Research in Autism Spectrum Disorders 90 (2022) 101901

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

journal homepage: www.elsevier.com/locate/rasd

Parenting behaviours among mothers of pre-schoolers on the autism spectrum: Associations with parenting stress and children's externalising behaviour problems

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ARTICLE INFO

No. of reviews completed is 2

Keywords:
Parenting behaviours
Parenting stress
Externalising behaviour problems
Autism
Pre-schoolers

ABSTRACT

Background: Parents of pre-schoolers diagnosed with Autism Spectrum Disorder (ASD) report increased parenting stress (i.e., stress related to the parent role) and more behaviour problems of the child compared with parents of non-autistic pre-schoolers. Parenting stress and children's behaviour problems are both associated with parenting behaviours, but have not yet been investigated together.

Method: 42 mothers of autistic and non-autistic pre-schoolers were observed during mother-child interaction and they reported on parenting behaviours, parenting stress, and children's externalising behaviour problems. Spearman correlations between all variables were calculated for the ASD group and the non-ASD group separately, and Linear Mixed Models were built to investigate whether parenting stress and externalising behaviour problems were similarly associated to parenting behaviours in both groups.

Results: Mothers in the ASD group reported more parenting stress and more externalising behaviour problems than mothers in the non-ASD group. In the ASD group only, parenting stress was related to externalising behaviour problems but not to the level of autism characteristics. In both groups, more externalising behaviour problems were associated with more observed negative parenting behaviours (i.e., criticising and ignoring the child), and more parenting stress was associated with less reported autonomy support.

Conclusions: Our findings indicate that in the case of possibly problematic parenting behaviours, such as negativity and lack of autonomy support, it is important to investigate associated factors like parenting stress and children's behaviour problems. An individualised strengths and needs assessment could then offer a tailored intervention to families with an autistic pre-schooler.

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https://doi.org/10.1016/j.rasd.2021.101901
Received 7 January 2021; Received in revised form 15 September 2021; Accepted 4 December 2021
Available online 11 December 2021
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1. Introduction

Pre-school age can be a stressful time for any parent, but parents of a young child on the autism spectrum[1] may encounter additional challenges. Early autism signs that parents may have observed in their child, such as differences in social responsiveness or the presence of repetitive behaviours, can become more pronounced and may cause further concern. Moreover, parents may have to cope with the recent Autism Spectrum Disorder (ASD) diagnosis and the start of intervention services (Davis & Carter, 2008). Not surprisingly, parents of autistic pre-schoolers experience increased parenting stress (i.e., stress related to the parent role), compared with parents of typically developing (TD) children and those who have a child with another disability (for a review, see Tint & Weiss, 2016). Despite this consistent finding, little research has focused on the relationships between parenting stress and parenting behaviours among parents of pre-schoolers on the autism spectrum. Moreover, children's additional behaviour problems have not consistently been taken into account when investigating parenting behaviours.

1.1. Parenting behaviours

Although parents of pre-schoolers on the autism spectrum report elevated stress levels compared with parents of non-autistic pre-schoolers, research suggests that parenting behaviours are largely comparable between parents of autistic and non-autistic pre-schoolers. However, some differences exist. Observational studies namely found that parents of autistic pre-schoolers were similarly sensitive and responsive (i.e., being child-centred; responding timely and appropriately to the child's needs and following the child's needs) as parents of non-autistic pre-schoolers (Blacher, Baker, & Kaladjian, 2013; Campbell et al., 2018), but demonstrated more behaviours deemed controlling and intrusive (i.e., being parent-centred; following their own agenda, being overly stimulating, or unable or unwilling to relinquish control) (Blacher et al., 2013). Blacher et al. (2013) suggest that these differences in parent-centred and controlling behaviours may be related to children's behaviour problems, which were more common in the ASD group compared to the non-ASD group. They also suggest that early intervention could have played a role, as behavioural techniques that parents may have learned can appear intrusive or directive, and are thus coded as such.

In line with these results, a questionnaire study by Lambrechts et al. (2015) found no differences between mothers from the ASD group and a non-ASD group for most parenting behaviours that are viewed as sensitive and responsive (e.g., supporting the child's autonomy or adapting the environment according to the child's needs). Moreover, they found no differences in provision of rules and structure or indulging behaviour (e.g., giving in when the child throws a tantrum). They however found that mothers in the ASD group reported lower scores on the subscale Stimulating the Child's Development (e.g., stimulating pretend play, explaining emotions in others, teaching a child to wait its turn) than mothers in the non-ASD group. Contrary to the findings of Blacher et al. (2013), mothers of autistic pre-schoolers reported fewer disciplinary behaviours (e.g., raising your voice when your child does not listen, giving a time-out) compared with the non-ASD group. However, the Discipline subscale assesses only disciplinary behaviours and not intrusive or controlling behaviours, and results may thus not be comparable between the different studies.

1.2. Parenting behaviours and parenting stress

Parenting stress has received considerable attention in autism research, but the nature of parenting stress is still open to debate. Some studies point at children's autism characteristics as strongest factor associated with parenting stress (Davis & Carter, 2008; Eisenhower, Baker, & Blacher, 2005; Firth & Dryer, 2013; Lyons, Leon, Roecker Phelps, & Dunleavy, 2010), while other studies found that parenting stress is related to children's additional externalising behaviour problems (Estes et al., 2013; Hastings et al., 2005; Lecavalier, Leone, & Wiltz, 2006; Lin, Iao, Lee, & Wu, 2021; Peters-Scheffer, Didden, & Korzilius, 2012). Behaviour problems are more common in autistic than in TD children (Estes et al., 2013; Wilson, Berg, Zurawski, & King, 2013), and they seem associated with the amount of autism characteristics (Jang, Dixon, Tarbox, & Granpeesheh, 2011; Lindsey, Saltness, Lau, & Barry, 2020).

