Parenting Adolescents With ASD: A Multimethod Study

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A number of studies have concluded that parents of children with ASD experience high levels of parenting stress. However, little is known about their parenting behaviors. Especially few studies investigated parenting in adolescence, although this period is associated with additional challenges for both adolescents and their parents. In the present study, a multi-method approach was used, combining data from a self-report questionnaire and observation of mother-child interactions during different semi-structured (e.g., inventing and building a vehicle of the future with construction toys) and structured tasks (e.g., solving marble maze). Linear mixed models (LMM) were used to compare the means of parenting behaviors among mothers of adolescents with ($n = 44$) and without ASD ($n = 38$), aged 12 to 16 years old. During the observations, mothers of adolescents with ASD showed more sensitivity and creativity, compared to the general population control group. In addition, mothers in the ASD group reported on the self-report questionnaire to adapt the environment more, for example, by establishing routines. Furthermore, this study investigated the role of maternal characteristics, that is, ASD characteristics and parenting stress. Parenting stress was associated with less self-reported positive parenting. Higher levels of ASD characteristics of the mother were related to more negativity and less sensitivity during the observation, and more self-reported harsh punishment and adapting the environment. This study additionally examined whether the impact of these maternal characteristics was the same across the two groups. Whereas group by parenting stress interaction effects were not significant for any of the observed and self-reported parenting behaviors, significant group by ASD characteristics interaction effects were noticed for self-reported harsh punishment and adapting the environment. ***Autism Res*** *2018, 11: 1000–1010.*
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Lay Summary: A number of studies have concluded that parents of children with ASD experience high levels of parenting stress. However, little is known about their parenting behaviors. Especially parenting in adolescence remains under investigated, although this period is associated with additional challenges for both adolescents and their parents. In this study, 44 adolescents with ASD and a control group of 38 adolescents without ASD, aged 12–16 years old, participated together with their mother. We compared parenting behaviors between the two groups, based on observations of mother-child interactions and a questionnaire that was filled out by the mother. During the observation, mothers of adolescents with ASD showed more sensitivity and creativity, compared to the control group. In addition, the questionnaire responses indicated that mothers in the ASD group adapted the environment more by for example, establishing routines. Furthermore, this study investigated the role of parenting stress and ASD characteristics of the mother on parenting behavior. Parenting stress was associated with less self-reported positive parenting. Higher levels of ASD characteristics of the mother were related to more negativity and less sensitivity during the observation in both groups, and more self-reported harsh punishment and adapting the environment in the control group only.

Keywords: Autism spectrum disorder; parenting behavior; parenting stress; adolescence; questionnaire; observation

Introduction

Research on parenting children with a developmental disability demonstrated a clear link between parenting stress and behavior problems of the child. According to the model of Hastings (2002), parenting stress, child behavior problems and parenting behaviors mutually affect each other. A greater insight in parenting behaviors could therefore offer a better understanding of the development and maintenance of parenting stress and behavior problems.

When considering research on parenting children with ASD in particular, a similar disparity can be noticed. A great number of studies focus on parenting stress and well-being. As indicated by the meta-analysis of Hayes and Watson [2013], many studies concluded

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that parents of children with ASD across all ages, including adolescence, experience more parenting stress than those of typically developing children or children with other disabilities. Moreover, parenting stress and depression were found to be associated with children's behavior problems [Barker et al., 2011; Bauminger et al., 2010; Lecavalier, Leone, & Wiltz, 2006; Peters-Scheffer, Didden, & Korzilius, 2012; Phetrasuwan & Shandor Miles, 2009] and ASD symptom severity [Benson, 2006; Bitsika & Sharpley, 2017; Ekas & Whitman, 2010]. However, it is remarkable that few studies have investigated parenting behaviors, particularly for parents of teenagers.

Nonetheless, some questionnaire studies have investigated parenting behaviors across a wider age range, including adolescents. Mothers of children and adolescents with ASD reported to use parenting behaviors adapted to the needs of children with ASD more frequently, that is, stimulating the development and adapting the environment [Maljaars, Boonen, Lambrechts, Van Leeuwen, & Noens, 2013]. In addition, they reported fewer rules and discipline and more positive parenting in comparison to mothers in the control group. Furthermore, lower scores on self-reported parental involvement, communication and limit setting, but similar levels of autonomy support were found among parents of children and adolescents with ASD, compared to the standardised norm scores of the questionnaire in the overall population [Osborne & Reed, 2010]. When specifically considering the age group of 12 to 16-year-old adolescents, parents of adolescents with ASD only showed significantly lower scores on communication and limit setting. Compared to parents of typically developing children, parents of children with ASD seem to use a more permissive parenting style, characterized by little demands, structure and control, yet warm and loving [van Steijn et al., 2013; Hutchison, Feder, Abar, & Winsler, 2016]. Hutchison [2016] added the age of the child as a covariate, but this did not have a significant impact on the results.

