ijbd

International Journal of
Behavioral Development
1–11

DOI: 10.1177/0165025416687416
journals.sagepub.com/home/ijbd
SAGE

Child differential sensitivity to parental self-efficacy improvement: A micro-trial perspective

Bénédicte Mouton,[1] Laurie Loop,[1] Marie Stievenart,[2] and Isabelle Roskam[1]

Abstract

This study investigates the hypothesis of a child differential sensitivity to parenting improvement. One hundred and fourteen parents of preschoolers participated in two parenting micro-trials aiming to increase parental self-efficacy in view of improving child behavior. The first micro-trial took place in a short-term laboratory experiment; the other was an eight-week parenting group intervention, both focusing on altering parental cognition. Differential effects of parental self-efficacy improvement on child's positive and negative behaviors, depending on child temperament, were compared at post-test between control and experimental groups. Both observation and questionnaires were used to measure child behavior as well as regression and Regions of Significance analyses. Child differential sensitivity was found both in the laboratory experiment and in the parenting intervention for the temperamental trait of negative emotionality but not for the temperamental trait of activity. However, this sensitivity was in an unexpected direction. Highly emotional children benefited less from this parental cognitive improvement than children low on emotionality. These results may be explained by the specific cognitive nature of these two parenting micro-trials.

Keywords

Child temperament, differential susceptibility, experiment, intervention program, parenting, preschoolers, self-efficacy

Introduction

In the field of parenting research, understanding what type of intervention works best for whom has become a priority (Belsky & van Ijzendoorn, 2015; Bornstein & Manian, 2013; Stoltz, Deković, van Londen, Orobio de Castro, & Prinzie, 2013). The average effect size of most parenting interventions tend to be small to moderate, as shown in several meta-analytic reviews (Barlow, Coren, & Stewart-Brown, 2002; Kaminski, Valle, Filene, & Boyle, 2008; Lundahl, Risser, & Lovejoy, 2006; Menting, Orobio de Castro, & Matthys, 2013; Serketich & Dumas, 1996). One explanation could be that not all children benefit equally from such intervention, because children's sensitivity to environmental influences may differ. The analysis of individual differences in reaction to a modification in parenting provides a useful insight into intervention efficacy research.

Parenting Modification

Parenting Interventions

To improve child behavior, working with parents to modify their parenting is a commonly used and widely researched therapeutic leverage. Parenting interventions have been developed in the last decades to respond to the request of parents to improve their child's behavior, in particular in case of Externalizing Behavior (EB), such as aggression, opposition, agitation or impulsivity. Based on the social learning, coercion and transactional models (Bandura, 1977; Patterson, Forgatch, & DeGarmo, 2010; Sameroff, 2009), most of these parenting interventions train parents to use more positive parenting behaviors to induce a positive dynamic with the child and reduce challenging, defiant, or aggressive child behavior.

Though effective, their average effect size is small to moderate, raising several questions related to their effectiveness. First, this may indicate that children vary in the extent to which they benefit from these programs (Menting et al., 2013; Wyatt Kaminski, Valle, Filene, & Boyle, 2008). Consequently, recent studies on parenting intervention have raised the issue of differential effects of intervention on children based on the differential sensitivity theories (Bakermans-Kranenburg & Van Ijzendoorn, 2015; Belsky & van Ijzendoorn, 2015). Second, this could indicate that the content of these parenting interventions may be improved. Not all components might be as effective and necessary. Recent studies have also explored this issue of focused interventions based on the micro-trials methodology (Leijten et al., 2015).

Parenting Micro-trials

Complementary to parenting interventions, experimental studies contribute to parenting research by testing specific parenting components' modification. They provide a clear added-value compared

[1] Psychological Sciences Research Institute, University of Louvain, Belgium
[2] University of Liege, Belgium

Corresponding author:
Bénédicte Mouton, Psychological Sciences Research Institute, University of Louvain, 10 Place du Cardinal Mercier, 1348 Louvain-la-Neuve, Belgium.
Email: benedicte.mouton@uclouvain.be

to research on parenting interventions, because the latter modify several parenting variables simultaneously. This wide scope of interventions makes it difficult to identify which parenting component's modification is really effective. By contrast, experimental studies designed as micro-trials are better suited to analyzing *specific* effects of distinct parenting variables on child outcomes (Howe, Beach, & Brody, 2010). Randomized controlled trials of this type are based on relatively brief and focused manipulations designed to suppress specific risk mechanisms or enhance specific protective mechanisms. Focused by nature, micro-trials build on the identification of a protective factor, the selection of a specific proximal outcome with multiple informants and instruments, and the manipulation of this selected factor in a randomized controlled trial. Though in progression (Leijten, Thomaes, Orobio de Castro, Dishion, & Matthys, 2016; Loop & Roskam, 2016), they remain new to the field and are rarely used to analyze differential sensitivity of children to parenting modification. Moreover, no micro-trial has documented differential effect of an exclusively cognitive parental intervention.

Modification of the Parenting Variable of Self-efficacy

In the field of parenting research, many researchers and clinicians acknowledge the importance of the cognitive dimension in parenting (Bugental & Johnston, 2000). Self-Efficacy Beliefs (SEB) – defined as the beliefs parents have on their capacity to positively influence their child's development (Coleman & Karraker, 2003) – has been identified as a good component of parenting on which to focus in order to empower parents, strengthen positive parenting and contribute to improve child's behavior (Deković et al., 2010; Sofronoff & Farbotko, 2002). However, parental SEB has been analyzed in existing programs so far mostly as a positive side-effect, a moderator or predictor of change, documenting the indirect effects of SEB on child behavior. Parental SEB predicts more positive child behavior after participating in a program in which parenting behaviors are modified (Beauchaine, Webster-Stratton, & Reid, 2005; Bor, Sanders, & Markie-Dadds, 2002).

Most parenting interventions primarily target a behavioral change in parenting, with a focus on positive parenting behaviors (use of praise, warmth, positive reinforcement, etc.). Several parenting interventions have included new components in addition to the existing behavioral components by modifying parental cognition during behavioral training in order to enhance treatment outcome (Bor et al., 2002). When they do, their effect size is slightly greater compared to regular programs, as shown by Mah and Johnston (2008) in their literature review of seven studies in which an incremental cognitive component was added to an existing behavioral program. Their effect is also maintained longer at follow-up (Gaviţa, Joyce, & David, 2011).

Noteworthy is the discrepancy between the acknowledgment of the role of SEBs in parenting and the small place it has been given in programs or experimental studies so far (2015). Study 1 is one of the few experiments on parental self-efficacy (Cassé, Oosterman, & Schuengel, 2015), leading to the parenting intervention focused on parental self-efficacy experiment in Study 2. Interestingly, no study has analyzed yet a differential sensitivity of children to parental self-efficacy modification.

Child Differential Sensitivity

The hypothesis of a child differential sensitivity to parenting has now been tested in several empirical studies (Ellis & Boyce, 2011; Pluess & Belsky, 2010; van Ijzendoorn, Bakermans-Kranenburg, & Ebstein, 2011; van Zeijl et al., 2007), by looking at how children are differently affected by their environment (Bornstein & Manian, 2013), whether it is favorable (for better) or detrimental (for worse). Several models of individual differences in environmental sensitivity have been developed over the last 15 years. The first model called diathesis-stress postulated that some children, because of their own temperamental, physiological, or genetic characteristics, have an increased sensitivity to negative stressful environments (Caspi et al., 2002). By contrast, the vantage sensitivity model stipulates that some children are sensitive to favorable environments (Pluess & Belsky, 2013), while the differential susceptibility model considers that children are sensitive to both types of environment (Belsky & Pluess, 2009). This latter theory is an evolutionary-based theory stating that some plasticity factors not only amplify risk of a maladaptive development, but also increase the probability of a positive adaptation, for better and for worse.