To the best of our knowledge, the relationships between parenting stress and parenting behaviours have only been investigated specifically among parents of autistic pre-schoolers by Osborne and Reed (2010), who included different age groups (2–3, 4–6, 7–11, 12+ years) in their study. Parents of children aged two to three years reported "extremely elevated levels of parenting stress" at baseline (p. 411), and these high initial levels of parenting stress predicted less involvement and poorer communication at follow-up (9–10 months later). Moreover, less limit-setting at baseline predicted more parenting stress at follow-up. In the age group of four to six years, elevated parenting stress at baseline predicted poorer communication and less limit-setting at follow-up, and vice versa. However, this study relied solely on self-report measures and no control group was included.

In a study on school-aged autistic and non-autistic children and their mothers, Boonen et al. (2015) found that parenting stress was related to both self-reported and observed parenting behaviours. In the ASD-group, higher levels of parenting stress were associated with more self-reported use of material rewarding and (harsh) punishment, and with more negative parenting behaviours (i.e., criticising or ignoring the child) during observation. In the non-ASD group, more parenting stress was only associated with less creativity (i.e., using fantasy or humour) during observation. There are several possible explanations for these group differences. First, they might be explained by the higher parenting stress levels in the ASD group, which may have diminished the mothers' ability to remain patient towards their autistic child. Second, there may have been additional differences between the groups regarding parental

[1] Throughout this manuscript, we use Person-First Language ("on the autism spectrum") and Identity-First Language ("autistic") interchangeably, following the recommendations of Botha, Hanlon, and Williams (2021).

ASD characteristics and temperament on the one hand, and children's temperament and behaviour problems on the other hand.

1.3. Parenting behaviours and children's behaviour problems

As suggested by Blacher et al. (2013), differences in parenting behaviours could be related to differences in children's behaviour problems. The relationships between parenting behaviours and behaviour problems have not yet been investigated among autistic pre-schoolers and their parents specifically, but were explored in three broader age samples.

Boonen et al. (2014) found that, in a sample of autistic and non-autistic children aged six to 12 years, significantly more behaviour problems, both externalising and internalising, were reported in the ASD group compared to the non-ASD group. Externalising (but not internalising) behaviour problems were positively associated with self-reported disciplinary parenting behaviours in both groups. Externalising behaviour problems were also positively associated with self-reported positive parenting behaviours (e.g., showing affection, providing daily structure, rewarding) in the ASD group, although the correlation was rather weak.

Shawler and Sullivan (2017) yielded similar results in a sample of autistic children aged three to 11 years, namely that harsh disciplinary parenting behaviours (e.g., displays of parental anger and irritability) were significantly – albeit weakly – related to children's behaviour problems. However, no significant association was found between permissive parenting behaviours (e.g., giving in to a tantrum, failing to enforce rules) and children's behaviour problems. Moreover, they found that the use of harsh disciplinary parenting behaviours, as reported by parents, mediated the link between parenting stress and behaviour problems. No mediation effect was found for permissive parenting behaviours.

A recent questionnaire study by Lindsey et al. (2020) among autistic children aged four to 10 years and their parents extends these findings. They found that poorer monitoring/supervision and higher levels of inconsistent discipline (the authors use the term "negative parenting") predicted children's externalising behaviour problems one year later, above parental distress, sex, and child's age. Warmth and involvement ("positive parenting"), on the other hand, did not predict children's behaviour problems one year later. However, the relationship between the "negative" parenting behaviours and children's behaviour problems needs to be interpreted with caution, since the interaction effect between autism characteristics and these "negative" parenting behaviours was also significant in the final model. This means that higher levels of "negative" parenting behaviours predicted more behaviour problems for children with less severe autism characteristics, but predicted fewer behaviour problems for children with more severe autism characteristics.

1.4. The present study

Pre-school age is challenging for any parent, and may be even more so for parents of a pre-schooler on the autism spectrum. Research shows that parents of autistic pre-schoolers report elevated parenting stress levels and more behaviour problems of the child compared to parents of non-autistic pre-schoolers, which are both associated with parenting behaviours. However, parenting behaviours, parenting stress, and children's externalising behaviour problems have not yet been investigated together among autistic pre-schoolers and their mothers, comparing them to non-autistic pre-schoolers and their mothers.

Building on prior research, investigating parenting using a multimethod approach (Boonen et al., 2015; van Esch, Vanmarcke, Ceulemans, Van Leeuwen, & Noens, 2018), the current study aimed to gain insight in parenting pre-schoolers on the autism spectrum. More specifically, we wanted to investigate whether parenting stress and externalising behaviour problems were similarly associated to observed and self-reported parenting behaviours among mothers of autistic and non-autistic pre-schoolers.

First, we explored parenting stress, children's autism characteristics, and children's externalising behaviour problems in our study sample. As a first step, we examined possible differences between a group of pre-schoolers diagnosed with ASD and their mothers ("ASD group"), and a group of pre-schoolers from a general population control group and their mothers ("non-ASD group"). In line with previous findings, we expected higher levels of parenting stress, more autism characteristics, and more externalising behaviours in the ASD group, compared with the non-ASD group. In the next step, we explored the associations between these three variables. The only study that used a similar measure of parenting stress (i.e., scores on the Parent Domain of the Parenting Stress Index; Abidin, 1983) found that autism characteristics and not behaviour problems predicted parenting stress (Davis & Carter, 2008). However, most studies found stronger associations with children's behaviour problems (Estes et al., 2013; Hastings et al., 2005; Lecavalier et al., 2006; Lin et al., 2021; Peters-Scheffer et al., 2012). We therefore predicted positive associations between children's externalising behaviour problems and parenting stress and between children's autism characteristics and parenting stress. In line with previous findings (Jang et al., 2011; Lindsey et al., 2020), we expected a positive correlation between autism characteristics and behaviour problems.

