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Does Parenting Influence Children's Behaviour For Better And For Worse?

Experimental Research On Temperament-Based Differential Susceptibility.

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Experimental Research On Temperament-Based Differential Susceptibility.

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Abstract

This experimental study examined, in line with a differential susceptibility hypothesis, which children are more affected by parenting, depending on temperament. Specifically, it examined whether temperament (negative emotionality/surgency) has a moderating effect on the relationship between parenting (warm and harsh) and children's behaviour (prosocial and antisocial). 160 children (46% girls, mean age: 6.58 years) first were primed with warm or harsh parenting using audio stories, and next prosocial and antisocial behaviour were measured. Parents filled in questionnaires about their child's temperament and prosocial and problem behaviour. Analyses of covariances showed that neither negative emotionality nor surgency functioned as moderators between parenting and children's prosocial and antisocial behaviour. Overall, no evidence for the differential susceptibility hypothesis was found.

Keywords: differential susceptibility, parenting, temperament, negative emotionality, surgency, prosocial behaviour, antisocial behaviour.

Samenvatting

Met een experiment is onderzocht welke kinderen, overeenkomend met een differential susceptibility hypothese, meer worden beïnvloed door opvoeding afhankelijk van temperament. Specifiek of temperament (negatieve emotionaliteit/extraversie) een modererend effect heeft op de relatie tussen opvoeding (warm en kil) en het gedrag van kinderen (prosociaal en antisociaal). Eerst werden 160 kinderen (46% meisjes, gemiddelde leeftijd: 6,58 jaar) door middel van audio verhaaltjes geprimed met warme of kille opvoeding, vervolgens werden prosociaal- en antisociaal gedrag gemeten. Ouders vulden vragenlijsten in over het temperament van hun kind en prosociaal- en probleemgedrag. Covariantie analyses toonden dat noch negatieve emotionaliteit noch extraversie als moderatoren functioneerden tussen opvoeding en prosociaal- en antisociaal gedrag. Er is geen bewijs gevonden voor de differential susceptibility hypothese.

Trefwoorden: differential susceptibility, opvoeding, temperament, negatieve emotionaliteit, extraversie, prosociaal gedrag, antisociaal gedrag.

Introduction

In Belgium, a bill was introduced stating that parents will lose their child benefit for 5 years if their child is convicted of a delinquent act twice. The member of the Parliament who came up with this bill explained that parents have the freedom to raise their children as they wish, which is why they must take responsibility for their children until they are fully-grown (“Ouders van Criminele Kinderen,” 2012). The question arises whether parents should be punished for the delinquent acts of their children and whether their parenting can actually prevent the delinquent acts from happening. Which factors contribute to the development of antisocial behaviour? A child will show antisocial behaviour depending on a dynamic interplay between child characteristics (i.e., temperamental traits) and environmental characteristics (i.e., harsh parenting) (Patterson, 1982). Current research in developmental psychology now focuses on the question of which children are more influenced in their behaviour by environmental factors like parenting, depending on their temperamental traits.

Until now, however, there has been insufficient evidence to answer this question. This is because most previous studies on the interaction of temperamental traits and environmental factors almost exclusively used correlational designs (see Belsky & Pluess, 2009). Although these studies are able to show an interaction of a child’s temperament with environmental factors in predicting children’s development, causal influences cannot be documented. To document a causal effect, an experimental design is needed. In addition to this advantage, experimental designs also confer greater statistical power in testing the effect of temperament by environment interactions, because the environmental factor is dichotomized and no alternative third variables have to be taken into account. This is why the current study uses an experimental design to examine whether parenting interacts with the presence of the negative emotionality temperamental trait in predicting children’s prosocial and antisocial behaviour.

In addition, the current study attempts to answer one of the unknowns that still exists in the literature by identifying other temperamental traits that might moderate parenting influence.

Parenting and Prosocial and Antisocial Behaviour

Prosocial behaviour is defined as any voluntary, intentional action that produces a positive or beneficial outcome for the recipient (Grusec, Davidov, & Lundell, 2008). If parents want to reinforce prosocial behaviour in their children, they have to provide warm parenting. Warm parenting is characterized by providing a loving and supportive environment. Parents who nurture their children and provide non-contingent approval have children who display increased prosocial behaviour (Eisenberg & Fabes, 1998). In addition, experiencing available, caring, and loving attachment figures facilitates prosocial behaviour (Mikulincer & Shaver, 2007). However, there are also studies that do not find a relationship between warm parenting and prosocial behaviour (Eisenberg, Fabes, & Spinrad, 2006). According to Knafo, Israel, and Ebstein (2011) this relationship is moderated by child characteristics - in their case the presence of a genetic marker. Only children with the genetic marker showed more prosocial behaviour when experiencing warm parenting. Thus, the influence of warm parenting on children's prosocial behaviour is dependent on child characteristics.

