

Sensitivity and Differential Susceptibility to Parenting:

Sensory Processing Sensitivity and Parenting predicting Behavioral Activation System activation

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25 juni 2013

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The '*differential susceptibility* theory' states that some children are more susceptible to parenting, in a 'for-better-and-for-worse' manner (Belsky & Pluess, 2009). The current study aimed to examine if Sensory Processing Sensitivity (SPS) influences the effect of parenting on child adjustment and if this influence is conform the '*differential susceptibility* theory'. I examined the relation between SPS, consistency and responsiveness in parenting, Behavioral Inhibition System (BIS) activation and Behavioral Activation System (BAS) activation in order to answer these questions. Two hundred six mothers and twelve fathers completed web based questionnaires about their children (116 boys and 104 girls). Children with low SPS seem more susceptible to parenting and they have, depending on the parenting style, either the highest or lowest BAS activation, conform the *differential susceptibility* theory. BIS activation seems an aspect of SPS as a system which pauses behavior in order to process the environment more thorough. Consistency in parenting seems to have a negative effect on BAS activation, perhaps because of discouraging punishment for attractive but inappropriate behavior. Responsiveness seems not related to BIS/BAS activation. Co-occurrence of BIS and BAS activation may indicate co activation of the BIS and BAS in order to orchestrate complex behavior.

De '*differential susceptibility* theorie' stelt dat sommige kinderen ontvankelijker zijn voor opvoeding en dat zij hierdoor het best of het slechtst ontwikkelen (Belsky & Pluess, 2009). De huidige studie onderzocht of Sensory Processing Sensitivity (SPS) het effect van opvoeding op de ontwikkeling van het kind beïnvloedt en of deze invloed overeenkomt met de '*differential susceptibility* theorie'. Om deze vraag te beantwoorden heb ik de relatie tussen SPS, consistentie en responsiviteit in de opvoeding, Behavioral Inhibition System (BIS) activatie and Behavioral Activation System (BAS) activatie onderzocht. Tweehonderd-zes moeders en twaalf vaders hebben vragenlijsten over hun kinderen ingevuld op internet (116 jongens en 104 meisjes). Kinderen met laag SPS lijken ontvankelijker te zijn voor opvoeding en hebben afhankelijk van de opvoedingsstijl de hoogste of laagste BAS activatie, wat overeenkomt met de *differential susceptibility* theory. Activatie van het BIS lijkt een aspect te zijn van SPS, als een systeem dat gedrag pauzeert om de omgeving beter te kunnen verwerken. Consistentie in opvoeding lijkt een negatief effect te hebben op BAS activatie, vermoedelijk door ontmoedigende bestraffing voor aantrekkelijk maar ongepast gedrag. Responsiviteit lijkt niet gerelateerd aan BIS/BAS activatie. Het samen voorkomen van BIS en BAS activatie zou kunnen wijzen op het tegelijk activeren van het BIS en BAS om complex gedrag te coördineren.

profit more from a positive environment than children with 'positive' temperamental traits (for review see Kiff, Lengua and Zalweski, 2011). Thus the findings concerning the validness of the *differential susceptibility* theory are not yet conclusive (for review see Kiff, Lengua and Zalweski, 2011) and *differential susceptibility* should be further examined and tested.

Sensory Processing Sensitivity

Some traits (i.e., 'negative' temperament) are suggested to make children more susceptible to parenting. Additionally the trait Sensory Processing Sensitivity (SPS) is proposed as a possible trait of general sensitivity (Aron and Aron, 1997). This sensitivity is different from the sensitivity to some particular parenting styles, because it is conceptualized as sensitivity to the environment in general (possibly including parenting) It is defined as using deeper and more thorough processing of environment stimuli (Aron, Aron and Jagiellowicz; 2012). In order to understand *differential susceptibility*, the influence of the reviewed negative temperamental traits and SPS should be carefully distinguished and SPS should be taken into account when examining *differential susceptibility*. This distinction is not recognized in previous research.

It is argued that SPS underlies at least some of the well known temperamental traits (Aron, Aron and Jagiellowicz; 2012). This could mean that *differential susceptibility* is not caused by the temperamental traits which are reviewed (see Kiff, Lengua and Zalewski; 2011), like fear or frustration, but that SPS is the underlying explanation for *differential susceptibility*. The fact that SPS was not accounted for in former research, could explain the inconsistent findings concerning *differential susceptibility*.

Examining the influence of SPS may help clarify which children are susceptible to parenting, for which parenting styles they are susceptible and more importantly when sensitivity would lead to growth or changes in adjustment problems (Kiff, Lengua and Zalewski; 2011).

Behavioral Inhibition System and Behavioral Activation System

A possible relation between SPS and the Behavioral Inhibition System (BIS) and Behavioral Activation System (BAS; Gray, 1981) would clarify how SPS is related to the adjustment of the child because the BIS and the BAS are suggested to be general systems for orchestrating adaptive behavior (Amodio, Master, Yee and Taylor, 2008). They influence behavior by resolving response conflicts as an attentional system and halting ongoing behavior in order to resolve these response conflict (BIS) and by coordinating approach/withdraw responses as a motivational system (BAS; Amodio, Master, Yee and Taylor, 2008).

SPS is associated with BIS activation, because of the presumption that SPS may be the underlying reason for inhibited behavior in some individuals (Aron, Aron and Jagiellowicz; 2012) and the BIS is strongly associated with inhibition. SPS is associated with BAS activation, because SPS is not only associated with inhibition, but also with responsiveness to reward (Aron, Aron and Jagiellowicz, 2012) and the BAS is strongly associated with reward.

BIS and BAS activation are not inherently bad or good for child adjustment and thus no adjustment outcome in itself. It seems that (co)activation of BIS and BAS leads to a broad range of processes, for instance neural, emotional and motivational, which manifest as well known temperamental traits and various behavioral outcomes (Amodio, Master, Yee and Taylor, 2008). The impact of the (co)activation of BIS and BAS on these processes, temperamental traits and behaviors seems more complex than was assumed

before in research (Amodio, Master, Yee and Taylor, 2008). Examining the influence of SPS on the effect of parenting (or different environments) on BIS and BAS activation, may be a start in understanding the complex contribution of BIS and BAS on child adjustment and the development of child adjustment problems.