Second, we compared self-reported and observed parenting behaviours between the ASD group and the non-ASD group. With regard to parenting behaviours, we hypothesised that mothers in the ASD group would demonstrate similar responsive and sensitive parenting behaviours during observation (Blacher et al., 2013; Campbell et al., 2018), and more disciplinary and negative parenting behaviours) than mothers in the non-ASD group (Blacher et al., 2013; Boonen et al., 2015). With regard to self-reported parenting behaviours, we expected similar results as Lambrechts et al. (2015), namely no differences in sensitive and responsive parenting behaviours, provision of rules and structure or indulging behaviours between the two groups, but fewer disciplinary behaviours and lower scores for Stimulation of the Child's Development in the ASD group, compared with the non-ASD group.

Third, we investigated how parenting stress and externalising behaviour problems were related to both self-reported and observed parenting behaviours, and whether this association differed between groups. Following Boonen et al. (2015), we expected that parenting stress would be associated with self-reported disciplinary behaviours and observed negative parenting behaviours in the ASD group, but not – or less strongly – in the non-ASD group. Moreover, we hypothesised that externalising behaviour problems were positively associated with self-reported disciplinary behaviours (Boonen et al., 2015; Shawler & Sullivan, 2017) in both groups, and

Table 1
Demographic and Other Characteristics of the ASD Group and Non-ASD Group.

Child characteristics		ASD ($n = 21$)	Non-ASD ($n = 21$)	Test statistic (U)	p	Effect size (η^2)
Chronological age (in months)	min.-max.	32–66	26–47	62.00	< .001	.38
	Median	50	41			
Developmental age (in months)	min.-max.	12–81	24–62	199.50	.60	.01
	Median	46	46			
Sex (%)	Female	3 (14.3)	3 (14.3)	220.50	1.00	< .001
	Male	18 (85.7)	18 (85.7)			
Autism characteristics	min.-max.	2-10	1–3	22.50	< .001	.59
	Median	6	2			
Externalising behaviour problems	min.-max.	8–44	0–26	68.00	< .001	.35
	Median	23	10			
Maternal characteristics		**ASD ($n = 21$)**	**Non-ASD ($n = 18$)**[a]	**Test statistic (U)**	***p***	**Effect size (η^2)**
Age (in years)	min.-max.	25–45	27–40	198.50	*.79*	.002
	Median	33.3	34.0			
		ASD ($n = 21$)	Non-ASD ($n = 21$)			
Parenting stress	min.-max.	19–53	13–36	56.50	< .001	.41
	Median	29	17			

Note. Effect size of $\eta^2 = .00$–.01: no effect; $\eta^2 = .01$–.06: small effect; $\eta^2 = .06$–.14: intermediate effect; $\eta^2 = .14$–.20: large effect.
[a] Birth year was not available for three mothers.

negatively with supervision behaviours (e.g., creating a safe environment, keeping an eye on my child when he or she is playing) in the ASD group (Lindsey et al., 2020).

2. Methods

2.1. Participants

In total, 42 children participated together with their mother. Inclusion criteria were: chronological age between 24 and 60 months, (estimated) developmental age above 15 months, Dutch speaking, no sensory or motor issues that could hinder the testing, no known neurological or genetic problems. Demographic characteristics of the participants are shown in Table 1. The ASD group consisted of 21 mothers of children between 32 months and 66 months old ($M = 49.76$ months, $SD = 7.82$ months), of which 18 were boys. All children had received a formal ASD diagnosis according to DSM-IV-TR criteria (American Psychiatric Association, 2000) by a multidisciplinary team, including a child psychiatrist or child neurologist, prior to the study. To confirm this diagnosis, the Autism Observation Schedule (ADOS; Lord et al., 2000) and the Diagnostic Interview for Social and Communication Disorders – version 11 (DISCO-11; Wing, 2006) were used. All children received a score above the classification threshold on at least one of the two instruments. Fifteen children received both an algorithm score above the cut-off for ASD on the ADOS (Module 1 or 2) and a classification of ASD on the ICD-10 algorithm of the DISCO-11. Four children only received a classification of ASD on the ICD-10 algorithm of the DISCO-11 and two children only on the ADOS.

The non-ASD group consisted of 21 mothers of children without ASD. Children were between 26 and 47 months old ($M = 39.57$ months, $SD = 6.68$ months) and 18 were boys. They all had algorithm scores below the cut-off for ASD on the ADOS (module 1 or 2) and no classification of ASD on the ICD-10 algorithm. The children in the non-ASD group ($n = 21$) were selected from a larger control group ($N = 47$) of a previous study in our research group (Jansen et al., 2013), matched on developmental age and sex.