Although parenting can influence a child for the better, it can also influence a child for the worse. Parent child interactions are a determining factor in the development of antisocial behaviour (Patterson, DeBaryshe, and Ramsey, 1990). Antisocial behaviour consists of vandalism, violence, aggression and delinquency. When children are raised with harsh parenting their deviant behaviour often gets reinforced. Recent research on the association between parental discipline and children's behavioural outcomes underlines the negative influence of harsh parenting on the development of antisocial behaviour (Gershoff et al., 2010). Specifically, this study indicated that using corporal punishment, expressing

disappointment, and yelling or scolding were each associated with more child aggression.

With regard to this association, the literature shows that there is a typical interaction between child characteristics and parenting. Temperamental characteristics like emotional reactivity evoke harsh parenting, which in turn places them at risk for developing antisocial behaviour (Ge, Conger, Cadoret, & Neiderhiser, 1996). Harsh parenting may stimulate the development of antisocial behaviour in children, just like warm parenting may give rise to increasingly prosocial behaviour. Still, the amount of influence parenting has will be dependent on a child's temperament.

Diathesis-Stress Versus Differential Susceptibility

Much empirical work on child development focused on the development of problem behaviour as a result of an interaction between vulnerability factors in children and the presence of an adverse environment. This is called a person x environment interaction (PxE). PxE occurs when a individual characteristic (i.e. temperament) moderates an environmental effect, or when some environmental factors moderates a temperamental effect (Rutter et al., 1997). In most research on the epidemiology of psychopathology the study of these interactions are grounded in a diathesis-stress model (Monroe & Simons, 1991). This model holds that children develop problems or pathologies in the context of environmental risk when they are temperamentally vulnerable. The presence of any protective factor may buffer the effect. Children will differ in their behaviour to the degree to which they are temperamentally vulnerable to an adverse environment. Amongst others, Belsky, Hsieh, and Crnic (1998) provided evidence for the diathesis-stress model, by revealing that negative parenting is a strong predictor of externalizing problems and inhibition, but only for boys with high negative emotionality.

Consistent with the diathesis-stress model, there is a main focus in the literature on vulnerable children that are adversely affected by a negative environment and develop

problem behaviour as a consequence. According to Belsky and Pluess (2009) the development of competent behaviour and the idea that some children may be more susceptible, instead of vulnerable, to both an adverse and a supportive environment is overlooked. This is why they came up with a new perspective on the interaction between parenting and temperament: the differential susceptibility hypothesis. The differential susceptibility hypothesis presumes that children will differ to the degree to which they are more or less susceptible to both an adverse and a supportive environment. They argued that a reactive/negative temperament will make some children more susceptible to an adverse environment like harsh parenting and, simultaneously make them more likely to benefit from a supportive environment like warm parenting. These children are susceptible to parenting for better and for worse. Children without a highly reactive/negative temperament, in contrast, are less susceptible and thus less likely to be affected by parenting (for the evolutionary background of the differential susceptibility hypothesis read: Pluess & Belsky, 2010).

Preliminary evidence for the differential susceptibility hypothesis on behavioural susceptibility factors mostly consists of correlational research, which includes the aforementioned disadvantages of the inability to detect a causal effect and alternative third variables have to be taken into account (see Belsky & Pluess, 2009). Experimental evidence, which is limited, shows that children with a negative temperament benefited most from a multifaceted infant-toddler intervention program. At 3 years of age they showed reduced levels of antisocial behaviour and enhanced cognitive functioning (Blair, 2002). Similarly, improvement in parenting led to secure attachments, but only for children (4-10 months old) who scored high on negative reactivity (Klein Velderman, Bakermans-Kranenburg, Juffer, & Van IJzendoorn, 2006). Another experimental study revealed that 16-19 month old boys with difficult temperament showed the smallest increase in externalizing behaviour problems when reared by highly sensitive mothers who infrequently used negative control. However, they

showed the largest increase when highly insensitive mothers relied heavily on negative control (Van Aken, Junger, Verhoeven, Van Aken, & Dekovic, 2007).

The evidence in favour of differential susceptibility is rather limited and diverse. In particular, most studies only examined negative outcomes, which is insufficient. To distinguish differential susceptibility from interaction effects consistent with the diathesis-stress model a measure of environment is needed that ranges from supportive to adverse environmental aspects. Second, there needs to be a measure of both a positive and a negative behavioural outcome. Third, the moderator (temperament) should neither correlate with the environmental predictor nor with the behavioural outcome (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007). If these criteria are met, the study is able to demonstrate that some children are more susceptible for better and for worse. Furthermore, it is unknown which factor represents the most adequate temperamental measure of behavioural susceptibility. This is why Belsky et al. (2007) called for more research on other markers of susceptibility.

