Conceptualisation of parenting in research on young children with or at elevated likelihood of autism: A systematic review of observational measures

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Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' contribution statements

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Abstract

Research on emergent autism spectrum disorder increasingly uses observational measures to investigate parenting of young children with or at elevated likelihood of autism. This systematic review analysed 21 papers narratively, including 13 unique “coding approaches” and 63 parenting constructs. Through a comprehensive consensus decision-making process, parenting constructs were classified under nine overarching categories, identified based on prior categorisation: Warmth, Responsiveness, Scaffolding, Proactive Control, Intrusiveness, Negativity, Dyad, Other, Multiple. We found large heterogeneity in observational measures, and descriptions of parenting constructs lacked uniformity. The complex categorisation process demonstrates the need for a solid conceptual framework that can inform theory and practice. This review provides a first step, but further research should investigate applicability among young children of different ages.

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The importance of early environmental experiences, such as parenting, is now more and more acknowledged in research on emergent autism spectrum disorder (ASD). Parenting is widely viewed as a bidirectional process, in which parent and child reciprocally influence each other (Pettit & Lollis, 1997), and several studies have been following young children and their families over an extended period of time in order to gain more understanding in how parenting and child characteristics influence each other, and how this leads to different developmental trajectories (e.g., Campbell et al., 2015, 2018; Harker et al., 2016; Siller & Sigman, 2002, 2008; Wan et al., 2012, 2013; Watson et al., 2017; Yirmiya et al., 2006). These studies generally follow children from birth into toddlerhood and pre-school age, to fully capture the development of bidirectional parent-child interactions as well as the early development of parenting behaviour. Although most of these studies have been focusing on interactive behaviours (i.e., parent-child interaction), the heterogeneity of studied variables, sample characteristics and observational measures makes it difficult to compare them and to draw strong conclusions (for a systematic review, see Wan, Green, & Scott, 2019). Hence, no “gold standard” exists when it comes to which parenting constructs should be studied and how they should be operationalised in observational measures. This may have serious consequences for both research and clinical practice, as parenting assessment outcomes are needed for and used in the development and empirical testing of theories, and in the design of parenting interventions.

One very recent example of the difficulties with comparing research findings on parenting behaviour, is the meta-analysis of Ku, Stinson, and MacDonald (2019). They compared parental behaviour between parents of children with and without autism aged 1 year

6 months to 11 years 9 months, and found that all 16 observational studies included in their analysis used different protocols and measurement tools. To solve this issue, they selected four parental behaviour categories (Warmth/Support, Behavioural Control, Negativity, and Neutral Parental Behaviour) and categorised all parenting constructs into these parenting dimensions. However, they excluded behaviours that could not be categorised under any dimension and synthesised multiple parental behaviours that tapped into the same dimension. Consequently, they suggested that clear definitions of parental behaviours and a standardised measurement tool for observing concrete parental behaviours are needed to move forward.

The heterogeneity of observational measures has been addressed more in depth by Lotzin and colleagues (2015). In a comprehensive systematic review, they compared the psychometric quality of 24 observational tools for measuring parent-infant interaction. These observational tools covered a broad range of constructs, assessed at parent, child or dyadic level. Most tools included aspects of responsive caregiving, but also facets of learning support and behaviours that interfered with infant development. They found that most tools demonstrated a valid rating procedure, reproducibility and discriminant validity, but that the tools lacked factorial and predictive validity, and standardised norms. Moreover, the authors stated that observational tools often lacked a manual with clear guidelines on scoring and interpretation. They concluded with practical recommendations for tool selection and stated that decisions should be guided by the particular purpose of the assessment, evidence for the validity of the tool, practical constraints, and the feasibility of implementing the tool in clinical practice. As the focus of this review was on psychometrics, the “wide range of heterogeneous constructs” (p. 109) was only briefly addressed by the authors.

Precisely this lack of clear parenting constructs has been discussed by Bohr, Putnick, Lee and Bornstein (2018), who evaluated the correspondences among four standardised measures of caregiver sensitivity. Through the computation of Pearson's zero-order one-tailed

correlations and, based on these zero-order correlations, percentages of unshared variance, they discovered that large proportions of variance were unshared and that these measures may therefore evaluate different aspects of sensitivity. The authors concluded that there is “much work left to be done in standardizing and harmonizing the definition, operationalization, and, by extension, assessment of sensitivity” (p. 14). It can be expected that this lack of uniformity in the definition and operationalisation of sensitivity is similar for other parenting constructs, such as support or directiveness, that are nonetheless commonly used in research on parenting and developmental outcomes.