But several gaps remain in the current literature. First, historically, studies exploring moderation effects of putative plasticity factors such as child temperament or genes on the relation between parenting and child outcomes looked mainly at negative parenting environments affecting negative child outcomes, according to the diathesis-stress model. Recently, a meta-analysis (Slagt, Dubas, Deković, & van Aken, 2016) examined sensitivity for both child positive and negative outcomes (the bright and dark sides) and for both positive and negative parenting. It showed that it is worth analyzing effects of positive parenting on positive child outcomes because they are comparable to effects of negative parenting on negative child outcomes.

Second, most of these studies base their conclusions on plots of interaction and single slopes analysis. In 2012, Roisman and colleagues (2012) revisited data of previously published studies on Temperament-by-Parenting interaction, applying a complementary analysis of the Regions of Significance (*RoS*). This new method provides information on the values of temperament for which parenting and child outcomes are significantly associated.

Third, most of these studies are correlational using longitudinal or cross-sectional design. Only few experiments have actually tested Temperament-by-Parenting interactions. The few studies that did, showed that highly reactive children benefited more from an improved parenting in terms of increased attachment security (Cassidy, Woodhouse, Sherman, Stupica, & Lejuez, 2011; Klein Velderman, Bakermans-Kranenburg, Juffer, & van Ijzendoorn, 2006) and fewer looked at externalizing behavior (Bakermans-Kranenburg, Van Ijzendoorn, Pijlman, Mesman, & Juffer, 2008).

Child Temperament or Genes x Intervention Interaction

Two recent studies have explored this issue of child differential sensitivity to parenting intervention. First, Scott and O'Connor (2012) found in their study on the effectiveness of the Incredible Years parenting program that emotionally dysregulated children (i.e., irritable, hurtful, headstrong, or defiant) were more responsive to improvements induced by this intervention than children scoring low on this temperament trait. Second, a recent study by Chhangur and colleagues (2016) confirmed a differential sensitivity of children to this Incredible Years intervention. They tested 341 Dutch families with 4- to 8-year-old children showing moderate to high levels of problem behavior. This program proved to be more

effective for children who carried more rather than fewer dopaminergic plasticity alleles.

Temperament as a Sensitivity Marker to Parenting

In most of research on differential sensitivity, temperament is used as a marker of sensitivity to parenting (Slagt, Dubas, & van Aken, 2015a). Temperament refers to constitutionally based individual differences in reactivity and self-regulation in the domain of affect, activity, and attention (Rothbart & Bates, 2006). It is partly heritable, based on genetic or neurobiological elements and is also shaped by interactions with the environment during early development. Various traits are used to describe child temperament, including negative emotionality, surgency (which may include positive emotionality and activity), effortful control and attention, self-regulation and soothability as well as sociability (De Pauw, Mervielde, & Van Leeuwen, 2009). Some of these contribute to what is called difficult temperament and are known risk factors in the development of child EB (Rothbart & Bates, 2006), in particular negative emotionality, surgency/activity and effortful control (Gilissen, Bakermans-Kranenburg, van Ijzendoorn, & van der Veer, 2008). Negative *emotionality* is the tendency to be easily distressed, with intense emotions of fear, worry, sadness, discomfort and anger, and frustration and irritability. It may reflect a highly sensitive nervous system making children more reactive to their environment. It has been shown to function as a sensitivity marker moderating the relation between parenting and child adjustment (Slagt et al., 2016). *Activity*, related to surgency, may be considered as a predisposition to be actively involved with the environment, through impulsivity, curiosity, or sensation-seeking for instance (Goldsmith et al., 1987). It has been less studied as a potential sensitivity marker and its moderating role has not been documented consistently (Slagt et al., 2016), which remains a clear gap in current research on differential sensitivity.

Current Study

The aim of this study is to overcome some of these gaps in literature by assessing child differential sensitivity in two parenting micro-trials that aim to improving the parental cognition of self-efficacy. This study expands the literature on this issue for several reasons. First, child differential sensitivity is analyzed in both experimental and intervention studies. Second, these two studies are micro-trials in which one and only one parenting variable – SEB – is manipulated exclusively. Third, the choice of this parenting cognitive variable of SEB is innovative in parenting intervention research. This study is looking exclusively at improved parental self-efficacy both in the laboratory experiment (Study 1) and in the intervention that aimed to help parents with their child's behavior (Study 2). Fourth, the current study covers a wide variety of child behavior with samples of typically developing children, at-risk for EB to children displaying a clinical level of EB. Fifth, it also uses a multi-informant and multi-method design with observation and questionnaires to measure the outcome of child behavior and taking into account both positive and negative behaviors and not only child EB. Sixth, the temperamental trait of activity, and not only emotionality, is also included in the analyses. Last, stringent *RoS* tests are used to explore differential sensitivity and not only plot interaction.

Study 1 is a short-term laboratory experiment during which mothers of a non-clinical sample of preschoolers are manipulated to improve their parental self-efficacy. Study 2 is an intervention study for parents of clinical or at-risk preschoolers for EB lasting eight weeks and expands the SEB manipulation tested in Study 1. In both micro-trials, parental self-efficacy was enhanced by using the four sources of self-efficacy described by Bandura's social learning theory (1977): positive experiences, vicarious experiences, verbal persuasion, and emotional and physiological states.

Both micro-trials had a main effect on parental self-efficacy and behaviors as well as on child behaviors. This opened the way to test child differential sensitivity effects.

We hypothesized that children with a difficult temperament (highly emotional or highly active) would be more sensitive to improved parental self-efficacy induced by the participation of their parents in the two micro-trials, as suggested by the literature on differential sensitivity to parenting. We expected that this sensitivity be higher in the eight-week intervention (Study 2) than in the short laboratory experiment (Study 1) because the modification of parental self-efficacy would be more deeply internalized and engraved. We had no specific hypothesis on a difference between the temperamental traits of emotionality or activity as markers for sensitivity because of limited research on the trait of activity so far.

General Method

Overview

Data for this research come from the H2M research program conducted at the University of Louvain (Louvain-la-Neuve, Belgium). Data were collected in two studies (Study 1 and Study 2), both approved by the ethical committee of the Psychological Sciences Research Institute of the University of Louvain. Parents gave their informed consent and their privacy was protected. Details on the two studies appear elsewhere, in Mouton and Roskam (2015) for Study 1 and Roskam, Brassart, Loop, Mouton, and Schelstraete (2015) for Study 2.

The characteristics of the samples of the two studies are presented in Table 1 and the recruitment procedures in Figures 1 and 3. Both were composed of a control and an experimental group.

Measures

Child Temperament

Child temperament was measured with the Colorado Childhood Temperament Inventory (CCTI), a 25-item questionnaire completed by parents (Rowe & Plomin, 1977) with a Likert-type scale (1–5), translated into French with back translation by a native speaker. The CCTI has good internal consistency ($\alpha = .73$ to $.88$) and test-retest reliability ($r = .43$ to $.80$) and leads to five factors, calculated by a sum for each scale, some items being reversed: emotionality, activity, sociability, attention, and soothability. The emotionality and activity scales measure negative traits with items such as "my child gets upset easily" for highly emotionally reactive children or "my child is off and running as soon as he wakes up in the morning" for highly active children. Sociability, attention, and soothability measure positive traits. Only the emotionality and activity scales were included in the analyses in this study, because they describe best "difficult" temperament traits related to EB

Table 1. Descriptive Statistics on Socio-demographic Characteristics and Temperament Traits at Baseline.