Boonen and colleagues [2015] investigated parenting behaviors in a multi-method study using both self-report questionnaires and observations, but in a younger age group, that is, school-aged children. Mother-child interactions were observed during three tasks; a free-play, a drawing and problem-solving task. Findings on the observations suggested that mothers of children with ASD provided less structure and were less sensitive compared to mothers of typically developing children. The combination of self-report and observation is very convenient since both methods offer valuable information, complementary to each other. Self-report has the advantage that a parent can evaluate his/her parenting behaviors over different situations and rate parenting behaviors that are difficult to observe or do not occur frequently (such as harsh punishment). Furthermore, these findings give us a broad view on the topic. However, when using observational data, behaviors are consistently and reliably defined by the researcher, and therefore less affected by respondent bias [Aspland & Gardner, 2003]. Additionally, parents do not always reflect consciously about their parenting behaviors and some parenting behaviors happen routinely or spontaneously, and are therefore difficult to report [Gardner, 2000]. The association between mothers' reported and observed parenting behaviors is found to be weak [Cheung, Pomerantz, Wang, & Qu, 2016].

Evidence for the association of parenting behaviors with parenting stress and child behavior problems among parents of children with ASD is also limited. Associations were found between higher scores on parenting stress and lower scores on self-reported involvement, communication and limit setting [Osborne & Reed, 2010] and higher scores on self-reported material rewarding, harsh punishment and observed negativity [Boonen et al., 2015]. In addition, some evidence was found for the association of parenting behaviors with children's behavior problems and ASD characteristics. The level of maternal criticism was associated with behavior problems and ASD characteristics of adolescents with ASD [Baker, Smith, Greenberg, Seltzer, & Taylor, 2011; Greenberg, Seltzer, Hong, & Orsmond, 2006]. Also several longitudinal effects were found between negative controlling and positive parenting behaviors on the one hand, and internalizing and externalizing behavior problems of the child on the other [Dieleman, De Pauw, Soenens, Beyers, & Prinzie, 2017].

Thus, both parenting stress and behavior problems of the child seem to impact parenting behaviors. Reed and Osborne [2014] additionally suggested a genetic factor; parenting behaviors may be influenced by ASD characteristics of the parent. Given the genetic component of ASD, parents of children with ASD are expected to have an elevated risk for socio-communicative difficulties and repetitive behaviors and interests themselves. Although some studies confirmed this [Wheelwright, Auyeung, Allison, & Baron-Cohen, 2010], other studies indicated this is only the case for parents with more than one child with ASD [Bernier, Gerdts, Munson, Dawson, & Estes, 2012]. With regard to the link between ASD characteristics and parenting behaviors, so far, studies suggested that ASD characteristics of mothers of a child with ASD have little effect on the parenting behaviors towards their child with ASD [van Steijn et al., 2013; Boonen et al., 2015]. However, maternal ASD characteristics were associated to a more permissive parenting style towards the sibling without ASD [van Steijn et al., 2013].

As stated earlier, few studies focus on parenting during adolescence specifically, although this period is

related to many changes, both intra- and interpersonal [Picci & Scherf, 2014]. Friendships typically gain importance during adolescence, but children with ASD tend to have few friends [Orsmond, Krauss, & Seltzer, 2004] and spend more time with their parents compared to typically developing adolescents [Solish, Perry, & Minnes, 2010]. Moreover, adolescents generally gain more independence and autonomy from parents [Picci & Scherf, 2014], which can be stressful for parents of adolescents with ASD [van Esch et al., 2018]. Furthermore, adolescence is associated with new challenges for parents of children with ASD, such as higher social demands and puberty challenges around hygiene [Navot, Jorgenson, & Webb, 2017]. The review of Rabinowitz and Drabick [2017] stresses the importance of parenting for typically developing children during adolescence, in order to become more autonomous, and to gain social and emotional competence. The study further emphasizes that specific child characteristics are associated with differential vulnerability and susceptibility to parenting behaviors. As a result, it is important to investigate parenting in the specific group of adolescence with ASD.