The influence of SPS on BIS and BAS activation

The question is how different levels of SPS influence BIS and BAS activation and how this effect depends on the (un)known environment. An example will be used to illustrate when the BIS and BAS systems would activate and how their activation would influence behavior.

A child discovers for example his favorite candy on the kitchen dresser in an unfamiliar house. The kitchen dresser is tall, so it would be hard and dangerous to climb on. The child would be motivated to reach for the candy when he sees it, which leads to the development of an approach response, but noticing the perilous path towards it would lead to the development of an avoidance response. These two responses are in conflict with each other and the child has to make a choice between these responses (i.e. this conflict has to be resolved), which leads to BIS activation. A child with high SPS has a bigger chance of noticing both the food and the danger of climbing, because of more sensitivity to environmental cues, than someone low in SPS. This would result in more response conflicts for someone with high SPS and thus in higher BIS activation, than for someone with low SPS (see Figure 4, relation 1 and 2).

There would be no motivation to approach the candy and the BAS would not activate if the child had not seen the candy yet, hence it is argued that excitement about potential rewards (i.e. BAS activation) depends on the analysis of a situation (Aron, Aron and Jagiellowicz, 2012). To analyze an environment takes longer for someone with high SPS than for someone with low SPS, because they would do it more thorough, which takes more time. This would lead to lower BAS activation for someone with high SPS than for someone with low SPS in an unknown environment (see Figure 4, relation 5 and 6).

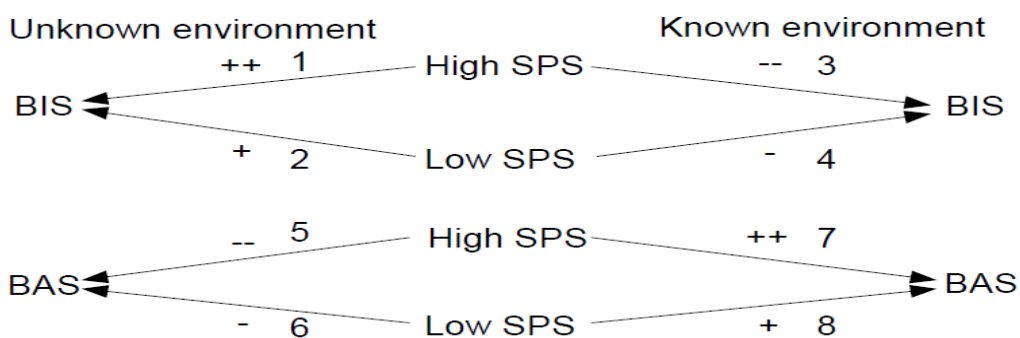


Figure 4. The effect of SPS on BIS and BAS activation in an unknown and known environment. The relative strength of the activation is expressed in plusses or minuses (from ++ = relatively the strongest activation up to - = relatively the weakest activation).

If we assume -continuing with the above example- that the candy is always at the same place (known environment) then the child has had the time to notice all the possible choices and to choose the best response (i.e. resolve the response conflicts). When the response conflicts are resolved, there would be

no need for high BIS activation. The more familiar a child is with the situation, the more response conflicts would be resolved. A child which did not process the environment thorough enough might for example notice a toy, which elicits another response conflict, leading to BIS activation. This chance is smaller for a child with high SPS and greater for a child with low SPS, leading to lower BIS activation for children with high SPS than for children with low SPS in a known environment (see Figure 4, relation 3 and 4).

Not only has the child had the time to notice all the possible choices, but is has also had the time to assess the costs and/or gains of these choices. The child can only be motivated to approach something when it knows it's worth, if the candy is for example his favorite flavor, which would lead to higher BAS activation. This effect would be stronger for a child with high SPS than a child with low SPS, based on the assumption that reward and fear areas of the brain are more easily activated in individuals with high SPS (see Figure 1, relation 7 and 8). This assumption is based on the association between responsiveness to reward and sensitivity (Aron, Aron and Jagiellowicz, 2012).

Aron, Aron and Jagiellowicz (2012) argue likewise that sensitivity could lead to behavior inhibition in novel situations or in those generating conflicting responses, but that there would be no need for a pause to check in situations which are already familiar. Sensitivity might lead to a faster than average response in these cases.

The example above illustrates how the same children (with high SPS) can have either the highest or lowest BIS/BAS activation depending on the situation. It shows that some children react stronger to their environment, conform the *differential susceptibility* theory. Testing if the above assumptions are correct could confirm the *differential susceptibility* theory and would identify the trait (i.e., SPS) which makes children more susceptible to parenting.

Parenting

The influence of SPS may be the same on the effect of parenting as on the effect of an (un)known environment, as described in the example with the candy.

It seems plausible that *consistency* in parenting is a contributor to the stability in a child's environment and that it could be compared with a known environment. A child knows what to expect and what is expected with *consistency* in parenting. A child does not know what to expect when *consistency* is low and the environment would be unstable, which could be compared with an unknown environment. *Responsiveness* in parenting seems to function as a buffer for fear in an unknown environment (Aron, Aron and Jagiellowicz; 2012). *Responsiveness* could be interpreted as 'safe' and may contribute to the familiarity of an environment. The lack of *responsiveness* may be interpreted as less 'safe', making an environment less familiar (i.e., unknown). It is recognized that these parenting styles have to be carefully balanced for children who are highly sensitive to positive and negative parenting (Kiff, Lengua and Zalewski; 2011).

Hypotheses

This study aims to examine if the child's temperament (i.e., SPS) influences susceptibility to parenting and whether it influences the effect of parenting on adjustment in order to clarify the different findings concerning the *differential susceptibility* theory. SPS may explain why there are such different findings concerning

differential susceptibility and SPS could, depending on the environment, either activate the BIS or BAS and BIS and BAS (co)activation may underlie temperament and behavior.