The main focus in identifying susceptibility markers has been on the personality trait emotional instability (i.e., difficult temperament and negative emotionality). However, the personality trait surgency might also be a susceptibility factor because surgency is related to both prosocial and antisocial behaviour (Rydell, Berlin, & Bohlin, 2003). Children scoring high on surgency, have high scores on impulsivity, pleasure intensity, activity level, and low scores on shyness (Putnam & Rothbart, 2006). Only two studies examined the susceptibility of children scoring high on impulsivity, a feature of surgency (Lengua, Wolchik, Sandler, & West, 2000; Leve, Kimm, & Pears, 2005). Unfortunately, these studies did not meet the criteria for establishing an effect consistent with differential susceptibility. There was either no supportive environment measure or no positive outcome measure. Therefore, besides establishing evidence for the differential susceptibility hypothesis with children scoring high

and low on negative emotionality, the current study attempts to identify surgency as another susceptibility factor.

The Present Study

The main research question is whether experimental primes of warm and harsh parenting interact with a child's temperament (negative emotionality) in predicting variation in prosocial and antisocial behaviour. Consistent with the differential susceptibility hypothesis, I hypothesized that for children scoring high on negative emotionality, the primes of warm parenting would predict more prosocial and less antisocial behaviour, and primes of harsh parenting would predict more antisocial and less prosocial behaviour compared with children scoring low on negative emotionality. In addition, I stated the same hypothesis for another possible susceptibility factor: surgency.

Method

Participants

Participants were recruited from Year 1 and 2 in nine primary schools in eight cities across the Netherlands. A total of 805 parents were approached by letter, of which 21% responded. Parent's informed consent and children's assent were obtained. Subsequently, 170 children and their parents participated in the experimental study. Ten participants were removed from the sample because their data was incomplete. Finally, a total sample of 160 participants remained, of which 46% were girls and 54% were boys. The mean age of the children was 6.58 years ($SD = .62$, range = 5.23-8.17).

Design and Procedures

Participants were enrolled in an experiment using a between-subjects 2 (parenting: warm vs. harsh) x 2 (temperament: high vs. low negative emotionality/surgency) design. Prior to data collection parents filled in questionnaires. Questionnaires were dropped off and picked

up at the child's school, and were passed to the parents through the children. The participating children were tested at their school in a quiet room in groups of 4. Each child was placed in front of a laptop and received a pair of headphones. The experiment was conducted based on a protocol, and started with the priming condition.

Primes of warm and harsh parenting. To prime warm or harsh parenting children in the warm parenting condition listened to three audio stories of warm parenting and children in the harsh parenting condition listened to three audio stories of harsh parenting (for transcripts see Appendix A). To make sure the primes resembled "real" warm and harsh parenting, the audio stories were tested in a pilot study. Specifically, the six audio stories were randomly divided across four test groups in which a total of ten parenting and behavioural experts participated. Each group listened to three stories and rated parental behaviours on a scale from 1 (harsh, insensitive and not comforting) to 10 (warm, sensitive and comforting). The results of the *t*-test showed parental behaviours in the warm primes were rated as more sensitive, warm and comforting ($M = 7.62$, $SD = 1.07$) than parental behaviours in the harsh primes ($M = 1.85$, $SD = .74$), $t(9) = -10.78$, $p < .01$). The warm and harsh parenting primes differed significantly and the effect size was large. This suggested that the audio stories were effective in implicitly priming two different constructs, warm or harsh parenting.

To make sure the children would attentively listen to the stories, they were told to listen carefully because they had to answer a question about the stories afterwards. The condition a child received was randomized, using an alphabetic sequence based on the first letter of their surname. After the priming condition each child performed a sticker sharing task and a noise blast task. To avoid order effects, the sequence in which the children performed these tasks was alternated through counterbalancing. Afterwards, a *t*-test showed no order effects were present. There were no differences between children starting with the noise blast task or

children starting with the sticker-sharing task in prosocial behaviour $t(158) = -1.64, p = .10$, and antisocial behaviour $t(158) = .73, p = .47$.

Prosocial behaviour. To measure prosocial behaviour each child performed a sticker-sharing task almost similar to the sharing task used in a study of Benenson, Pascoe, and Radmore (2007). Each child received an envelope with 20 attractive gender sensitive stickers. They were told they could choose the stickers they liked, but that the stickers were also needed for participating children at another school. The children could take as many stickers as they wanted, and the stickers they wanted to share with participating children from another school could be placed back into the envelope. The measure of prosocial behaviour was the amount of stickers placed back into the envelope.