This study addresses the limitations of existing work by (a) focusing exclusively on adolescents aged 12–16 (a more restricted age range than usually reported in the literature), and (b) employing self-report questionnaires and observations of mother-adolescent dyads to obtain a better in-depth insight into parenting during adolescence. The main aim of this study was to examine differences in means between parenting behaviors among mothers of adolescents with ASD and mothers of a general population control group. The second aim was to investigate the role of ASD characteristics and parenting stress of the mother in parenting behaviors and whether the role of these maternal characteristics was comparable for the two groups.

Methods

Participants

In total, 82 adolescents between 12 and 16 years old and their mother participated in this study. We recruited a sample of 44 mothers and their son or daughter with ASD through the Autism Expertise Center of the university hospital and from previous studies in our research group [Boonen et al., 2015; van Esch et al., 2018]. All adolescents were diagnosed with ASD prior to this study, based on DSM-IV-TR criteria [American Psychiatric Association, 2000]. In order to confirm this clinical diagnosis, the adolescents in the ASD group were assessed with the Autism Diagnostic Observation Schedule, second edition [Lord et al., 2012] and their mothers were interviewed using the Diagnostic Interview for Social and Communication [Wing, 2006] within the research protocol. Applying the ICD-10 algorithm for the DISCO-11, 90.9% of the adolescents scored above the cutoff indicative for ASD. Regarding the ADOS, 88.6% had a score equal to or greater than the autism spectrum cutoff of 7 ($M = 10.1$). All adolescents received a score above the classification threshold on one of the two instruments, therefore no children were excluded from the study. A general population control group (GPC), consisting of 38 adolescents without ASD, was recruited via regular secondary schools. These two groups were matched on chronological age and gender and did not differ on any variable except for education level and ASD characteristics of the adolescent (Table 1). In both groups, intelligence was estimated with an abbreviated version [Sattler, 2001] of the Wechsler Intelligence Scale for Children-III [WISC-III; Kort et al., 2005], containing the following subtests: Vocabulary, Similarities, Block design, and Picture completion. Furthermore, the Social Responsiveness Scale [SRS-2; Constantino et al., 2003] was filled out by the mothers to acquire information about the ASD characteristics of the adolescents. In the ASD group, 74.4% had a t-score above the cutoff score of 70, in the control group 7.9% scored above this cutoff.

Apart from ASD, for 37.2% of the adolescents with ASD ($n = 16$) and 10.5% of the adolescents in the control group ($n = 4$), an (additional) diagnosis was reported by their mother, such as ADHD, dyslexia, dyscalculia, dysgraphia, developmental coordination disorder, anxiety disorder, and language impairment.

We conducted independent sample t-tests to compare parenting stress and maternal ASD characteristics across groups. Mothers of adolescents with ASD had higher scores on the Nijmegen Parental Stress Index, short version [NOSIK; de Brock, Vermulst, Gerris, & Abidin, 1992] than mothers in the GPC group, indicating more parenting stress (Table 1). With regard to the ASD characteristics of the mother, no significant difference was found.

There were data missing in the questionnaires for four participants in the ASD group and for one participant in the control group, so numbers may differ in the analyses. This study was reviewed and approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of the KU Leuven.

Measures

Before the start of the assessments, both the adolescent and his or her mother signed the informed consent. To characterize parenting behavior, a multi-method approach was used including a self-report questionnaire and a structured observation. Maternal ASD characteristics and parenting stress were measured by the use of