	Laboratory experiment (Study 1)							Parenting intervention (Study 2)		
	Control ($n = 18$)		Experimental ($n = 18$)		$t(35)$ $X^2(1)$	Control ($n = 42$)		Experimental ($n = 36$)		$t(77)$ $X^2(1)$
Characteristics	*M (SD)*	range	*M (SD)*	range		*M (SD)*	range	*M (SD)*	range	
Parent's age (years)	37.17 (4.03)	31–48	37.00 (3.74)	30–43	*0.51*	36.95 (5.15)	29–50	38.72 (5.93)	30–54	*−1.36*
Parent's gender (% mothers)	100.00		100.00		*0.00*	72.20		76.70		*.21*
Child's age (months)	57.61 (6.87)	46–70	56.50 (6.19)	47–69	*0.13*	53.74 (8.87)	35–71	56.83 (6.88)	41–68	*−1.70*
Child's gender (% boys)	55.55		50.00		*0.11*	53.50		50.00		*.09*
Child externalizing behavior	10.56 (7.67)	0–24	6.67 (4.00)	0–18	*1.91*	23.19 (9.17)	7–45	20.92 (7.98)	6–34	*1.16*
Child emotionality	13.44 (3.35)	9–21	11.67 (2.85)	5–16	*1.72*	18.05 (3.78)	10–25	17.50 (4.64)	7–25	*.57*
Child activity	15.50 (3.54)	10–23	14.28 (3.56)	8–21	*1.03*	17.93 (3.72)	10–25	17.92 (4.02)	10–25	*.01*
Child sociability	18.89 (3.51)	10–25	17.11 (4.24)	9–24	*1.37*	16.86 (4.08)	9–25	17.31 (4.18)	9–25	*−.48*
Child attention	17.33 (2.68)	13–21	16.61 (3.38)	11–24	*0.71*	14.52 (4.07)	6–25	15.31 (3.94)	6–22	*-.86*
Child soothability	18.17 (3.38)	11–24	16.50 (2.28)	11–20	*1.73*	13.76 (3.91)	5–22	13.44 (4.44)	6–22	*.33*

Note. There is no significant difference between the two groups. All variables are computed so that a high score in the table reflects a high level in the variable (e.g., high score of child externalizing behavior or high level of temperamental trait of emotionality).

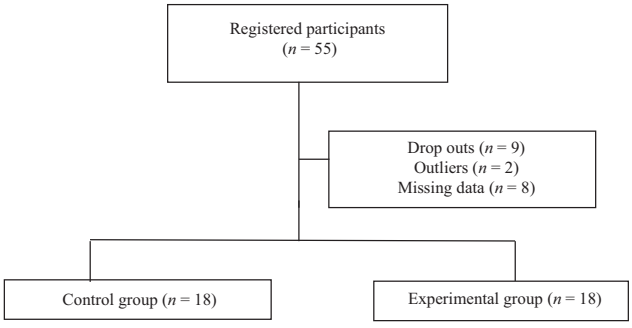

Figure 1. Flowchart of laboratory sample (Study 1) participants ($n = 36$).

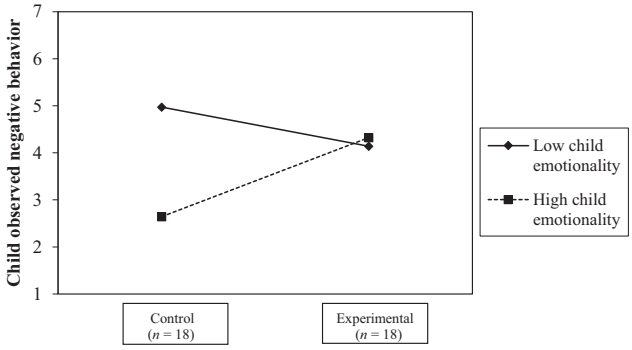

Figure 2. Graph on child differential sensitivity to parenting in the laboratory experiment (Study 1).

(Slagt et al., 2015a). Positive scales were only used to compare control and experimental groups at baseline.

Children's Observed Positive and Negative Behavior

Children's positive and negative behaviors were observed using the Crowell procedure. This method of observing caregiver–child interactions in a semi-structured play session has been widely used (Crowell & Feldman, 1988) and recently validated in French (Loop, Mouton, Brassart, & Roskam, 2016). Coding was done by two independent trained coders with an intercoder's reliability on 25% of the sample of .92. Children's behaviors in interaction with the parent were measured using the Crowell child scales. Positive affect (smiling and laughing), irritability (fighting, withdrawn behavior with anger, sulking), non-compliance (not listening to the parent's suggestions or requests), and aggression (verbal or physical) toward the parent, as well as persistence and enthusiasm toward the task, were coded on a seven-point Likert-type scale. A positive behavior score was computed by adding scores on the positive affect, enthusiasm, and persistence scales ($\alpha = .90$). A negative behavior scale was computed by adding scores on the irritability, non-compliance and aggression scales ($\alpha = .76$).

Children's Negative Externalizing Behavior Reported by the Parent

EB was measured with the preschool version of the Child Behavior Check-List or CBCL (Achenbach & Rescorla, 2000) using a three-point Likert scale. The EB scale encompasses attention problems and aggressive behavior scales. The CBCL is a widely used instrument and the psychometric properties of the initial version of the scale are good ($\alpha = .92$) and similar to the French version.

Analysis Strategy

A preliminary analysis consisted of comparing the experimental and control groups in study 1 and 2, with *t-tests* on socio-demographic, EB at baseline, and temperament measures (see Table 1). Next, a manipulation check was done on parental self-efficacy and parent behaviors (see Table 2) using analyses of variance (one-way ANOVA in the experiment and ANOVA for repeated measures in the intervention (Time × Condition) and Cohen's *d* for effect size. The main effect of the condition in both Study 1 and 2 on child observed and reported behaviors were also analyzed.

Table 2. Main Effect of Condition on Child and Parent Outcomes in Both Laboratory Experiment and Intervention.

	Laboratory experiment (Study 1) ($n = 36$)				Parenting intervention (Study 2) ($n = 78$)			
	F (1,36)	t (35)	95% CI	d	F (1,78)	t(77)	95% CI	d
Parental self-efficacy	n.a.	n.a.	n.a.	n.a.	14.95***	3.87	[.18, .57]	0.88
Parent's positive observed behavior	2.50	−1.58	[−2.79, .35]	0.53	9.36**	3.06	[.62, 2.95]	0.69
Parent's negative observed behavior	4.64*	2.15	[.03, .97]	0.72	.71	−.84	[−.53, .21]	0.19
Child's positive observed behavior	4.69*	−2.16	[−3.34, −.11]	0.72	.14	.38	[−.86, 1.27]	0.09
Child's negative observed behavior	1.28	1.13	[−.58, 2.02]	0.38	2.97	−1.72	[−2.64, .19]	0.40
Child externalizing behavior	n.a.	n.a.	n.a.	n.a.	.71	−.84	[−3.65, 1.48]	0.19

Note. ** $p < .01$; * $p < .05$; n.a.: not available; CI = Confidence Interval; d = Cohen's d. In the laboratory experiment, the analysis of variance, t-test, and CI are calculated for post-test measures between control and experimental groups. In the intervention, the analysis of variance (time x condition) is calculated with repeated measures (baseline and post-test) between control and experimental groups. T-test and CI are calculated on a difference score between post-test and baseline.