Antisocial behaviour. To measure antisocial behaviour each child performed a noise blast game on the computer based on the noise blast paradigm (see Thomaes & Bushman, 2008). Children were told they would play an online reaction time game called *Go!*, and compete against an opponent from another school. In reality, the opponent did not exist and the children played against the computer. The game consisted of 3 rounds with 5 trials. The first round contained 5 practice trials. The second round they played against their fake opponent, each child lost the game to elicit disappointment and/or frustration. In the last round children got the opportunity to give blasts of noise (which sounded like radio static) to their opponent. After listening to the loudness of the noise ranging from 0 to 10, they played 5 trials against their opponent. After each trial they could set the noise level their opponent would receive. Children themselves did not receive any noise. The measure of antisocial behaviour was the average level of noise set for the opponent across the last 5 trials. The internal consistency was $\alpha = 0.67$.

The experiment ended with a question (“*What were the names of the children in the three stories?*”), and a debriefing to desensitize and to remove lingering effects of the

manipulation. During debriefing children were informed that they played against a fake opponent. Some children were disappointed about losing, but those were told there was no chance they could have won, so they must not feel sad about it. Each child was allowed to keep the stickers, and received a small stamp to make sure they would not inform the other participating children. The children were happy with their gift, and effort was made to let the children leave with positive feelings.

Questionnaires

Temperament. To measure whether a child's temperament is characterized by negative emotionality or surgency, parents filled in the Children's Behaviour Questionnaire (CBQ). The very short form of the CBQ is a measure of temperament for children between 5 and 8 years old (Putman & Rothbart, 2006). Parents rated their child on 36 items, using a 7-point frequency scale ranging from 1 (extremely true of your child) to 7 (extremely untrue of your child). When the child has not been observed in the situation described, parents could choose the option X (never seen in this situation). The CBQ assesses three dimensions of temperament: negative affect ("*Has a hard time settling down for a nap*"), surgency ("*Usually rushes in to an activity without thinking about it*") and effortful control ("*Can lower his/her voice when asked to do so*"). Only the dimensions of negative affect and surgency were used. In previous research, the reliability of the very short form was good, and cross-informant reliability and convergent validity for the short form of the CBQ was high (Putnam, & Rothbart, 2006). In the present study the Cronbach's alphas for negative affect and surgency were 0.66 and 0.74, respectively.

Parenting. To measure base rates of warm and harsh parenting, parents filled in the Alabama Parenting Questionnaire (APQ, Frick, 1991). The APQ is developed to measure different aspects of parenting. The 35 items, rated on a 5-point frequency scale ranging from 1 (never) to 5 (always), assesses 5 constructs of parenting; involvement ("*You have a friendly*

talk with your child”), positive parenting (“*You praise your child if he/she behaves well*”), poor monitoring/supervision (“*Your child is home without adult supervision*”), inconsistent discipline (“*The punishments you give your child depends on your mood*”) and corporal punishment (“*You slap your child when he/she done something wrong*”). Seven additional items measure specific discipline factors other than corporal punishment composing the scale other discipline practices (“*You ignore your child when he/she is misbehaving*”). These items were added to prevent an implicit negative bias against the corporal punishment items.

The dimension warm parenting consisted of the constructs involvement and positive parenting, and the dimensions harsh parenting consisted of the constructs poor monitoring/supervision, inconsistent discipline and corporal punishment. In previous research, the reliability was moderate to good and the criterion validity was good. Specifically, the negative scales showed more deviant elevations for children with behaviour disorders as compared with children without behaviour disorders (Shelton, Frick, & Wooton, 1996). Cronbach’s alphas for warm and harsh parenting in the present study were 0.72 and 0.69, respectively.

Prosocial behaviour and antisocial behaviour. To measure base rates of prosocial and antisocial behaviour in children, parents filled in the Strength and Difficulties Questionnaire (SDQ). The SDQ measures psychopathological symptoms and consists of 25 items rated on a 3-point frequency scale ranging from 1 (not true) to 3 (certainly true) (Muris, Meesters, & Van den Berg, 2003). These items assess 5 subscales labelled emotional symptoms (“*Many fears, easily scared*”), conduct problems (“*Often fights with other children or bullies them*”), hyperactivity-inattention (“*Restless, overactive, cannot stay still for long*”), peer problems (“*Rather solitary, prefers to play alone*”) and prosocial skills (“*Helpful if someone is hurt, upset or feeling ill*”). Prosocial behaviour was measured with the subscale prosocial skills, and antisocial behaviour with the subscale conduct problems. In previous research the

reliability for each subscale was modest to good, and the validity was good (Muris et al., 2003). The reliability for prosocial and antisocial behaviour in the present study were $\alpha = 0.64$ and $\alpha = 0.50$, respectively.

