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Self- and Co-regulation of Anger and Fear in Preschoolers with Autism Spectrum Disorders: The Role of Maternal Parenting Style and Temperament

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Abstract Emotion regulation (ER) difficulties are a major concern in children with autism spectrum disorder (ASD). Maternal temperament and parenting style have significant effects on children's ER. However, these effects have not been studied in children with ASD. Forty preschoolers with ASD and their mothers and forty matched controls engaged in fear and anger ER paradigms, micro-coded for child self- and co-regulatory behaviors and parent's regulation-facilitation. Mothers' parenting style and temperament were self-reported. In the ASD group only, maternal authoritarian style predicted higher self-regulation and lower co-regulation of anger and maternal authoritative style predicted higher self-regulation of fear. Maternal temperament did not predict child's ER. Findings emphasize the importance of maternal flexible parenting style in facilitating ER among children with ASD.

Keywords Autism spectrum disorder · Preschool children · Emotion regulation · Parenting style · Maternal temperament

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Introduction

The ability to regulate one's emotions plays an important role in the socio-emotional development of young children (Calkins and Mackler 2011; Grolnick et al. 2005). Emotion regulation (ER) is defined as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions… to accomplish one's goal" (Thompson 1994). In this definition, intrinsic processes refer to self-directed, or self-oriented, regulation processes. These are evident from early development and become more goal oriented with age, as a result of neurophysiological maturation and internalization of parental regulation facilitation. Simple behaviors aiming for self regulation, such as thumb sucking and gaze aversion emerge early in infancy as means of self-calming and reducing emotional reactivity (Stifter and Braungart 1995). Other physical self-soothing behaviors, such as rhythmic or repetitive manipulation of the body, are observed during the first year (Tronick 1989). By toddlerhood, a continuum of self-regulation strategies was found to reduce negative emotionality: focused attention in the arousing stimulus, engaging in physical comfort behaviors or verbalization, shifting attention from the arousing stimulus, and actively engaging with a different object (Grolnick et al. 1996). By preschool age, more sophisticated self-regulatory strategies include shifting attention towards active engagement in symbolic play and a reappraisal of the situation (Feldman et al. 2011; Morris et al. 2011).

Extrinsic processes of ER focus on mutual, or co-regulation of emotion, occurring during social interaction, and reliance on external agents, such as parents. Whereas during infancy regulation is initiated more often by the parent, emotion co-regulatory processes become more reciprocal with age (Feldman et al. 1999). As with self-

regulation, the use of co-regulatory strategies gradually develops with maturation of the child's capacities: from the use of social gaze at the parent (Feldman et al. 1999), towards active seeking of parental closeness and physical comfort (Feldman et al. 2011; Raver 1996), and later to seeking support from a parent by engaging in symbolic play with the parent as a mean of distraction, or verbally asking for parental assistance (Roben et al. 2013).

As described above, parents have a unique role in the development of their child's ER capacities. They support the development of their child's ER through a variety of tactics, including synchronization of their behavior with the child's (Feldman 2007a), modeling specific behavioral and verbal strategies, and helping children move from physical comforting strategies to those involving explanation, reflection, and symbolization (Morris et al. 2011). Throughout development, the child gradually shifts from complete reliance on parental regulation to regulating her own emotions (Mangelsdorf et al. 1995; Rothbart et al. 2011). Nevertheless, the child continues to relate to the parent for support in the management, control, and facilitation of ER capacities even when self-regulatory mechanisms mature (Dumas et al. 1995; Morris et al. 2011).

Processes of ER are formed by reciprocal relationship between parent and child and thus may be compromised by both parental and child's risk factors, such as in the case of children with an autism spectrum disorder (ASD). Children with ASD are characterized by deficits in social communication (American Psychiatric Association 2013), and are therefore expected to experience difficulties in relying on others as a source of comfort or reevaluation of the situation in emotionally arousing situations. In addition, restricted and repetitive behavior patterns, characteristic of ASD, make children with ASD less flexible in modulating their own emotions (Mazefsky et al. 2013). Indeed, difficulties in self-regulation of emotion, albeit not diagnostic, have been reported in children with ASD (Jahromi et al. 2012), yet, self and co-regulation of emotion in children with ASD remains an under-studied topic (Mazefsky et al. 2012). From the few studies assessing co-regulatory processes in children with ASD and their mothers (Gulsrud et al. 2010), it appears that maternal immediate regulation facilitation is associated with self-comforting behavior in toddlers with ASD. In addition, we recently reported that maternal, but not paternal, presence is linked to improved regulation of negative emotion in children with ASD (Hirschler-Guttenberg et al. 2014). These reports focus on immediate maternal responses to the child during the interaction. Here, we wish to extend current research and explore the role of maternal temperament and parenting style in supporting the child's self and co-regulation of negative emotions during challenging situations. We compare, for the first time, the contribution of maternal

factors to the regulation of two negative emotions—anger and fear—which, although similar in valence, differ in relation to level of arousal and in approach versus avoidance orientation.

The regulation of negative emotionality is of special importance when attempting to predict future psychopathology. Anger and fear dysregulation in the preschool years have been shown to predict later externalizing and internalizing symptomatology, respectively (Morris et al. 2010; Rydell et al. 2003). Fear and anger have also been shown to elicit different regulatory behaviors (Buss and Goldsmith 1998). Recent studies demonstrate that children with ASD struggle with self-regulation of anger (Jahromi et al. 2012) and fear (Hirschler-Guttenberg et al. 2014), but a comparative examination of the regulatory behaviors used for each emotion has not been conducted. Recently, it was suggested that ER difficulties in children with ASD underlie the externalizing and internalizing symptoms, found to be more common in this group (Rieffe et al. 2011, 2012). Such symptoms are characteristic of various psychopathologies, such as oppositional-defiant and anxiety disorders (Mazefsky et al. 2013; Mazefsky and White 2014). Therefore, it is important to examine emotion regulation in ASD in both fear and anger provoking situations. To our knowledge, no study has compared regulatory response to situations that elicit the two emotions among young children with ASD.