Third, we used a regression model to test whether difficult children (highly emotional or active) showed a greater response to parenting improvement than easier children. The outcomes were related to the child in both studies. Two models were tested: one for the child temperament trait of emotionality and the other for the temperament trait of activity using z scores for the variables and unstandardized coefficients for the analyses.

Fourth, a complementary analysis was done to measure the Regions of Significance of the interaction with respect to temperament, using Fraleys' application to probe interaction in differential susceptibility research (Roisman et al., 2012).

Study 1

Method

Study 1 sample was a self-selected convenience sample of 42 mothers with their 4-to 5-year-old preschoolers. It was selected to be a relatively well-functioning, non-clinical community sample and not considered to be at risk in terms of child's behavior, based on mothers' income and education. Eighteen dyads were randomly assigned to the experimental group and the other 18 to the control group, on a signing-up order basis. Two outliers were withdrawn from the sample because of the parent's gender (one father) or the child high EB score. There were missing data for eight participants because of technical video recording dysfunctioning and missing questionnaires on child temperament. These outliers and missing data were spread equally between the two groups (Figure 1).

In this laboratory experiment ($n = 36$), the procedure began with mothers filling in a questionnaire at home on their child behavior, temperament and their parenting practices. Then, they came once into the lab with their child and were randomly allocated to the experimental or control group. The experimental mothers were manipulated to improve their SEB based on Bandura's self-efficacy theory (1977), in which four sources of SEB were identified: positive experiences or performance accomplishment; verbal persuasion; vicarious experiences; and emotional states. A false positive feedback was given to mothers (verbal persuasion) by referring to their answers to the questionnaire filled in at home. The same comment was given to all mothers, irrespective of their actual answers. In this comment, their positive parenting and the positive development of their child were acknowledged (positive experiences) and compared to a fictive sample showing that these mothers were part of the 20% of parents that use the most positive parenting practices (vicarious experience). The control group did not receive any comment. After the manipulation, mothers of both experimental and control groups played with their child following a standardized procedure including free play and frustration tasks during 45 minutes (Crowell & Feldman, 1988).

In Study 1, the outcomes were twofold: child observed positive and negative behaviors at post-test. Child's EB reported by the parent was measured only at baseline and their observed behaviors only after parenting manipulation, as is usual in such experiments. More detailed information on this study can be found in Mouton and Roskam (2015).

The regression model used to test differential sensitivity included condition (control, experimental), child temperament (emotionality in Model 1, activity in Model 2) and interaction between condition and the temperament trait, as shown in Table 3.

Results and Discussion

First, comparison between experimental and control groups at the baseline revealed no difference on socio-demographic and temperament traits. Descriptive statistics and the results of *t-tests/* X^2 are presented in Table 1.

In Table 2, the main effects of the condition (control, experimental) are reported. Parent's negative observed behavior was significantly lower in the experimental group compared to the control group. No data was available on parental self-efficacy, which was measured only at pre-test to check for group comparison at baseline, and showed no difference between the two groups.

Concerning main effects on child's outcomes, the laboratory experiment in Study 1 improved positive observed behavior. No data were available on child negative behavior reported by the parent.

When testing the differential sensitivity hypothesis, the analysis showed that the full model that includes temperament, condition, and the interaction between temperament and condition explains between 23% and 35% of variance depending on the outcomes and the temperament trait (see in Table 3). Differential sensitivity is confirmed for the negative observed behavior based on negative emotionality. Activity was a significant predictor of both the positive and the negative observed behavior, but the interaction between activity and condition was not significant. Thus, only emotionality appears as a child sensitivity marker for the experimental reinforcement of parental self-efficacy.

Further analyses were conducted to clarify the interpretation of the significant interaction effect. Interaction between temperament

Table 3. Regression Models for Child's Observed Behaviors with Child Emotionality and Activity × Condition in Study 1.

	Laboratory experiment Study 1 ($n = 36$)					
	Child observed positive behavior			Child observed negative behavior		
	B	95% CI	R^2	*B*	95% CI	R^2
Model 1: Emotionality			.24			.23
Condition	−.70	[−1.51, .11]		.21	[−.41, .84]	
Emotionality	−.59	[−1.42, .24]		.54	[−.10, 1.18]	
Condition x emotionality	−.60	[−1.43, .23]		.63*	[−.01, 1.27]	
Model 2: Activity			.30			.35
Condition	−.70	[−1.45, .06]		.20	[−.36, .75]	
Activity	−.95*	[−1.71, –.18]		.96*	[.39, 1.52]	
Condition x activity	−.55	[−1.31, .22]		.55	[−.02, 1.11]	

Note. *$p < .05$; CI = Confidence Interval. Scores are measured at post-test. *B* are unstandardized coefficients.

and condition are represented in Figure 2 using www.jeremydawson.co.uk/slopes.htm internet interface.

Figure 2 shows that children with a low level of emotionality benefited more from the parental self-efficacy improvement than other children with a high level of emotionality. These children had slightly lower levels of negative observed behavior than children with higher emotionality in the experimental condition, compared to the control group. For children with higher emotionality, negative behavior was higher in the experimental group compared to the control group. They did not profit from the parenting improvement more than other children.

The Regions of Significance (*RoS*) with respect to child emotionality on observed child negative behavior in are between 1.65 and 13.79. This means that the regression of negative behavior on Condition is significant for all values of Emotionality that fall between these values. Given that the lower bound value is between +/− 2 standard deviations from the mean and the upper bound value is not, only the lower bound is considered informative. Therefore, it can be concluded that parenting is significantly associated with child negative observed behavior with scores at or above 1.65 on emotionality, which is a low level of emotionality. The Proportion of the Interaction ($PoI = 0.86$) indicates that the interaction is mostly significant for children with low levels of emotionality in the control group, at the left side of the graph (Figure 2), where parental self-efficacy is on the "for worse" side or at least not improved. The cross-over point is located on the right side of the graph, related to the experimental group and the Proportion Affected index (*PA*) is .80.

In sum, the experiment in Study 1 showed that improving parental SEB had an effect on child behavior and this effect was different according to the child's emotionality. Children with low level of emotionality benefited more from an improvement in their parent's SEB.

Study 2

Method

The sample in Study 2 consisted of 78 self-referred parents with 3- to 6-year-old preschoolers, at-risk or with clinical scores of EB (see flow of participants in Figure 3). Parents registered for Study 2 by filling in an online questionnaire on their child behavior and socio-demographics. A hundred and five had to be excluded because the child displayed a low level of EB, a developmental delay, a low IQ, or did not speak French. Fifty-six parents were randomly allocated to another intervention tested in the H2M research. Forty-seven parents were quasi-randomly assigned to a waiting list control group, on the basis of their enrolment order. Three parents dropped out, and 42 valid cases were finally considered for control data analyses after excluding one outlier and one missing data on child temperament. After the eight-week waiting period, the experimental group was composed of 36 parents: 24 from the former control group and 16 parents who enrolled later in the recruitment process. There were no drop-outs between baseline and follow-up; parents attended at least 80% of the program sessions and all pre-post assessments.

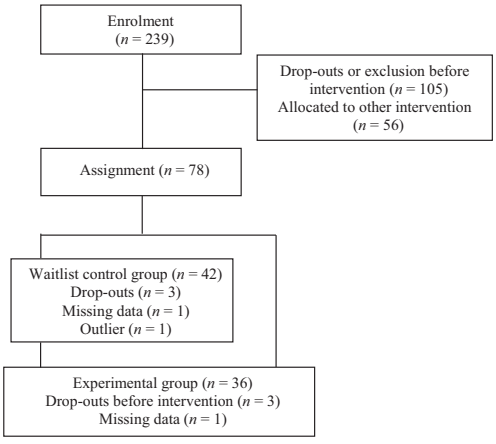

Figure 3. Flowchart of intervention (Study 2) sample participants ($n = 78$).