Table 1. Demographic and Other Characteristics of the ASD and Control Group

Child characteristics		**ASD ($n = 44$)**	**GPC ($n = 38$)**	**Test statistic**	***P***
Age	min.-max. (in months)	145–188	145–189	$t_{(80)} = 0.49$	0.62
	M (*SD*)	165.7 (11.8)	164.4 (12.2)		
Gender (%)	Boys	35 (79.5)	29 (76.3)	$\chi^2_{(1)} = 0.12$	0.73
	Girls	9 (20.5)	9 (23.7)		
VIQ	min.-max.	76–135	73–133	$t_{(80)} = -1.33$	0.19
	M (*SD*)	103.8 (12.2)	107.3 (11.0)		
PIQ	min.-max.	71–120	71–132	$t_{(80)} = 0.72$	0.48
	M (*SD*)	100.3 (13.0)	98.1 (13.8)		
		ASD ($n = 43$)	**GPC ($n = 38$)**	**Test statistic**	***P***
Education level (%)	Primary school	2 (4.7)	0	*FET* = 15.08	0.002
	Secondary school				
	General	24 (55.8)	34 (89.5)		
	Artistic education	1 (2.3)	0		
	Technical	5 (11.6)	4 (10.5)		
	Vocational	6 (14.0)	0		
	Special Education	5 (11.6)	0		
SRS	min.-max.	39–137	5–76	$t_{(79)} = 10.69$	<0.001
	M (*SD*)	77.6 (23.3)	27.11 (18.6)		
Maternal characteristics		**ASD ($n = 43$)**	**GPC ($n = 38$)**	**Test statistic**	***P***
Age	min.-max. (in years)	32–54	36–55	$t_{(79)} = 0.24$	0.81
	M (*SD*)	44.6 (4.66)	44.3 (4.24)		
Education level (%)	No college	11 (25.6)	9 (23.7)	$\chi^2_{(2)} = 0.40$	0.82
	Bachelor degree	19 (44.2)	15 (39.5)		
	Master degree	13 (30.2)	14 (36.8)		
		ASD ($n = 42$)	**GPC ($n = 38$)**	**Test statistic**	***P***
Parenting stress	*M* (*SD*)	29.2 (11.6)	17.8 (6.3)	$t_{(64.6)} = 5.52$	< 0.001
		ASD ($n = 41$)	**GPC ($n = 37$)**	**Test statistic**	***P***
ASD characteristics	*M (SD)*	26.6 (18.6)	23.7 (16.1)	$t_{(76)} = 0.74$	0.46
Family characteristics		**ASD ($n = 43$)**	**GPC ($n = 38$)**	**Test statistic**	***P***
N of children (%)	1	7 (16.3)	2 (5.3)	$\chi^2_{(4)} = 6.31$	0.18
	2	16 (37.2)	22 (27.9)		
	3	11 (25.6)	10 (26.3)		
	4	7 (16.3)	4 (10.5)		
	>4	2 (4.7)	0 (0)		
Marital status (%)	Single-parent	3 (7)	0 (0)	$\chi^2_{(3)} = 4.09$	0.25
	Cohabitation	5 (11.6)	4 (10.5)		
	Separated/divorced	3 (7)	6 (15.8)		
	Married	32 (74.4)	28 (73.7)		

VIQ, verbal IQ; PIQ, performance IQ; FET, Fisher's exact test.

self-report questionnaires. There was variation between participants in the order of the assessments.

Parenting Behavior

Mother-child interactions were observed during four tasks, carried out in a neutral room out of the home situation: two structured problem-solving tasks (marble maze and complex social scene) and two semi-structured tasks (discussion task and building task). The tasks were presented in a fixed order. In the first task, the mother and adolescent had to cooperate to guide a marble through a maze. In the second task, a complex social scene (fragment from a soap series for adolescents) was shown to the participants. Afterwards they answered questions on recognition and interpretation of emotions and social insight together. The third task was a discussion task. In this task, they were asked to discuss and try to solve a recent conflict from a list of five themes that are potential causes of conflict, that is, time spent using a multimedia device, free time, hygiene and cleaning, homework or a disagreement on something they saw or heard. In the fourth task they had to build a vehicle of the future with K'Nex. They were asked to perform every task for 10 min, but in fact the durations ranged between 2 min (complex social scene and discussion task) and 20 min (building task). The instructions were given before the start of every task, no questions or interactions with the researcher were allowed during the task.

All interactions were video-taped and coded on different parenting dimensions, using two coding systems. Seven dimensions of maternal parenting behavior were

coded based on the Coparenting and Family Rating System [CFRS; McHale, 1995; Karreman et al., 2008]. Warmth (e.g., making eye contact, giving compliments), Negativity (e.g., critical comments, ignoring the child), Investment (e.g., being involved, taking the lead), Limit setting (e.g., stopping challenging behavior, communicating expectations), Sensitivity and timing (e.g., reacting to the needs of the child, good timing of interventions), Provision of structure (e.g., providing guidance and explanation, adapting the structure when required), and Creativity (e.g., making jokes, using fantasy, expanding activities) were rated on a 7-point Likert scale. Autonomy support was measured by a second coding system [Grolnick et al., 1984; Whipple et al., 2011], consisting of four subscales that were rated on a 5-point Likert scale: Flexibility and perspective-taking (e.g., trying different strategies to keep the child focused on the task, recognizing the feelings of the child), Following child's pace and giving child the opportunity to make choice (e.g., giving the child the opportunity to play an active role), Behaving to support child's sense of competence (e.g., adapting the task to create an optimal challenge), and Mother's verbalizations (e.g., encouragement, giving hints).