The operationalisation of parenting into concrete and observable behaviours is rather challenging and as a consequence, observational tools differ considerably in the parenting constructs they use to measure parenting behaviour. It may thus be problematic if heterogeneous results are treated as representative for parenting behaviour in a certain group of research participants, or used to draw conclusions about the relationship between parenting behaviour and developmental outcomes. This is even more true when participants are parents of a child with or at elevated likelihood of autism. Due to the inaccurate historical notion of “refrigerator mums”, blaming cold and distant parents for their child’s autism, research into the relationship between parenting and the development of ASD has been limited for many decades (Reed & Osborne, 2014). Even though the bidirectional relationship between parent and child behaviour is now also studied in the development of autism (e.g., Campbell et al., 2015, 2018; Harker et al., 2016; Siller & Sigman, 2002, 2008; Wan et al., 2012, 2013; Yirmiya et al., 2006), with many interventions focusing on parenting behaviour (e.g., Green et al., 2017; Watson et al., 2017), it is important to be careful when addressing (the influence of) parenting behaviour in this group and to remain far from any “scapegoating” of parents.

As more and more longitudinal studies are investigating parenting of young children with or at elevated likelihood of autism (e.g., Campbell et al., 2015, 2018; Wan et al., 2012,

2013; Yirmiya et al., 2006), a clear conceptual framework can provide a solid foundation for the observation of parenting behaviour and thus inform theory and practice. However, this framework should consist of transparently defined and operationalised parenting constructs that are related to child developmental outcomes.

The aim of this systematic review is to take a first step towards a common language for parenting research, by critically reviewing the parenting constructs that are currently used in research on parenting behaviour among parents of children with or at elevated likelihood of autism. As empirical studies that investigate parenting behaviours in samples of young children with or at elevated likelihood commonly use observational measures to assess parenting behaviours, we will limit our review to those parenting behaviours that are assessed with observational measures.

Methods

Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009), the following steps were taken: (a) definition of the scope of the review, (b) search strategy and study selection, and (c) analysis of relevant data.

Search strategy, study selection, and analysis of relevant data were done in four steps: (a) literature search, (b) first categorisation of the parenting constructs into categories of parenting behaviour, (c) independent categorisation of the parenting constructs into the categories defined in the second step, (d) final categorisation of the parenting constructs. In the first, second and fourth step, consensus decision-making was used to come to agreements. The second step consisted of individual and independent categorisation of the parenting constructs by three researchers.

Definition of the scope of the review

Parenting

Only papers were included that studied parenting constructs, and that used these as overarching labels for concrete, observable, interactive parenting behaviours. This means that parenting behaviours should be behaviours that can be assessed *independently*. For example, we included the construct of parental sensitive responsiveness, that assesses observable parenting behaviours as “appropriate, timely responding to infant behaviour” and “an attentive attitude, warmth, and appropriate engagement, support and structuring” (Manchester Assessment of Caregiver-infant Interaction; Wan, 2017, p. 44). We excluded interactive behaviours such as gaze of the parent, as this is only one piece of the puzzle that makes a parenting behaviour (i.e., gaze to the infant is no independent behaviour, but has to be combined with a smile and a warm tone of voice to be assessed as a ‘sensitive behaviour’).

Observational measures

Only papers were included that reported observations of interaction taking place either in a naturalistic or a lab setting and that were observed during free play, structured, or semi-structured observation. Since observations are usually videotaped and coded afterwards, we also included papers that used or re-used videos of parent-child interactions. We excluded papers that reported on parent-child interaction during the *Strange Situation* procedure, as this procedure uses a very specific protocol for studying the concept of attachment. Intervention studies were included only when they reported observational measures at baseline.

Young children with or at elevated likelihood of autism

Papers were selected that investigated child development in samples from birth up to a maximum mean chronological age of three years (36 months), to fully capture the start of bidirectional parent-child interactions. Moreover, earlier research findings demonstrated that it

is crucial to include children up to an age of 36 months, as ASD diagnoses are not always stable at this young age (Ozonoff et al., 2015; Woolfenden et al., 2012). We included only papers that described the results of young children with a diagnostic classification in the autism spectrum (ASD, autism, Pervasive Developmental Disorder, not otherwise specified [PDD-NOS], or Asperger syndrome), either as a group or as a subgroup, and studies investigating young children without a formal diagnosis but at elevated likelihood of autism, having an older autistic sibling.

Search strategy and study selection

The search procedure and study selection were carried out by the first and the last author. Search terms, inclusion and exclusion criteria were agreed upon through consensus decision-making, after which the first author conducted a literature search through three electronic databases (Web of Science, PubMed, Scopus). Articles from database inception until the 17th January 2018 were included, using the following combination of key words: observ* AND (infant OR “young child” OR toddler) AND (“parent-child interaction” OR “mother-child interaction” OR “parent-infant interaction” OR “mother-infant interaction” OR parenting) AND (ASD OR autis* OR “PDD-NOS” OR “pervasive developmental disorder” OR Asperger). Specific key words, hyphens and quotation marks were used to obtain a relevant selection of papers that could contribute to further identification of papers. This database search yielded 168 papers (Figure 1).