BIS activity is expected to be higher and BAS activity to be lower in an unknown environment and BIS activity is hypothesized to be lower and BAS activity to be higher in a known environment (see Figure 5 a & b). SPS is expected to strengthen this effect leading to higher BIS and lower BAS activation for children with high SPS than children with low SPS in an unknown environment and lower BIS and higher BAS activation for children with high SPS than children with low SPS in a known environment (see Figure 5 a & b) Negative parenting (i.e., low consistency and low responsiveness) will indicate an unknown environment and positive parenting (i.e., high consistency and low responsiveness) will indicate a known environment.

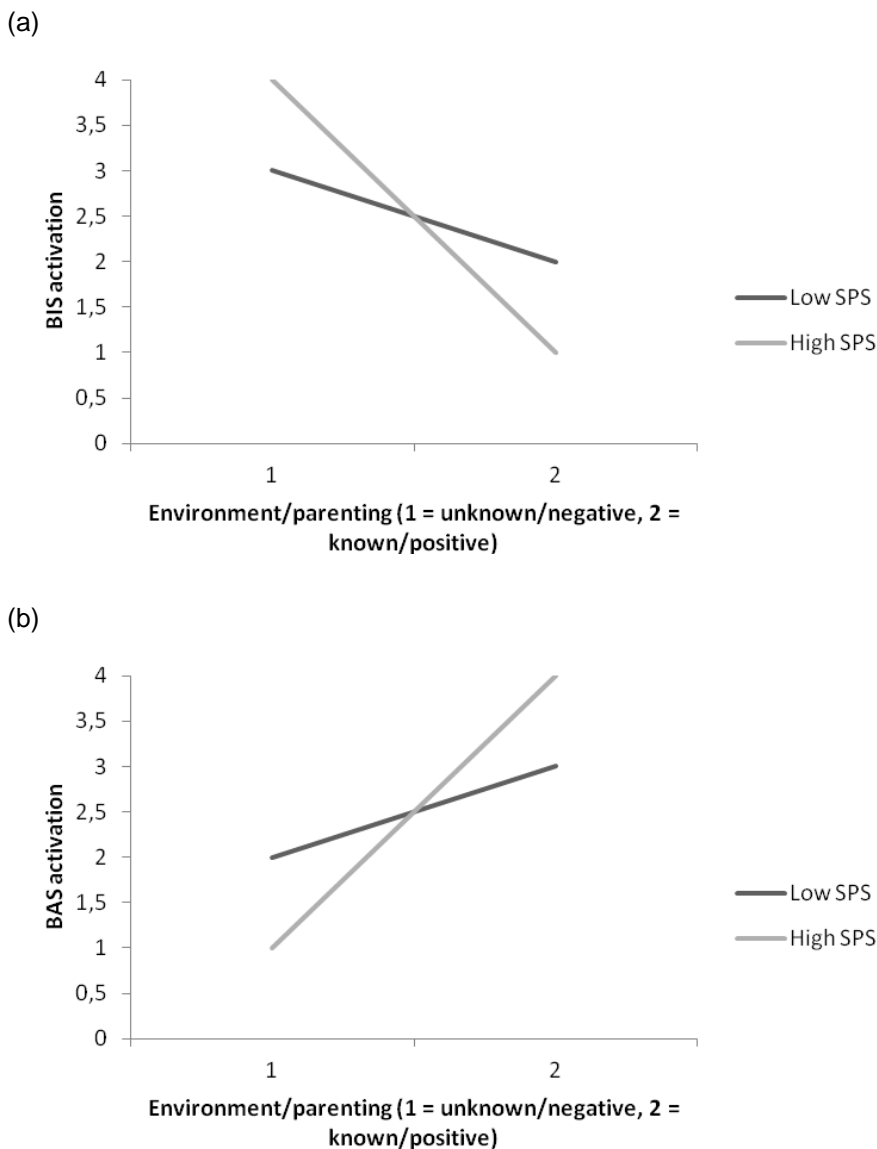


Figure 5. The effect of SPS on BIS (a) and BAS (b) activation in an unknown and known environment.

It is expected that children with high SPS would have either the highest or lowest BIS/BAS activation, depending on the situation. High SPS would influence a stronger reaction to the environment, conform the *differential susceptibility* theory. If this is true; children with high SPS could be identified as the most at risk

for negative parenting, but also as the children who would profit most from positive parenting or extra support. Interventions could be aimed to target them in negative situations, either to remove them from the bad influence or by targeting negative parenting behaviors. They could also be targeted for extra support/enrichment (e.g. educational).

Method

Participants

A total of 220 children (116 boys and 104 girls) and 220 parents (206 mothers and 12 fathers) participated. They originated from 220 families and were randomly invited through (pre)schools to participate voluntarily (see procedure section).

The average age of the children was 4 years and 9 months (the youngest child was 3 years and 8 months old and the oldest was 6 years and 2 months old). Around 40% of the children were in class 1 of kindergarten, around 40% in class 2, around 10% in between and 12 children had yet to join kindergarten (the last one would join in another 4 months). Most of the children were born in the Netherlands (98%). Nine percent of the children had no siblings, 55% percent had one sibling, 27% had two siblings and 6% had 3 siblings.

Seventy-five percent of the parents were married and 19% of the parents were unmarried and living together (leaving 6% single, divorced or in a relationship but living separately). Ninety-three percent of the parents were born in the Netherlands. The average gross year income of the households was 85,000 euro. Six percent of the parents had no higher finished education than high school, 17% had finished vocational education, almost 39% had finished higher vocational education and almost 37% had finished university. Most of the parents had, based on income and finished education, an above average social and educational status.

Materials

Sensory Processing Sensitivity

SPS was assessed using the 12- item version of the Highly Sensitive Personality scale (Aron & Aron, 1997), provided by Pluess. This version is not yet tested, so the reliability and validity of the 27-item scale (Aron & Aron, 1997) was discussed. Although the HSP scale does not capture all of the SPS facets, a high score on the HSP scale is an indicator of the presence of other traits which fit with the formal definition of SPS (Aron, Aron and Jagiellowicz, 2012).