The involvement of maternal factors in predicting internalizing and externalizing symptoms in children with ASD and with Typical Development (TD) has been recently described in two studies: one found that higher maternal stress predicted higher externalizing and internalizing symptoms to the same extent in school aged children with ASD and TD (Bauminger et al. 2010). In contrast, the other study showed that the association between maternal harsh parenting and children's externalizing symptoms was higher in children with ASD, compared to TD children (Maljaars et al. 2014), suggesting that parenting factors may play a more central role in shaping the child's emotional reactions among children with ASD, as compared to TD children. Indeed, a focus on parenting sensitivity and attunement to the child's cues, as part of intensive early intervention, has been argued to alter the neurodevelopmental pathways of children with ASD (Dawson 2008).

Considering the impact of maternal factors on children's ER, which may be especially strong in children with ASD, we examined two maternal factors—temperament, and parenting style—as predictors of children's regulatory behavior and mother–child co-regulation during anger and fear paradigms. We chose to include a behavioral factor (parenting style) in addition to a more biological factor (maternal temperament). Whereas the former may have a

direct behavioral effect on the child's ER, the latter may impact the child's ER both genetically through heredity and behaviorally through maternal behavioral practices.

Maternal temperament, which describes the mother's personality dimension of emotionality as well as her ability to effortfully control her emotions (Evans and Rothbart 2009), was found to be associated with the child's emerging regulation capacities and self-control in TD children. More specifically, maternal negative emotionality was associated with higher rates of preschoolers' regulatory malfunctioning and behavioral problems in anger or frustration-evoking situations (Cumberland-Li et al. 2003; Kochanska et al. 1997). Maternal effortful control was associated with better ER to frustration and better child adjustment (Cumberland-Li et al. 2003). In fear evoking situations, maternal depressive symptomatology was positively associated with the child's emotional withdrawal and the use of less effective regulatory behaviors during infancy and toddlerhood (Feldman et al. 2009; Kochanska 1991), and negatively associated with the infant's active regulatory strategies (Glogger and Pauli-Pott 2008). It has been suggested that the association between parental innate factors, such as temperament, and child's ER is mediated by parental practices and style (Eisenberg et al. 1998). Studies which explored this model have demonstrated that maternal effortful control and negative emotionality (or depression vulnerability) have both a direct effect as well as an indirect effect (via parental practices) on the child's ER from infancy through early school-age (Bridgett et al. 2011; Cumberland-Li et al. 2003; Pesonen et al. 2006). Thus, in the current study, we examine the effects of maternal temperament on ER behavior among children with ASD both directly and indirectly, through its effect on parenting style.

Two main dimensions have been described as contributors to the parental style: parental control, which examines disciplinary behavior, limit setting and child's directing; and parental responsiveness, which examines parental sensitive, warm and affectionate behaviors towards the child (Maccoby and Martin 1983). The combination of these two dimensions yielded three parenting styles (Baumrind 1971): authoritative (high control, high responsiveness), authoritarian (high control, low responsiveness) and permissive (low control, high responsiveness). Parenting style was found to influence the child's regulatory efforts in TD children. Maternal warm responsiveness has been associated with more optimal self-regulation in pre-school age (von Suchodoletz et al. 2011), with more constructive ER strategies and lower internalizing symptomatology in school age (Jaffe et al. 2010), and with greater teen empathy in adolescence (Feldman 2007b). Maternal warm control was associated with better and more constructive ER tactics (Calkins et al. 1998;

Feldman et al. 1999; Jaffe et al. 2010), while harsh control was associated with ER difficulties and aggressive behaviors (Chang et al. 2003).

The aforementioned association between maternal factors and child ER capacities may exhibit different patterns in children with ASD (Kasari and Sigman 1997), due to their difficulties in social communication and potential difficulties in the internalization of self-regulation abilities (Jahromi et al. 2012). In terms of parenting practices, mothers to children with ASD have been found to be as responsive and sensitive to their child as mothers of children with other developmental delays or mothers of TD children (Hirschler-Guttenberg et al. 2014; Siller and Sigman 2002; Van IJzendoorn et al. 2007). Other studies on parental control in ASD have reported that parents of children with ASD describe themselves as more directive and controlling than parents of TD children (Kasari et al. 1988). In addition, parents of children with ASD were less inclined to rationally guide the child, to encourage independence, and to openly express emotions, compared to parents of TD children or parents to children with other developmental disorders (Rutgers et al. 2007).

The Current Study

The current study aims to explore children's self-regulation and co-regulation with their mothers in anger- and fear-provoking situations. In addition, the study aims to explore whether maternal immediate regulation facilitation of the child's emotional state, temperamental dimensions of negative emotionality and effortful control, and parenting style, would predict her child's self-regulation and co-regulation of negative emotion, and whether the associations would differ between children with ASD and TD. In light of previous research, we hypothesized that children with ASD will show more self-regulatory efforts and will use less co-regulatory strategies when encountering frustrating and fearful experiences, compared to their TD peers. Furthermore, in accordance with previous studies on parenting styles of parents to children with ASD and TD (Kasari et al. 1988; Rutgers et al. 2007), we hypothesized that the associations between the mother's parenting style and the child's regulatory efforts will differ among the two groups. Thus, in the ASD group, maternal use of an *authoritarian* style will be more beneficial for the child's ER and will therefore predict fewer regulatory efforts. In contrast, in the TD group the mother's use of an *authoritative* style will be more beneficial for the child's ER and will therefore predict fewer regulatory efforts. In terms of maternal temperamental factors, it was predicted that maternal negative emotionality will predict more self- and less co-regulatory efforts, while maternal effortful control will predict more co- and less self-regulatory efforts by the

child. Finally, since the effects of maternal temperamental factors on the child's ER in ASD have not yet been studied, group differences on these effects will be explored.

Methods

Participants

Eighty families of mothers, fathers, and their preschool aged children participated in two groups. The *ASD Group* included 40 preschoolers (5 females) diagnosed with ASD by trained clinicians according to DSM-IV-TR criteria (American Psychiatric Association 2000) and their parents. Families were recruited from psychiatric clinics and special-needs kindergartens in central Israel. Diagnosis was confirmed using the 2nd edition of the Autism Diagnostic Observation Schedule (ADOS 2; Gotham et al. 2007), with 56 % given module 2 of the ADOS and 44 % module 3. One child failed to meet ASD criteria and was excluded from the study. The *Typical Development group* included 40 preschoolers (6 females) and their parents, with no known neuro-psychiatric diagnoses, who were matched to the ASD group on child's mental age, gender, and family demographics. Families were recruited by ads posted in the community. TD participants were screened out for ASD using the Childhood Autism Spectrum Test (CAST; Scott et al. 2002). To provide better matching between groups on mental age, children in the TD group were slightly younger than children in the ASD group and groups were matched on raw scores of four subtests from the Stanford–Binnet Intelligence Test (Thorndike et al. 1986). Table 1 presents the groups' background data.