The intervention consisted of eight weekly group sessions focusing on parental self-efficacy. In this theory-based focused intervention, exercises were based on the four sources of self-efficacy documented by Bandura: focus on positive parenting experiences, use vicarious experiences to compare oneself to others and normalize difficulties with the child, receive positive feedback through verbal persuasion from the group, and identify and anticipate negative emotional states and automatic thoughts.

In Study 2, the outcomes were child-observed positive behavior and child-observed negative behavior with an additional outcome

Table 4. Regression models for child's observed and reported behaviors with child emotionality and activity x condition in Study 2.

	Parenting intervention Study 2 ($n = 78$)								
	Child observed positive behavior			Child observed negative behavior			Child reported negative behavior		
	B	95% CI	R^2	*B*	95% CI	R^2	*B*	95% CI	R^2
Model 1: Emotionality			.11			.19			.63
Baseline level	.23*	[.04, .42]		−.31**	[−.49, –.12]		.70***	[.55, .84]	
Condition	−.17	[−.57, .22]		.28	[−.10, .66]		.65	[−.50, 1.79]	
Emotionality	−.23	[−.63, .17]		.18	[−.20, .56]		.59	[−.67, 1.83]	
Condition x emotionality	−.16	[−56, .24]		−.08	[−.46, .30]		−1.15*	[−2.31, .00]	
Model 2: Activity			.12			.08			.62
Baseline level	.21*	[.01, .42]		−.16	[−.37, .04]		.67***	[.52, .82]	
Condition	−.19	[−.58, .20]		.35	[−.05, .75]		.74	[−.43, 1.19]	
Activity	−.23	[−.65, .20]		−.04	[−.47, .38]		.90	[−.39, 2.19]	
Condition x activity	.22	[−.19, .62]		-.02	[−.43, .39]		-.18	[−1.34, .98]	

Note. ***$p < .000$; **$p < .01$; $p < .05$. CI = Confidence Interval. Scores are measured at post-test. β are unstandardized coefficients.

for child negative EB reported by the parent. All these child outcomes (observed and parent-reported) were measured at baseline and post-test. More detailed information on Study 2 can be found in Roskam et al. (2015).

The regression model used to test differential sensitivity included condition (control, experimental), child temperament (emotionality in Model 1, activity in Model 2) and interaction between condition and the temperament trait, as in Study 1. The baseline level of negative behavior reported by the parent was also included in the model to take into account the initial severity of the child EB in this at-risk and clinical sample (see Table 4).

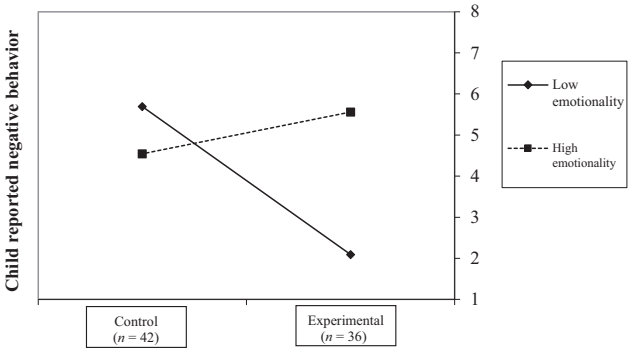

Figure 4. Graph on child differential sensitivity to parenting in the parenting intervention (Study 2).

Results and Discussion

First, comparison between experimental and control groups at the baseline revealed no difference on socio-demographic and temperament traits. Descriptive statistics and the results of *t-tests/* X^2 are presented in Table 1.

Second, the manipulation check (see in Table 2) showed that parent's positive observed behavior was improved significantly between pretest and post-test and parental self-efficacy increased significantly more in the experimental group than in the control group. The intervention had a main effect on child negative behavior that tended to be reduced.

When testing the differential sensitivity hypothesis in the intervention (see Table 4), the full model including emotionality and condition, over and above EB initial severity, significantly explains 11% in positive observed behavior, 19% of variance in negative observed behavior and 63% of the variance in negative EB reported by the parent. With activity, 12%, 8%, and 62% of variance are explained respectively. For observed negative and positive behavior, higher EB initial severity predicts a higher improvement in observed behavior both in emotionality and activity models, as found in other studies (Leijten, Raaijmakers, Orobio de Castro, & Matthys, 2013; Lundahl et al., 2006). Here again, a differential sensitivity is found for negative emotionality with respect to negative EB reported by parents. This means that highly emotional children tended to respond differently to the parenting intervention than children low in negative emotionality.

To clarify the interpretation of the significant interaction effect between temperament and condition, further analyses were conducted and represented in Figure 4. Children with a low level of emotionality benefited more from their parents' self-efficacy improvement than children with a higher level of emotionality. The negative behavior reported by their parent was lower for children whose parent was in the experimental group and participated to the parenting intervention, in comparison with the control group.

The *RoS* with respect to child emotionality on child negative behavior reported by the parent in this intervention are between -336.78 and -0.58. This means that the regression of negative behavior on Condition is significant for all values of Emotionality that fall inside this region. Given that the upper bound value is between +/– 2 standard deviations to the mean and the lower bound value is not, only the upper bound is considered here informative. Therefore, it can be concluded that parenting is significantly associated to the child EB for children with scores at or above -.58 on

emotionality, which is a low level. Additional analyses indicate that the interaction is mostly significant for low level of emotionality for children in the experimental condition as shown by the *PoI* ($PoI = 0.26$), which is located at the right side of the cross-over point for the interaction, with a Proportion Affected index (*PA*) of .31 (see Figure 4).

Here again, a child differential sensitivity was found in this intervention study based on emotionality. Children with a low level of emotionality tended to respond better to the parenting intervention than children with a high level of negative emotionality.

Summary and Concluding Discussion

The aim of this study was to test differential child sensitivity to a parental self-efficacy improvement implemented in two micro-trials. The strengths of this study are the use of a multi-method and multi-informant assessment of child behaviors, as well as stringent tests on differential sensitivity to parenting. Also, the samples analyzed here cover both non-clinical and clinical children for EB. The focus of the parenting modification on the cognition of self-efficacy, using a micro-trial design, is also an asset.

The results confirm the hypothesis that children display differential sensitivity to a parental self-efficacy improvement both in the laboratory experiment and in the intervention on the basis of their level of emotionality. First, both in the laboratory experiment (Study 1) and in the intervention (Study 2), negative emotionality appears to be a sensitivity marker for the negative outcome (the dark side), as found in other research (Slagt et al., 2015a). The results did not show a differential sensitivity on the basis of the temperament trait of child activity. This confirms earlier research on child temperament traits showing that emotionality is a better marker than activity, surgency, or effortful control (Slagt et al., 2016).

Second, differential sensitivity in both micro-trials did not confirm our hypothesis that children with higher levels of emotionality would benefit more from the parental self-efficacy improvement. Results show that children with a lower level of emotionality profited more from their parents' enhanced self-efficacy.

Third, differential sensitivity to improved parental self-efficacy, based on child emotionality, was found only on the negative outcome of the child. Children with low levels of emotionality reduced their negative behavior observed and reported by the parents after the parental self-efficacy improvement but they did not increase their positive behavior. This "dark side" effect, compared to the "bright side" effect when child positive outcome is increased, has been found in other studies, as described in the meta-analysis by Slagt and colleagues (2016) .