2.2. Procedure

The mothers of the ASD group were contacted via the Autism Expertise Centre and the Centre for Developmental Disorders in Leuven, two special needs schools and a home guidance service for families with a child on the autism spectrum. The mothers of the non-ASD group were contacted via eight regular schools and eight day care services. All parents of a child between two and six years old received a letter with information about the study and were asked if they were interested to participate. All mothers gave informed consent prior to the study. A researcher contacted them by telephone to arrange a date for the home visit and the questionnaires were sent by post. By the time of the home visit, the mothers had filled out the questionnaires. During the home visit, mother and child were observed in three different situations. The three play tasks were chosen to elicit a wide variety of parenting behaviours, as every play task brings out different parenting behaviours and children may be more comfortable during more or less structured tasks (see also Blacher et al., 2013). The instructions were given before the start of every task. Mothers were told that when the researchers would indicate the end of the task, they had to clean up together with their child. The observation was video recorded. The first situation aimed to elicit free play, to gain insight in naturalistic parenting behaviours. Mother and child could choose one out of three bags with different play materials: a Duplo pet store; several little cars, a train, a plane and two little puppets; or music instruments. They were asked to play for 4 min like they usually do at home. In the second situation, they received a big bag with toys (two telephones, a doll, two plates, two cups, and two spoons, a peg puzzle, a tower with rings, two little trucks and a book) and were again asked to play for 4 min like they usually do at home. This situation aimed to elicit free play as well, but provided the mother-child dyad with a wide range of toys. In the third more structured situation, mother and child were asked to build a little house with Duplo similar to the example. This last task ended after 5 min or earlier when they were finished. During this situation, we wanted to elicit more directive parenting behaviours. Mothers were interviewed using the DISCO-11 (Wing, 2006), and an individual assessment took place at school, in the day care centre, at a home guidance service or at our research centre. Cognitive abilities of 39 out of 42 children were assessed by using the Snijders-Oomen Nonverbal Intelligence Test (SON-R 2½-7; Tellegen, Winkel, Wijnberg-Williams, & Laros, 1998). This test consists of six subtests and provides insight into visual-spatial ability and abstract and concrete reasoning. The result can be expressed as an IQ score and a reference age can be calculated. For three children of the ASD group, no SON-R scores were available. Their cognitive level was estimated by the Bayley Scales of Infant Development – Second Edition (BSID-II-NL; Van der Meulen, Ruiter, Spelberg, & Smrkovsky, 2002) or the Psychoeducational Profile-Revised (PEP-R; Schopler, Reichler, Bashford, Lansing, & Marcus, 1990; Steerneman, Muris, Merckerlbach, & Willems, 1997). Communication and social skills were assessed with the ADOS (Lord et al., 2000). This study was reviewed and approved by the Ethical Committee of the Faculty of Psychology and Educational Sciences of KU Leuven and carried out in accordance with the Declaration of Helsinki.

2.3. Materials

2.3.1. Observed parenting behaviours

We used the Parenting Rating Scale of Karreman, van Tuijl, van Aken, and Dekovic (2008) and Karreman, de Haas, van Tuijl, van Aken, and Dekovic (2010), based upon McHale's Coparenting and Family Rating System (CFRS; McHale, 1995). Seven dimensions of maternal parenting were rated on a 7-point Likert scale: Warmth, Negativity, Investment, Limit-Setting, Sensitivity, Provision of Structure and Creativity. To measure Autonomy Support, the coding system of Whipple, Bernier, and Mageau (2011) was used. For a detailed description of the scales, see Boonen et al. (2015).

The first, middle and last minute of the three play situations were rated for each mother-child dyad, resulting in nine minutes of coded observation. All the video observations were rated by two coders and a mean score was calculated based on their ratings. The coders were trained using similar video observations and they had to reach exact agreement of 70 % with the primary coder before they could start coding the actual observations. We calculated adjacent inter-agreement reliability between two coders based on the percentage agreement within one scale point, which ranged from .73 (Negativity) to .95 (Warmth) in the ASD group, and from .77 (Limit-Setting) to .98 (Warmth) in the non-ASD group.

The Negativity subscale is meant to detect subtle indications of negative parenting behaviour. A maximum score of 7 means that a parent is overtly hostile and critical, and is only focused on the shortcomings of the child; a score of 4 stands for a parent that criticises or ignores a child once; a minimum score of 1 means that no hostile or critical behaviours were observed. The maximum score given in this study was a 4 (both in the ASD-group and non-ASD group).

The dimension Limit-Setting could only be rated if the child showed disobedient behaviour, or behaviour that deviated from the task during the observation. Most children did not show this type of behaviour, so this dimension could only be rated for 11 mother-child dyads in the ASD group and for six mothers in the non-ASD group. This dimension is mentioned in the descriptive analyses, but excluded from the final analyses.

2.3.2. Self-reported parenting behaviours

The Parental Behavior Scale for Toddlers (PBS-T; Van Leeuwen & Vermulst, 2004; Van Leeuwen, Rousseau, Hoppenbrouwers, Wiersema, & Desoete, 2011) was used to assess parenting behaviours. In line with a prior study (Lambrechts et al., 2015), behaviours specially relevant for parents of pre-schoolers on the autism spectrum were added, leading to a final 50-item questionnaire. Seven subscales refer to general parenting behaviour: Positive Parenting ($n = 6$; e.g., I play with my child), Autonomy Support ($n = 4$; e.g., I give my child the opportunity to try new things), Supervision and Safety ($n = 6$; e.g., I provide a safe environment for my child), Discipline ($n = 5$; e.g., When my child does something I do not like, I raise my voice), Rules and Structure ($n = 3$; e.g., I make sure my child's daily routine is the same day in, day out), Rewarding ($n = 3$; e.g., When my child masters doing something new, I applaud or say good boy/girl) and Indulging ($n = 2$; e.g. When my child wants something, I give in so he or she won't get cross or start to cry). Two subscales include items specifically relevant for parenting autistic children: Stimulating the Development ($n = 13$; e.g., When a person is crying, I explain to my child how this person is feeling and why) and Adapting the Environment ($n = 8$; e.g., When my child is doing an activity (e.g. drawing, reading a book, …), I restrict distraction to a minimum). Using a 5-point Likert scale, parents rate the frequency of their parenting behaviour towards the child that is participating in the study (1 = *(almost) never*, 2 = *little*, 3 = *sometimes*, 4 = *often*, and 5 = *(almost) always*). Internal consistency was measured in a larger sample (Lambrechts et al., 2015), and was acceptable or good for five of the subscales (ranging from $\alpha = .71$ for the subscale Supervision and Safety to $\alpha = .81$ for the subscale Rewarding; corrected item total correlations >.36). However, internal consistency of the subscale Discipline was rather poor, with Cronbach's alpha value of .57 (corrected item total correlations >.25). Pearson's correlation between the two items of the Indulging subscale was high ($r = .48$; $p < .001$).