Procedure

Diagnostic and Cognitive Assessment—participants with ASD were visited in kindergarten by trained psychologists for ADOS 2 assessment. All participants were tested with four subtests from the Stanford–Binnet Intelligence Test (Table 1).

Home Visits—two identical home visits were conducted within the same month with mother or father (counterbalanced), each lasting approximately 2 h. Testing included parent–child interactions, ER procedures, and parents filling out questionnaires. Since fathers' protocol did not include all ER paradigms, only mother–child interactions will be reported.

Measures

Emotion Regulation: *Masks*—In this procedure adapted from the Laboratory Temperament Assessment Battery (LAB-TAB; Goldsmith and Rothbart 1996), child and parent sat in front of the experimenter who put on four masks of increasing fearfulness: rabbit, lion, alligator, and monster. After putting on each mask, the experimenter called the child's name, and left the mask on for 15 s.

Emotion Regulation: Toy Removal—In this procedure, adapted from the LAB-TAB, the child received an attractive toy from the experimenter (a remote controlled car). Following a 2 min play, the experimenter took the toy away and placed it within the child's visual field but outside arm's reach for 2 min. The toy was then returned to the child for additional 3 min. Mothers remained in the room and were given no further instructions. Behavioral coding was conducted only when the car was withheld from the child.

Maternal Temperament: *Adult Temperament Questionnaire* (ATQ; Evans and Rothbart 2007)—The ATQ is a self-report measure, developed within the framework of the psychobiological model of temperament (Rothbart and Ahadi 1994). Two out of four dimensions from the ATQ were used in the current study: negative affect (51 items, e.g. "I often feel sad") and effortful control (35 items, e.g. "It is easy for me to inhibit fun behavior that would be inappropriate"). The validity of the ATQ as a measure of adult temperament has been supported in prior work

Table 1 Means (standard deviations) and ranges of groups' demographic data

	ASD group (N = 39)	TD group (N = 40)	t(77)
Child measures			
Age (months)	63.38 (12.35) 36–82	53.56 (13.83) 29–78	3.31*
Verbal reasoning	14.15 (4.08) 7–21	15.51 (5.98) 1–43	1.17
Abstract/visual reasoning	12.67 (6.66) 3–27	14.05 (12.98) 1–54	.59
Quantitative reasoning	11.15 (5.59) 1–20	11.54 (8.7) 1–80	.23
Short term memory	13.18 (4.86) 4–22	11.79 (7.58) 1–42	.96
ADOS-2	11.89 (3.23) 7–22	N.A.	
Mother's measures			
Age (years)	37.6 (4.45) 30–47	36.14 (4.39) 27–44	1.37
Education (years)	15.94 (2.47) 12–22	16.59 (2.28) 12–25	1.42

(Evans and Rothbart 2007). Internal consistency calculated in the current study for the two dimensions was $\alpha = .89$ for maternal negative affect, and $\alpha = .83$ for maternal effortful control.

Parenting Style: Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson et al. 1995)—The PSDQ is a 62 Item self-report measure, assessing parenting styles according to Baumrind's three typologies (Baumrind 1971): authoritative, authoritarian and permissive. The measure yields a separate, continuous score for each parenting style with larger numbers indicating increased use of parenting practices associated with a particular style. Internal consistency calculated in the current study for the three parenting styles was $\alpha = .82$ for Authoritative style, $\alpha = .72$ for Authoritarian style, and $\alpha = .60$ for Permissive style.

Coding

Micro-coding of child and parent behavior during the ER paradigms was conducted on a computerized system (Noldus Co, Waggeniggen, The Netherlands). Codes were based on our own and others' ER research with TD toddlers and preschoolers (Feldman et al. 2011; Grolnick et al. 1996) and with children with ASD (Gulsrud et al. 2010; Konstantareas and Stewart 2006). The following categories were coded (see Table 2 for detailed description):

Child's Self-Regulation—This category was represented by a sum of the proportions of time each of the following behaviors took place during the ER paradigm: withdrawal, gaze aversion, idiosyncratic behaviors, physical self-soothing and solitary substitutive play.

Child's Co-Regulation with mother—This category was represented by a sum of the proportions of time each of the following behaviors took place during the ER paradigm: social gaze to parent, physical proximity-seeking, engaging the mother for distraction.

Mother Regulation Facilitation—represented by a sum of the proportions of time the mother engaged in each of the following behaviors during the ER paradigm: physical and verbal comfort, diverting talk and play; emotional reflection and cognitive reappraisals.

Two coders, blind to group membership, coded each episode and were trained to 90 % reliability. Reliability was computed for 15 observations in each paradigm. Masks reliability averaged *intraclass* $r = .91$ (range .8–.94), Toy Removal reliability averaged *intraclass* $r = .93$ (range .88–.1).

Results

We first conducted analyses of variance to test for group differences on ER variables and maternal variables. Next we conducted four regression analyses, predicting child's self and co-regulation in the two ER paradigms.

Child ER: Group Comparison

A repeated measures MANOVA was computed with paradigm (Masks, Toy Removal) and regulation (Self, Co) as the within subject factors and group (ASD, TD) as the between group factor. The analysis yielded a main effect for paradigm: Wilks' $F[1, 77] = 139.92$, $p < .001$, $\eta^2 = .65$, indicating more regulatory efforts during the Toy Removal paradigm than during the Masks paradigm. A paradigm by regulation interaction (Wilks' $F[1, 77] = 7.83$, $p < .005$, $\eta^2 = .09$) revealed that whereas during the masks paradigm children used more self-regulatory efforts than co-regulatory efforts ($t[78] = 2.0$, $p < .05$), no such difference was found during the Toy Removal paradigm ($t[78] = 1.76$, n.s.). No significant group differences or interaction with group were found.