Statistical Analyses

Preliminary analyses consisted of *t*-tests to examine whether the warm and harsh parenting condition were comparable groups, and randomization was successful. When the two groups differed on a variable at baseline, this variable was included as a covariate in the main analyses. The primary analyses consisted of multiple Analyses of Covariances (ANCOVA's) to examine whether high and low scores of negative emotionality and surgency (using a mean split) served as a moderator between primes of warm and harsh parenting (predictor variables) and children's mean level of prosocial or antisocial behaviour (outcome variables).

Results

Preliminary Analyses

First, the audio stories, which were effective in implicitly priming either warm or harsh parenting (see Method section), also appeared effective in eliciting either happy or sad feelings in children. A manipulation check was conducted in which children indicated that a happy smiley (see Appendix B) most fitted the warm parenting stories ($M = 1.51$, $SD = 0.50$) and a sad smiley the harsh parenting stories ($M = 1.92$, $SD = 0.26$). The warm and harsh parenting condition differed significantly on the manipulation check, $t(158) = 6.58$, $p < .05$. Second, the two parenting conditions appeared two comparable groups. *T*-tests showed there were no significant mean differences between the warm and harsh parenting condition with regard to gender, age, temperament (negative emotionality, surgency), parent reported externalizing and internalizing behaviour and parent reported harsh parenting. However, the

two parenting conditions did differ on parent reported prosocial behaviour ($t(158) = 2.18, p < .05$) and parent reported warm parenting ($t(158) = 2.00, p < .05$). To control for these differences, these two variables were used as covariates in the main analyses. Third, the outcome variables - prosocial and antisocial behaviour were, as expected, independent constructs. There was no significant correlation between the scores on the sharing task and the noise blast task ($r = -.072, p = .367$). Finally, the criteria for establishing a differential susceptibility effect were met. There were no significant correlations between the moderators (negative emotionality and surgency) and the outcome variables (prosocial and antisocial behaviour), and between the moderators and the predictor variables (warm and harsh parenting).

Primary Analyses

In order to examine whether negative emotionality and/or surgency functioned as moderators between parenting condition (warm/harsh) and prosocial and antisocial behaviour, I performed ANCOVA's with either prosocial behaviour or antisocial behaviour as outcome variables. Do primes of warm parenting predict more prosocial and less antisocial behaviour than primes of harsh parenting and vice versa, depending on high and low scores of negative emotionality? Controlling for children's prosocial behaviour and parent reported warm parenting, this was not the case (see Tables 1 and 2). No significant interaction effects of parenting condition and levels of negative emotionality were found, neither for prosocial behaviour nor antisocial behaviour. Also, no significant main effects of parenting condition and levels of negative emotionality on prosocial and antisocial behaviour could be demonstrated. Negative emotionality did not function as a moderator between parenting condition and children's behavioural outcomes. With regard to surgency, I also found no moderating effect (see Tables 3 and 4). No significant interaction effects of parenting condition and levels of surgency in predicting prosocial and antisocial behaviour were found.

Finally, no significant main effects of parenting condition and levels of surgency on children's behavioural outcomes were present.

Discussion

This experimental study examined, in line with the differential susceptibility hypothesis, whether some children are highly influenced in their behavioural outcomes by parenting, depending on specific temperamental traits. Specifically, it examined whether negative emotionality and/or surgency had a moderating effect on the relationship between parenting (warm and harsh) and children's behaviour (prosocial and antisocial). Surprisingly, the results showed that children's temperamental traits negative emotionality and surgency did not function as moderators on the relationship between primes of warm and harsh parenting, and children's prosocial and antisocial behaviour. Besides, parenting and temperament each had no direct effect on children behaving prosocially or antisocially. The differential susceptibility hypothesis could not be confirmed.

An important aim of this experimental study was to make a contribution to research on differential susceptibility, which is still in its infancy. Previous experimental studies found evidence for the differential susceptibility hypothesis with children up to 3 years of age using a longitudinal design (e.g., Blair, 2002; Klein Velderman et al., 2006; Van Aken et al., 2007). In this study I chose a different approach and attempted to demonstrate differential susceptibility in an experiment in which parenting was systematically manipulated (i.e. primed) with children between 5 and 8 years old. Furthermore, for the first time, to my knowledge, the effect of two possible susceptibility factors – negative emotionality and surgency, were examined in one sample. In this way, an attempt was made to answer one of the unknowns (see Belsky et al., 2007). However, in contrast with previous longitudinal

experimental studies, this study could not demonstrate a differential susceptibility effect in an experiment using primes of parenting for neither of the two temperamental traits.

