



Universiteit
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Early childhood aggression

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Citation

Alink, L. R. A. (2006, November 9). *Early childhood aggression*. Retrieved from <https://hdl.handle.net/1887/4977>

Version: Corrected Publisher's Version

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General discussion

Introduction

The current thesis focused on early childhood aggression. First, the early normative development and stability of physical aggression were investigated. Next, the observation of physically aggressive behavior in young children was described. The current thesis addressed the reliability and validity of an instrument originally developed by Shaw, Keenan, and Vondra (1994). In addition, this observational instrument was used to investigate the influence of maternal sensitivity and discipline on the development of child aggression. Finally, the relation between the functioning of the HPA axis and aggression was investigated by performing two meta-analyses: one on the relation between aggression and basal levels of cortisol and one on the association of aggression with cortisol reactivity after a stressor. The current chapter summarizes and integrates the results of the previous chapters. In addition, the limitations of the research project will be addressed and recommendations for further research will be made.

Normative development

The first topic of this thesis was the normative development of aggression in early childhood. Knowing the normative course, gender differences, and stability of aggression facilitates the investigation of abnormal levels of aggression. The research focused on *physical* aggression, since this is considered the most relevant subtype of aggression early in development (Tremblay et al., 1999). Levels of physical aggression were longitudinally investigated in a sample of 1- to 3-year-old children. A clear hypothesis regarding the early development of physical aggression was derived from the literature: Rates of aggression would increase between the 1st and 2nd birthday and decline from the fourth year of life onward (the “early childhood aggression curve”; Tremblay, 2000, 2004). However, this hypothesis had not been previously tested using a longitudinal research design including children of all relevant ages (i.e., the first four years of life). In addition, little was known on aggression in children as young as 1 year of age. The current research was the first to test the hypothesis using a longitudinal design, describing the development of aggression from 1 to 4 years of age. The results of the study indicated that aggression already occurs in 1-year-olds. Furthermore, evidence was provided for the early childhood aggression curve (shown in Figure 6.1).

From a developmental perspective, these findings correspond to the issues that are relevant in particular stages of development. During the toddler period children become more autonomous and they start to develop awareness of standards for behavior (Sroufe, Egeland, Carlson, & Collins, 2005). This may be the basis for increasing mother-reported levels of aggression. The combination of parents who start to impose rules and children who want to do things according to their own wishes may result in an increased number of conflicts between parents and children. This may elicit frustration in the children and aggressive acts may be the result (Berkowitz, 1989). The preschool period is characterized by the development of self-regulation (Kochanska, 1995; Sroufe et al., 2005).

Children internalize rules and values and start to be able to regulate their own emotions and behavior. Being frustrated does no longer “automatically” result in aggression, because children learn new adaptive ways to express their emotions. The improvement in the use and understanding of language may also contribute to reduced levels of frustration and better ways to express this frustration.