Maternal Regulation Facilitation: Group Comparison

A repeated measures MANOVA was computed with paradigm (Masks, Toy Removal) as the within subject factor and group (ASD, TD) as the between group factor. The analysis yielded a main effect for paradigm (Wilks' $F[1, 77] = 71.34$, $p < .001$, $\eta^2 = .48$), indicating mothers showed higher regulation facilitation during the Toy Removal paradigm than during the Masks paradigm. No significant group differences or interaction with group were found.

Maternal Temperament: Group Comparison

Next, a MANOVA of maternal temperament components was computed, with maternal negative affect and effortful control as dependent variables and group as the between group factor. Results indicated overall group differences (Wilks' $F[2, 76] = 3.91$, $p < .05$, $\eta^2 = .1$). Univariate tests showed mothers of children with ASD scored higher on effortful control than mothers to TD children, ($F[1, 77] = 7.61$, $p < .005$, $\eta^2 = .09$). No group differences in maternal negative affect were found.

Table 2 Coding of child emotion regulation and parent regulation facilitation behaviors during the fear (Masks) and anger (Toy Removal) paradigms

Behaviors	Definition
Child self-regulation behaviors	
Withdrawal	Behaviors aimed at avoiding the target object after it has been presented, such as hiding face or whole body, turning or twisting body from object, moving backward from target object, walking away, or escaping the room
Gaze aversion	Turning gaze away from the target object after it has been presented or closing eyes
Idiosyncratic behaviors	Repetitive unusual behaviors with no apparent goal. These may include hand flapping, body rocking, finger flips, head movement, tongue clicking, lips smacking, etc.
Physical self-sooth	Bodily-directed behaviors aimed to self-sooth, such as thumb sucking, hair-twisting, self-petting, laying down etc.
Solitary substitutive play	Turning focus away from the target object or partner to active play with another object
Child co-regulation behaviors	
Social gaze	Child initiates eye contact with mother
Proximity seeking	Child looks for physical closeness with mother, approaches her, cuddles, puts head in her lap, takes her hand
Distraction through mother	Child distracts attention through initiation of conversation or substitutive play with the mother
Mother regulation facilitation	
Physical and verbal comfort	Mother initiates physical contact to provide comfort or sooth child, including hugging, patting, giving hand etc. Or mother talks to child, hums, or sings in order to sooth and provide comfort
Diverting talk and/or play	Mother distracts child's attention by talking about other topics unrelated to the task (e.g. "How was your day?"), presenting toys, exclaiming, or suggesting an alternative game
Emotional reflection	Mother reflects or elaborates on the child's emotional state (e.g. "Oh! this is a scary lion, isn't it?", "are you afraid?", "you're laughing, it's funny"
Cognitive reappraisals	Mother attempts to regulate the child's emotional state by reframing the situation or the experienced emotion (e.g. "do you remember we saw the same lion in the zoo? It was so much bigger!")

Maternal Parenting Style: Group Comparison

A MANOVA of maternal style was computed, with maternal authoritarian, authoritative and permissive styles as dependent variables, indicating an overall main effect for group (Wilks' F[3, 75] = 3.77, $p < .05$, $\eta^2 = .13$). Univariate tests revealed mothers of TD children scored higher on authoritarian parenting style than mothers of children with ASD (F[1, 77] = 11.57, $p < .001$, $\eta^2 = .13$). No group differences in maternal authoritative or permissive style scores were found.

Predicting Child's Self and Co-regulation of Emotion

Four hierarchical regression analyses were conducted, predicting child's self-regulation and child's co-regulation of anger (Toy Removal) and fear (Masks). Predictors were entered in five blocks in a theoretically guided order. Group was entered in the first step, followed by maternal regulation facilitation, to control for the effect of maternal behavior during the paradigm. In the third step we entered maternal temperamental factors: negative affect and

effortful control. Maternal parenting style was entered in the fourth step. In light of previous studies and the above MANOVA analysis, only the authoritarian and authoritative style scores were entered. The final step included the interactions of group and each of the parenting style and temperamental variables. All models were significant and are presented in Tables 3 and 4.

Predicting Child's Self Regulation of Anger

As shown in Table 3, child's self-regulation of anger was predicted by lower maternal regulation facilitation, and the interaction of maternal authoritarian style and group. The interaction was analyzed by grouping the maternal authoritarian style variable to high (above median) and low (below median), and conducting a univariate ANOVA with group (ASD, TD) and maternal authoritarian style (high, low) as independent variables. The analysis yielded a significant group by maternal authoritarian style interaction (F[1, 75] = 7.98, $p < .01$, $\eta^2 = .10$). Post hoc analysis revealed children to mothers with high authoritarian style showed more self-regulatory behaviors than children to mothers with low authoritarian style in the ASD group

Table 3 Predicting child self-regulation and co-regulation with mother during the anger evoking paradigm

Criterion		Anger self-regulation			Anger co-regulation		
		Beta	R^2 change	F change	Beta	R^2 change	F change
1	Group	.02	.00	.04	.05	.00	.18
2	Mother regulation facilitation	−.43**	.18	16.92**	.70**	.49	73.64**
3	Temp-negative affect	−.23+	.04	1.70	.06	.01	.38
	Temp effortful control	−.12			−.02		
4	Parent style-authoritative	.02	.00	.01	.13	.02	1.77
	Parent style authoritarian	.01			−.07		
5	Negative affect × group	−.11	.08	1.83	.18+	.05	2.17+
	Effortful control × group	.07			.18+		
	Authoritative × group	−.13			−.15		
	Authoritarian × group	.23*			−.19*		
	R^2 total	$R^2 = .30$, $F(10, 68) = 2.84$**			$R^2 = .58$, $F(10, 68) = 9.24$***		

*** $p < .001$; ** $p < .01$; * $p < .05$; +$p \sim .05$

Table 4 Predicting child self-regulation and co-regulation with mother during the fear evoking paradigm

	Criterion	Fear self-regulation			Fear co-regulation		
		Beta	R^2 change	F change	Beta	R^2 change	F change
1	Group	.20+	.04	3.26+	.03	.00	.06
2	Mother regulation facilitation	.17	.03	2.34	.42**	.17	15.23**
3	Temp-negative affect	−.02	.02	.96	.07	.03	1.21
	Temp effortful control	.15			.20		
4	Parent style-authoritative	.27*	.09	2.82+	−.03	.03	1.14
	Parent style authoritarian	.19			.18		
5	Negative affect × group	−.29*	.08	1.90	−.04	.08	1.93
	Effortful control × group	−.21			.23+		
	Authoritative × group	.19			−.16		
	Authoritarian × group	.11			−.11		
	R^2 total	$R^2 = .24$, $F(10, 68) = 2.19$*			$R^2 = .30$, $F(10, 68) = 2.9$**		

** $p < .01$; * $p < .05$; +$p \sim .05$

(t[37] = 2.34, $p < .05$). No such difference was found in the TD group (t[38] = 1.35, n.s.).