Fig. 1 PRISMA-flow chart describing the different phases of systematic study identification

(Figure based on Moher et al., 2009)

After duplicates were removed, title and abstract of the remaining 118 papers were screened by the first author against the inclusion criteria (Table 1), but final decisions were made through consensus decision-making. Intervention studies and papers using data from the same sample of participants were included in the review. Of these, 74 papers were excluded on the basis of title and abstract (e.g., no group or subgroup of children with or at elevated likelihood of autism was included, the study was not available in English, the study sample did not consist of humans, the study did not investigate parenting, or the study only reviewed parenting), and the remaining 44 papers were reviewed in full. Another 34 papers were excluded because they did not meet the inclusion criteria (e.g., participants were too old, no parenting constructs were assessed), resulting in a total of 10 papers that were selected for further review.

Table 1
Inclusion Criteria for the Systematic Review

a)	English language peer-reviewed journal articles, reporting empirical findings or case reports
b)	Reporting observation of parenting behaviours during parent-child interaction
c)	Focus on concepts of parenting, using overarching labels for concrete, observable parenting behaviours
d)	Including a group or subgroup of young children diagnosed with or at elevated likelihood of autism spectrum disorder (ASD), autism, Asperger or PDD-NOS
e)	Sample of children with a maximum mean chronological age of 36 months or younger

In a next step, reference lists of the 10 selected papers were “backward searched” for additional references, and both Web of Science’s “Times cited” and Google Scholar’s “Cited by” features were used to “forward search”, identifying papers that cited the selected papers. This back and forward searching, conducted in June 2018, was done in two subsequent steps in order to identify the most relevant papers on the topic. Through a first search, six papers were identified after full-text reading. These six papers were then back and forward searched in return, which yielded another five papers. Adding these 11 papers to the prior selection, a total sample of 21 papers was included in this review.

Analysis of relevant data

First, details about observational measures and parenting constructs were extracted from the papers included in this review by the first author (Online Resource 1, electronic supplementary material). If the meaning of a construct was unclear, additional papers and coding manuals were searched for better descriptions of the parenting constructs and one author was contacted for further information. Papers were then grouped according to the coding system used (either a formal coding system or a combination of selected parenting constructs), leading to 13 unique “coding approaches.” In total, these 13 coding approaches included 63 parenting constructs. Only the parenting constructs that were mentioned in the selected papers were included in this review, regardless of whether the coding system consisted of additional constructs. This approach was chosen to highlight those parenting constructs thought to be

meaningful in this research area. As per the nature of this study, i.e., to review the conceptualisation of parenting in research on infants with or at elevated likelihood of autism, it was decided to use a narrative approach to synthesise the data.

The categorisation process included three steps: (a) bottom-up categorisation of the parenting constructs into categories of parenting behaviour, (b) independent top-down categorisation of the parenting constructs into the categories defined in the first step, (c) final categorisation of the parenting constructs.

All 63 parenting constructs were first grouped together based on their description by three of the authors (MM, IN, KVL), through a consensus decision-making process. This first step resulted in seven groups of parenting constructs, that were viewed as overarching categories of parenting behaviour (Table 2). Although these categories of parenting constructs are parenting constructs as well, and can be viewed as “umbrella constructs”, we will use the term ‘category’ for the group of parenting constructs, and ‘construct’ for the individual constructs. The seven categories were labelled Warmth, Responsiveness, Scaffolding, Proactive Control, Intrusiveness, Negativity and Dyadic. An eighth category, Other, was added for parenting constructs that could not be grouped under any of the seven categories.

In a second step, two of the authors (MM, KVL) and a fellow researcher (EO) independently assigned one or more codes to the parenting constructs. In total, 57 out of 63 parenting constructs were coded by all three raters (6 missing: 9.52%). Total interrater agreement (exact and partial agreement) was obtained for 85.96% of the parenting constructs. Exact interrater agreement was obtained for 30 out of 57 constructs (52.63%), meaning that all three coders assigned either one or more similar codes to the construct. Partial interrater agreement was obtained for 19 out of 57 constructs (33.33%), meaning that all coders assigned at least one similar code to the construct.

A synthesis of the results was then presented to the other authors (IN, PW). In a final step, again through a process of consensus decision-making, the remaining categorisation issues were resolved between the authors. As it turned out to be impossible to classify all parenting constructs under just one category, a ninth category, Multiple, was added for constructs tapping multiple categories. The parenting constructs classified as Multiple were then further categorised.

Table 2
Descriptions of the Overarching Categories of Parenting Constructs

Construct		Description
Warmth	W	Positive regard and a supportive presence through verbal and non-verbal behaviours
Responsiveness	R	Consistent sensitive and supportive responses that match the child's actions, requests and intentions, feelings, focus of interest
Scaffolding	S	Guiding child's development to promote independence (teaching behaviour)
Proactive control	P	Establishment of rules and limitations in order to encourage desired child behaviour
Intrusiveness	I	Parent-centred behaviour, not recognising and/or respecting child's signals and needs
Negativity	N	Negative regard towards the child
Dyadic	D	Dyadic behaviours
Other	O	Parenting concepts that cannot be grouped under any other overarching concept
Multiple	M	Parenting concepts that can be grouped under multiple overarching concepts, depending on interpretation

Results

Study characteristics

The 21 papers included in this review were published between 2005 and 2018. Ten of the selected studies were conducted in the USA, eight in the UK, two in The Netherlands, and one in Israel. Five studies included the same sample of British participants, which were recruited within the context of the prospective longitudinal observational British Autism Study of Infant Siblings (BASIS; Elsabbagh et al., 2015; Green et al., 2015; Green et al., 2017; Wan et al., 2012, 2013). Two studies included the same sample of North American participants, but at a different age (Campbell et al., 2015, 2018). Two studies used videos of parent-infant

interaction from the Avon Longitudinal Study of Parents and Children (ALSPAC; Marwick et al., 2013; Puckering et al., 2014).