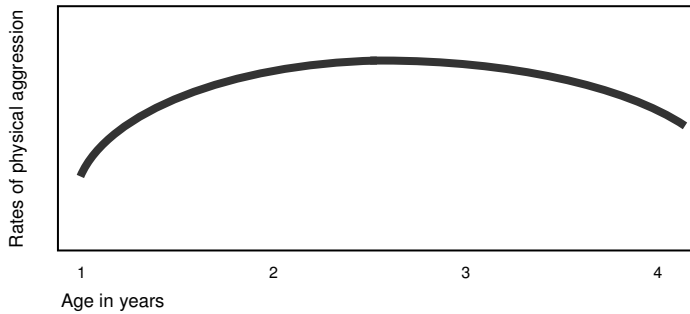


Figure 6.1
The early childhood aggression curve

The differences between 1-, 2-, and 3-year-olds were also investigated using the observational measure of aggression. Contrary to analyses on mother-reported aggression, no age differences were found in the observational data. One-year-old children did not show lower rates of observed aggression than 2- and 3-year-olds. This discrepancy between mother-rated and observed aggression may be due to the fact that in the laboratory, aggression was observed in situations in which the mother imposed a rule on her child (having to clean up the toys, not touching very attractive toys). These types of situations may be rather uncommon for 1-year-old children and as a result, these children may be more aggressive in the laboratory than at home. Several mothers in our lab indeed indicated that in daily life they would not ask their children to clean up their toys and they put forbidden objects out of sight. This higher level of frustration in the laboratory may indicate that 1-year-olds showed more aggressive behaviors in the laboratory than at home. Thus, it seems that 1-year-olds are already capable of performing aggressive behaviors, but since they do not encounter frustrating situations as much as 2- and 3-year-olds, they may show this behavior less often in daily life. The finding that rates of observed aggression did not differ between 1-year-olds and older children, whereas they did for parent-rated aggression may also be partly explained by the specific instructions we used for our observation of aggression. The *intention* to hurt or harm was not necessary to code the behavior as aggressive. Mothers may have underreported the behavior of their 1-year-olds because they may have thought that their child did not hit or kick with the purpose of hurting and therefore, this behavior should not be considered aggressive. In fact, several mothers wrote down remarks to this effect on the questionnaire.

The results of the current study also showed that parent-rated physical aggression is highly stable across one year in 2- and 3-year-olds. Furthermore, the results revealed that even in 1-year-old children the stability of aggressive behavior is considerable. This indicates that it is indeed relevant to investigate aggression in children of these young ages. The rank order of children concerning their rates of aggression remains considerably similar across one year. It is unlikely that this effect is largely due to consistent informant biases over time, because the mean of mother and father reports was used to compute stability.

Observational measurement

The observation of aggression was addressed from a developmental perspective. An observational measure was used to assess levels of physical aggression in 1- to 4-year-old children during a laboratory session. This instrument was originally developed by Shaw et al. (1994) and incorporates our definition of aggression: behavior that is aimed at and may cause harm to people, objects, or animals, and is not due to motor limitations, or part of age-appropriate play and exploration. Results revealed that physical aggression in 1- to 3-year-old children can be reliably assessed. Intercoder reliabilities were high, even in the youngest age group. There was evidence for convergent validity of the instrument in all age groups, except for 1-year-olds. For this age group the correlation between mother-rated and observed aggression was not significant. As discussed above, mothers of 1-year-old children may have applied the rule of intent when answering the questions on physical aggression in their children. Some of these mothers may have considered the behaviors of their children, such as hitting or kicking, as aggressive, whereas others did not because they felt the child did not have the purpose of hurting someone (some mothers actually wrote these comments on the questionnaire). Thus, for some mothers intent was a condition for coding aggression, whereas it was not included as a necessary condition in the observational measure. This discrepancy may explain the insignificant correlation between observed and mother-rated aggression in 1-year-olds. In addition to convergent validity, discriminant validity was established. Physical aggression obtained with the observational instrument could be clearly distinguished from other types of externalizing behaviors, such as oppositional and overactive behavior. Furthermore, results revealed that observed aggression was related to parenting in a meaningful way.

In contrast to the results on parent-rated aggression, no significant stability was found for observed aggression. This may be due to low ecological validity of the observational instrument as a result of the relatively short time of the episodes in which aggression was observed (with a maximum of 13 minutes). A child who is aggressive in daily life may not show this behavior during these episodes at one (or both) of the time points. This may depend on the mood of the child, activities of the mother and child before the laboratory session, etc. In order to investigate whether the ecological validity and hence the stability can be enhanced, we are currently extending the episodes in which physical aggression is observed (cf. Shaw et al., 1994, whose total coding time was 13 minutes). Aggression is also being observed in a situation in which mother and child are involved in a

problem-solving task situation. This episode may correspond to situations at home in which mother and child play games, and therefore enhance ecological validity.