Predicting Child's Co-regulation of Anger

Child's co-regulation of anger was predicted by higher maternal regulation facilitation and the interaction of maternal authoritarian style and group. The interaction was analyzed by grouping the maternal authoritarian style variable to high (above median) and low (below median), and conducting a univariate ANOVA with group (ASD, TD) and maternal authoritarian style (high, low) as independent variables. The analysis yielded a significant group by maternal authoritarian style interaction (F[1, 75] = 6.37, $p < .05$, $\eta^2 = .08$). Post hoc analysis revealed children to mothers with high authoritarian style showed less co-regulatory behaviors than children to mothers with low authoritarian style in the ASD group (t[37] = 3.64,

$p < .005$). No such difference was found in the TD group (t[38] = .05, n.s.).

Predicting Child's Self and Co-regulation of Fear

As shown in Table 4, child's self-regulation of fear was predicted by higher maternal authoritative style and the interaction of maternal temperamental negative affect and group. In order to examine if maternal authoritative style was predictive of child's self-regulation in both groups, correlation analysis was conducted, revealing that higher authoritative style was related to higher self-regulatory efforts in the ASD group (r = .36, $p < .05$), but not in the TD group (r = .07, n.s). The interaction between group and maternal temperamental negative affect was analyzed by grouping the negative affect variable to high (above median) and low (below median), and conducting a univariate ANOVA with group (ASD, TD) and negative affect (high,

low) as independent variables. The analysis yielded no significant effects.

Child's co-regulation of fear was predicted only by maternal regulation facilitation.

Discussion

The current study is amongst the first to examine self and co-regulatory processes of two distinct negative emotions—anger and fear—in preschoolers with ASD and their mothers. To our knowledge it is the first study that explores how maternal factors affect the regulatory efforts of children with ASD during situations that elicit fear and anger. Our findings suggest that despite their social communication difficulties, children with ASD seek their mothers' help in regulating distress as much as their TD peers, and that mothers to children with ASD play an important role in calming, soothing, and directing the child during moments of distress. Furthermore, the findings emphasize the importance of the mother–child relationship in children with ASD, as suggested in previous research on attachment and maternal sensitivity in this group (Oppenheim et al. 2012; Seskin et al. 2010).

Our findings indicate that during situations that evoke anger or frustration, the mother's parenting style predicted both the child's self-regulatory efforts and the child's use of co-regulatory strategies. However, during situations that evoke fear, maternal parenting style predicted the child's self-regulatory, but not co-regulatory behavior. We found that during anger/frustration situations, maternal authoritarian parenting style has a unique effect on the regulatory strategies of children with ASD. This finding implies that an authoritarian parenting style (i.e. high control, low warmth) makes it harder for a child with ASD to rely on his/her mother and to use her as an external regulator during moments of frustration. Parenting a child with ASD, especially during anger arousing situations can raise a conflict in mothers between trying to control their child's behavior, which may be socially undesirable, and responding to him/her in an accepting and supportive manner (Maljaars et al. 2014). Our findings emphasize the negative effect of a harsh maternal control style towards her child, which limits the child's ability to engage the mother during moments of anger or frustration.

In contrast to anger regulation, we found that in the case of fear regulation it was the maternal authoritative style (i.e. high control, high warmth) that played a more central role in shaping the regulatory behavior of children with ASD. In contrast to the wealth of literature pointing to the associations between authoritative parenting and more optimal social-emotional outcomes, our findings show that in the specific context of fear regulation in children with

ASD, maternal authoritative style did not enhance the child's co-regulatory behavior with the mother, and increased the child's self-regulatory efforts, suggesting greater difficulties in regulating the emotional state of fear. These findings emphasize the adjustment and flexibility needed by the mothers to children with ASD in supporting their ER processes. Our findings suggest children with ASD who have difficulties in regulating fear, may feel safer when their mothers set limits in a more emotionally reserved manner. However, in order to regulate anger, children with ASD may need their mother to use a warm approach when setting limits, enabling the child to engage the mother as a source of comfort. Such different needs require the mother to be more flexible in her parenting style, and to be more attuned to the specific needs of her child and the specific requirements of the regulatory context. These findings extend previous results suggesting that parenting a child with neuro-developmental difficulties in general, and a child with ASD in particular, requires a more attuned and adapted approach towards the specific needs of the child at each particular moment (Doussard-Roosevelt et al. 2003; Meirsschaut et al. 2011; Rivers and Stoneman 2008).

Our findings on maternal temperament provide further support to this notion, suggesting mothers to children with ASD are characterized by greater effortful control, i.e. enhanced ability to restrain their needs during goal directed behavior (Evans and Rothbart 2007). Although maternal effortful control did not predict child's self or co-regulatory efforts in either fear of anger eliciting situations, the marginally significant interaction between maternal effortful control and group, predicting child's co-regulation in the fear situation, suggested maternal effortful control was positively associated with child's co-regulatory efforts in the ASD group alone ($r = .28$, $p = .09$). Possessing good effortful control skills may enable mothers to be more available and attuned to their child's needs in moments of distress. Such abilities enhance the mother's general positive approach towards their child (i.e. maternal sensitivity) during mother–child interaction, which we previously found to be comparable to mothers of TD children (Hirschler-Guttenberg et al. 2014).

These findings may challenge previous research on the broader autism phenotype, suggesting that parents of children with ASD may possess some of their children's traits, including inflexibility (Sasson et al. 2013; Seidman et al. 2012). Further research is needed in order to investigate whether the flexibility described here in a parenting context is also characteristic of other aspects in these mothers' lives.