Most studies compared infants at elevated likelihood of autism with infants at typical likelihood for ASD (Baker et al., 2010; Blasi et al., 2015; Campbell et al., 2015, 2018; Elsabbagh et al., 2015; Harker et al., 2016; McDonald et al., 2016; Wan et al., 2012, 2013). Five studies included only children with or at elevated likelihood of autism (Green et al., 2015, 2017; Oosterling et al., 2010; Shire et al., 2016; Watson et al., 2017) and one study followed up children at typical likelihood that had been screened positive for ASD likelihood (Suma et al., 2016). The remaining studies included children with a diverse background of autism, other developmental disorders, or a typical development (Blacher et al., 2013; Feldman et al., 2013; Mahoney et al., 2005; Marwick et al., 2013; van IJzendoorn et al., 2007). Maximum mean age of the samples was 36 months, with the age of participants ranging from 4 (Blasi et al., 2015) to 40 months (Feldman et al., 2013).

As presented in Table 3, the 21 papers yielded 13 coding approaches, with four coding approaches used in more than one paper (GRS, MACI, MBRS, NICHD/ECCRN). Two studies used more than one coding approach (Campbell et al., 2015; Wan et al., 2012). The number of parenting constructs used per coding approach ranged from one (CIB) to 12 (MBRS), with a total of 63 parenting constructs included in this review. Ten of these constructs were classified as Multiple, nine as Responsiveness, seven as Warmth, nine as Scaffolding, two as Proactive Control, six as Intrusiveness, five as Negativity, eight as Dyadic, and seven as Other (categories indicated with an X). The 10 parenting constructs under Multiple were further categorised under one of the other categories (indicated with an O).

Table 3

Categorisation of parenting constructs into overarching categories grouped per coding approach

Coding approach	Study	Concepts	W	R	S	P	I	N	D	O	M
Coding of Attachment-Related Parenting in Autism (CARP-A; Blazey et al., 2008)	Wan et al., 2012	Dyadic mutuality							X		
		Sensitive responsiveness		X							
Coding Interactive Behavior manual (CIB; Feldman, 1998)	Feldman et al., 2013	Social reciprocity							X		
Communication Play Protocol (CPP; Adamson et al., 2001, 2009)	Suma et al., 2016	Fluency and connectedness							X		
		Scaffolding			X						
		Sustainability of shared topics							X		
The Emotional Availability Scales (EAS; Biringen et al., 1998)	van IJzendoorn et al., 2007	Non-hostility						X			
		Non-intrusiveness	O				O				X
		Sensitivity	X								
		Structuring			O	O					X
Erickson scales (Erickson et al., 1985)	Oosterling et al., 2010	Supportive presence	X								
		Respect for child's autonomy					X				
		Effective structure and limit-setting				X					
		Quality of instructions			X						
		Non-hostility						X			
The Global Rating Scales (GRS; Murray et al., 1996)	Blasi et al., 2015 Wan et al., 2012	Depressive affect								X	
		Intensity of engagement							X		
		Intrusiveness					X				
		Remoteness								X	
		Sensitivity	O	O			O				X
Manchester Assessment of Caregiver-Infant Interaction (MACI; Wan et al., 2012, 2013)	Elsabbagh et al., 2015 Green et al., 2015 Green et al., 2017 Wan et al., 2013	Non-directiveness					X				
		Sensitive responsiveness		X							
Maternal Behavior Rating Scale (MBRS; Mahoney, Powell, & Finger, 1986; Mahoney, 1999; MBRS-Revised: Mahoney, 2008)	Harker et al., 2016 Mahoney et al., 2005 Shire et al., 2016	Acceptance	X								
		Achievement			X						
		Directiveness			O	O	O				X
		Effectiveness			X						
		Enjoyment	X								
		Expressiveness	O	O				O			X
		Inventiveness			X						
		Pace		O			O				X
		Praise	O	O	O						X
		Responsivity		X							