The observational instrument that was used in the current study is one of the few instruments that focus on child aggression in a situation involving mothers and children. Most studies on child aggression used parent or teacher reports (Crick, Casas, & Mosher, 1997; Estrem, 2005; Russell, Hart, Robinson, & Olsen, 2003; Tremblay et al., 1999, 2004) and research that did rely on observational measures usually focused on aggression among peers (Cummings, Iannotti, & Zahn-Waxler, 1989; Ostrov, Woods, Jansen, Casas, & Crick, 2004; Strayer & Roberts, 2004). In early childhood however, the family context is generally the most important environment. Experiences in this context shape later behaviors and interpretations of social situations (Sroufe et al., 2005). Therefore, it is relevant to investigate aggressive behavior in early childhood within this mother-child context.

Gender differences

Another focus of the current thesis was on gender differences. The main difference between boys and girls was that boys showed higher rates of aggressive behavior than girls. In the large general population sample this was true for all ages except for 1-year-olds. This gender difference was also found for observed aggression in the total group of 1- to 3-year-olds. These findings are in line with previous studies (Baillargeon, Tremblay, & Willms, 2005; Tremblay et al., 1999). However, according to some researchers, gender differences in the rate of aggression do not emerge before the age of 4 years (e.g., Cummings et al., 1989; Keenan & Shaw, 1994). The convergent findings regarding gender differences on both parent-rated and observed aggression indicated that these are likely to reflect true differences between boys and girls that are not likely to be completely due to informant biases. The 1-year stability of physical aggression was comparable for boys and girls. This is consistent with the results reported by Keenan and Shaw (1994) and Cummings et al. (1989) on stability of aggression in toddlers and preschoolers. Comparisons between stabilities in 1-year-old boys and girls have not been reported thus far. The current study is the first to show that physical aggression in 1-year-olds predicted physical aggression one year later in the same way for boys and for girls.

The reported gender differences in rates of aggression can be explained from different perspectives. Archer and Côté (2005) used an evolutionary approach to address this issue. According to these authors the evolutionary function of the behavior is more relevant for males than for females. Females are more selective in their choice of mates because of their greater investment in their offspring. This leads to more aggression in males, because males need to compete with other males for both access to females and the resources that make them more acceptable for females. Dominance is thus a more important value in males than in females. The higher rates of male aggression in humans early in life may serve two longer-term purposes. First, techniques of fighting are learned that may be valuable for later in life, and second, in addition to fighting techniques,

physically based dominance acquired early in life may be a basis for dominance in young adulthood. In line with this gender difference in dominance are data that reveal differences between boys and girls in levels of testosterone (e.g., Bolton, Tapanainen, Koivosto, & Vihko, 1989; Collaer & Hines, 1995). Several authors reported that people with higher levels of testosterone are more dominant and aggressive than individuals with lower levels of this hormone (Book, Starzyk, & Quinsey, 2001; Rowe, Maughan, Worthman, Costello, & Angold, 2004; for a review, see Ramirez, 2003). Another presupposed hormonal difference between boys and girls pertains to levels of cortisol (Keenan & Shaw, 1997). However, results on gender differences in infants regarding cortisol are mixed. In several studies no gender differences were found (e.g., Ramsay & Lewis, 1994; Gunnar, Larson, Hertsgaard, Harris, & Broderson, 1992), whereas Davis and Emory (1995) found that boys showed a larger stress response following the administration of the Brazelton Neonatal Behavior Assessment Scale (NBAS). In line with this, Kudielka and Kirschbaum (2005) stated that in the literature on cortisol responses in children either no gender differences or heightened cortisol responses in boys are reported. Little is known on gender differences in infants regarding basal levels of cortisol. In addition, results of the current study revealed that the *associations* of basal cortisol and cortisol reactivity with aggression were similar for boys and girls.

Differences in early language development between boys and girls may also explain differences in physical aggression. Girls are generally found to have better language skills than boys in early development (Galsworthy, Dionne, Dale, & Plomin, 2000; Roulston, Loader, Northstone, & Beveridge, 2002). There are indications that these early language differences are partly related to gender differences in brain development (e.g., Blanton et al., 2004). Part of children's aggressive behavior may be based on frustration of not being understood (i.e., not being able to verbally express your needs and negative emotions). Therefore, having better language skills may reduce this type of frustration and thus result in lower levels of aggression. This is in line with the results presented by Estrem (2005), revealing that lower levels of physical aggression were associated with better receptive language abilities.