For all four tasks, the parenting dimensions were rated during the first, middle, and last minute of each task. Thus, typically for each mother-child dyad, twelve ratings per dimension were obtained. In the ASD group, for eight participants, only 10 or 11 min instead of 12 min could be coded because they spent less than 3 min on the complex social scene task ($n = 6$), the discussion task ($n = 1$) or both of these tasks ($n = 1$). Two participants missed one task, due to technical issues with the marble maze and because one adolescent refused to carry out the discussion task, so observations for these participants were coded on 9 min. All mother–child interaction videos were rated by two coders. Coders were trained by watching videotaped observations until 80% inter-rater agreement was established. On the observations in this study, the percentage adjacent inter-rater agreement [Stemler, 2004], allowing one-point difference, was also calculated for each dimension; that is, 96% on Warmth, 85% on Negativity, 95% on Investment, 81% on Sensitivity and timing, 93% on Provision of structure, 88% on Creativity, 72% on Pace and choices, 69% on Support child's sense of competence and 76% on Verbalizations. Since Limit setting and Flexibility and perspective-taking could only be coded when the adolescent deviates from the given task, these scales were hardly coded and therefore excluded from analyses. The average scores of the two coders on the seven dimensions of the CFRS [Karreman et al., 2008; McHale, 1995] were used. The scores on the subscales of Autonomy support [Whipple et al., 2011] were averaged again to obtain one mean score of Autonomy support.

Next to the observed parenting behaviors, mothers filled out a self-report questionnaire about their parenting behaviors, that is, the Parental Behavior Scale-ASD version (PBS-A; Van Leeuwen and Noens, 2013, unpublished document). Mothers rated 52 items referring to observable parenting behaviors on a 5-point Likert scale from (almost) never to (almost) always. Five subscales refer to general parenting behaviors: Positive parenting (e.g., I make time to listen to my child, when he/she wants to tell me something), Material rewarding (e.g., I let my child buy something when he/she has done something well), Rules (e.g., I teach my child to handle his/her things with care), Discipline (e.g., When my child has been disobedient, I give him/her a chore for punishment) and Harsh punishment (e.g., I slap my child when he/she hasn't kept to an agreement). In addition, two subscales refer to ASD adapted parenting behaviors: Stimulating the development (e.g., When someone is angry, I explain to my child what that person is feeling and why) and Adapting the environment (I only give my child one task at a time). Scientific properties of the questionnaire were evaluated by [Lambrechts, Van Leeuwen, Boonen, Maes, & Noens, 2011], which resulted in a relatively stable factor structure. Internal consistency for the subscales is acceptable to good, with Cronbach's alphas between 0.70 and 0.85 for the general subscales [Van Leeuwen & Vermulst, 2004] and 0.69 to 0.76 for the ASD related subscales [Lambrechts et al., 2011]. In the current study the Cronbach's alphas of all PBS-A scales ranged from 0.75 to 0.87, with the exception of harsh punishment, which had a value of 0.61, presumably because parents endorsed items on this subscale infrequently.

Maternal characteristics

Mothers completed the Social Responsiveness Scale—Adult Self-Report [SRS-A; Constantino & Todd, 2005; Noens, De La Marche, & Scholte, 2012] to assess ASD traits. Mothers rated 65 items on a 4-point Likert scale (e.g., I would rather be alone than with others). Cronbach's alpha of the total scale is 0.95, inferring an excellent internal consistency [Ingersoll, Hopwood, Wainer, & Donnellan, 2011; Noens et al., 2012]. Maternal stress was measured by the Nijmegen Parental Stress Index, short version [NOSIK; De Brock et al., 1992], which is based on the Parenting Stress Index [PSI; Abidin, 1983]. Mothers rated 25 statements on a 6-point Likert scale. In this study we used the sum score of the parent-related stress domain, based on ratings of 11 items (e.g., Parenting this child is more difficult than I expected it to be). Internal consistency of the NOSIK is excellent, with Cronbach's alpha between 0.92 and 0.95 (De Brock et al., 1992).