2.3.3. Parenting stress

The Nijmegen Parental Stress Index – Short (NOSIK; de Brock, Vermulst, Gerris, & Abidin, 1992), a shorter and translated version of the Parenting Stress Index (PSI; Abidin, 1983), was used to measure parenting stress. By means of a 6-point Likert scale ranging from 1 (*totally disagree*) to 6 (*totally agree*), parents rate their stress level on 25 items. The subdomain of Parent Related Stress includes 11 items, and 14 items refer to the subdomain of Child Related Stress. The NOSIK has shown good internal reliability with Cronbach's alpha's higher than .90 (de Brock et al., 1992; Boonen et al., 2015; Lambrechts et al., 2015). In the current study, the raw sum scores on the parent domain are used.

2.3.4. Autism characteristics

The Autism Diagnostic Observation Schedule, second edition, module 1 of 2 (ADOS; Gotham, Risi, Pickles, & Lord, 2006) was administered to all participants. The total severity scores were used to estimate autism characteristics.

2.3.5. Externalising behaviour problems

Children's emotional and behaviour problems were assessed with the Child Behaviour Checklist for children aged 1½-5 years (CBCL; Achenbach & Rescorla, 2001). Parents are asked to rate each of the 100 items for how true it is for their child, now or within the

Table 2
Spearman Correlations between Parenting Stress, Externalising Behaviour Problems, and Autism Characteristics.

	Parenting stress		Externalising behaviour problems	
	r_s	p	r_s	p
ASD group				
Externalising behaviour problems	.45	.04	/	/
Autism characteristics	.20	.40	.02	.95
Non-ASD group				
Externalising behaviour problems	.18	.44	/	/
Autism characteristics	.20	.38	−.24	.29

past two months, using the following scale: 0 = *not true (as far as you know)*; 1 = *somewhat or sometimes true*; 2 = *very true or often true*. The CBCL consists of seven empirically derived syndrome scales (Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems, Aggressive Behaviour), and two broad problem scales (Internalising Behaviours, Externalising Behaviours). The internal consistencies of the Externalising Behaviours scale was $\alpha = .89$, as calculated for a large Flemish study sample (Braet et al., 2011). In the current study, raw sum scores were used.

2.4. Analysis

To answer our first research question, group differences in parenting stress and externalising behaviour problems were investigated with Mann-Whitney *U* tests (Table 1), and Spearman correlations between parenting stress, externalising behaviour problems, and autism characteristics were calculated for the ASD group and the non-ASD group separately (Table 2), using IBM SPSS version 24. Due to non-normality of the data, non-parametric tests were used. To answer the second and third research questions, linear mixed models (LMM) were built in IBM SPSS version 24 (Tables 4 and 5). The observed parenting dimensions, minus Limit-Setting, and the subscales of the self-report questionnaire were used as dependent variables. Group was dummy coded (0 for non-ASD group, 1 for ASD group) and included as a first covariate, to investigate group differences. Parenting stress was included as a second covariate, using within-group centred scores, since the mean maternal parenting stress score differed significantly between the two groups. Externalising behaviour problems were entered as a third covariate, again using within-group centred scores, since the average scores in the ASD group were significantly higher than in the non-ASD group. Lastly, we included the interaction between parenting stress and externalising behaviour problems. For the observed parenting behaviours, task situation (3 levels; three different play situations) and minutes (3 levels; first, middle and last minute) were additionally included as fixed within-subject factors. No random effects were fitted in the LMM.

3. Results

3.1. Parenting stress, children's autism characteristics, and children's externalising behaviour problems

Mann-Whitney *U* tests revealed significant differences in Parenting Stress ($U = 56.5$, $p < .01$, $\eta^2 = 0.42$), Externalising Behaviour Problems ($U = 68.0$, $p < .01$, $\eta^2 = 0.36$) and autism characteristics ($U = 22.5$, $p < .01$, $\eta^2 = 0.63$) between the ASD group and the non-ASD group (Table 1).

In the non-ASD group, no significant associations were found between the variables (Table 2). In the ASD group, Parenting Stress was positively and significantly associated with Externalising Behaviour Problems ($r_s = .45$, $p = .04$), but not with autism characteristics ($r_s = .20$, $p = .40$).

3.2. Observation of parenting behaviours

Mean scores of the observed parenting behaviours are presented in Table 3. To investigate the possible differences between mothers in the ASD and the non-ASD group, mean scores were compared between the two groups using LMM (Table 4). Mothers in the ASD group received significantly lower scores on Sensitivity and higher scores on Negativity. Within-group centred Parenting Stress did not

Table 3
Range and Mean Scores of Observed and Self-Reported Parenting Behaviours.

	ASD group ($n = 21$)		Non-ASD group ($n = 21$)	
	Range	*Mean*	*Range*	*Mean*
Observed parenting behaviours				
Warmth	4.1–5.5	4.6 (0.4)	3.9–5.1	4.6 (0.3)
Negativity	1.1–2.1	1.5 (0.4)	1.0–2.2	1.2 (0.3)
Investment	4.2–5.3	4.8 (0.3)	3.9–5.1	4.7 (0.4)
Limit-Setting	2.0–6.0	4.3 (1.2)	2.3–6.3[a]	4.7 (1.8)[a]
Sensitivity	3.8–5.8	4.9 (0.5)	4.7–5.8	5.3 (0.3)
Provision of Structure	4.3–6.0	5.3 (0.6)	4.7–6.0	5.6 (0.4)
Creativity	1.6–3.0	2.2 (0.4)	1.1–2.9	2.1 (0.6)
Autonomy Support	2.9–4.8	3.7 (0.5)	3.4–4.5	3.9 (0.3)
Self-reported parenting behaviours				
Positive Parenting	3–5	3.9 (0.5)	4–5	4.1 (0.3)
Autonomy Support	3–5	3.9 (0.4)	3–5	4.1 (0.4)
Supervision and Safety	3–5	4.3 (0.5)	3–5	4.2 (0.4)
Discipline	2–4	2.9 (0.6)	2–4	3.2 (0.4)
Rules and Structure	2–5	4.1 (0.8)	3–5	4.4 (0.6)
Rewarding	4–5	4.7 (0.4)	4–5	4.7 (0.4)
Indulging	2–4	2.9 (0.6)	2–4	2.6 (0.6)
Stimulating the Development	2–5	3.6 (0.6)	3–5	3.9 (0.5)
Adapting the Environment	3–5	3.5 (0.5)	3–5	3.7 (0.4)

[a] Only 6 out of 21 children from the control group received a score for Limit-Setting, and this subscale has thus been removed from further analyses.