The items (27) used for the HSP scale were developed based on observations, theory and past research to be in accordance with the construct SPS (Aron & Aron, 1997). Examples of what the items consisted of were “*My child doesn't do well with big changes. My child notices subtleties (something that's been moved, a change in a person's appearance, etc.). My child is bothered by loud places.*” Answers were given on a 7-point scale (1 = 'totally not' up to 7 = 'extremely').

The internal consistency of the scale was high (Cronbach's alpha is 0.78) and the reliability of the scale is concluded to be good. The convergent validity was good and the discriminant validity supported (Aron & Aron, 1997).

Behavioral inhibition and Behavioral activation

BIS and BAS scores were assessed using the Behavioral Inhibition System and Behavioral Activation System scale (Carver & White, 1994).

The scale consisted of 7 BIS items (*"My child feels worried when he/she thinks he/she has done poorly on something. If my child thinks something unpleasant is going to happen he/she usually gets pretty worked up. Even if something bad is to happen to my child, he/she rarely experience fear or nervousness."*) and 13 BAS items (*"When my child gets something he/she wants, he/she feels excited and energized. When my child wants something, he/she go all-out to get it. My child will often do things for no other reason than that they might be fun."*). Answers were given on a 4 point scale (0 = not true to 3 = totally true). The BAS items were originally divided into three factors, but were used as one factor, because the three factors were found to load strongly onto a single second-order factor (Harmon-Jones & Allen, 1997; Sutton & Davidson, 1997).

The BIS sub-scale and BAS sub-scale had a high internal consistency (Cronbach's alpha was 0.81 for BIS and 0.86 for BAS). The convergent validity was tested and concluded to be good and the divergent validity was tested and concluded to be sufficient (Carver and White, 1994).

Parental consistency

Parental consistency was assessed using the Consistency scale (8 items) from the Dutch version of the Parental Dimensions Inventory (Slater & Power, 1987; Gerrits, Groenendaal, Deković & Noom, 1996) consisting of 25 items which measure parental parenting behavior (Karreman, van Tuijl, van Aken & Decovic, 2008). Examples of what the items consisted of were *"My child convinces me to change my mind after I have refused a request."* Answers were scored on a 6-point scale (1 = completely disagree to 6 = completely agree).

The scale had a high internal consistency (Cronbach's alpha was 0.76) and the reliability of the scale is concluded to be good. The convergent validity was tested and concluded to be good (Slater & Power, 1987).

Parental responsiveness

Parental responsiveness was assessed using the Responsiveness scale (8 items) of the Nijmeegse Parenting scale developed by Gerrits et al. (1993). Parental responsiveness is defined as "a tendency to react promptly and sensitively to the child's signals" (Decovic, Janssens & van As, 2003). Examples of items were *"I know very well what my child wants or feels. When I talk with my child about his/her problem, I really help my child."* Answers were given on a 6-point scale (1 = completely disagree to 6 = completely agree).

The sub-scale had a high internal consistency (Cronbach's alpha is 0.82) and the reliability of the scale is concluded to be good. The validity of the scale is not discussed in the literature (Rodenburg, Meijer, Dekovic & Aldenkamp, 2007).

Procedure

The schools were randomly selected in the proximity of Utrecht, excluding special education. From the 300 schools which were contacted, 49 agreed to participate. Letters with information about the research were

distributed at these schools, advertisements posted and some schools were visited at parent meetings. The parents which were interested could open a web-link provided in the letters and on the advertisements. By opening the link, the parents were able to fill in a screening questionnaire and give their voluntary and informed consent to participate in the study. They received more information about the proceedings of the study here.

The data used for this paper is part of a research containing 3 waves. The first wave consisted of a web-based screening questionnaire, discussed above, to get acquainted with the research and to give their voluntary and informed consent. In wave 2, the temperament of the child and parents, along with parenting were assessed using a web-based questionnaire consisting of multiple questionnaire's. The link to this site was provided in an e-mail which they received when the wave started. This wave took place six months after wave 1. The questionnaire was filled in by the primary caretaker and in some cases by the other parent as well. Only a part of these questionnaires were used for this particular paper. The parents received 5 euro for completing wave1.

Results

Descriptives and correlations

Descriptive statistics and correlations between the variables are presented in Table 1. The sample scored at average close to the middle of the score range at the BIS, BAS and SPS scales. For the consistency scale, the sample scored a little above this middle and for responsiveness the sample scored especially high (the sample scored an average of 5.15 out of 7).

Based on the correlations, parenting seemed not to be related with BIS/BAS activation. SPS seemed to be related with BIS, BIS seemed to be related with BAS and responsiveness seemed to be related with consistency. As described below, a regression analyses was used to further explore the prediction of BIS/BAS.

Table 1.

The means, standard deviations and the zero order correlations of the assessed variables

Variables	1.	2.	3.	4.	5.	Mean	SD
1. BIS	-					1.24	0.59
2. BAS	0.22**	-				1.32	0.49
3. SPS	0.62**	0.08	-			4.26	0.80
4. Resp	0.04	0.08	0.09	-		5.15	0.50
5. Cons	-0.11	-0.03	-0.04	0.30**	-	4.67	0.70

Note. BIS: Behavioral Activation System; BAS: Behavioral Activation System; Resp: Responsiveness in parenting; Cons: Consistency in parenting.

* $p \leq .05$; ** $p \leq .01$.

Predicting BIS activation

In order to examine whether SPS influences the effect of parenting on BIS activation and if parenting predicts BIS activation, the data were analyzed with a two-step hierarchical regression analysis. SPS, parenting (i.e.

consistency and responsiveness in parenting) and BAS were centered and entered in the first step (BAS was entered in order to control for the found correlation between BIS and BAS). The two-way interaction terms of SPS with consistency and responsiveness respectively were entered in the second step. The results did not confirm the hypotheses, as outlined in Table 2. Responsiveness and consistency in parenting did not predict BIS activation and SPS did not influence the effect of parenting on BIS activation. Interestingly and unexpected, BAS and SPS did significantly predict BIS activation (see Table 2). Both were positively associated with BIS activation and accounted for 43% of the variance of BIS ($F\text{-change}(8,200) = 18.98, p < 0.01$).