Data Analysis

To investigate the research questions, linear mixed models (LMM) were built in IBM SPSS version 24, using each observed parenting dimension and each subscale of the self-report questionnaire as a dependent variable. With these models, we firstly aimed to compare parenting behaviors among mothers of adolescents with ASD and a control group. Therefore, group was dummy-coded (0 for control group, 1 for ASD group) and included as covariate in the LMM. Secondly, the role of parenting stress and ASD characteristics of the mother was evaluated by adding these characteristics as covariates. Since the means on maternal stress (the parent domain of the NOSIK) significantly differ between the two groups, the within-group centered scores of maternal stress were used, rather than the overall stress levels, allowing to focus on the within group associations between parenting behaviors and stress. Consistently, also the within-group centered scores of ASD characteristics (total score on the SRS-A) were calculated. Additionally, we investigated whether the role of these maternal characteristics was similar for the two groups. To this end, both the interaction of group with the within-group centered scores of parenting stress, and the interaction of group with the within-group centered scores of ASD characteristics were included. Regarding the observations, task situation (4 levels; marble maze, complex social scene, discussion task and building task) and minutes (3 levels; first, middle and last minute) were additionally included as fixed within-subject factors. However, these variables were not central to the research questions of the current study. We therefore only presented the results including Task, Minute and the interactions of Task and Minute with Group in Supplementary Material Table 1. No random effects were fitted in the LMM.

Table 2. Mean Scores on Observed and Self-Reported Parenting Behavior

	GPC ($n = 38$) *M (SD)*	ASD ($n = 44$) M (SD)
Observed parenting behavior		
Warmth	4.43 (0.36)	4.39 (0.42)
Negativity	1.28 (0.24)	1.32 (0.34)
Investment	4.77 (0.31)	4.75 (0.41)
Provision of structure	5.52 (0.25)	5.32 (0.41)
Sensitivity and timing	4.51 (0.55)	4.94 (0.51)
Creativity	1.34 (0.20)	1.54 (0.33)
Autonomy support	3.20 (0.48)	3.22 (0.52)
Self-reported parenting behavior		
Positive parenting	4.19 (0.47)	4.06 (0.55)
Material rewarding	2.29 (0.64)	2.42 (0.70)
Rules	4.26 (0.58)	4.27 (0.45)
Discipline	2.86 (0.82)	2.73 (0.78)
Harsh punishment	1.27 (0.37)	1.26 (0.31)
Stimulating the development	3.86 (0.53)	3.92 (0.57)
Adapting the environment	2.54 (0.56)	2.88 (0.59)

Results

Observation

Mean scores of the observed parenting behaviors are presented in Table 2. To investigate the first research question, mean scores were compared between the two groups using LMM (Table 3). Higher scores of Sensitivity and timing and Creativity were present in the ASD group. Secondly, the role of parenting stress and maternal ASD characteristics was investigated. Within-group centered parenting stress never was a significant predictor of observed parenting behaviors, neither were the interactions of parenting stress with group. However, within-group centered ASD characteristics was found to be a significant predictor for the observed parenting behaviors Negativity and Sensitivity and timing. More precisely, these characteristics were related to more observed negativity and less sensitivity. No significant interactions with group and ASD characteristics were noticed, implying a similar effect of maternal ASD characteristics in both groups.

Self-Report Questionnaire

Similar to the observed parenting behaviors, LMM were conducted with the subscales of the PBS-A as dependent variable (Table 4). Considering the first research

Table 3. Unstandardized Parameters Estimates from Linear Mixed Model Analyses for Predictors of Observed Parenting Behaviors

	Warmth	Negativity	Investment	Structure	Sensitivity and timing	Creativity	Autonomy support
Intercept	4.59**	1.11**	4.86**	5.56**	4.65**	1.15**	3.22**
Group (0 = GPC; 1 = ASD)	−0.10	0.03	< 0.01	−0.02	0.43**	0.10*	0.12
Within group centered parental stress	0.01	< 0.01	0.01	< 0.01	−0.01	< 0.01	−0.01
Within group centered ASD characteristics	< 0.01	< 0.01*	< 0.01	< 0.01	−0.01*	< 0.01	−0.01
Group * Within group centered parental stress	−0.01	< 0.01	−0.01	−0.01	< 0.01	< 0.01	< 0.01
Group * Within group centered ASD characteristics	< 0.01	< 0.01	−0.01	< 0.01	0.01	< 0.01	< 0.01

* $P < 0.05$
** $P < 0.01$.