Fourth, we expected differences in child sensitivity to parental self-efficacy improvement between the laboratory experiment (Study 1) and the parenting intervention (Study 2) because of the samples' composition and of the duration of parenting improvement. The laboratory experiment was tested with typically developing children, whereas intervention was designed for parents of children at-risk (based on education and income levels) or clinical for EB. The parenting manipulation was also different in the laboratory and intervention settings. Whereas, in laboratory experiment (Study 1), manipulation took only 45 minutes, the intervention (Study 2) manipulation consisted of 12-hour group session spread over eight weeks. But child emotionality did not affect differently the relation between parenting improvement and child behavior when the intervention lasted longer. The only difference found between the two micro-trials lies in the level of parental self-efficacy at which we see a differential sensitivity of the child. In the short term experiment (Study 1) with typically developing children, temperament affects more children of the control group for which parental self-efficacy is not improved than children from the experimental group. In contrast, in the long term intervention (Study 2), temperament is mostly influential on children of parents belonging to the experimental group, with a "for better" effect. These varied results remain exploratory and would need replication.

Concerning the unexpected direction of sensitivity showing that less emotional children benefited more from an improved parental self-efficacy, there are several possible explanations. In the intervention (Study 2), parents of less emotional children see a larger decrease in EB than parents of high emotional children after the intervention. Here, the proximity between the symptom (negative behavior measured by CBCL) and the temperament trait of negative emotionality might explain this effect. Some items of the CCTI are similar to the items of the CBCL, measuring behavioral expressions of temperament. This is illustrated by the fact that EB reported by parents at baseline is significantly correlated with difficult temperament traits both in the experiment ($r = .60$) and in the intervention ($r = .36$).

This unexpected finding regarding the direction might be also explained by the cognitive nature of the intervention that focuses on parental self-efficacy. This is unusual compared to most parenting interventions focusing on coaching parents on child-rearing practices, as discussed in a recent meta-analytic review of parenting interventions for preschoolers (Mouton, Loop, Stievenart, & Roskam, in press). Parental self-efficacy manipulation may not affect children in the same way as other behavioral or cognitive-behavioral parenting interventions. Parents who became more confident may be less self-centered or concerned with doubts about their parenting and be more attentive to their child. This increased positive attention would be particularly beneficial for quieter children, with lower levels of emotionality, because they usually attract less attention from their parents than children with higher levels of emotionality. This differential sensitivity would be visible in the child's observed behavior. Concerning the child's EB reported by the parent, it could be that the normalization cognitive process at stake in the intervention leads parents to assess their child's EB in a less negative way when the child is less emotional. When comparing his child with others during the intervention, the parent may modify positively his representation of the child, even more for easier children who appear less difficult than other children described by the other parents. The vicarious experience would affect particularly parents' representation of easier children.

It is also possible that some of these children are not the easier ones, as implied in the temperament literature. Some of these children may share some similar characteristics with cold, oppositional, and negative children, such as Callous-Unemotional (CU) profiles. These children express shallow affects and show reduced empathy and remorselessness. They have been found to be less responsive to usual behavioral parenting programs (Högström, Enebrink, & Ghaderi, 2013). Even though CU profiles have their specificity, in particular the callous dimension with low empathy and guilt which does not overlap with negative emotionality, it would be interesting to further explore if these children displaying high CU traits may be more receptive to a cognitive parenting intervention such as the one on parental self-efficacy analyzed in this study.

Eventually, results show that micro-trials improving parental self-efficacy affect more the easier children in terms of temperament than the more difficult ones. These could also show a vantage resistance of highly emotional children to an improved parental self-efficacy. These children may be less receptive to more parental positive attention because they already receive this attention thanks to their difficult temperament. They may express regular negative emotions such as cries or screams that elicit parent's attention and gain secondary benefits this way. A change in the parent may not be comfortable for them as they could lose this special position toward their parent.

Although this unexpected direction of susceptibility found in this study raises questions, it is not the first time that contrasting findings have been found in susceptibility studies (Slagt et al., 2016; Weeland et al., 2015). For instance, several studies found higher effect size of positive parenting on externalizing behavior of children with a lower level of emotionality compared to children with higher levels (Burk et al., 2011; Hill et al., 2010; Leerkes, Blankson, & O'Brien, 2009).

Another interesting result comes from the *RoS* analysis showing that the interaction between emotionality and parenting condition is significant for the control group in the laboratory experiment (Study 1). Children were more sensitive to a non-improved parental self-efficacy than to an improved parental self-efficacy in the experimental group. This negative effect of negative temperament would disappear when parenting is improved. Temperament literature shows that children with difficult temperament, regardless of their EB level, display more negative behavior. It may be that the laboratory manipulation in Study 1, by improving parental self-efficacy, smoothed or protected the negative effect of a difficult temperament trait.

In the intervention for the at-risk and clinical sample (Study 2), the differential sensitivity is inversed between control and experimental groups. It was mostly significant for the experimental group receiving the intervention, compared to the control group. Children were more sensitive to a parenting improvement which shows a clear differential sensitivity, for the better.

Replication would be necessary to confirm these tentative conclusions. Yet, results confirm the added-value of micro-trial studies in improving our understanding of what works, how and for whom in parenting intervention (Stoltz et al., 2013). It provides insight on *specific* parenting variables to manipulate. It may show here a specific effect of the modification of a cognitive parenting variable, compared to most parenting interventions that focus on the short-term modification of parenting behavior. In such programs, it is not possible to disentangle effects according to what is worked with the parents during the program (cognitive or behavioral elements), as shown in a recent meta-analytic review (Mouton et al., in press). Yet, the relation between parental self-efficacy and parental behaviors may not be as linear as it used to be described in literature. Recently, research has shown that this relation is probably more curvilinear than linear (Wilson, Gettings, Guntzviller, & Munz, 2014). Some parents may behave positively but lack self-efficacy and, inversely, some maltreating parents probably feel strong about themselves as parents. In the current study, parents were volunteers to participate to the experiment or to the parenting intervention. In the experiment (Study 1), families came from high SES backgrounds. In the intervention (Study 2), families came for help with their child. Therefore, we expected the proportion of parents combining both high self-efficacy and poor parenting to be limited.

Clinical Implications

Testing a differential sensitivity hypothesis based on temperament measures can contribute to the identification regarding which intervention is most beneficial to which type of children. This knowledge can be useful for tailoring interventions by identifying clinical priorities according to child's temperament as an indication of the child's potential response to parental change. If clinicians know that highly emotional or active children will not benefit from the SEB intervention as much as others, they could opt for a longer or more intense version of the intervention (Matthys, Vanderschuren, Schutter, & Lochman, 2012) or a parenting intervention with a behavioral approach that may be more suited for them, or even an intervention on the child directly.

Limitations and Further Research

This study has several limitations. First, the reduced size of its sample, due to the experimental and intervention nature of the two studies, limits regression and interaction analyses. Second, the measurement of child temperament, though widely used to test sensitivity, has some drawbacks. It is closely correlated with some CBCL items measuring EB symptomatology as discussed earlier, creating an overlap between one of the outcomes and the moderator and leading to a possible overestimation of the moderating role of temperament. Furthermore, temperament is not as stable as it is considered to be in the literature (Van Den Akker, Deković, Prinzie, & Asscher, 2010). This is particularly true for preschoolers who have already interacted with their parents countless times. Temperament may be a better marker at early age, in infancy in particular, than later on. Future research could take into account the role played by parents' own temperament. Less studied in literature so far, it could contribute to an understanding of the dynamics of the dyad, in a goodness-of-fit perspective (Thomas & Chess, 1985). We could put forward a vantage sensitivity hypothesis for parents with a high level of anger-emotionality, for instance (Slagt, Dubas, Denissen, Deković, & van Aken, 2015b). Sociability could also be a key temperament trait to be investigated

In spite of these shortcomings, this study contributes to parenting intervention research by assessing sensitivity in both negative and positive child outcomes in two micro-trials. The fact that this study did identify possible child sensitivity to parental self-efficacy in an unexpected direction calls for further investigation and replication. It confirms that micro-trials could be a way forward by looking at specific interaction effects of specific mechanisms on specific positive or negative outcomes, using a multi-method and multi-informant design.