Early (biological) gender differences (e.g., differences in maturation rate or brain development) may be the basis of differences in levels of aggression between boys and girls, but later social experiences may also play a role. The social environment may magnify the early gender differences in aggression by responding differently to boys' and girls' aggressive behaviors (Fagot, 1984). In turn, biological factors may change in the course of development in response to social experiences. Little is known on this interaction between biological and environmental factors in the development of gender differences regarding aggression. More research is needed to investigate the social and biological causes of gender differences in levels of physical aggression.

Risk and protective factors

Even though a clear normative course of physical aggression was found, there were considerable individual differences in rates of aggression. Part of the

research in the current thesis focused on factors that may explain these individual differences. Two types of correlates were addressed: parenting and biological factors.

Parenting

Important parenting practices in early childhood are sensitivity and discipline. In the current thesis the association of these factors with aggression in 1- to 3-year-old children was addressed. It was found that maternal sensitivity moderated the effect of negative discipline of child aggression (Figure 6.2). When mothers were insensitive, their frequent use of commands, physical interference, and the absence of positive feedback were predictors of high levels of child physical aggression one year later. Negative discipline had no effect on child aggression when mothers were more sensitive. In terms of the developmental psychopathology perspective, the current study indicated that maternal negative discipline is a risk factor for the development of physical aggression, whereas sensitivity is a protective factor.

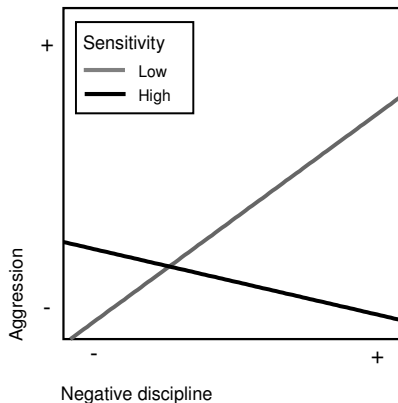


Figure 6.2

The moderating effect of maternal sensitivity on the association of negative discipline with child aggression

Maternal sensitivity may be a protective factor by influencing the meaning children attribute to the acts of negative discipline (McLoyd & Smith, 2002). In contrast to children of insensitive mothers, children of sensitive mothers are less likely to interpret their mothers' negative disciplining as rejecting. Because the interpretation of social information as hostile or rejecting is related to aggressive behavior (Dodge, 1980; Dodge, Laird, Lochman, & Zelli, 2002; for meta-analytic evidence see De Castro, Veerman, Koops, Bosch, & Monshouwer, 2002), children of highly sensitive mothers may show less aggression than children of less sensitive mothers. Correspondingly, Loeber and Hay (1997) hypothesized that early experience to insensitive parenting causes the child to be sensitive to rejection, which is often accompanied by either anger or anxiety as a reaction to rejection.

The role of information processing in the development of aggressive behavior can also be viewed from the attachment theory perspective. Bowlby (1980) stated that children of insensitive mothers may evidence “defensive exclusion” or denial of negative self-relevant information in order to protect a fragile self-system. These children exclude information that threatens the self-system in order to buttress their fragile sense of felt security, and as a result they retain unrealistically positive ideas about themselves. According to Baumeister, Smart, and Boden (1996), an overly positive sense of self may be a risk factor for aggression under conditions of perceived threat to self-esteem. These authors proposed a model in which the discrepancy between (positive) self-appraisal and (negative) external evaluation leads to aggressive behavior. When the unrealistic and unstable sense of self is threatened by an external negative evaluation (e.g., maternal negative discipline), children are likely to react with aggression as a result of negative emotions towards the source of the threat. Studies by Edens, Cavell, and Hughes (1999) and Hughes, Cavell, and Grossman (1997), who found that aggressive children did have inflated self-views, indeed support this model. Thus, children of insensitive mothers may perceive social information more often as rejecting than other children, and at the same time they may have strong negative emotions towards the person who - in their opinion - negatively evaluates them. Combining the ideas from the attachment theory with Dodge’s (1980) theory on social information processing, we may thus explain the increased risk for showing aggressive behavior of children with insensitive mothers when they are frequently faced with negative discipline.

