

Expressed Emotion in Families of Children With and Without Autism Spectrum Disorder,
Cerebral Palsy and Down Syndrome: Relations with Parenting Stress and Parenting Behaviors

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The research includes a subset of data on parenting behavior and child behavior, which has been previously published (De Pauw, 2010; Dieleman, De Pauw, Soenens, Van Hove, & Prinzie, 2018; De Clercq, Van der Kaap-Deeder, Dieleman, Soenens, Prinzie, & De Pauw, 2019). However, this is the first paper that included data on Expressed Emotion and parenting stress among parents of children with Autism Spectrum Disorder, Cerebral Palsy, Down Syndrome or without any known disability.

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Abstract

This study examined the family emotional climate as assessed by Five Minute Speech Samples and the relation with parenting stress and parenting behaviors among parents of children (6-17 years, 64.7% boys) with autism spectrum disorder, cerebral palsy, Down syndrome, and without any known disability ($n = 447$). The large majority of parents (79%) showed low levels of Expressed Emotion, an indicator of a positive emotional family climate. In all groups, more Emotional Over-involvement, more Criticism and fewer expressions of Warmth were associated with higher levels of parenting stress. Across groups, Emotional Over-involvement was related to more autonomy-supportive parenting, Criticism to more psychologically controlling and overreactive parenting, and Warmth was associated with more responsive and less psychologically controlling and overreactive parenting.

Keywords. Expressed Emotion, Five Minute Speech Sample, Autism Spectrum Disorder,

Cerebral Palsy, Down Syndrome

In both neurotypical populations (Sher-Censor 2015) and populations with developmental disabilities (Thompson et al. 2018), the construct of Expressed Emotion (EE) receives increasing attention to capture the emotional quality of a family subsystem. More specifically, there is a growing interest in using the Five Minute Speech Sample (FMSS) method to capture EE of parents towards their child (Magaña-Amato 1993). Currently, two research avenues are pursued in EE-literature among families of children with special needs: evaluating the ‘point estimates’ of how many parents of children with a disability exhibit high EE, and less pursued, the evaluation of the nomological network (i.e., how EE maps onto other more established constructs for assessing parent-child dynamics). Notably, the accumulation of study findings on the impact of EE is hampered by two important limitations. First, current studies among special needs populations are based on small sample sizes, rely on one specific developmental disability with little input from similar research on another disability, and include no comparison group (Thompson et al. 2018; Laghezza et al. 2010; Sher-Censor 2015). Second, very few studies evaluated the conceptual meaning of EE in special needs groups by examining its nomological network. The current study addresses these limitations by (1) examining group differences in EE-point estimates, parenting stress, and parenting behaviors and (2) exploring relations between EE and parenting stress, on the one hand, and relations between EE and parenting behaviors, on the one hand, in and across three groups of children with diverse neurodevelopmental disabilities (i.e., autism spectrum disorder, cerebral palsy, Down syndrome) and one reference group of children without any known disability.

The growing interest in what parents of children with a disability ‘feel, do, and say’

The past decades have witnessed a growing interest in studying the reality of raising a child with a developmental disability. To date, the majority of these studies have focused on the concept of parenting stress with many studies pointing out that, as a group, parents of children with a developmental disability are likely to experience more parenting stress than

parents of children without special needs (Pinquart 2018; Yorke et al. 2018; Peer and Hillman 2014; Hodapp et al. 2019). Also, accumulated research now suggests that parents of children with autism spectrum disorder (ASD) report the highest levels of parenting stress compared to other types of neurodevelopmental disabilities, even though group differences are generally small to moderate in effect size and depend on the specific nature of the comparison group (Hayes and Watson 2013; Valicenti-McDermott et al. 2015).

In addition to the vast parenting stress literature, recent research also started to evaluate specific parenting behaviors in parents raising children with disabilities (Dieleman et al. 2017; Maljaars et al. 2014; Boonen et al. 2015; Phillips et al. 2017; Dieleman et al. 2020; Dieleman et al. 2018a). To do so, several studies among special needs populations adopted the framework of Self-Determination Theory (SDT; Ryan and Deci 2017), a motivational theory on human socialization, which is prominent in research on parenting within neurotypical populations and claims to be universally applicable (Deci and Ryan 2000; Soenens et al. 2017). Within this framework, both need-supporting parenting (i.e., parenting behaviors that satisfy children's needs for autonomy, relatedness, and competence) and need-thwarting parenting behaviors (i.e., parenting behaviors that impede children's psychological needs) are examined. Although this body of research is quite limited in special needs populations (Dieleman et al. 2020; Dieleman et al. 2017; Dieleman et al. 2018a), it has been suggested that parents of children with special needs might rely more on need-thwarting parenting (i.e., psychologically controlling or overreactive parenting) and less need-supporting parenting (i.e., autonomy-supportive or responsive parenting) due to the increased levels of parenting stress or need-frustrating experiences these parents face when raising their child (Hodapp et al. 2019; McCauley et al. 2019).