		Sensitivity	O	O		X
		Warmth	X			
Mellow Parenting Observational System (MPOS; Puckering et al., 2010)	Puckering et al., 2014	Anticipation of child's needs		X		
		Autonomy			X	
		Containment of child's distress		X		
		Control/conflict			X	
		Cooperation				X
		Responsiveness				X
Parent-Child Interaction Rating System (PCIRS; Belsky et al. 1995; Fenning et al. 2007)	Blacher et al., 2013	Detachment		X		
		Intrusiveness			X	
		Negative affect				X
		Positive affect	X			
		Sensitivity		X		
		Stimulation of cognition			X	
<i>Scales developed by the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (ECCRN), 1999</i>	Baker et al., 2010	Affective mutuality				X
	Campbell et al., 2015	Negative regard, Hostility				X
	Campbell et al., 2018	Respect for child's autonomy,			X	
	McDonald et al., 2016	Lack of intrusiveness				
		Sensitivity, Responsiveness		X		
		Stimulation of cognitive development,			X	
<i>Frequency coding</i>	Campbell et al., 2015	Structuring				
		Warmth, Positive Regard	X			
		Initiate/Direct play		O	O	X
		Praise	O	O		X
<i>Scales adapted from the categories of interpersonal interaction developed by Marwick and Trevarthen (1982, 1986)</i>	Marwick et al., 2013	Scaffold play			X	
		Activity				X
		Contingent responsiveness		X		
		Cooperativeness		X		
		Fussiness			X	
		Involvement				X
		Playfulness				X
		Speech				X
		Wellbeing				X

W Warmth, R Responsiveness, S Scaffolding, P Proactive Control, I Intrusiveness, N Negativity, D Dyadic, O Other, M Multiple, X main category that the parenting construct taps, O further categorisation of constructs classified as Multiple

Descriptions of parenting constructs were extracted from the papers included in this review, additional papers, correspondence with the first author, or a combination of sources (Online Resource 1, electronic supplementary material). In the following, quotations from these descriptions are used to explain the categorisation of the construct or to illustrate a concept. For reasons of clarity, the name of the coding approach is mentioned instead of the quotation's source.

Warmth

This group of constructs shares notions of warmth, acceptance, support and positive regard. Names of the constructs differ a lot, and carry in general the name of one dimension of the construct while being further described by the other dimensions. For example, Positive Affect (PCIRS) is described as “the degree to which mothers verbally and nonverbally expressed positive regard, warmth, and affection toward the child (e.g., hugging, kissing, praising).”

Behaviours that are categorised as warm and positive need to be more than just performance: they also have to express honest affection. This has been stated explicitly for the constructs Warmth (MBRS) and Sensitivity (EAS), whose descriptions mention the rating of “both the overt behaviour of the parent and the quality of fondness conveyed” (MBRS) and “much genuine, authentic, and congruent interest, pleasure and amusement with the infant (as opposed to performing these behaviors)” (EAS). These behaviours can be verbal or non-verbal and include kisses and hugs, but also tone of voice and interested eye contact.

Warmth and support are also prevalent in descriptions of other constructs, that have been categorised as Multiple. Praise (Campbell, 2015; MBRS) conveys a notion of responsiveness (e.g., timing, appropriateness), but is also a positive statement that can be delivered with a warm tone of voice and shows acceptance and support. Non-intrusiveness

(EAS) is created by negation of the negative behaviour Intrusiveness, thus reflecting “the ability to be available to the child without being intrusive to him/her” and “the quality of emotionally ‘being there.’”

Responsiveness

Parenting constructs categorised as Responsiveness include both the identification of and behavioural response to the child’s signals. Sensitivity and responsiveness are closely intertwined but not the same. A parent can be sensitive and identify the signals of a child accurately, but an appropriate and timely behavioural response has to follow in order to be responsive.

The close relationship of both elements is most prominent in the CARP-A and MACI, that use the construct Sensitive Responsiveness. The NICHD/ECCRN scale on the other hand has a different name in different studies, being named Sensitivity according to the NICHD (1999) and in Campbell and colleagues (2015, 2018) but Responsiveness in Baker and colleagues (2010). Detachment (PCIRS) can be seen as the opposite of Sensitive Responsiveness, being described as “marked non-responsiveness and a lack of awareness of the child’s needs.”

Despite the large variety in names, Responsivity (MBRS), Sensitivity (PCIRS), Containment of Child’s Distress (MPOS), Contingent Responsiveness (Marwick, 2013), and Cooperativeness (Marwick, 2013) all stress the behavioural component of responsiveness (e.g., Responsivity, MBRS: “the appropriateness of the parent’s responses to the child’s behaviours”). The appropriateness of responses can also be found in the interpretation of the constructs Expressiveness and Pace (MBRS), as a responsive parent would adapt the intensity, frequency and pace of expression and behaviour to the child’s needs.

Verbal statements, whether neutral, negative or positive, could also be considered responsive to a greater or lesser extent. According to this interpretation, Praise (Campbell, 2015; MBRS) could be viewed as a behavioural response following the identification of the child's needs (e.g., need for acknowledgement or encouragement).