Table 4
Unstandardised Parametres Estimates from Linear Mixed Model Analyses for Predictors of Observed Parenting Behaviours.

	Warmth	Negativity	Investment	Sensitivity	Provision of Structure	Creativity	Autonomy Support
Intercept	4.63**	1.15**	4.71**	5.27**	5.57**	2.03**	3.86**
Group	0.07	0.29**	0.12	−0.34**	−0.24	0.14	−0.11
Within-group centred Parenting stress	0.00	−0.01	−0.01	0.01	−0.01	−0.03	−0.00
Within-group centred Externalising behaviour problems	0.01	0.02**	0.01	−0.00	−0.00	0.02	−0.00
Group* Within-group centred Parenting stress	−0.02	−0.00	0.01	−0.02	−0.02	0.03	−0.02
Group* Within-group centred Externalising behaviour problems	−0.00	0.00	−0.01	0.01	0.00	−0.02	0.02

* $p < .05$.
** $p < .01$.

predict any of the observed parenting behaviours, and neither did the interaction of Parenting Stress and group. Within-group centred Externalising Behaviour Problems significantly predicted Negativity, with more Externalising Behaviour Problems predicting more Negativity. The interaction between within-group centred Externalising Behaviour Problems and group was not significant, meaning that its predictive value was similar for both groups.

3.3. Self-reported parenting behaviours

Mean scores of the self-reported parenting behaviours are presented in Table 3. Table 5 presents the results of the LMM conducted with the subscales of the PBS as dependent variables. Mothers in the ASD group reported lower scores on Stimulation of the Development, compared with mothers in the non-ASD group. Within-group centred Parenting Stress significantly predicted reported Autonomy Support, with higher levels of Parenting Stress predicting lower scores on Autonomy Support. The interaction between within-group centred Parenting Stress and group did not predict any of the self-reported parenting behaviours, so Parenting Stress predicted Autonomy Support similarly in both groups. Independently, within-group centred Externalising Behaviour Problems did not predict any of the parenting behaviours. However, the interaction with group significantly predicted Indulging, with more Externalising Behaviour Problems predicting less Indulging in the ASD group but more Indulging in the non-ASD group.

Table 5
Unstandardised Parametres Estimates from Linear Mixed Model Analyses for Predictors of Self-Reported Parenting Behaviours.

	Positive Parenting	Autonomy Support	Supervision and Safety	Discipline	Rules and Structure	Rewarding	Indulging	Stimulating the Development	Adapting the Environment
Intercept	4.06**	4.10**	4.17**	3.18**	4.40**	4.67**	2.62**	3.90**	3.70**
Group	−0.20	−0.15	0.15	−0.28	−0.27	0.03	0.31°	−0.32*	−0.18
Within-group centred Parenting stress	−0.00	−0.03*	−0.01	−0.00	−0.00	−0.02	0.02	−0.03	−0.01
Within-group centred Externalising behaviour problems	0.01	−0.02	−0.00	0.00	−0.02	0.01	0.03	−0.02	0.01
Group* Within-group centred Parenting stress	0.01	0.03	0.01	0.02	−0.01	0.02	−0.02	0.02	0.01
Group* Within-group centred Externalising behaviour problems	−0.03	0.01	−0.00	0.01	0.01	−0.02	−0.08**	0.03	−0.00

* $p < .05$.
** $p < .01$.
° $p = 0.054$.

4. Discussion and implications

Although pre-school age is thought to be challenging for parents in general and even more so for parents of a pre-schooler on the autism spectrum, very little research has focused on the relationships between parenting behaviours, parenting stress, and children's behaviour problems. This study aimed to fill this gap by investigating whether parenting stress and externalising behaviour problems were similarly associated to observed and self-reported parenting behaviours among mothers of autistic and non-autistic pre-schoolers.

4.1. Parenting stress, children's autism characteristics, and children's externalising behaviour problems

In line with previous findings, we found that mothers in the ASD group reported significantly more parenting stress than mothers in the non-ASD group (Tint & Weiss, 2016), and that pre-schoolers on the autism spectrum were reported to demonstrate more externalising behaviour problems than non-autistic pre-schoolers (Estes et al., 2013; Wilson et al., 2013). Moreover, our findings indicate that parenting stress is not significantly associated with children's autism characteristics, but rather with children's externalising behaviour problems, confirming previous studies (Estes et al., 2013; Hastings et al., 2005; Lecavalier et al., 2006; Lin et al., 2021; Peters-Scheffer et al., 2012) but contradicting others (Davis & Carter, 2008; Firth & Dryer, 2013; Lyons et al., 2010). Contrary to our hypothesis however, parenting stress was related to children's externalising behaviour problems only in the ASD group and not in the non-ASD group. One possible explanation could be that mothers in the non-ASD group reported both low levels of parenting stress and externalising behaviour problems, and it might be that variations within the normal range are not experienced as very stressful by these mothers. In contrast with Jang et al. (2011) and Lindsey et al. (2020), we found no significant association between children's autism characteristics and externalising behaviour problems, suggesting that they are independent from one another.

4.2. Observed parenting behaviours

We found that mothers in the ASD group received lower scores on the subscale Sensitivity and higher scores on the subscale Negativity over the three tasks, compared with mothers in the non-ASD group. In the coding scheme of Karreman et al. (2008, 2010), Sensitivity assesses the timing and quality of the mother's interventions with the child, and Negativity assesses the degree of the mother criticising or ignoring the child, and being annoyed during the session.