Next to examining what parents *feel* (i.e., feelings of parenting stress), or *do* (i.e., parenting behaviors) in their relationship with their child, there is a growing interest to capture

experiences of parents relying on what they *say* in free speech samples (McCauley et al. 2019). Within these studies, the FMSS-method (Magaña-Amato 1993) is increasingly being used to assess the quality of a family's emotional climate. Within the FMSS-method parents are asked to speak for five uninterrupted minutes about their child and the relationship with their child. By doing so, parents' EE can be assessed, which has been described as the attitude of a parent towards their child represented by expressions about the child, and the intensity and regulation of emotion in these expressions (Sher-Censor 2015). Parents' responses are transcribed and coded to capture an overall rating of high EE (i.e., excessive presence or intensity of emotions, often beyond the control of the parent) or low EE (i.e., well-modulated and balanced level of communicated emotion), and specific domains of EE. These EE-domains encompass the parents' level of Emotional Over-Involvement (EOI) (i.e., parental expressions of over-protectiveness, self-sacrificing behavior, or excessive use of praise or blame towards the child), Criticism (i.e., expressions of dissatisfaction about the child or the parent-child relationship), and Warmth (i.e., expressions of interest, sympathy, concern, and empathy towards the child) (Magaña-Amato 1993; Rea et al. 2020; Hickey et al. 2019).

Research avenue 1: A cross-disability perspective on Expressed Emotion, parenting stress and parenting behaviors

One major research objective in the research on EE in special needs populations is to address 'how many' parents express higher levels of EE compared to parents raising neurotypically developing peers (Thompson et al. 2018). To date, a conclusive estimate is lacking due to the large heterogeneity across studies, and because results heavily depend upon the nature of the control group. Two studies evaluated EE in the context of differential parenting, comparing speech samples of parents on their child with a disability and their sibling without a disability. Parents expressed substantially more Criticism and less Warmth towards their child with ASD (Griffith et al. 2015) or higher levels of EE towards their child

with an intellectual disability (ID) (Beck et al. 2004) than towards their child without a disability. A recent meta-analysis (Thompson et al. 2018) identified seven studies providing point estimates of the proportion of parents exhibiting high EE towards their child (or adolescent) with a developmental disability (two studies on ASD, three studies on ID, one on Fragile X-syndrome, one cross-disability study). Based upon fixed-effects meta-analysis, effect sizes across studies varied from .19 to .61, with an overall pooled proportion of .39. This finding suggests that approximately 40% of parents with a child with a developmental disability exhibits high EE. The results of this small meta-analysis should be interpreted with caution as included studies are limited, have widely varying sample sizes (ranging from 33 to 202), often do not control for the impact of sociodemographic factors (such as child age, parental age, socio-economic status), and the use of fixed-effects modeling might cause an overestimation (Borenstein et al. 2007). Nevertheless, this report suggests that a sizable proportion of families with a child with a developmental disability raise their child in a stressed-out emotional climate.

Notably, in this literature on point estimates of high EE in families of children with a disability, the current practice is to focus on only one, single disability (Thompson et al. 2018). Scholars increasingly argue that our understanding of the construct of EE in special needs groups would benefit from a cross-disability perspective, where EE is evaluated across multiple groups of children with special needs (Hastings and Lloyd 2007; Laghezza et al. 2010; Sher-Censor 2015). Therefore, the current study evaluates group differences in point estimates (percentages of high EE and subdomains), parenting stress and parenting behaviors across three groups of parents raising a child with a disability: ASD, cerebral palsy (CP), and Down syndrome (DS). These three groups resemble three of the most prevalent neurodevelopmental disabilities and include difficulties in at least one of the three main domains of functioning: psychosocial (ASD), physical (CP), and/or cognitive (DS).

Additionally, we include a reference group of parents raising a child without any known disability (No-Disability: ND). Based upon the literature (e.g., Thompson et al. 2018; Valicenti-McDermott et al. 2015), we hypothesize that higher levels of EE (especially high Criticism), parenting stress and need-thwarting parenting behaviors will be more present among parents of children with a developmental disability compared to parents of children with ND. Moreover, we expect the highest levels of parenting stress among parents of children with ASD (Hayes and Watson 2013).