Table 4. Unstandardized Parameters Estimates from Linear Mixed Model Analyses for Predictors of Self-Reported Parenting Behaviors

	Material rewarding	Positive parenting	Rules	Discipline	Harsh punishment	Stimulating the development	Adapting the environment
Intercept	2.31**	4.20**	4.28**	2.88**	1.27**	3.90**	2.57**
Group (0 = GPC; 1 = ASD)	0.12	−0.16	0.01	−0.14	< 0.01	0.01	0.31*
Within group centered parental stress	0.01	−0.03*	−0.01	0.01	0.02	−0.02	< 0.01
Within group centered ASD characteristics	0.01	< 0.01	< 0.01	0.02	0.01*	< 0.01	0.01*
Group * Within group centered parental stress	−0.02	0.03	0.01	−0.01	−0.01	0.01	0.02
Group * Within group centered ASD characteristics	−0.01	−0.01	< 0.01	−0.02	−0.01*	< 0.01	−0.02*

* $P < 0.05$
** $P < 0.01$.

question, only a significant effect could be noted on Adapting the environment, a subscale of ASD adapted parenting, with a higher score in the ASD group (Table 2). In addition, the effects of maternal characteristics were investigated. Within-group centered parenting stress had a significant, negative effect on the subscale Positive parenting. The interaction with group was not significant, indicating that the effect was the same for both groups. For Harsh punishment and Adapting the environment, both the main effect of ASD characteristics and the interaction effect of ASD characteristics with group were significant predictors. The parameter estimates indicate that ASD characteristics of the mother were positively associated with harsh punishment and adapting the environment in the GPC group. Yet, in the ASD group, these ASD characteristics seem to have little impact on Harsh punishment, and the results were even reverse for Adapting the environment.

Discussion

The model of Hastings (2002) suggests associations between parenting stress, child behavior problems and parenting behaviors among parents of children with developmental disabilities. Hastings stated that especially parenting behaviors and the link with the two other constructs remain understudied. With this study, we tried to fill this gap in the literature, hereby focusing on adolescents with ASD in particular.

A first aim of this study was to compare observed and self-reported parenting behaviors between parents of adolescents with and without ASD. Considering the observations, the results indicate that mothers of adolescents with ASD were more sensitive and creative during the tasks. For example, mothers use humor and invigorate the task (i.e., creativity) to have their adolescent involved or they react empathetically when their adolescent gets frustrated or tired (i.e., sensitivity) to prevent challenging behavior. This may indicate that mothers of adolescents may have found their way to deal with the challenges of parenting their adolescent with ASD. Alternatively, social desirability may be higher among parents of children with ASD. With regard to the self-report questionnaire, mothers of adolescents with ASD in our study report to adapt the environment more frequently than mothers of adolescents in the GPC group for example, by establishing routines. This was to be expected, since this is an ASD adapted parenting behavior subscale and previous studies have found the same effect (Boonen et al., 2015; Maljaars et al., 2013). However, overall little differences were found between the two groups, even though the groups differ on characteristics that were expected to play a role in parenting behaviors; that is, ASD characteristics of the child, and parenting stress of the mother.

Secondly, the role of maternal ASD characteristics and parenting stress was investigated. As reported repeatedly in previous research (see Hayes & Watson, 2013, for meta-analysis on this topic), mothers in our ASD sample experienced more parenting stress than mothers in the GPC group. Equal levels of ASD characteristics of the mother were reported across the ASD and GPC group, which is in line with the study of Bernier and colleagues (2012), but in contrast with the study of Wheelwright and colleagues (2010). Parenting