Scaffolding

Constructs that describe teaching behaviour, as demonstrated by structuring the interaction or stimulating the cognitive development of a child, have been categorised as Scaffolding. Scaffolding means that the parent only helps the child when necessary, and withdraws when support is no longer required. Two constructs out of nine already carried this name, namely Scaffolding (CCP) and Scaffold Play (Campbell, 2015). The CCP assesses communication, and thus interprets scaffolding as “how well a partner supports the child's activities and provides opportunities for learning about shared objects and events and about communicating, including language.” On the other hand, Scaffold Play (Campbell, 2015) refers to “ways in which the parent supports the child's play (...). A scaffold would be defined by actions or statements such as labelling or describing the child's actions, elaborating verbally on what the child is doing, demonstrating (...) or facilitating play (S. Campbell, personal communication, October 30, 2018).” Scaffolding is also mentioned in the description of the NICHD/ECCRN scale Stimulation of Cognitive Development/Structuring: “The mother's ability to provide sensitive and developmentally appropriate scaffolding for her child.” The notion of fostering the child's development at a developmentally appropriate level is shared by the Stimulation of Cognition scale of the PCIRS.

Other constructs, such as Quality of Instructions (Erickson Scales) and Structuring (EAS) focus on the structuring of the situation. For example, Quality of Instructions is described as “the degree to which the parent structures the situation so that the child knows what the task

objectives are and receives hints or corrections while solving the problems that are well-timed and paced, graded in logical steps, and stated clearly.” The advanced preparation that is given to a child, is also mentioned in the description of Anticipation of Child’s Needs (MPOS).

The MBRS includes the scale Achievement Orientation, that consists of the subscales Achievement and Praise. Achievement is described as “the parent’s encouragement of sensorimotor and cognitive achievement,” and Praise is the amount of verbal praise that is given to a child. Praise is an example of how to stimulate a child during a teaching process, and could thus be categorised as Scaffolding. Two other scales from the MBRS involve dimensions of teaching behaviour, namely the ability to gain the child’s attention, cooperation and participation (Effectiveness) and the ability to find different things to interest the child to maintain the child’s involvement in the interaction (Inventiveness). However, these constructs are part of the MBRS scales Responsiveness and Affect, respectively.

Proactive control

Both constructs categorised as Proactive Control include the encouragement of desired behaviour: Effective Structure and Limit-Setting (Erickson Scales) assesses “the degree to which the parent attempts to establish his/her expectations for the child’s behaviour,” while Control/Conflict (MPOS) assesses if the “parent intervene[s] appropriately to achieve legitimate compliance.” The establishment of rules is also mentioned in the description of Structuring (EAS), whereas Directiveness (MBRS) includes the direction of the child’s immediate behaviour.

Intrusiveness

Constructs categorised as Intrusiveness describe adult-centred rather than child-centred behaviour. This is well described in the PCIRS: “The intrusive parent sought to impose an

agenda upon the child without regard to the child's signals and may have been overly stimulating or unable or unwilling to relinquish control." Lack of respect for the child's autonomy or supporting the child's autonomy is prominent in four constructs (Respect for Child's Autonomy, Erickson Scales, NICHD/ECCRN; Non-directiveness (MACI); Autonomy, MPOS). Two coding approaches assess the opposite of intrusiveness: Non-directiveness (MACI) describes respecting the child's autonomy, and Non-intrusiveness (EAS) focuses on the ability to be available to the child without being intrusive.

Descriptions of Sensitivity (GRS), Directiveness (MBRS), Pace (MBRS), and Initiate/Direct Play (Campbell et al., 2015) have been categorised as Multiple. Their descriptions also hint at adult-centred, intrusive behaviour without respect for the child's autonomy. For example, the parent's rate of behaviour (Pace, MBRS) could be well matched to the child's needs and thus be coded as Responsiveness, but poorly matched arousal would be coded as Intrusiveness.

Negativity

Constructs categorised as Negativity assess negative affect and hostility of a parent "through verbal means (e.g., harsh tone of voice) or nonverbal behaviour (e.g., strained expression, look of disgust)" (Negative Affect, PCIRS). The EAS and the Erickson Scales use the construct Non-hostility, but describe hostile behaviour (e.g., "Reflects the parent's expression of anger, discounting or rejecting of the child", Erickson Scales). Fussiness (Marwick, 2013) is described as "restlessness, negativity and lack of compliance" with the wishes of the child. The MBRS describes "the tendency of the caregiver to express and react emotionally towards the child" (Expressiveness), which could range from the expression of positive to negative emotions.

Dyadic

Dyadic constructs focus on responsive and reciprocal behaviour that takes place between parent and child. This can mean active behaviour, where parent and child “co-operate/negotiate together” (Cooperation, MPOS), or “togetherness, ‘tunefulness’, and sharedness of the play experience” (Dyadic Mutuality, CARP-A). Sharing of affection (Affective Mutuality, NICHD/ECCRN), attention (Dyadic Mutuality, CARP-A; Intensity of Engagement, GRS), and topics (Sustainability of Shared Topics, CPP) would result in an “interactive flow” (Dyadic Mutuality, CARP-A) and “cohesion” (Fluency and Connectedness, CPP), with the dyad “moving in harmony” (Social Reciprocity, CIB).

Multiple

Ten parenting constructs were categorised as Multiple, because their descriptions included both poles of a construct and/or contained elements of more than one parenting construct.