Acknowledgments

Sponsors provided rewards to the participants. Special thanks to Maja Deković and Meike Slagt for their support in the finalization of this article. All underlying research materials related to this paper can be accessed by request to the first author.

Declaration of Conflicting Interests

Both authors certify that they have no conflict of interest.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This

research was supported by Belgian Fund for Scientific Research (Grant 95348) awarded to Bénédicte Mouton and Coordinated research action on externalizing behavior (Grant ARC11/16–038) awarded to Laurie Loop.

References

Achenbach, T., & Rescorla, L. (2000). *Manual for the ASEBA preschool forms & profiles*. Burlington: University of Vermont, Research Center for Children, Youth, & Families.

Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2015). The hidden efficacy of interventions: Gene×environment experiments from a differential susceptibility perspective. *Annual Review of Psychology*, *66*, 381–409.

Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., Pijlman, F. T. A., Mesman, J., & Juffer, F. (2008). Experimental evidence for differential susceptibility: Dopamine D4 receptor polymorphism (DRD4 VNTR) moderates intervention effects on toddlers' externalizing behavior in a randomized controlled trial. *Developmental Psychology*, *44*, 293–300.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.

Barlow, J., Coren, E., & Stewart-Brown, S. (2002). Meta-analysis of the effectiveness of parenting programmes in improving maternal psychosocial health. *British Journal of General Practice*, *52*, 223–233.

Beauchaine, T. P., Webster-Stratton, C., & Reid, M. J. (2005). Mediators, moderators, and predictors of 1-year outcomes among children treated for early-onset conduct problems: A latent growth curve analysis. *Journal of Consulting and Clinical Psychology*, *73*, 371–388.

Belsky, J., & Pluess, M. (2009). Beyond diathesis stress: Differential susceptibility to environmental influences. *Psychological Bulletin*, *135*, 885–908.

Belsky, J., & van Ijzendoorn, M. H. (2015). What works for whom? Genetic moderation of intervention efficacy. *Development and Psychopathology*, *27*, 1–6.

Bor, W., Sanders, M., & Markie-Dadds, C. (2002). The effects of the triple P-positive parenting program on preschool children with co-occurring disruptive behavior and attentional/hyperactive difficulties. *Journal of Abnormal Child Psychology*, *30*, 571–587.

Bornstein, M. H., & Manian, N. (2013). Maternal responsiveness and sensitivity reconsidered: Some is more. *Development and Psychopathology*, *25*, 957–971.

Bugental, D. B., & Johnston, C. (2000). Parental and child cognitions in the context of the family. *Annual Review of Psychology*, *51*, 315–344.

Burk, L. R., Armstrong, J. M., Goldsmith, H. H., Klein, M. H., Strauman, T. J., Costanzo, P., & Essex, M. J. (2011). Sex, temperament, and family context: How the interaction of early factors differentially predict adolescent alcohol use and are mediated by proximal adolescent factors. *Psychology of Addictive Behaviors*, *25*, 1–15.

Caspi, A., McClay, J., Moffitt, T., Mill, J., Martin, J., Craig, I. W., & . . . Poulton, R. (2002). Role of genotype in the cycle of violence in maltreated children. *Science*, *297*, 851–854.

Cassé, J., Oosterman, M., & Schuengel, C. (2015). Verbal persuasion and resilience of parenting self-efficacy: Preliminary findings of an experimental approach. *Family Science*, *6*, 23–30.

Cassidy, J., Woodhouse, S. S., Sherman, L. J., Stupica, B., & Lejuez, C. W. (2011). Enhancing infant attachment security: An examination of treatment efficacy and differential susceptibility. *Development and Psychopathology*, *23*, 131–148.

Chhangur, R. R., Weeland, J., Overbeek, G., Matthys, W., Orobio de Castro, B., van der Giessen, D., & Belsky, J. (2016). Genetic moderation of intervention efficacy: Dopaminergic genes, the incredible years, and externalizing behavior in children. *Child Development*. Epub ahead of print 15 September 2016. doi: 10.1111/cdev.12612.

Coleman, P. K., & Karraker, K. H. (2003). Maternal self-efficacy beliefs, competence in parenting, and toddlers' behavior and developmental status. *Infant Mental Health Journal*, *24*, 126–148.

Crowell, J. A., & Feldman, S. S. (1988). Mothers' internal models of relationships and children's behavioral and developmental status: A study of mother–child interaction. *Child Development*, *59*, 1273.

De Pauw, S. S. W., Mervielde, I., & Van Leeuwen, K. G. (2009). How are traits related to problem behavior in preschoolers? Similarities and contrasts between temperament and personality. *Journal of Abnormal Child Psychology*, *37*, 309–325.

Deković, M., Asscher, J. J., Hermanns, J., Reitz, E., Prinzie, P., & Akker, A. (2010). Tracing changes in families who participated in the Home-Start parenting program: Parental sense of competence as mechanism of change. *Prevention Science*, *11*, 263–274.

Ellis, B. J., & Boyce, W. T. (2011). Differential susceptibility to the environment: Toward an understanding of sensitivity to developmental experiences and context. *Development and Psychopathology*, *23*(01), 1–5.

Gaviţa, O. A., Joyce, M. R., & David, D. (2011). Cognitive behavioral parent programs for the treatment of child disruptive behavior. *Journal of Cognitive Psychotherapy*, *25*, 240–256.

Gilissen, R., Bakermans-Kranenburg, M. J., van Ijzendoorn, M. H., & van der Veer, R. (2008). Parent–child relationship, temperament, and physiological reactions to fear-inducing film clips: Further evidence for differential susceptibility. *Journal of Experimental Child Psychology*, *99*, 182–195.

Goldsmith, H. H., Buss, A. H., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., . . . McCall, R. B. (1987). What is temperament? Four approaches. *Child Development*, *58*, 505–529.

Hill, K. G., Hawkins, J. D., Bailey, J. A., Catalano, R. F., Abbott, R. D., & Shapiro, V. B. (2010). Person–environment interaction in the prediction of alcohol abuse and alcohol dependence in adulthood. *Drug and Alcohol Dependence*, *110*(1–2), 62–69.

Högström, J., Enebrink, P., & Ghaderi, A. (2013). The moderating role of child callous-unemotional traits in an Internet-based parent-management training program. *Journal of Family Psychology*, *27*, 314–323.

Howe, G. W., Beach, S. R. H., & Brody, G. H. (2010). Microtrial methods for translating gene-environment dynamics into preventive interventions. *Prevention Science*, *11*, 343–354.

Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, *36*, 567–589.

Klein Velderman, M., Bakermans-Kranenburg, M. J., Juffer, F., & van Ijzendoorn, M. H. (2006). Effects of attachment-based interventions on maternal sensitivity and infant attachment: Differential susceptibility of highly reactive infants. *Journal of Family Psychology*, *20*, 266–274.