A theoretical explanation for not finding an effect is my suggestion that differential susceptibility with behavioural markers might primarily be operative in the early childhood years. As previously mentioned, preliminary evidence for the differential susceptibility hypothesis was obtained from experimental studies with children up to 3 years old. Perhaps the present study did not find evidence for the differential susceptibility hypothesis because the most extreme susceptibility to environmental signals or stimuli has “died out” or has at least numbed in the age period of 5 to 8 years. This is in line with research on biological sensitivity to context and Boyce and Ellis’ (2005) suggestion that stress reactivity as a susceptibility factor over time develops a greater resistance to change and plasticity diminishes. Until now, however, no experimental evidence on differential susceptibility with children between 5 and 8 years old was present, perhaps caused by publication bias. Previous correlational studies on differential susceptibility with children between 8 and 12 years old (Lengua, 2008) and children between 5 and 17 years old (Leve et al., 2005) have documented contrasting findings. Future studies are needed to replicate and further scrutinize the present findings. In this way, scholars may examine whether differential susceptibility is primarily operative at the early years of life.

Another explanation for the absence of an effect is that the experiment perhaps was not sensitive enough to find a (small) differential susceptibility effect, due to several limitations. First, maybe the primes did not resemble “real” warm and harsh parenting enough to generate an effect of parenting. Although the primes seemed effective considering the results of the pilot study and the manipulation-check, in the warm parenting condition the mean score of the manipulation-check approached that of the harsh parenting condition. Which means that many children indicated the sad smiley most fitted the warm parenting story (“because the

boy fell of his bike”). If many children focused on the child’s behaviour and felt sad accordingly, this might have influenced their behaviour during the sticker sharing task and the noise blast task. Future studies should therefore describe the child’s behaviour without emotions when using audio primes. Also, the manipulation-check should focus on the parenting behaviours (for example: “which face fits the parenting behaviours most?”). In this way, the focus can be more specifically on the parenting behaviours one wants to differentiate, and a stronger priming effect could be generated. Second, prosocial and antisocial behaviour were used as outcome measures, but perhaps the differential susceptibility effect was too small to demonstrate an effect on these extreme behavioural outcomes. Together with the former limitation, then, this may suggest that bigger samples are needed to reveal any direct effects on behavioural outcomes – especially given that small main effects of parenting should be expected (see Rutter, 2012).

Another issue concerns the context in which outcome behaviour was measured. In this study, prosocial and antisocial behaviour were measured in the peer-context (i.e., sharing and giving blasts of noise to other participating children). Possibly, measures in the parent-child context, for instance: feelings of attachment or children’s positive and negative feelings/behaviours towards their parents, are more valid and more precise outcome measures if parenting is the environmental measure. This seems relevant to examine in future research considering that it is unknown whether children are more susceptible to general or specific environments and associated aspects of functioning (see Belsky and Pluess, 2009). Third, with regard to temperament, there is a bigger chance of finding an effect if only children with extreme scores (i.e. high score = 1 *SD* from the mean till the maximum) are included. The relatively limited number of participants in the present study made this impossible. A mean-split was used to create two groups of children scoring either high or low on negative emotionality and surgency. This means that some children in the high and low group actually

had average scores. Replication with a larger sample is desirable. Lastly, some other limitations were: children aged 5-6 perhaps were too young to fully understand the noise blast task. These children received additional instructions, which could have affected their scores on antisocial behaviour; temperament was measured using questionnaires and if that involved social desirability, I did not control for it; 78% percent of the approached parents did not respond. These non-respondents might differ from the respondents on temperamental characteristics and parenting.

Despite these limitations, this study has several notable strengths. First, the sample was heterogenic: age was normally distributed, participants came from different parts of The Netherlands and gender was evenly distributed. Second, the two experimental conditions (warm and harsh parenting primes) were adequately comparable on most variables (i.e., randomization was overall successful), and if not so I controlled for group differences with covariates in the analyses. Third, for the first time, to my knowledge, the differential susceptibility hypothesis was tested in an experiment in which parenting was systematically manipulated (i.e., primed) using audio stories of parenting. Fourth, the criteria for establishing a differential susceptibility effect were met (e.g., positive and negative predictors and positive and negative outcome variables). Finally, this was the first study, to my knowledge, that examined the effect of two different susceptibility factors in one sample - negative emotionality and surgency. Although for both factors no effect was demonstrated, let this be a direction for future research to detect which factor is a good susceptibility factor for parenting.