The description of Sensitivity (GRS) literally contains two opposite elements, being a “measurement of the quality of maternal interaction on a scale from sensitive to insensitive.” In turn, Directiveness (MBRS), Expressiveness (MBRS), Pace (MBRS), and Indirect/Direct Play (Campbell, 2015) are not described as bipolar constructs, but can be interpreted in contrasting ways. For example, Pace is described as “This item examines the parent’s rate of behaviour,” and can therefore be categorised as either a responsive or intrusive behaviour towards a child.

Descriptions of Non-intrusiveness (EAS), Structuring (EAS), Praise (MBRS), Sensitivity (MBRS), and Praise (Campbell, 2015) include elements of multiple parenting constructs that are quite close in content. For example, Structuring (EAS) assesses “the degree to which the parent appropriately structures the child’s play by taking care to follow the child’s

lead, and sets limits for appropriate child behavior and/or misbehavior. These qualities also may be observed in the parent's establishing rules and requesting or demanding compliance with them." This description contains both elements of Scaffolding (structuring play) and Proactive Control (setting limits, establishing rules).

Other

Seven constructs could not be categorised under one of the overarching parenting constructs. The majority of these constructs tap personality characteristics or emotional states of the parent, rather than parenting behaviours. Remoteness and Depressive Affect (GRS) rate "psychological or verbal disengagement" and the "display of depressive affect, through sadness, slowness and focus on the self rather than the infant." Activity, Involvement, Playfulness and Wellbeing (Marwick et al., 2013) assess more positive maternal states. Speech (Marwick et al., 2013) is "a judgement on the overall speech or vocalisation levels of (...) adult throughout the segment."

Discussion

The present study provides a review of the parenting constructs that are currently used in observational research including children below an age of four with or at elevated likelihood of autism. Through a consensus decision-making process, seven overarching categories of parenting behaviour – Warmth, Responsiveness, Scaffolding, Proactive Control, Intrusiveness, Negativity, Dyadic – and two categories for other parenting behaviours (Other) and behaviours tapping multiple categories (Multiple) were identified. The challenging categorisation process demonstrates the complexity of studying parenting behaviour, both at a methodological and conceptual level, and thus reflects the findings of this systematic review.

Methodological level

Our most prominent finding at a methodological level is the large heterogeneity in observational measures, and hence, in parenting constructs, that are used in research on young children with or at elevated likelihood of autism, confirming prior research (Bohr et al., 2018; Ku et al., 2019; Wan et al., 2019). A first and obvious explanation for this heterogeneity is the different research focus of the included studies. Observation of parent-child interaction is not exclusively used to study parenting behaviour, but is also a variable in studies on, for example, brain activity (e.g., Elsabbagh et al., 2015), intervention programmes (e.g., Green et al., 2017; Suma et al., 2016) or play behaviour (e.g., Campbell et al., 2018).

An alternative explanation is that research projects often develop their own observational measures to suit the particular interest of the project or for practical reasons (e.g., training costs). Many of the studies included in this review are indeed part of a large longitudinal and multidisciplinary project. For example, all five studies from the BASIS group include the same parenting constructs, eventually characterising the Manchester Assessment of Caregiver–infant Interaction (MACI; Wan et al., 2017). Because the development of an observational measure requires time and energy, Lotzin and colleagues (2015) suggest that researchers channel their resources into the refinement of existing measures with evidence of validity, rather than into the development of a new tool. Apart from the benefits this would have for the validity of observational measures, it would also make it easier to compare results across studies (Bohr et al., 2018).

A second methodological complication is the lack of uniformity in the definitions of parenting constructs, confirming the findings of Bohr and colleagues (2018) and extending them to constructs other than sensitivity. Our analysis demonstrates that parenting constructs with the same name could have different descriptions, and vice versa, and that descriptions could be interpreted in multiple ways. Moreover, observational measures or parenting

constructs sometimes changed names throughout the course of a longitudinal project. For example, the first studies from BASIS used a combination of constructs originating from the GRS and the CARP-A (Wan et al., 2012), while subsequent studies used the combined and refined new MACI (Elsabbagh et al., 2015; Green et al., 2015, 2017; Wan et al., 2013). It also happened that names of constructs differed from study to study, with or without providing the rationale behind this decision (Baker et al., 2010; Campbell et al., 2015, 2018). Lastly, descriptions of assessed constructs were not always provided in the papers.

Conceptual level

Despite these methodological challenges, it turned out to be possible to create categories of parenting behaviour using a bottom-up approach, and to categorise most of the parenting constructs into one of the seven categories using a top-down approach. This suggests that some common core concepts of parenting behaviour exist. For example, most observational measures assessed sensitive, supportive and responsive parenting behaviour, and many assessed negative and intrusive parenting behaviour. Both conceptual overlap and high correlations between parenting behaviours have led several researchers to combine parenting constructs a priori, or in their analyses, suggesting that core constructs of parenting behaviour exist (e.g., Baker et al., 2010; Wan et al., 2017). Future research should therefore further investigate what the core constructs of parenting behaviour are, especially when applying these parenting constructs to parents of children with or at elevated likelihood of autism.

