.67	.82	.74	.81	–	.80	−.15	*−.04*	−.15	−.14	−.20
PN7	.72	.83	.74	.81	.85	–	−.13	−.12	−.10	−.10	−.17
IA1	−.15	−.18	−.17	−.24	−.18	−.22	–	.57	.62	.57	.49
IA2	−.08	−.13	−.15	−.18	−.14	−.18	.58	–	.50	.46	.66
IA3	−.11	−.13	−.11	−.17	−.14	−.10	.60	.35	–	.58	.53
IA4	−.13	−.07	−.10	−.13	*−.06*	−.12	.69	.58	.56	–	.54
IA5	*−.03*	−.16	−.15	−.17	−.10	−.13	.56	.54	.49	.56	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance, *IA* indirect aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1. Italicized coefficients are not statistically significant

Table 4 Polychoric correlations between the parental nurturance and the direct aggression scale items at age 10

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	DA1	DA2	DA3	DA4	DA5	DA6
PN1	–	.52	.49	.46	.56	.54	−.19	−.25	−.28	−.24	−.20	−.23
PN2	.47	–	.45	.46	.50	.46	−.36	−.28	−.30	−.27	−.19	−.32
PN3	.53	.47	–	.58	.55	.56	−.21	−.23	−.27	−.22	−.19	−.32
PN5	.56	.49	.60	–	.54	.59	−.16	−.21	−.22	−.22	−.21	−.29
PN6	.57	.49	.61	.60	–	.67	−.21	−.24	−.36	−.23	−.20	−.33
PN7	.58	.45	.59	.62	.70	–	−.23	−.26	−.29	−.23	−.17	−.26
DA1	−.21	−.17	−.23	−.24	−.16	−.23	–	.56	.49	.35	.42	.56
DA2	−.24	−.16	−.23	−.27	−.20	−.26	.47	–	.58	.50	.46	.54
DA3	−.36	−.21	−.35	−.28	−.33	−.39	.43	.38	–	.62	.59	.63
DA4	−.25	−.18	−.28	−.27	−.17	−.30	.39	.43	.63	–	.64	.59
DA5	−.20	−.25	−.25	−.25	−.26	−.24	.40	.43	.55	.61	–	.64
DA6	−.31	−.18	−.37	−.27	−.21	−.29	.40	.52	.60	.63	.64	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance, *DA* direct aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1

Table 5 Polychoric correlations between the parental nurturance and the direct aggression scale items at age 12

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	DA1	DA2	DA3	DA4	DA5	DA6
PN1	–	.52	.57	.54	.57	.51	−.16	−.08	−.18	−.17	−.12	−.25
PN2	.63	–	.53	.57	.62	.54	−.15	−.17	−.13	−.13	−.10	−.25
PN3	.57	.65	–	.62	.65	.66	−.21	−.19	−.16	−.24	−.21	−.27
PN5	.66	.65	.70	–	.64	.65	−.11	−.12	−.12	−.08	−.12	−.15
PN6	.68	.67	.67	.74	–	.71	−.18	−.18	−.14	−.14	−.18	−.24
PN7	.71	.67	.71	.74	.80	–	−.11	−.26	−.29	−.15	−.13	−.23
DA1	−.30	−.33	−.30	−.26	−.31	−.31	–	.43	.42	.56	.40	.53
DA2	−.17	−.23	−.20	−.16	−.25	−.22	.51	–	.18	.43	.29	.34
DA3	−.33	−.32	−.29	−.25	−.27	−.33	.65	.49	–	.55	.66	.66

Table 5 continued

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	DA1	DA2	DA3	DA4	DA5	DA6
DA4	−.31	−.37	−.39	−.35	−.27	−.39	.75	.60	.80	–	.53	.61
DA5	−.24	−.22	−.23	−.25	−.24	−.27	.52	.23	.64	.79	–	.60
DA6	−.35	−.35	−.38	−.31	−.29	−.38	.73	.46	.76	.84	.68	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance; *DA* direct aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1

Table 6 Polychoric correlations between the parental nurturance and the direct aggression scale items at age 14

Item[a]	PN1	PN2	PN3	PN5	PN6	PN7	DA1	DA2	DA3	DA4	DA5	DA6
PN1	–	.68	.56	.62	.65	.65	−.26	−.17	−.19	−.29	−.19	−.31
PN2	.75	–	.67	.74	.75	.71	−.13	−.19	−.21	−.24	−.08	−.28
PN3	.64	.70	–	.70	.66	.69	−.23	−.22	−.18	−.27	−.25	−.35
PN5	.71	.80	.74	–	.76	.78	−.24	−.18	−.20	−.29	−.24	−.30
PN6	.67	.82	.74	.81	–	.80	−.22	−.20	−.25	−.27	−.15	−.32
PN7	.72	.83	.74	.81	.85	–	−.23	−.22	−.23	−.27	−.21	−.34
DA1	−.34	−.34	−.33	−.39	−.30	−.36	–	.56	.66	.59	.54	.62
DA2	−.18	−.17	−.18	−.22	−.18	−.16	.49	–	.57	.54	.42	.50
DA3	−.24	−.30	−.25	−.29	−.21	−.24	.75	.51	–	.70	.61	.75
DA4	−.31	−.36	−.37	−.39	−.31	−.34	.61	.50	.72	–	.59	.65
DA5	−.18	−.24	−.22	−.20	−.21	−.22	.58	.43	.64	.78	–	.64
DA6	−.20	−.31	−.32	−.29	−.28	−.31	.69	.57	.75	.73	.66	–

The correlations below the diagonal are for girls and the correlations above the diagonal are for boys

[a] The first two letters of the variable name indicate the scale it belongs to: *PN* parental nurturance; *DA* direct aggression. The digit in the variable name indicates the item number in the scale. $n = 735$ for girls and $n = 681$ for boys; $M = 0$; SD = 1

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