Unexpectedly, mean scores on prosocial behaviour were in the opposite direction. Children scoring low on negative emotionality showed more prosocial behaviour if they were primed with warm parenting. Although the differences were non-significant, it was at least expected that the mean scores were in the right directions. Also, for surgency the mean scores

on antisocial behaviour were in the opposite direction. Children scoring low on surgency gained from hearing the warm parenting primes. These findings can be explained by the fact that the measures of temperament were obtained from parental reports, whilst objectively behaviourally based measurements of negative emotionality and surgency possibly are more valid measures (Belsky et al., 1998).

Taken together, with caution two interrelated conclusions can be drawn from the present findings. First, the idea that only the most susceptible children are highly influenced in their behavioural outcomes by parenting, might primarily apply to children in the early childhood years. This does not necessarily rule out that differential susceptibility is operative later in life, but implies that the susceptibility effect will numb while children grow older. This leads to the second conclusion; as the differential susceptibility effect progressively is getting smaller it is more difficult to detect. The present experiment might not have been sensitive enough to prove that parenting influence children's functioning for better and for worse dependant on temperament. Whilst counteracting the previously mentioned limitations, future research endeavours first should focus on the question whether differential susceptibility is present in children older than 3 years conducting an experiment. Next, to answer the question how susceptibility develops, an additional research focus should be on the developmental trajectories of differential susceptibility in a longitudinal study. If some children are more susceptible to environmental influences, creating a protective environment seems like the best thing to do. If it would turns out that the susceptibility actually diminishes as children grow older, that means one should stimulate supportive parenting and intervene on inadequate parenting as soon as possible.

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Table 1

Means and Standard Deviations of Parenting Condition and Levels of Negative Emotionality for Prosocial and Antisocial behaviour

Parenting condition	Prosocial behaviour				Antisocial behaviour			
	High negative emotionality		Low negative emotionality		High negative emotionality		Low negative emotionality	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Warm parenting	10,36	4,88	11,57	4,60	7,99	1,84	8,83	1,45
Harsh parenting	10,63	5,45	10,26	5,21	8,62	1,59	8,63	1,66

Table 2

ANCOVA's with Parenting Condition and Negative Emotionality for Prosocial and Antisocial Behaviour

	Prosocial behaviour			Antisocial behaviour		
	<i>F</i>	<i>p</i>	<i>Partial η²</i>	<i>F</i>	<i>p</i>	<i>Partial η²</i>
Parenting Condition	,214	,722	,170	,657	,563	,390
Negative emotionality	,341	,661	,248	1,673	,416	,622
Parenting Condition * Negative emotionality	1,279	,260	,008	2,136	,146	,014
Covariates:	<i>F</i>	<i>p</i>	<i>Partial η²</i>	<i>F</i>	<i>p</i>	<i>Partial η²</i>
PR warm parenting	5,789	,017	,036	1,722	,191	,011
PR prosocial behaviour	,004	,952	,000	3,863	,051	,024

Note. PR=parent reported

Table 3

Means and Standard Deviations of Parenting Condition and Levels of Surgency for Prosocial and Antisocial Behaviour

Parenting condition	Prosocial behaviour				Antisocial behaviour			
	High Surgency		Low Surgency		High Surgency		Low Surgency	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Warm parenting	9,50	4,86	12,16	4,35	8,32	1,65	8,42	1,78
Harsh parenting	9,81	5,84	11,32	4,18	8,33	1,66	9,08	1,48

Table 4*ANCOVA's with Parenting Condition and Surgency for Prosocial and Antisocial behaviour*

	Prosocial behaviour			Antisocial behaviour		
	<i>F</i>	<i>p</i>	<i>Partial η</i> ²	<i>F</i>	<i>p</i>	<i>Partial η</i> ²
Parenting Condition	,147	,757	,107	2,008	,384	,657
Surgency	31,128	,116	,969	1,645	,422	,623
Parenting Condition * Surgency	,255	,615	,002	1,190	,277	,008
Covariates:	<i>F</i>	<i>p</i>	<i>Partial η</i> ²	<i>F</i>	<i>p</i>	<i>Partial η</i> ²
PR warm parenting	2,334	,129	,015	4,463	,036	,028
PR prosocial behaviour	3,665	,057	,023	,012	,914	,000

Note. PR=parent reported

Appendix A: Transcripts of Warm and Harsh Parenting Primes

Warm Parenting Primes (translated into English from original Dutch version)

1) Warm

Roos goes to bed. She already brushed her teeth and put on her pyjama herself. Her father and mother are downstairs. Roos and her teddy-bear stand on top of the stairs and she calls her father and mother that she is ready to be put to bed. Mother calls: "I'm coming".