High levels of maternal sensitivity in the first years of life also contribute to the development of emotion regulation (Cassidy, 1994; Sroufe et al., 2005). When children do not learn to regulate negative emotions such as anger and frustration effectively, they may be more prone to show aggressive behavior. Parental negative discipline may elicit anger and frustration in the child and, as a result, children who are unable to effectively regulate these emotions are more likely to act aggressively (Arsenio, Cooperman, & Lover, 2000; Berkowitz, 1989; Sroufe, 1995).

Our results suggest that parenting is relevant in the early development of aggression and they may be considered an important avenue to develop prevention and intervention programs. In fact, the SCRIPT study, from which the data for the current thesis were derived, included an intervention study. Results of this study revealed that the intervention was effective in enhancing maternal attitudes towards sensitivity and sensitive discipline, in promoting sensitive discipline interactions, and in reducing the rate of overactive problem behaviors in the children (Van Zeijl et al., in press).

Cortisol

In addition to the focus on parenting in relation to aggression, two meta-analyses were performed to investigate the association of aggression on the one hand with cortisol and cortisol reactivity on the other hand. Results of previous research on these issues are equivocal, but the main hypothesis in the literature states that high levels of aggression are related to cortisol hypo(re-)activity. The results of the meta-analysis on basal cortisol revealed that higher levels of aggression were

related to lower levels of basal cortisol (conform the hypothesis) in 5- to 12-year-old children, but to higher levels of basal cortisol in younger children (Figure 6.3). This inverse relation in 5- to 12-year-old children was stronger in clinical groups. No significant associations between aggression and cortisol reactivity were found. However, the number of studies reporting on this issue was relatively small and more importantly, there were only four studies that used a strong stressor to elicit a physiological stress response. According to Dickerson and Kemeny (2004) only these stressors are capable of eliciting a substantial response of the HPA axis. The combined effect size of the four studies using a strong stressor was not significant but pointed in the expected direction (inverse relation between cortisol reactivity and aggression).

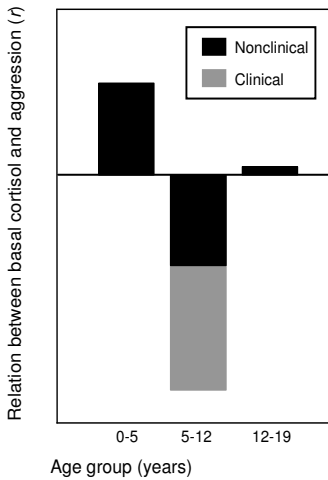


Figure 6.3

The relation between basal cortisol and aggression for the different age and clinical status groups

The positive relation between basal cortisol and aggression in young children may be explained by a common factor that affects both the functioning of the HPA axis and levels of cortisol. Several studies have shown that substantial levels of stress early in life or even before birth are associated with the development of aggressive behavior (for a review, see McBurnett, King, & Scarpa, 2003). This early stress may also result in higher basal levels of cortisol (Gunnar & Cheatham, 2003). If high levels of stress continue to exist for an extensive period of time, this may cause a downregulation of the HPA axis, resulting in lower levels of basal cortisol or hypoactivity (Fries, Hesse, Hellhammer, & Hellhammer, 2005; Gunnar & Vasquez, 2001). This may explain the change from a positive to a negative relation between cortisol and aggression after some time. In later childhood, the hypoactivity of the HPA axis may contribute to the persistence or increase of aggressive behavior. In line with Raine's (1996) theory, children with low levels of cortisol are underaroused and may compensate for this underarousal by acting aggressively. Children with lower basal levels of cortisol may also be inclined to

seek sensation (e.g., act aggressively) in order to get the pleasant feeling of arousal resulting from the elevation of their cortisol levels. These children may also have a lack of fear, and thus may be less inhibited to show outgoing behavior than other children. Since the inverse relation between basal cortisol and aggression was stronger in clinical groups, these processes may be more pronounced in children with clinical syndromes, such as Conduct Disorder, Oppositional Defiant Disorder, or Disruptive Behavior Disorder.