In addition to the importance of maternal parenting styles to child's ER, our findings emphasize the importance of maternal immediate behaviors during both anger and

fear arousing situations. We found that during frustrating moments, maternal scaffolding, through regulation facilitation, enhances the child to use more co-regulatory behaviors. Children whose mothers used less regulation facilitation engaged in less co-regulatory and in more self-regulatory behaviors. These results, found in both children with ASD and TD children are consistent with previous studies suggesting that maternal scaffolding is necessary for a child with ASD to turn to the mother for support during moments of distress (Gulsrud et al. 2010). It is noteworthy that mothers in both groups engaged in regulation facilitation in higher rates during anger evoking situations as compared to fear-evoking situations. This may be due to the fact that externalizing behaviors, occurring more during frustrating situations, can be more socially and emotionally challenging to the parent than internalizing behaviors, occurring during moments of fear (Sikora et al. 2013). However, our findings suggest that greater emphasis should be placed on parenting behaviors during fearful situations, since maternal immediate behavior was the only parental factor involved in child's co-regulation.

Our findings suggest that anger and fear elicit different ER patterns and were influenced by different maternal factors in both children with ASD and TD children. These findings support the notion that anger and fear regulation differ in various aspects and should be studied separately (Dennis and Kelemen 2009; Diener and Mangelsdorf 1999) in both clinical and non-clinical populations. Further support of this notion lies in the finding that over and above group, anger situations evoked more regulatory efforts than fearful situations. This finding may imply that regulating anger demands more resources than regulating fear (Braungart-Rieker et al. 2010; Roque and Veríssimo 2011).

Unlike previous findings (Cumberland-Li et al. 2003; Kochanska et al. 1997), we found maternal negative emotionality was less influential on the child's ER. This may be due to the low variability of negative emotionality in our sample. Mothers in the two groups did not differ in their negative emotionality, with both groups reporting only moderate levels of it. Future studies should explore the association between maternal temperament and child's ER with mothers showing a wider range of negative emotionality, such as in the case of maternal depression or anxiety, as this may better represent the association between these factors.

Our findings may imply that maternal parenting style and immediate behavior has a greater effect on the development of ER in children with ASD, compared to the mother's innate temperament. These encouraging findings give more room for clinical interventions targeting maternal flexible adaptation of her parenting style to different emotional contexts of her child.

Limitation and Future Directions

It is important to bear in mind the correlational nature of our investigation. Hence, whereas we examined the effects mothers' parenting had on child's regulatory behaviors, it is also possible that the dysregulated behavior of a child with ASD affects the maternal parenting style. Care should also be taken when interpreting the results regarding maternal temperament and parenting style, as they relied on self-report. Future studies could include observational measures of maternal behavior in order to validate the mothers' self-report and to examine their effect on the child's ER.

In contrast to other studies on ER in ASD (Jahromi et al. 2012), we did not find that children with ASD use simpler emotion regulation tactics when regulating their negative emotions. This may be related to our analysis of children's regulatory efforts in term of self and co-regulation, rather than in terms of specific regulatory behaviors. Future studies should examine how maternal behavior affects the use of specific regulatory mechanisms in children with ASD and their TD peers.

Our findings highlight the need for mothers of children with ASD to acquire greater flexibility in their parenting style in order to facilitate their child's ER. At the same time, these mothers are characterized by higher effortful control, which may enable them such attunement and flexibility. However, whether this flexibility in maternal parenting style is indeed characteristic of mothers of children with ASD, and how it affects the child's ER in the long run is yet to be studied. It is also important to note that the current study involved mothers characterized by low negative emotionality, high effortful control, and a rather balanced parenting style. Future studies should look into parental effects on children's ER in clinical samples, such as mothers with depression, anxiety, or broader autism phenotype, to see how these parental characteristics affect the ER of a child with ASD. Finally, the current study tested children's ER only in the presence of mothers, who are usually the primary carers (and therefore face the need for greater flexibility). Future studies should examine how paternal behaviors are employed flexibly, in accordance to the child's emotional state.

References

American Psychiatric Association. (2000). *DSM-IV-TR diagnostic and statistical manual of mental disorders, 4th edition, text revision*. Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *DSM-5 diagnostic and statistical manual of mental disorders, 5th edition*. Washington, DC: American Psychiatric Association.

Bauminger, N., Solomon, M., & Rogers, S. J. (2010). Externalizing and internalizing behaviors in ASD. *Autism Research, 3*(3), 101–112.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology, 4*(1p2), 1.

Braungart-Rieker, J. M., Hill-Soderlund, A. L., & Karrass, J. (2010). Fear and anger reactivity trajectories from 4 to 16 months: the roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology, 46*(4), 791.

Bridgett, D. J., Gartstein, M. A., Putnam, S. P., Lance, K. O., Iddins, E., Waits, R., et al. (2011). Emerging effortful control in toddlerhood: The role of infant orienting/regulation, maternal effortful control, and maternal time spent in caregiving activities. *Infant Behavior and Development, 34*(1), 189–199.

Buss, K. A., & Goldsmith, H. H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development, 69*(2), 359–374.

Calkins, S. D., & Mackler, J. S. (2011). Temperament, emotion regulation, and social competence. In M. Underwood & L. Rosen (Eds.), *Social development: Relationships in infancy, childhood, and adolescence*. New York: Guilford Press.

Calkins, S. D., Smith, C. L., Gill, K. L., & Johnson, M. C. (1998). Maternal interactive style across contexts: Relations to emotional, behavioral and physiological regulation during toddlerhood. *Social Development, 7*(3), 350–369.

Chang, L., Schwartz, D., Dodge, K. A., & McBride-Chang, C. (2003). Harsh parenting in relation to child emotion regulation and aggression. *Journal of Family Psychology, 17*(4), 598.

Cumberland-Li, A., Eisenberg, N., Champion, C., Gershoff, E., & Fabes, R. A. (2003). The relation of parental emotionality and related dispositional traits to parental expression of emotion and children's social functioning. *Motivation and emotion, 27*(1), 27–56.