While Rose runs to her room and crawls in bed, she hears footsteps on the stairs. Her mother ascend the stairs and says: "so sweetie, just crawl in bed. Mommy is so proud that you brushed your teeth and put on your pyjamas by yourself". Mother places the blanket over Rose, gives her a big hug and a kiss on her forehead.

Now also father ascend the stairs and together with mother he sits down on Rose her bed. Father begins to sing a beautiful lullaby. While Rose slowly falls asleep, the song ends. She gets one last hug, a very big one, from father and mother simultaneously.

2) Sensitive

Mother and Jan are together in the living room, while mother is reading on the couch Jan makes a drawing on the table. Jan's drawing is finished, he looks at his mother and shouts: "I am ready".

Mother looks at him, laughs and asks: "ooh, you have finished the drawing? Well done".

Jan asks: "mama do you want to see my drawing?" Mother places her book on the couch and walks too Jan to watch the drawing. "You have created a beautiful drawing, good job."

Jan seems not completely satisfied about the result. Mother notices it and asks: "is it true that you are not completely satisfied?" Jan says: "Actually, I wanted to draw something else that I

find rather prettier, but that did not worked out well.” Mother says: “that is alright, I think you have tried really hard, the next time you will certainly succeed.”

Mother strokes Jan over his head, sit’s back on the couch and picks up her book. Quickly, Jan starts drawing a new drawing.

3) Comforting

One day Thijs goes to play outside. On the playground in front of his house, he sees the bike from the boy next door. Thijs does not see the boy anywhere, so he thinks: “he would not mind if a ride the bicycles for a moment.” Quickly, Thijs jumps on the bike.

For a moment he is so happy, he even forgets that he has never cycled without a set of training wheels. And before he even noticed it, he fell of the bike on the playground.

“OUCH” Thijs says. Thijs is laying on the ground and remarks that his pants and his knee both are damaged. Immediately he starts crying. Quickly his mother appears. She has seen what happened and starts comforting Thijs.

“It is alright”, mama says and she strokes Thijs over his head. “We will put you on another pants, and this afternoon or tomorrow dad will practice together with you to cycle on your own bike without a set of training wheels.” Thijs likes what he hears and stops crying.

Together with mama he runs inside the house.

Harsh Parenting Primes (translated into English from original Dutch version)

1) Harsh

Roos goes to bed. She already brushed her teeth and put on her pyjama herself. Her father and mother are downstairs. Roos and her teddy-bear stand on top of the stairs and she calls her father and mother that she is ready to be put to bed. Rose does not get a reaction.

While Rose runs to her room and crawls in bed, she hears footsteps on the stairs. Her mother ascend the stairs, she walks to the bathroom while passing Rose. She calls: “you have to put the cap on the toothpaste if you really want to brush your tooth by yourself”. Mother locks the door and Rose hears the sound of the shower.

Now also father ascend the stairs. He sees that Rose her bedroom door is still open. With a loud bang he shuts the door and walks to his room. While Rose slowly falls asleep, she hears the loud music of her father coming through the wall.

2) Insensitive

Mother and Jan are together in the living room, while mother is reading on the couch Jan makes a drawing on the table. Jan’s drawing is finished, he looks at his mother and shouts: “I am ready”.

“Hmm” says mother, she does not look at him and continues reading her book. Jan asks: “mama do you want to see my drawing?” Mother sighs, places her book on the couch and walks too Jan to watch the drawing. “What exactly have you drawn? ...It resembles nothing.”

Jan seems not completely satisfied about the result. Mother says: “Do you want me to look at anything else, otherwise I will go reading again”.

Jan says: “Actually, I wanted to draw something else that I find rather prettier, but that did not worked out well”. Mother says: “do not start whining, you should not try to draw something you are not able to”.

With a deep sigh Mother goes back to the couch and grasps her book. Although he does not like it, Jan starts drawing a new drawing.

3) Uncomforting

One day Thijs goes to play outside. On the playground in front of his house, he sees the bike of the boy next door. Thijs does not see the boy anywhere, so he thinks: "it would not mind if a ride the bicycles for a moment". Quickly, Thijs jumps on the bike.

For a moment he is so happy, he even forgets that he has never cycled without a set of training wheels. And before he even notice it, he fell of the bike on the playground.

"OUCH" says Thijs. Thijs is laying on the ground and remarks that both his pants and his knee are damaged. Immediately he starts crying. Thijs lays there for a while. Especially he is very sad because the bike is full of scratches and his pants is damaged.

His mother has seen what happened and shouts: "You fool, now your pants is damaged again. And stop crying because I am totally sick of it!!!" While still crying Thijs rises and walks inside the house.

Appendix B: Manipulation check

Which face fits the stories most?