In order to control for age and sex of the child, the regression above was reproduced with the addition of interaction terms with respectively age and sex (for example the interaction term between age and BAS, the interaction term between age and SPS etc.). Because of the presence of many non-significant predictors, a backward regression analysis was used to counteract suppressor effects. As is customary with the backward method, all variables were entered in the first step. The sex and age of the child did not influence the results and only BAS and SPS remained as significant predictors (see Table 2).

Table 2.

BAS, SPS, Parenting (responsiveness and consistency) and their interaction terms predicting BIS

Variable	B	SE B	β	p
Step 1 of the hierarchical analysis				
BAS	0.20	0.07	0.17	0.00
SPS	0.45	0.04	0.61	0.00
Resp	-.02	0.07	-.02	0.74
Cons	-.05	0.05	-.06	0.26
Step 2 of the hierarchical analysis				
SPS \times Resp	0.07	0.09	0.05	0.44
SPS \times Cons	-.03	0.06	-.03	0.58
Backward analysis with control variables				
BAS	0.20	0.06	0.17	0.00
SPS	0.45	0.04	0.61	0.00

Note. Only the remaining significant predictors are reported in the backward regression analysis.

Predicting BAS activation

In order to examine the prediction of BAS activation, the same two-step hierarchical regression (as described above) was used, with the exception that BIS, instead of BAS, was entered as controlling variable in the first step (see Table 3). The results did not confirm the hypotheses, as outlined in Table 3. Responsiveness and consistency in parenting did not predict BAS activation and SPS did not influence the effect of parenting on BAS activation. BIS did significantly predict BAS activation and the interaction between SPS and consistency had a tendency towards significance.

Table 3.

BIS, SPS, Parenting (responsiveness and consistency) and their interaction terms predicting BAS

Variable	B	SE B	β	p
Step 1 of the hierarchical analysis				
BIS	0.22	0.03	0.27	0.00
SPS	-.06	0.05	-.10	0.25
Resp	0.11	0.07	0.11	0.14
Cons	-.06	0.05	-.09	0.21
Step 2 of the hierarchical analysis				
SPS \times Resp	0.12	0.10	0.10	0.20
SPS \times Cons	0.10	0.06	0.12	0.11
Backward analysis				
BIS	0.17	0.06	0.20	0.00
SPS \times Cons	0.13	0.06	0.15	0.03
Backward analysis with control variables				
BIS	0.15	0.06	0.18	0.01
SPS \times Cons	0.13	0.06	0.15	0.03
Cons \times Age	-0.02	0.01	-0.16	0.02

Note. Only the remaining significant predictors are reported in the backward regression analysis.

It was suspected that the presence of suppressor effects might limit the possibility to detect significant predictors, so a backward method was used. The interaction between SPS and consistency did indeed significantly predict BAS activation (see Table 3) and accounted for 2.3% of the variance in BAS activation (F -change(1,206) = 4.99, p = 0.03).

At first glance this seemed to confirm the hypothesis (see Figure 1), but after examining the figure more thorough, it was suspected that consistency did only predict BAS activation for the children with low SPS and not for the children with high SPS. This was true and the hypothesis was rejected. There was no relation between consistency and BAS activation for the children with high SPS (β = 0.05, t = 0.53, p = 0.60) and consistency negatively predicted BAS activation for the children with low SPS (β = -0.20, t = -2.16, p = 0.03).

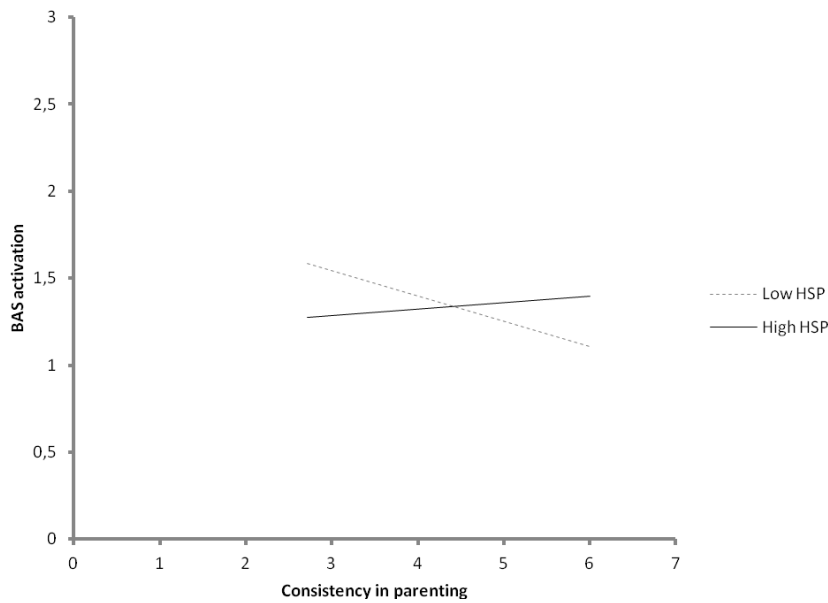


Figure 1. The influence of SPS on the effect of consistency on BAS activation. SPS is median-split.

The same backward method was used to control for the age and sex of the children, as was used when predicting BIS. The interaction between consistency in parenting and the age of the child significantly predicted BAS activation (see Table 3) and accounted for 2,4% of the variance in BAS activation ($F_{\text{change}(1,205)} = 5.38, p = 0.02$). The sex of the child did not influence BAS activation. The effect of consistency was examined per sub-group.

The hypothesis was rejected, after examining Figure 2. Consistency did not predict BAS activation for the younger children ($\beta = 0.13, t = 1.31, p = 0.19$) and it negatively predicted BAS activation for the older children ($\beta = -0.30, t = -3.21, p = 0.00$; see Figure 2).