Leerkes, E. M., Blankson, A. N., & O'Brien, M. (2009). Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. *Child Development*, *80*, 762–775.

Leijten, P., Dishion, T. J., Thomaes, S., Raaijmakers, M. A. J., Orobio de Castro, B., & Matthys, W. (2015). Bringing parenting interventions back to the future: How randomized microtrials may benefit

parenting intervention efficacy. *Clinical Psychology: Science and Practice*, *22*, 47–57.

Leijten, P., Raaijmakers, M. A. J., Orobio de Castro, B., & Matthys, W. (2013). Does socioeconomic status matter? A meta-analysis on parent training effectiveness for disruptive child behavior. *Journal of Clinical Child & Adolescent Psychology*, *42*, 384–392.

Leijten, P., Thomaes, S., Orobio de Castro, B., Dishion, T. J., & Matthys, W. (2016). What good is labeling what's good? A field experimental investigation of parental labeled praise and child compliance. *Behaviour Research and Therapy*, *87*, 134–141.

Loop, L., Mouton, B., Brassart, E., & Roskam, I. (2016). The observation of child behavior during parent–child interaction: The psychometric properties of the Crowell procedure. *Journal of Child and Family Studies*. Epub ahead of print 07 December 2016. doi: 10.1007/s10826-016-0625-0.

Loop, L., & Roskam, I. (2016). Do children behave better when parents' emotion coaching practices are stimulated? A micro-trial study. *Journal of Child and Family Studies*.

Lundahl, B., Risser, H. J., & Lovejoy, M. C. (2006). A meta-analysis of parent training: Moderators and follow-up effects. *Clinical Psychology Review*, *26*, 86–104.

Mah, J. W. T., & Johnston, C. (2008). Parental social cognitions: Considerations in the acceptability of and engagement in behavioral parent training. *Clinical Child and Family Psychology Review*, *11*, 218–236.

Matthys, W., Vanderschuren, L. J. M. J., Schutter, D. J. L. G., & Lochman, J. E. (2012). Impaired neurocognitive functions affect social learning processes in oppositional defiant disorder and conduct disorder: Implications for interventions. *Clinical Child and Family Psychology Review*, *15*, 234–246.

Menting, A. T. A., Orobio de Castro, B., & Matthys, W. (2013). Effectiveness of the Incredible Years parent training to modify disruptive and prosocial child behavior: A meta-analytic review. *Clinical Psychology Review*, *33*, 901–913.

Mouton, B., Loop, L., Stievenart, M., & Roskam, I. (in press). Parenting programs to reduce preschoolers' externalizing behavior: A meta-analytic review of their behavioral or cognitive components. *Child and Family Behavior Therapy*.

Mouton, B., & Roskam, I. (2015). Confident mothers, easier children: A quasi-experimental manipulation of mothers' self-efficacy. *Journal of Child & Family Studies*, *24*, 2485–2495.

Patterson, G. R., Forgatch, M. S., & DeGarmo, D. S. (2010). Cascading effects following intervention. *Development and Psychopathology*, *22*, 949–970.

Pluess, M., & Belsky, J. (2010). Children's differential susceptibility to effects of parenting. *Family Science*, *1*(1), 14–25.

Pluess, M., & Belsky, J. (2013). Vantage sensitivity: Individual differences in response to positive experiences. *Psychological Bulletin*, *139*, 901–916.

Roisman, G. I., Newman, D. A., Fraley, R. C., Haltigan, J. D., Groh, A. M., & Haydon, K. C. (2012). Distinguishing differential susceptibility from diathesis–stress: Recommendations for evaluating interaction effects. *Development and Psychopathology*, *24*, 389–409.

Roskam, I., Brassart, E., Loop, L., Mouton, B., & Schelstraete, M. A. (2015). Stimulating parents' self-efficacy beliefs or verbal responsiveness: Which is the best way to decrease children's externalizing behaviors? *Behaviour Research and Therapy*, *72*, 38–48.

Rothbart, M. K., & Bates, J. E. (2006). *Temperament handbook of child psychology: Vol. 3, Social, emotional, and personality development* (6th ed., pp. 99–166). Hoboken, NJ: John Wiley & Sons .

Rowe, D. C., & Plomin, R. (1977). Temperament in early childhood. *Journal of Personality Assessment*, *41*, 150–156.

Sameroff, A. J. (2009). The transactional model. In A. Sameroff (Ed.), *The transactional model of development: How children and contexts shape each other* (pp. 3–21). Washington, DC: American Psychological Association.

Scott, S., & O'Connor, T. (2012). An experimental test of differential susceptibility to parenting among emotionally-dysregulated children in a randomized controlled trial for oppositional behavior. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *53*, 1184–1193.

Serketich, W. J., & Dumas, J. E. (1996). The effectiveness of behavioral parent training to modify antisocial behavior in children: A meta-analysis. *Behavior Therapy*, *27*, 171–186.

Slagt, M., Dubas, J., & van Aken, M. A. G. (2015a). Differential susceptibility to parenting in middle childhood: Do impulsivity, effortful control and negative emotionality indicate susceptibility or vulnerability? *Infant and Child Development*. doi: 10.1002/icd.1929

Slagt, M., Dubas, J. S., Deković, M., & van Aken, M. A. G. (2016). Differences in sensitivity to parenting depending on child temperament: A meta-analysis. *Psychological Bulletin*, *142*, 1068–1110.

Slagt, M., Dubas, J. S., Denissen, J. J. A., Deković, M., & van Aken, M. A. G. (2015b). Personality traits as potential susceptibility markers: Differential susceptibility to support among parents. *Journal of Personality*, *83*, 155–166.

Sofronoff, K., & Farbotko, M. (2002). The effectiveness of parent management training to increase self-efficacy in parents of children with Asperger syndrome. *Autism*, *6*, 271–286.

Stoltz, S., Deković, M., van Londen, M., Orobio de Castro, B., & Prinzie, P. (2013). What works for whom, how and under what circumstances? Testing moderated mediation of intervention effects on externalizing behavior in children. *Social Development*, *22*, 406–425.

Thomas, A., & Chess, S. (1985). Genesis and evolution of behavioral disorders: From infancy to early adult life. *The American Journal of Psychiatry*, *141*(1), 1–9.

Van Den Akker, A. L., Deković, M., Prinzie, P., & Asscher, J. J. (2010). Toddlers' temperament profiles: Stability and relations to negative and positive parenting. *Journal of Abnormal Child Psychology*, *38*, 485–495.

van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., & Ebstein, R. P. (2011). Methylation matters in child development: Toward developmental behavioral epigenetics. *Child Development Perspectives*, *5*, 305–310.

van Zeijl, J., Mesman, J., Stolk, M. N., Alink, L. R. A., van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., ... Koot, H. M. (2007). Differential susceptibility to discipline: The moderating effect of child temperament on the association between maternal discipline and early childhood externalizing problems. *Journal of Family Psychology: JFP: Journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *21*, 626–636.

Weeland, J., Slagt, M., Brummelman, E., Matthys, W., Orobio de Castro, B., & Overbeek, G. (2015). 5-HTTLPR expression outside the skin: An experimental test of the emotional reactivity hypothesis in children. *PLoS One*, *10*(11).

Wilson, S. R., Gettings, P. E., Guntzviller, L. M., & Munz, E. A. (2014). Parental self-efficacy and sensitivity during playtime interactions with young children: Unpacking the Curvilinear Association. *Journal of Applied Communication Research*, *42*, 409–431.

Wyatt Kaminski, J., Valle, L., Filene, J., & Boyle, C. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, *36*, 567–589.