The abovementioned work of Baker and colleagues (2010) already points towards such core constructs. They used a composite score of Emotional Supportiveness, a construct that represents behaviours that “convey warmth and acceptance, reflected responsiveness to the child’s needs, and balanced maternal involvement with a respect for the child’s desires and emergent independence” (p. 994). The second construct, Structuring, captures “the mother’s

ability to provide sensitive and developmentally appropriate scaffolding for her child” (p. 994). Due to a low occurrence rate, the Hostility construct was removed from the analyses. This raises the question of how suitable a construct is that measures hostile behaviour and punishment.

Another important observation is that some parenting constructs included in this review do not seem to measure parenting behaviour per se, but rather parental characteristics like temperament or emotional state of the parent. As behaviour is closely intertwined with emotions, cognitions, and goals, it is to be expected that this is also the case for parenting behaviour. This may have led researchers to develop observational measures that also take dimensions like emotional state into account, which may be hampering comparability of research findings. For conceptual clarity, it is mandatory to distinguish parenting behaviours clearly from other dimensions of parenting. The observation of parenting behaviour in research should be as objective and reliable as possible, and results can only later be interpreted against a background of parent and child characteristics, circumstances, and culture.

Strengths

This study is the first to review observational measures used in research on parenting children with or at elevated likelihood of autism. It confirms previous research findings concerning heterogeneity of observational measures and lack of uniformity in parenting constructs used in the field of parenting research. A major strength of this study is the comprehensive methodology, using both a bottom-up and top-down approach to categorise parenting constructs. Moreover, researchers from different backgrounds (parent-child interaction, parenting behaviour, autism, typical development) have been collaborating closely throughout the whole categorisation process.

Contrasting our work to that of Ku and colleagues (2019), it appears that we have both categorised parenting behaviours, but used a different methodology and hence, reached

different outcomes. On the one hand, Ku and colleagues (2019) used a theory-driven approach and selected four parenting dimensions prior to the categorisation process. As per the heterogeneity of constructs, they had to exclude some parenting constructs and synthesise others to be able to analyse the data statistically. On the other hand, our answer to the heterogeneity of observational measures and parenting constructs was to use a data-driven approach and to analyse the results narratively, in order to do justice to the complexity of the topic and to demonstrate the urgency of the matter. However, both studies included a different age group and results may therefore be difficult to compare.

Limitations

A first and important limitation of this study is its exclusive focus on observational measures. As parenting behaviour can be investigated using self-report questionnaires as well, this means that a large amount of studies was excluded. Parental self-report questionnaires have the advantage of assessing parenting behaviours outside the research setting, which would have added to our understanding of parenting behaviour in our sample. However, it can be expected that the inclusion of questionnaires would have added considerably to the heterogeneity in parenting constructs, which could have complicated the categorisation process even further.

A second limitation is our choice to include only concrete and observable interactive parenting behaviours, such as sensitive responsiveness or scaffolding, hereby excluding for example communicative behaviours, such as verbal responsiveness or directives. We are aware of the value of communicative behaviours in the investigation of parenting, but we had to limit ourselves in order to present a coherent review. Studies that investigate communicative behaviours namely differ considerably in the constructs that they assess. Some studies assess responsive or directive comments, that could be viewed as interactive parenting behaviours, while others investigate how parents introduce new words. Further research should investigate

how communicative behaviour is conceptualised, and compare this to the conceptualisation of interactive parenting behaviours.

Third, we have only included studies until June 2018, which means that more recent studies could have been missed. As research on parenting behaviour among parents of a child with or at elevated likelihood of autism is increasing, it is not unlikely that new observational measures have been developed in the meantime.

A fourth limitation concerns the bottom-up categorisation of the parenting constructs. As this was done in very close collaboration between three of the authors, the interrater reliability was not calculated. However, the interrater reliability for the top-down categorisation, that was done independently by two of the authors and a fellow researcher, was excellent.

At a conceptual level, it is important to note that the observation of parenting behaviour does not assess the intention of the behaviour. Objective observation of parenting behaviour is necessary in research, but does not take into account that the reasoning behind seemingly same behaviour may greatly differ from parent to parent and child to child. Behaviours that might be warm to one child could be intrusive to another, but would still receive the same objective score. A focus on intentions is especially important for parents of a child with or at elevated likelihood of autism, as these children may have different needs than typically developing children. Future research should therefore take into account the beliefs of parents and their intentions regarding parenting of their autistic child or their child at elevated likelihood of autism.

Conclusion

The heterogeneity in observational measures and the lack of uniformity in parenting constructs complicate the understanding of research on parenting of young children with or at elevated likelihood of autism. This is a potential problem for the assessment of parenting

behaviour and the comparison of results across studies. Moreover, the observation of parenting behaviour does not assess the intentions behind parenting behaviour among parents of a child with or at elevated likelihood of autism. Since research findings are used to develop and test theories and to design interventions, future studies should define their parenting constructs clearly and carefully. This review provides a first step towards a conceptual framework, but further research is needed to investigate applicability among different ages and samples.

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