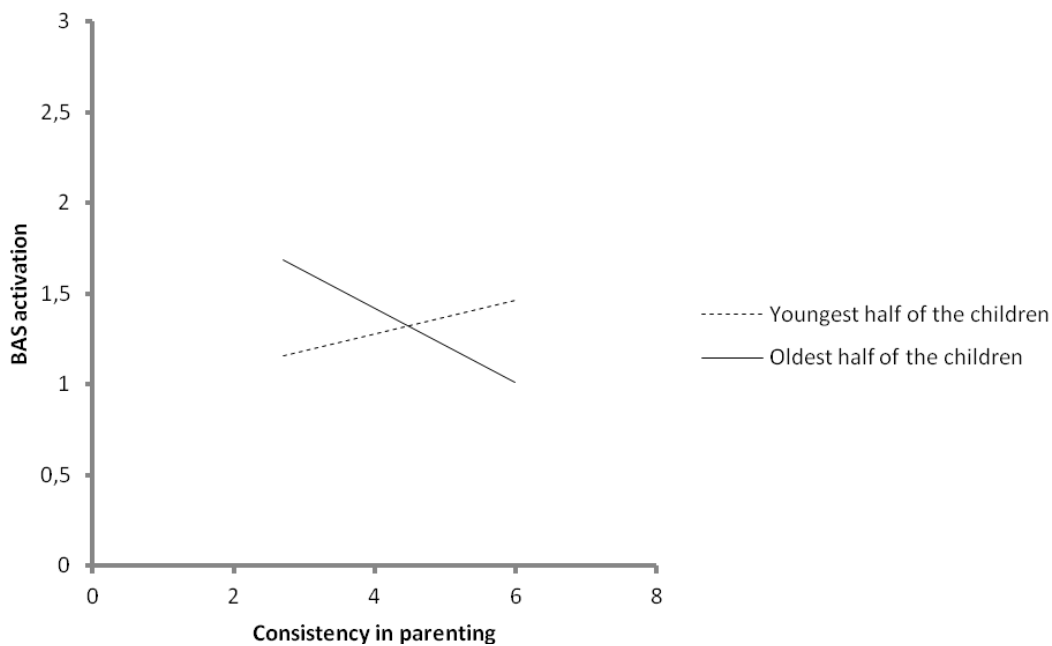


Figure 2. The influence of age on the effect of consistency on BAS activation. The age is median split.

Discussion

The aim of this research paper was to examine if a trait of sensitivity (i.e., SPS) influences the effect of parenting on BIS/BAS activation. It was expected that SPS would make the children more susceptible to parenting, even to the point where the same children had, depending on the parenting, either the highest or lowest BIS/BAS activation. This would confirm the *differential susceptibility* theory which states that the same children which flounder the most in the face of negative parenting, profit the most in the face of positive parenting.

The current study seems to confirm that some children are more susceptible to the effect of parenting and that they seem to react conform the *differential susceptibility* theory. This means that the more susceptible children have, depending on the parenting style, either the highest or lowest BAS activation, which reflects the 'for-better-and-for-worse' statement of the *differential susceptibility* theory. Remarkably, it seems that not the children with high SPS, but the children with low SPS are more susceptible to the effect of parenting, in contrast to what was expected. SPS and BIS activation seem to be directly related, without the influence of parenting, in contrast to what was expected. It seems that SPS does not influence BIS activation, but BIS activation seems to be an aspect of SPS as a system which pauses behavior in order to process the environment more thorough. This is conform a suggestion in the literature which proposes that a strong BIS would provide more thorough processing of stimuli (i.e., SPS; Aron, Aron and Jagiellowicz, 2012). SPS may be a general trait of sensitivity consisting of cognitive, emotional and physiological aspects.

Consistency seems negatively related to BAS activation, counter to what was expected. It had no effect on the younger children and on the children with high SPS. The older children and the children with low SPS (presumably the less fearful children) may be inclined to risky or inappropriate behavior, like for instance jumping on the couch or running in the corridor. The things which these children may find attractive may be considered dangerous or inappropriate by the parents and may be discouraged by consistent punishment. A child would be less motivated to endorse another adventure when punishment is certain. Responsiveness in parenting seems, counter to what was expected, not related to BIS/BAS activation.

BIS activation seems related to BAS activation which was not expected, because they are conceptualized as two different systems with different prerequisites to activate (Amodio, Master, Yee & Taylor, 2008). However it is suggested that the BIS and BAS may co activate in, for instance, dangerous situations where attentional vigilance (i.e., BIS activation) and the motivation to approach safety (i.e., BAS activation) are needed in order to actively avoid a threat (Amodio, Master, Yee & Taylor, 2008). It is suggested that the BIS and BAS relate to broader motivational, emotional and behavioral processes (Amodio, Master, Yee & Taylor, 2008) and it may be possible that co activation is needed in order to organize some of the more complex processes.

For the interpretation of this study, it must be taken into account that the findings concerning the effect of parenting may not be generalized to fathers, because of the small percentage of participating fathers and the fact that the same parenting style has a different effect when applied by fathers (Forehand & Nousiainen, 1993). The young age and the limited age span of the children in this sample should be considered as well. The effects of parenting and SPS might be different, stronger or only noticeable at older age. This may be examined in further research. Additionally the validity of the SPS questionnaire should be

tested in order to clarify why the children who score low on SPS appear more susceptible than the children who score high on SPS, which is contra intuitive. The questionnaire may for instance not measure sensory sensitivity, because most of the questions seem to measure distress. It could be argued that overstimulation of a sensitive person would lead to distress, but the measure of distress does not indicate sensory sensitivity, because distress is in itself not the same thing as sensitivity to sensory information. It may also indicate for instance high intensity negative reactions, distress to limitations or distress to novelty.

The most important finding of this study is the confirmation that some children are more susceptible to parenting (and possibly to the environment in general) and that these children are more affected by both positive and negative parenting. This implicates that these children could be identified in order to protect them from negative parenting and in order to support and guide them towards an unusually well development.