The lower scores on the Sensitivity subscale suggest that mothers of autistic pre-schoolers are more likely to have difficulties with timing and quality of play interventions, compared with mothers of non-autistic pre-schoolers. This could be explained by the child's cues that may be more challenging to interpret for mothers in the ASD group. As the ASD diagnosis has been given only recently, mothers may still be figuring out how to read their child and how to respond adequately. Our results are in line with those of Boonen et al. (2015), who found that mothers of school-aged children on the autism spectrum received lower scores on Sensitivity, compared with mothers in the non-ASD group. However, mothers of adolescents on the autism spectrum received *higher* scores on Sensitivity during interaction with their child than mothers from a general population control group (van Esch et al., 2018). Although these three studies investigated children at consecutive developmental stages (i.e., pre-schoolers, school-aged children, and adolescents), they have not followed the same groups of children and their parents, so no causal conclusions can be drawn from the results. It is possible that mothers' sensitive and responsive parenting behaviours have evolved over time, but longitudinal research is needed to test this hypothesis.

An important note needs to be made concerning the finding regarding the lower Sensitivity scores, that contrasts with previous research including pre-schoolers (Blacher et al., 2013; Campbell et al., 2018). While the coding scheme of Karreman et al. (2008, 2010) includes a single Sensitivity subscale, the other two studies used composite scores: Blacher et al. (2013) used the composite Positive Parenting, which exists of Positive Affect, Sensitivity, Stimulation of Cognition, and Detachment-reverse coded, and Campbell et al. (2018) used a Sensitivity Composite score that was derived by adding the subscales Warmth and Sensitivity, and subtracting the subscale Intrusiveness. If we would have used a composite score in our study, combining the scores on the subscales Sensitivity and Warmth, we would probably not have found a difference between the two groups either, since mothers in the ASD group did not differ from mothers in the non-ASD group on the Warmth subscale.

Although the Negativity subscale does not assess reactive behaviours per se, the higher scores on the Negativity subscale could be explained by the child's behaviour during the observation. Externalising behaviour problems were not assessed during the play interaction, but we found that reported externalising behaviour problems were associated with observed Negativity in both groups. Moreover, the subscale Limit-Setting gives an indication of disobedient behaviour, since this scale assesses the extent to which the mother prevents the child from wandering away from an assigned task. As mentioned in the Methods section, this parenting behaviour could only be rated if a child displayed disobedient behaviour. Interestingly, this happened in 11 mother-child dyads in the ASD group, compared with 6 dyads in the non-ASD group. It could thus be the case that the higher Negativity score for mothers in the ASD group reflects a higher number of situations that prompted a negative reaction, compared with the interactions in the non-ASD group.

4.3. Self-reported parenting behaviours

Regarding the self-report questionnaires, there was only one significant difference between the two groups, namely that mothers in the ASD group reported lower scores on Stimulating the Development than mothers in the non-ASD group. This is in line with prior results in a larger sample of autistic and non-autistic pre-schoolers (Lambrechts et al., 2015). One possible explanation is that some items of the subscale Stimulating the Development may be less suited to young children on the autism spectrum, such as "When a

person is crying, I explain to my child how this person is feeling and why", and "I stimulate pretend play." It could also be the case that mothers of an autistic child stimulate the development of their child in a different way than mothers of non-autistic children, for example stimulating other play forms than pretend play. The scores on this subscale thus reflect only some ways of stimulating the development, leaving others out. Another explanation could be that these mothers are experimenting with different ways to stimulate the development of their child, since the children have received the ASD diagnosis only relatively recently.

We could not confirm the significantly lower scores on Discipline that Lambrechts et al. (2015) found in the ASD group. As our sample existed of 42 children only, the power could have been too low to yield a significant difference.

4.4. Associations between parenting stress and parenting behaviours

We did not find consistent associations between parenting stress and parenting behaviours, contrary to our hypotheses. In both the ASD and the non-ASD group, more parenting stress only predicted less self-reported Autonomy Support. This contradicts the findings of Osborne and Reed (2010), although one could argue that Autonomy Support requires involvement and good communication, which is reflected in the items of the subscale (e.g., "I encourage my child to do or to try something by him/herself", "I encourage my child to make his/her own choices (e.g., to play with something)"). Nonetheless, our findings suggest that parents of pre-schoolers in this sample are able to cope with their elevated stress levels, so that their parenting behaviours remain mostly unaffected. However, we only investigated stress that is related to the parenting role, and should not necessarily expect the same results for general stress, depressive symptoms or anxiety.

4.5. Associations between children's externalising behaviour problems and parenting behaviours

Our hypotheses regarding the associations between externalising behaviour problems and observed parenting behaviours were partly confirmed, as we found only one significant association, that was similar for both groups: Mothers who reported more externalising behaviour problems displayed more Negativity during observation. With regard to self-reported parenting behaviours, we only found that the interaction with group predicted self-reported Indulging. Mothers in the ASD group who reported more externalising behaviour problems reported *less* indulging behaviour, whereas mothers in the non-ASD group who reported more externalising behaviour problems reported *more* indulging behaviour. The results in the non-ASD group are in line with our expectations, but the results in the ASD-group are less clear. A first explanation could be that mothers of an autistic pre-schooler attribute the behaviour problems to their child's autism, and therefore react with clear and predictable parenting behaviours, rather than giving in to their child. A second explanation could be that mothers of a child on the autism spectrum with co-occurring behaviour problems look for support from child services sooner than parents of children on the autism spectrum without co-occurring behaviour problems. In this way, they may get advice on how to best approach their child's difficulties.