Another explanation for the different associations between cortisol and aggression in the different age groups may be related to the normative development of aggression. Since results of this thesis indicated that high levels of aggression in early childhood are more common than aggression in later childhood, aggression measured in preschoolers may be more likely to be within the normal range than the aggression shown by school-aged children. These possible (qualitative) differences in aggression may account for the different relations with basal levels of cortisol. In addition, the exact type of aggression may be different in preschoolers and school-aged children and therefore, aggression may be differentially related to cortisol in the different age groups. For example, Lopez, Vasquez, and Olson (2004) suggested that high levels of offensive aggression, which is related to difficulties with impulse control and to underarousal, may be related to low levels of cortisol, whereas high levels of defensive aggression, induced by excessive fear, may be related to high levels of cortisol. Since the measures of aggression used in the studies included in the meta-analyses were not always described in detail, it was not possible to distinguish different types of aggression. Future research is needed to address these topics. For example, longitudinal data on different types of aggression (offensive, defensive) and cortisol assessed at different time points during development in groups of children with high and low levels of aggression will help clarify the issues.

Based on the results of these meta-analyses no conclusion can be drawn about whether lowered HPA axis functioning is a risk factor for aggressive behavior. As has been described, impeded HPA functioning and high levels of aggression may have a common cause. Based on previous studies, low levels of cortisol in later childhood may be considered an additional risk factor for the persistence of this behavior. However, there is little empirical evidence regarding the causal processes involved in the relation between cortisol and aggression and future research is needed to address this issue. As is true for associations between biological factors and behavior in general, these causal processes could work either way, mutually influencing each other during development (Susman & Ponirakis, 1997). For example, research has shown that the relation between testosterone and dominant behavior is reciprocal (Mazur & Booth, 1998). Testosterone does not only influence behavior, but levels of this hormone also change as a result of behavior. An example of the latter effect is the rise of testosterone levels in response to winning a match (whether it is a physical contest or a chess match), whereas they do not after the match is lost (Booth, Shelley, Mazur, Tharp, & Kittok, 1989; Mazur, Booth & Dabbs, 1992). Another example of the possible mutual influence of hormones and behavior pertains to the changing circadian rhythm of adolescents. In most children in this developmental period a shift in the sleep-wake patterns occurs (Carskadon, 2002). There are indications

that the behavior of adolescents (i.e., delaying bedtime) influences the biological circadian rhythm, and that in turn, hormonal changes in the brain occurring in puberty influence the changing sleep-wake cycle in adolescence (Carskadon, 2002; Richardson & Tate, 2002).

Integrating parenting and cortisol in relation to child aggression

A possible common cause for both early aggression and disturbance of the HPA axis may be found in parental sensitivity. There are indications that insensitive parenting in the first year of life is associated with disturbed HPA axis functioning (Bugental, 2004; Bugental, Martorell, & Barraza, 2003; Warren et al., 2003). In addition to the effect of sensitivity on HPA axis functioning, results of the current thesis showed that when mothers were both insensitive and showed high levels of negative discipline, their children were at risk for developing aggressive behavior. Furthermore, the relation between high levels of both cortisol (partly predicted by maternal insensitivity) and aggression in early childhood may also be mediated by the child's emotion regulation skills. One of the hypotheses posed in the current thesis regarding the explanation of the interaction effect of maternal sensitivity and discipline on child aggression concerned the effect of maternal sensitivity on the emotion regulating skills of the child. When the development of emotion regulation is impaired, children may be at risk for showing aggressive behavior in case of frequent frustrating situations (such as maternal negative discipline). Research has shown that the HPA axis is involved in emotion regulation (Stansbury & Gunnar, 1994). Parenting may thus influence the functioning of the HPA axis, which is related to the child's emotion regulating skills. When children are not able to regulate their anger and frustration, they are likely to show high levels of aggression. This mediating effect of HPA axis functioning in the relation between parenting and emotion regulation in young children should be carefully addressed in future research.