Dawson, G. (2008). Early behavioral intervention, brain plasticity, and the prevention of autism spectrum disorder. *Development and Psychopathology, 20*(03), 775–803.

Dennis, T. A., & Kelemen, D. A. (2009). Preschool children's views on emotion regulation: Functional associations and implications for social-emotional adjustment. *International journal of behavioral development, 33*, 243–252.

Diener, M. L., & Mangelsdorf, S. C. (1999). Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions. *Infant Behavior and Development, 22*(4), 569–583.

Doussard-Roosevelt, J. A., Joe, C. M., Bazhenova, O. V., & Porges, S. W. (2003). Mother–child interaction in autistic and nonautistic children: Characteristics of maternal approach behaviors and child social responses. *Development and Psychopathology, 15*(02), 277–295.

Dumas, J. E., LaFreniere, P. J., & Serketich, W. J. (1995). "Balance of power": A transactional analysis of control in mother–child dyads involving socially competent, aggressive, and anxious children. *Journal of Abnormal Psychology, 104*(1), 104.

Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. *Psychological inquiry, 9*(4), 241–273.

Evans, D. E., & Rothbart, M. K. (2007). Developing a model for adult temperament. *Journal of Research in Personality, 41*(4), 868–888.

Evans, D. E., & Rothbart, M. K. (2009). A two-factor model of temperament. *Personality and Individual Differences, 47*(6), 565–570.

Feldman, R. (2007a). Mother–infant synchrony and the development of moral orientation in childhood and adolescence: Direct and indirect mechanisms of developmental continuity. *American Journal of Orthopsychiatry, 77*(4), 582–597.

Feldman, R. (2007b). Parent–infant synchrony biological foundations and developmental outcomes. *Current Directions in Psychological Science, 16*(6), 340–345.

Feldman, R., Dollberg, D., & Nadam, R. (2011). The expression and regulation of anger in toddlers: Relations to maternal behavior and mental representations. *Infant Behavior and Development, 34*(2), 310–320.

Feldman, R., Granat, A., Pariente, C., Kanety, H., Kuint, J., & Gilboa-Schechtman, E. (2009). Maternal depression and anxiety across the postpartum year and infant social engagement, fear regulation, and stress reactivity. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(9), 919–927.

Feldman, R., Greenbaum, C. W., & Yirmiya, N. (1999). Mother–infant affect synchrony as an antecedent of the emergence of self-control. *Developmental Psychology, 35*(1), 223.

Glogger, B., & Pauli-Pott, U. (2008). Different fear-regulation behaviors in toddlerhood relations to preceding infant negative emotionality, maternal depression and sensitivity. *Merrill-Palmer Quarterly, 54*, 86–101.

Goldsmith, H. H., & Rothbart, M. K. (1996). *The laboratory temperament assessment battery: Locomotor version 3.0*. Technical manual. Madison, WI: University of Wisconsin.

Gotham, K., Risi, S., Pickles, A., & Lord, C. (2007). The Autism Diagnostic Observation Schedule: revised algorithms for improved diagnostic validity. *Journal of Autism and Developmental Disorders, 37*(4), 613–627.

Grolnick, W. S., Bridges, L. J., & Connell, J. P. (1996). Emotion regulation in two-year-olds: Strategies and emotional expression in four contexts. *Child Development, 67*(3), 928–941.

Grolnick, W. S., McMenamy, J. M., & Kurowski, C. O. (2005). Emotional self-regulation in infancy and toddlerhood. In L. Balter & C. Tamis-LeMonda (Eds.), *Child psychology: A handbook of contemporary issues* (2nd ed.). New York: Garland.

Gulsrud, A. C., Jahromi, L. B., & Kasari, C. (2010). The co-regulation of emotions between mothers and their children with autism. *Journal of Autism and Developmental Disorders, 40*(2), 227–237.

Hirschler-Guttenberg, Y., Golan, O., Ostfeld-Etzion, S., & Feldman, R. (2014). Mothering, fathering, and the regulation of negative and positive emotions in high-functioning preschoolers with autism spectrum disorder. *Journal of Child Psychology and Psychiatry, 56*(5), 530–539.

Jaffe, M., Gullone, E., & Hughes, E. K. (2010). The roles of temperamental dispositions and perceived parenting behaviours in the use of two emotion regulation strategies in late childhood. *Journal of Applied Developmental Psychology, 31*(1), 47–59.

Jahromi, L. B., Meek, S. E., & Ober-Reynolds, S. (2012). Emotion regulation in the context of frustration in children with high functioning autism and their typical peers. *Journal of Child Psychology and Psychiatry, 53*(12), 1250–1258.

Kasari, C., & Sigman, M. (1997). Linking parental perceptions to interactions in young children with autism. *Journal of Autism and Developmental Disorders, 27*(1), 39–57.

Kasari, C., Sigman, M., Mundy, P., & Yirmiya, N. (1988). Caregiver interactions with autistic children. *Journal of Abnormal Child Psychology, 16*(1), 45–56.

Kochanska, G. (1991). Patterns of inhibition to the unfamiliar in children of normal and affectively ill mothers. *Child Development, 62*(2), 250–263.

Kochanska, G., Clark, A., & Goldman, M. S. (1997). Implications of mothers' personality for their parenting and their young children's developmental outcomes. *Journal of Personality, 65*(2), 387–420.

Konstantareas, M. M., & Stewart, K. (2006). Affect regulation and temperament in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 36*(2), 143–154.

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent–child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology* (4th ed., Vol. 4). New York: Wiley.

Maljaars, J., Boonen, H., Lambrechts, G., Van Leeuwen, K., & Noens, I. (2014). Maternal parenting behavior and child behavior problems in families of children and adolescents with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 44*(3), 501–512.

Mangelsdorf, S. C., Shapiro, J. R., & Marzolf, D. (1995). Developmental and temperamental differences in emotion regulation in infancy. *Child Development, 66*(6), 1817–1828.

Mazefsky, C. A., Herrington, J., Siegel, M., Scarpa, A., Maddox, B. B., Scahill, L., & White, S. W. (2013). The role of emotion regulation in autism spectrum disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 52*(7), 679–688.

Mazefsky, C. A., Pelphrey, K. A., & Dahl, R. E. (2012). The need for a broader approach to emotion regulation research in autism. *Child Development Perspectives, 6*(1), 92–97.