stress was found to be negatively related to self-reported positive parenting. This is consistent with the results of previous research (Boonen et al., 2015; Osborne & Reed, 2010) suggesting a relation of parenting stress with less involvement and more observed negativity (i.e., related to positive parenting). Nonetheless, in contrast with these studies and with the theoretical model of Hastings (2002), the role of parenting stress appeared to be rather modest in our study. Parenting stress was not a significant predictor of the observed parenting behaviors, and all self-reported parenting behaviors but positive parenting. We also did not observe an interaction between group and within-group parental stress, suggesting a similar effect of stress in both groups, once mean differences in stress are taken into account. In addition, ASD characteristics seem to be an important predictor for several parenting behaviors. Mothers who report to have more ASD characteristics themselves, were observed to show more negativity and less sensitivity. These are interesting findings, especially since the coders of the observation were blind to all information of the questionnaires. Furthermore, these findings seem to be invariant to group, since the interactions with ASD characteristics were not significant. With respect to the self-report questionnaire on parenting behaviors, ASD characteristics had a significant main effect on Harsh punishment and Adapting the environment. Importantly, and additional to these main effects, we also observed a significant interaction between ASD characteristics and group for these two dependent variables. This suggests that ASD characteristics have a differential effect for the two groups on Harsh Punishment and Adapting the environment. Whereas more ASD characteristics in parents in the control group are associated with higher scores on harsh punishment, no association is found in the ASD group. The meta-analysis of Gershoff (2002) indicates that harsh punishment can be effective in acquiring short-term compliance. However, children comply immediately out of fear rather than understanding the reasons for behaving correctly. A better alternative parenting behavior would be inductive discipline, that is, giving reasons for not tolerating undesirable behaviors and explaining the consequences of these behaviors. Possibly, for mothers of children without ASD, more maternal ASD characteristics could be associated with more difficulties to understand problem behaviors of their child, and emotions and beliefs behind these behaviors, and to communicate this with their child. Therefore, it is possible that they react more often with harsh punishment. For mothers of children with ASD on the other hand, problem behaviors of their children are probably attributed to the ASD diagnosis, which may lead to a better understanding of these behaviors. In addition, encountering similar difficulties as their child could also result in a greater awareness. This greater understanding could also play a part in explaining the inverse interaction effect for Adapting the environment. It is possible that mothers of children with ASD who have more ASD characteristics themselves may be better accustomed to the particular needs of their adolescent, and thus may be more selective when adapting the environment, whereas mothers with less ASD characteristics may take a more general approach, incorporating more adaptations in daily life. In the control group, mothers with more maternal ASD characteristics may adapt more because they need the adaptations themselves. It would be interesting for further research to take into account child characteristics such as ASD characteristics and behavior problems, because these characteristics could mediate and/or moderate the impact of maternal characteristics on parenting behavior. For example, maternal ASD characteristics could be related to ASD characteristics of the child, which in turn could explain the higher scores on Adapting the environment and Harsh punishment.

A few limitations can be noticed for this study. First, these results cannot be generalized over both parents, since only mothers were included in this study. Although observations offer a good attempt to capture parenting behavior in an objective way, compared to self-report for example, it can be questioned how representative these interactions are for daily life. In particular, since these children are already teenagers, they seem to be very aware of the presence of the camera. Furthermore, since teenagers spend less time with their mother, doing these activities together in itself might be little representative for daily life. It would be useful in further research to observe mother-child dyads during more common activities, for example, having lunch together, or in truly naturalistic situations. Lastly, this study only takes into account mothers' characteristics and parenting behaviors. However it is well established that both mother and child reciprocally influence each other (Kuczynski, 2003). Therefore, it would be interesting to also include child characteristics (e.g., behavior problems) and child behavior during the interactions in further research. In addition, further research could also inspect time profiles and the effect of task characteristics on parenting behavior more elaborately.

Finally, this study may provide some clinical implications. Although adolescence is often associated with many challenges, mothers of adolescents with ASD were found to be more sensitive and creative during the observations, compared to mothers of adolescents without ASD. So, although their levels of parenting stress are much higher compared to parents in the GPC group, they still manage to react in a sensitive way and to contribute to pleasant interactions. This should motivate parent counselors to be aware of and reinforce

the strengths of parents. In addition, we noticed that ASD characteristics of the mother relate to the frequency of harsh punishment and adapting the environment in diverse ways across groups. In the control group we noticed a positive association between maternal ASD characteristics and harsh punishment. We hypothesize that mothers with more ASD characteristics experience more difficulties in understanding and communicating about problem behaviors with their child. Therefore, it would be helpful to acknowledge the challenges these parents encounter, and explore with them alternative parenting practices to correct or prevent undesirable behavior and to encourage wanted behavior. The literature on adapting the environment is rather limited, so further research on the short and long-term consequences of these behaviors, while taking into account child and mother characteristics (e.g., ASD characteristics and parenting stress), would be useful.

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