References

- Amodio, D.M., Master, S.L., Yee, C.M. & Taylor, S.E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self regulation. *Psychophysiology*, *45*, 11-19.
- Aron, E., & Aron, A. (1997). Sensory-processing sensitivity and its relation to introversion and emotionality. *Journal of Personality and Social Psychology*, *73*, 345-368.
- Aron, E.N., Aron, A. & Jaggielowicz, J. (2012). Sensory Processing Sensitivity: A Review in the Light of the Evolution of Biological Responsivity. *Personality and Social Psychology Review*, *16*(3), 262-282.
- Belsky, J., Kuang-Hua, H., & Crnic, K. (1998). Mothering, fathering, and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology*, *10*, 301–319.
- Belsky, J. & Pluess, M. (2009). Beyond Diathesis Stress: Differential Susceptibility to Environmental Influences. *Psychological Bulletin*, *135*(6), 885-908.
- Carver, C.S. & White, T.L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment. *Journal of Personality and Social Psychology*, *67*, 319-333.
- Deković, M., Janssens, J.M.A.M., & As, N.M.C. van (2003). Family predictors of antisocial behavior in adolescence. *Family Process*, *42*, 223-235.
- Forehand, R. & Nousiainen, S. (1993). Maternal and Paternal Parenting: Critical Dimensions in Adolescent Functioning. *Journal of Family Psychology*, *7*(2), 213-221.
- Gerrits, L.A.W., Groenendaal, J.H.A., Docovic, M., & Noom, M.J. (1996). *Interne rapportage over een Nederlandse bewerking van de Parenting Dimensions Inventory (PDI)*. Utrecht: Univesity Utrecht.
- Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (pp. 246-276). New York, NY: Springer.
- Harmon-Jones, E., & Allen, J. J. (1997). Behavioral activation sensitivity and resting frontal EEG asymmetry: Covariation of putative indicators related to risk for mood disorders. *Journal of Abnormal Psychology*, *106*, 159–163.
- Karreman, A., van Tuijl, C., van Aken, M.A.G., & Dekovic, M. (2008). Parenting, Coparenting, and Effortful

- Control in Preschoolers. *Journal of Family Psychology*, 22(1), 30–40.
- Kiff, C. J., Lengua, L.J. & Zalewski, M. (2011). Nature and Nurturing: Parenting in the Context of Child Temperament. *Clinical Child and Family Psychology Review*, 14, 251-301.
- Lengua, L. J. (2006). Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. *Developmental Psychology*, 42(2), 819–832.
- Rapee, R. M. (2002). The development and modification of temperamental risk for anxiety disorders: Prevention of a lifetime of anxiety? *Biological Psychiatry*, 52, 947–957.
- Rodenburg, R., Meijer, A. M., Dekovic, M., & Aldenkamp, A. P. (2007). Parents of children with enduring epilepsy: *Predictors of parenting stress and parenting*. *Epilepsy & Behavior*, 11, 197-207.
- Schwebel, D. C., Brezausek, C. M., Ramey, S. L., & Ramey, C. T. (2004). Interactions between child behavior patterns and parenting: Implications for children's unintentional injury risk. *Journal of Pediatric Psychology*, 29, 93–104.
- Slater, M.A., & Power, T.G. (1987). Multidimensional assessment of parenting in single-parent families. In J.P. Vincent (Ed.), *Advances in family intervention, assessment, & theory* (pp. 197-228). Greenwich, CN: Jai Press.
- Stright, A. D., Gallagher, K. C., & Kelley, K. (2008). Infant temperament moderates relations between maternal parenting in early childhood and children's adjustment in first grade. *Child Development*, 79, 186–200.
- Sutton, S. K., & Davidson, R. J. (1997). Prefrontal brain asymmetry: A biological substrate of the behavioral approach and inhibition systems. *Psychological Science*, 8, 204–210.
- Zuckerman, M. (1999). *Vulnerability to psychopathology: A biosocial model*. Washington, DC: American Psychological Association.

Appendix

SPS questionnaire

INSTRUCTIES: Geef op elke vraag het antwoord dat het beste weergeeft hoe u zich persoonlijk voelt. Maak hiervoor gebruik van de volgende schaal:

1	2	3	4	5	6	7
Helemaal niet						Matig Extreem

1. Mijn kind merkt het op als kleine dingen veranderd zijn in zijn/haar omgeving.
2. Harde geluiden zorgen ervoor dat mijn kind zich ongemakkelijk voelt.
3. Mijn kind houdt van lekkere geuren.
4. Mijn kind wordt nerveus als hij/zij veel moet doen in weinig tijd.
5. Sommige muziek kan mijn kind echt gelukkig maken.
6. Mijn kind is geïrriteerd als mensen hem/haar te veel dingen tegelijk proberen te laten doen.
7. Mijn kind houdt niet van kijken naar tv-programma's die veel geweld bevatten.
8. Mijn kind vindt het onprettig als er veel tegelijk gaande is zijn/haar leven.
9. Mijn kind houdt er niet van als dingen veranderen in zijn/haar leven.
10. Mijn kind houdt van lekkere smaken.
11. Mijn kind houdt niet van harde geluiden.
12. Als iemand mijn kind observeert, wordt hij/zij nerveus. Hierdoor presteert hij/zij slechter dan normaal.

BIS/BAS questionnaire

BIS

- a. Als mijn kind denkt dat er iets vervelends gaat gebeuren, maakt hij/zij zich daar meestal erg druk over
- b. Mijn kind is bang om fouten te maken
- c. Mijn kind kan er niet goed tegen als mensen hem/haar straf geven of tegen hem/haar zeggen dat hij/zij iets fout doet
- d. Mijn kind voelt zich erg bezorgd, wanneer hij/zij denkt dat iemand boos op hem/haar is
- e. Zelfs wanneer er iets vervelends gebeurt, wordt mijn kind niet bang of zenuwachtig
- f. Mijn kind maakt zich zorgen, als hij/zij denkt dat hij/zij iets niet goed gedaan heeft
- g. In vergelijking met zijn/haar vrienden, is mijn kind erg angstig

BAS reward responsiveness

- a. Als mijn kind krijgt wat hij/zij hebben wil, voelt hij/zij zich opgewonden en vol energie
- b. Als mijn kind ergens goed in is, wil hij/zij dat graag blijven doen
- c. Als er iets goeds met mijn kind gebeurt, maakt dat mijn kind echt super-blij
- d. Mijn kind zou erg opgewonden raken, als hij/zij een wedstrijd zou winnen
- e. Als mijn kind een kans ziet om iets te krijgen wat hij/zij hebben wil, raakt hij/zij meteen opgewonden