Limitations of the study

The most notable limitations of the current research concern the samples of the study. First, the response rate in the general population screening was moderate and parents with high educational levels were overrepresented in the final sample. Second, the control group of our intervention study, in which we observed aggression and parenting, was selected based on the children's high levels of externalizing behavior. The variance of both samples is thus relatively small. However, obtaining significant results is more likely when variance increases. Therefore, the results that were found in our samples are quite impressive. As in the general population sample, the educational level of the majority of the parents was high. Since both samples seem to be deviant from the general population in some respects, the results cannot be generalized in a straightforward manner. The results on occurrence of aggressive behavior may reflect an underestimation compared to the occurrence rates expected in the general population sample.

However, the results regarding the questionnaire data regarding the normative development and stability of aggression were similar in the larger screening sample and the highly externalizing group (the latter consisting of children who actually showed higher levels of aggression than the children in the larger screening sample). In addition, the convergence with the hypothesized early childhood aggression curve (Tremblay, 2000, 2004) is striking. As far as the association of parenting and aggression (investigated in the highly externalizing group) is concerned, levels of child aggression or parental insensitivity and negative discipline may be higher than those in a more representative general population sample, but it is not expected that the processes (influence of parenting on child behavior) would be different. Nevertheless, future research is needed to test the hypotheses of the current study in a sample that is more representative of the general population.

A longitudinal perspective on early childhood aggression

The current study aimed to investigate early childhood aggression. This is considered a highly relevant topic, because there are indications that high levels of early aggression are predictive of later behavior problems. However, we did not examine whether high levels of physical aggression in the first years of life indeed predict later conduct problems. Shaw, Gilliom, and Giovannelli (2000) discussed the issue of the meaning of early childhood aggression. According to these authors, one of the concerns of those who have doubts about establishing an early childhood aggressive disorder is that the highest rates of aggression can be found in 2-year-olds and therefore, the false-positive rate for predicting future aggression is likely to be high. However, from a developmental psychopathology perspective, abnormal levels of aggression must be derived from normative levels. Thus, a 2-year-old child who occasionally hits or grabs things from others is likely to follow a normative course (as shown in this thesis), but a child of this age who shows high rates of aggression that are deviant from this normative course, may be at risk for developing conduct problems. In the current thesis it was shown that aggression in 1-, 2-, and 3-year-olds was already considerably stable, indicating that the children who are among the most aggressive in their age group are likely to be the most aggressive children within their age group 1 year later, even though the mean levels of the group of children may have declined. These developmental trajectories may be expected to continue during the following years of life, as has been shown for the ages 4 through 18 years (Bongers, Koot, Van der Ende, & Verhulst, 2004). These are indications that physical aggression in the first years of life is predictive of later behavior problems and form a basis for future research on the long-term development of children showing deviant rates of physical aggression in the first years of life.

Conclusion

The current thesis aimed to investigate early childhood aggression and yielded several new and interesting findings. It was shown that physical aggression already occurs in children as young as 1 year of age. Furthermore, a preschool aggression curve was found, with rates of aggression increasing in the second year of life and decreasing from the fourth year of life onward. Aggression at these early ages was considerably stable. In general, boys showed higher rates of aggression than girls from the age of 2 years onward. It was also shown that parenting influences the development of physical aggression. High levels of maternal negative discipline may be considered a risk factor for early aggression, and having a highly sensitive mother may be a protective factor against the influence of negative discipline. Finally, there are indications that the functioning of the HPA axis is related to aggression. The current study provides a valuable basis for further research on the early development of aggression. We now know its normative course and factors that may influence this course. Future research should address the exact developmental mechanisms through which these effects occur.