Mazefsky, C. A., & White, S. W. (2014). Emotion regulation: Concepts & practice in autism spectrum disorder. *Child and adolescent psychiatric clinics of North America, 23*(1), 15–24.

Meirsschaut, M., Roeyers, H., & Warreyn, P. (2011). The social interactive behaviour of young children with autism spectrum disorder and their mothers: Is there an effect of familiarity of the interaction partner? *Autism, 15*(1), 43–64.

Morris, A. S., Silk, J. S., Morris, M. D., Steinberg, L., Aucoin, K. J., & Keyes, A. W. (2011). The influence of mother–child emotion regulation strategies on children's expression of anger and sadness. *Developmental Psychology, 47*(1), 213–225.

Morris, A. S., Silk, J. S., Steinberg, L., Terranova, A. M., & Kithakye, M. (2010). Concurrent and longitudinal links between children's externalizing behavior in school and observed anger regulation in the mother–child dyad. *Journal of Psychopathology and Behavioral Assessment, 32*(1), 48–56.

Oppenheim, D., Koren-Karie, N., Dolev, S., & Yirmiya, N. (2012). Maternal sensitivity mediates the link between maternal insightfulness/resolution and child–mother attachment: The case of children with autism spectrum disorder. *Attachment & Human Development, 14*(6), 567–584.

Pesonen, A.-K., Räikkönen, K., Heinonen, K., Järvenpää, A.-L., & Strandberg, T. E. (2006). Depressive vulnerability in parents and their 5-year-old child's temperament: A family system perspective. *Journal of Family Psychology, 20*(4), 648.

Raver, C. C. (1996). Relations between social contingency in mother–child interaction and 2-year olds' social competence. *Developmental Psychology, 32*(5), 85–859.

Rieffe, C., Camodeca, M., Pouw, L. B., Lange, A. M., & Stockmann, L. (2012). Don't anger me! Bullying, victimization, and emotion dysregulation in young adolescents with ASD. *European Journal of Developmental Psychology, 9*(3), 351–370.

Rieffe, C., Oosterveld, P., Terwogt, M. M., Mootz, S., van Leeuwen, E., & Stockmann, L. (2011). Emotion regulation and internalizing symptoms in children with autism spectrum disorders. *Autism, 15*(6), 655–670.

Rivers, J. W., & Stoneman, Z. (2008). Child temperaments, differential parenting, and the sibling relationships of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 38*(9), 1740–1750.

Roben, C. K., Cole, P. M., & Armstrong, L. M. (2013). Longitudinal relations among language skills, anger expression, and regulatory strategies in early childhood. *Child Development, 84*(3), 891–905.

Robinson, C. C., Mandleco, B., Olsen, S. F., & Hart, C. H. (1995). Authoritative, authoritarian, and permissive parenting practices: Development of a new measure. *Psychological Reports, 77*(3), 819–830.

Roque, L., & Veríssimo, M. (2011). Emotional context, maternal behavior and emotion regulation. *Infant Behavior and Development, 34*(4), 617–626.

Rothbart, M. K., & Ahadi, S. A. (1994). Temperament and the development of personality. *Journal of Abnormal Psychology, 103*(1), 55.

Rothbart, M. K., Sheese, B. E., Rueda, M. R., & Posner, M. I. (2011). Developing mechanisms of self-regulation in early life. *Emotion Review, 3*(2), 207–213.

Rutgers, A. H., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Swinkels, S. H., van Daalen, E., Dietz, C., et al. (2007). Autism, attachment and parenting: A comparison of children with autism spectrum disorder, mental retardation, language disorder, and non-clinical children. *Journal of Abnormal Child Psychology, 35*(5), 859–870.

Rydell, A.-M., Berlin, L., & Bohlin, G. (2003). Emotionality, emotion regulation, and adaptation among 5-to 8-year-old children. *Emotion, 3*(1), 30.

Sasson, N. J., Lam, K. S., Parlier, M., Daniels, J. L., & Piven, J. (2013). Autism and the broad autism phenotype: Familial patterns and intergenerational transmission. *Journal of Neurodevelopmental Disorders, 5*(1), 11.

Scott, F. J., Baron-Cohen, S., Bolton, P., & Brayne, C. (2002). The CAST (Childhood Asperger Syndrome Test): preliminary development of a UK screen for mainstream primary-school-age children. *Autism, 6*, 9–31.

Seidman, I., Yirmiya, N., Milshtein, S., Ebstein, R. P., & Levi, S. (2012). The broad autism phenotype questionnaire: Mothers versus fathers of children with an autism spectrum disorder. *Journal of Autism and Developmental Disorders, 42*(5), 837–846.

Seskin, L., Feliciano, E., Tippy, G., Yedloutschnig, R., Sossin, K. M., & Yasik, A. (2010). Attachment and autism: Parental attachment representations and relational behaviors in the parent–child dyad. *Journal of Abnormal Child Psychology, 38*(7), 949–960.

Sikora, D., Moran, E., Orlich, F., Hall, T. A., Kovacs, E. A., Delahaye, J., et al. (2013). The relationship between family functioning and behavior problems in children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 7*(2), 307–315.

Siller, M., & Sigman, M. (2002). The behaviors of parents of children with autism predict the subsequent development of their children's communication. *Journal of Autism and Developmental Disorders, 32*(2), 77–89.

Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology, 31*, 448–455.

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development, 59*(2–3), 25–52.

Thorndike, R., Hagen, E., & Sattler, J. (1986). *The Stanford–Binet intelligence scale* (4th ed.). Chicago, IL: Riverside Publication Co.

Tronick, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist, 44*(2), 112–119.

Van IJzendoorn, M. H., Rutgers, A. H., Bakermans-Kranenburg, M. J., Swinkels, S. H., Van Daalen, E., Dietz, C., & Van Engeland, H. (2007). Parental sensitivity and attachment in children with autism spectrum disorder: Comparison with children with mental retardation, with language delays, and with typical development. *Child Development, 78*(2), 597–608.

von Suchodoletz, A., Trommsdorff, G., & Heikamp, T. (2011). Linking maternal warmth and responsiveness to children's self-regulation. *Social Development, 20*(3), 486–503.