BAS drive

- a. Als mijn kind iets wil, doet hij/zij er meestal alles aan om het te krijgen
- b. Mijn kind doet echt alles om te krijgen wat hij/zij hebben wil
- c. Als mijn kind een kans ziet om iets te krijgen wat hij/zij hebben wil, gaat hij/zij er meteen op af
- d. Als mijn kind iets wil hebben, laat mijn kind zich door niemand tegenhouden

BAS fun seeking

- a. Mijn kind doet dingen vaak alleen maar, omdat ze hem/haar leuk lijken
- b. Mijn kind heeft het heel erg nodig om spannende en opwindende dingen mee te maken
- c. Mijn kind heeft altijd zin om iets nieuws te proberen, als hij/zij denkt dat het leuk zal zijn
- d. Mijn kind doet vaak dingen zonder er bij na te denken

Antwoordcategorieën:

- 0 Niet waar
- 1 Een beetje waar
- 2 Waar
- 3 Heel erg waar

PDI questionnaire**Machtsuitoefening**

- a. Uw kind is naar buiten gegaan zonder zijn/haar speelgoed op te ruimen, zoals u gevraagd had.
- b. Na ruzie om speelgoed slaat uw kind zijn/haar kameraadje.
- c. Uw kind wordt brutaal als u hem/haar iets verbiedt.
- d. U betrapt uw kind erop dat het liegt over iets dat hij/zij gedaan heeft en wat u afgekeurd zou hebben.

Antwoordcategorieën:

- Stem verheffen
- Fysiek straffen (een tik, een pak slaag geven)
- Onthouden van privileges of het kind een extra taakje geven

Ouders moeten van deze antwoordcategorieën aangeven hoe waarschijnlijk het is dat zij zo zullen reageren

- 1 zeer onwaarschijnlijk
- 2 onwaarschijnlijk
- 3 soms wel/soms niet
- 4 waarschijnlijk
- 5 zeer waarschijnlijk

Inductie

- a. Uw kind is naar buiten gegaan zonder zijn/haar speelgoed op te ruimen, zoals u gevraagd had.
- b. Na ruzie om speelgoed slaat uw kind zijn/haar kameraadje.
- c. Uw kind wordt brutaal als u hem/haar iets verbiedt.
- d. U betrapt uw kind erop dat het liegt over iets dat hij/zij gedaan heeft en wat u afgekeurd zou hebben.

Antwoordcategorieën:

- Wijzen op gevolgen van het gedrag (voor anderen, voor het kind zelf)
- Met het kind praten (alternatief gedrag aangeven, uitleggen waarom het gedrag verkeerd is)
- Op eerder gemaakte afspraken wijzen

Ouders moeten van deze antwoordcategorieën aangeven hoe waarschijnlijk het is dat zij zo zullen reageren

- 1 zeer onwaarschijnlijk
- 2 onwaarschijnlijk
- 3 soms wel/soms niet
- 4 waarschijnlijk
- 5 zeer waarschijnlijk

Consistentie

- a. Soms duurt het zo lang voordat ik de kans krijg te reageren op een overtreding van mijn kind dat ik het gewoon laat zitten
- b. Soms heb ik gewoon niet de energie om mijn kind zich te laten gedragen zoals het hoort
- c. Mijn kind weet mij vaak over te halen haar/hem lichter te straffen dan ik van plan was
- d. Mijn kind overtuigt mij om van gedachten te veranderen nadat ik haar/zijn verzoek afgewezen heb
- e. Ik heb weinig of geen moeite met het volhouden van regels voor mijn kind, zelfs als er familie (ook grootouders) bij is
- f. Zodra ik besloten heb hoe ik om moet gaan met slecht gedrag van mijn kind, dan houd ik mij daar ook aan
- g. Ik dreig alleen met een straf, als ik zeker weet dat ik die ook ga uitvoeren
- h. Ik zet altijd door met het disciplineren van mijn kind, ongeacht hoe lang het duurt

Antwoordcategorieën:

- 1 helemaal mee oneens
- 2 tamelijk mee oneens
- 3 beetje mee oneens
- 4 beetje mee eens
- 5 tamelijk mee eens
- 6 helemaal mee eens

NOV questionnaire**Responsiviteit**

- a. Als het niet zo goed met mijn kind gaat, dan lukt het mij om mijn kind te troosten.
- b. Als mijn kind verdrietig is of ergens mee zit, dan heb ik dat in de gaten.
- c. Ik weet precies wanneer mijn kind het ergens moeilijk mee heeft.
- d. Ik help mijn kind goed als zij/hij het moeilijk heeft.
- e. Als mijn kind ergens over piekert of verdrietig is, dan begrijp ik wat er aan de hand is.
- f. Ik weet heel goed wat mijn kind wil of voelt.
- g. Ik kan goed met mijn kind over alles praten.
- h. Als ik met mijn kind over haar/zijn problemen praat, dan help ik mijn kind echt.

Negeren

- a. Als mijn kind iets doet wat niet mag, kijk ik vaak boos en doe alsof zij/hij er niet is.
- b. Als mijn kind iets doet wat niet mag, praat ik vaak niet meer met haar/hem totdat zij/hij zegt dat het haar/hem spijt.
- c. Als mijn kind iets doet wat niet mag, ben ik meestal boos en luister ik niet naar wat zij/hij zegt.
- d. Als mijn kind iets doet wat niet mag, praat ik meestal pas weer met haar/hem als zij/hij zich beter gedraagt.
- e. Als mijn kind iets doet wat niet mag, kijk ik meestal boos en kijk dan niet naar haar/hem om.

Autonomie

- a. Ik moedig mijn kind regelmatig aan dingen te onderzoeken.
- b. Ik laat mijn kind veel nieuwe dingen uitproberen, ook al is de afloop van deze dingen heel onzeker.
- c. Ik leer mijn kind dat zij/hij zelf verantwoordelijk is voor wat er met haar/hem gebeurt.

d. Ik moedig mijn kind vaak aan zelf na te denken over het leven.

Antwoordcategorieën:

1 helemaal mee oneens

2 tamelijk mee oneens

3 beetje mee oneens

4 beetje mee eens

5 tamelijk mee eens

6 helemaal mee eens