Due to our cross-sectional research design, we could not replicate the findings of Lindsey et al. (2020) regarding the predictive value of inconsistent discipline, punishment and poor supervision in the relationship between parenting behaviours and externalising behaviour problems. However, we did find that externalising behaviour problems were associated with observed Negativity (cfr. supra, "the degree of the mother's criticising, ignoring the child, and being annoyed"), in both the ASD and the non-ASD group. Further longitudinal research could provide more insight into the relationships between parenting behaviours and externalising behaviour problems over time in the context of ASD.

4.6. Strengths

This study has several strengths. To our knowledge, observational measures and self-report questionnaires were combined to investigate parenting behaviours among mothers of pre-schoolers on the autism spectrum for the first time. The observation of mother-child interaction consisted of three different tasks that varied in the amount of structure that was provided, which allowed for a more nuanced assessment of parenting behaviours. This nuance was reflected in our choice for linear mixed models to analyse our data, since this method takes the intra-individual differences in parenting behaviours (i.e., all three minutes of all three observational tasks were included in the models) into account. Although we have tried to create natural circumstances during mother-child play by filming at the family's home, more naturalistic observations could add to the understanding of parenting behaviours in families of a child with autism. A second strength of this study is the non-ASD group, that was matched on gender and developmental age, instead of chronological age. As a result, differences in parenting behaviours could not be attributed to differences in levels of development. However, this also means that parents of the ASD group have more experience being parents. Finally, to advance the understanding of parenting among parents of an autistic child, we included measures of parenting stress and externalising behaviour problems in our analyses to avoid conclusions based solely on a comparison between young autistic and non-autistic children.

4.7. Limitations

A first limitation of this study is the small sample size. We are aware of the precautions that should be made when working with a small sample, and have thus chosen our analytic methods accordingly, relying on non-parametric tests for correlational analyses and comparisons between the two groups. However, a larger sample size might have given us more opportunities to observe disobedient child behaviour and parental limit-setting in more mother-child dyads, and the chance to include the scale Limit-Setting in our analyses. Moreover, the inclusion of children that show elevated levels of externalising behaviour problems could have given us

additional insight into the relationships between children's behaviour problems and parenting behaviours and parenting stress. Secondly, we included only measures of the mother's behaviours during interaction with their child, which makes it impossible to investigate bidirectional relationships. To investigate bidirectionality, measures of the child's behaviour should be included and behaviours should (additionally) be micro-coded to allow for the analysis of temporal associations. Thirdly, we have not included measures of other parent and child characteristics, such as parental ASD characteristics or children's temperament, in our study, although these factors could have influenced parenting stress levels or parenting behaviours. A fourth limitation is that the interrater reliability for Negativity was not very high. This demonstrates the difficulty of the interpretation and assessment of parenting behaviours, especially of critical parenting behaviours. Moreover, the coding scheme was not developed for use with children on the autism spectrum and may thus not be suited to capture "negative" parenting behaviours in this population. This is the case for more coding schemes used in autism research. Blacher et al. (2013) namely noted that in their coding scheme, there was no "differentiation between appropriate direction and unnecessary intrusion" (p. 771). Future research should investigate this differentiation further. A fifth, and often mentioned, limitation of our study is the exclusive focus on mothers. Despite all emancipating efforts, mothers are often the primary caregivers and spend more time with their children, work part-time, and fill out questionnaires more often than fathers do. This might be a valid reason not to include fathers in this study, since data collection would most probably require more resources and effort when fathers are required to participate as well, but we, as researchers, should definitely investigate ways in which fathers can be included in parenting studies.

4.8. Implications

This study has implications for both research and clinical practice. First, our findings regarding the association between negative parenting behaviours, such as criticising and ignoring the child, and externalising behaviour problems underline the need for concurrent measures of parent and child behaviours to explore how parent and child react to one another during interaction, and suggest that the assessment of parenting behaviours during observation may need further fine-tuning. For example, parents receive higher scores on the Negativity subscale when they ignore their child, when they criticise their child, or when they are visibly annoyed. These behaviours could be independent of the child's behaviour and be characteristic for the parent, but they are more likely reactions to the child's behaviour.

Second, the relationships between parenting stress, children's behaviour problems, and parenting behaviours that we have found suggest that an individualised approach is needed when choosing an early intervention. Numerous types of early intervention exist in clinical practice, but the heterogeneity that exists in the autistic population is reflected in the treatment outcomes (for a review, see Vivanti, Prior, Williams, & Dissanayake, 2014). Consequently, the authors state that "the critical issue (…) is not as much a lack of evidence-based treatments, but rather an inability to predict which treatment will work best for each child" (Vivanti et al., 2014, p. 6). Interventions can target parental emotions, provide knowledge, focus on stimulation of a child's development or management of additional behaviour problems, and individual families may need different combinations. Assessing the strengths and needs of families with a pre-schooler on the autism spectrum and choosing interventions accordingly thus seems crucial in supporting families throughout this critical age period.

Author contributions

Melinda Madarevic: Conceptualisation, Methodology, Formal Analysis, Writing – Original Draft. **Lotte van Esch:** Conceptualisation, Methodology, Software, Formal Analysis, Data Curation, Writing – Original Draft. **Greet Lambrechts:** Conceptualisation, Methodology, Investigation, Data Curation. **Eva Ceulemans:** Methodology, Formal Analysis. **Karla Van Leeuwen:** Conceptualisation, Writing – Review & Editing, Supervision. **Ilse Noens:** Conceptualisation, Writing – Review & Editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

Acknowledgements

First, the authors would like to thank all children and parents who participated in this study. The authors are also very grateful for the time and effort that Dr. Rianne Jansen has put in the data collection.

Melinda Madarevic receives funding from the Marguerite-Marie Delacroix Foundation (grant numbers GV/B-319 and GV/B-375). Melinda Madarevic, Lotte van Esch and Ilse Noens are part of the Tracking Infants At Risk for Autism (TIARA) study, that is funded by FWO (project number S001517N). The funding sources were not involved in the study design, the study itself, or in the submission process.

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