Research avenue 2: In search for the nomological network: relations between Expressed Emotion, parenting stress and parenting behaviors

In addition to research on addressing ‘how many’ parents exhibit high EE, an even more important research question is to better understand the conceptual meaning of EE in developmental studies (Rea et al. 2020; Sher-Censor 2015). Recently, scholars called out for more research examining how EE maps onto other more established constructs for assessing parent-child dynamics. Moreover, parenting stress and parenting behaviors have been put forward as two especially relevant constructs to evaluate in this nomological network (Hastings and Lloyd 2007; Laghezza et al. 2010; Sher-Censor 2015; Hickey et al. 2020). To date, however, the large majority of EE-research in parents of children with disabilities mainly examines direct associations between parents’ EE and child adjustment outcomes, with very few studies evaluating concurrent relations with parenting stress and parenting behaviors. Especially in ASD-research, EE-studies consistently demonstrated strong associations between higher levels of parental Criticism and lower levels of parental Warmth, on the one hand, and externalizing child behavior on the other hand (see for review, McCauley et al. 2019; Romero-Gonzalez et al. 2018). Another lingering issue in EE-research among special needs populations is the validity of the EE-domain EOI. Although EOI has been historically developed as a marker of a dysfunctional family climate (Magaña-Amato et

al. 1986), scholars examining EE in special needs populations suggested that EOI might be more normative or even an adaptive aspect of raising a child with a disability that indicates parents' commitment towards their child (Wamboldt et al. 2000; Kubicek et al. 2013; Laghezza et al. 2010).

Current studies on the nomological network between what parents of children with a developmental disability 'feel, do and say'

Even though the current interest in EE among families of children with a developmental disability is growing, a literature search identified few studies examining relations between EE and parenting stress, and even fewer studies investigating relations between EE and parenting behaviors among this population. Even more, these studies applied diverse methods and theoretical concepts to assess parenting stress and parenting behaviors (Sher-Censor 2015), which hampers the integration of existing research findings.

In ASD-research, one recent study addressed the relation between parenting stress and both maternal and paternal EE in 150 families of children with ASD (aged 5–12 years). Both mothers' and fathers' levels of parenting stress predicted higher levels of Criticism toward their child with ASD 12 months later, in mothers as well as fathers. Parenting stress also predicted lower levels of maternal Warmth 12 months later, but this relation was not observed for fathers (Hickey et al. 2020). To date, no study evaluated associations between EE and parenting behaviors among ASD-populations.

In CP-research, we retrieved one relevant study where an indicator of parenting stress was related to EE, yet assessed by a questionnaire instead of the FMSS-method. This study observed a moderate correlation between parents' feelings of caregiver burden and the EE-questionnaire among 144 caregivers of children with CP (Yığman et al. 2020).

We found no specific study on EE in families of children with DS, even though a handful of studies have used the FMSS-method in parents of children with ID, sometimes

including DS (see for reviews, Laghezza et al. 2010; Thompson et al. 2018). These studies mostly relied on small sample sizes and have reported mixed results. On the one hand, high EE predicted more feelings of burden among 31 parents of children with ID (Datta et al. 2002) and was longitudinally associated with higher stress levels in parents of youth and adults with ID (also including youth with ASD) (Greenberg et al. 2006; Hastings et al. 2006; Orsmond et al. 2006). In contrast, a study among 33 mothers raising a child with an ID (including 18 with DS) observed that mothers with high EE also report more feelings of parenting satisfaction (i.e., an affective dimension reflecting parenting satisfaction, anxiety, and motivation) (Beck et al. 2004).

One study adopted a cross-disability perspective evaluating associations between EE and observed parent-child interactions (Kubicek et al. 2013). Although this study suggested that the FMSS-method is a viable measure for assessing the emotional climate among families of young children with special needs, the study findings lack generalizability due to the limited study sample ($n = 38$), the young age of the children (aged 6 to 34 months), and the wide range of disabilities (including general developmental delays, delays in speech/language, vision impairments, hearing loss, ASD, CP, and DS).

Towards a better understanding of the nomological network of Expressed Emotion through the lens of Self-Determination Theory

In pondering the nomological network of the EE-construct with parenting stress and parenting behaviors, it is important to consider that the FMSS-method has been developed from bottom-up analyses, and is not founded on a firm theoretical framework (Sher-Censor 2015; Magaña-Amato et al. 1986). To better understand the conceptual nature of the EE-construct through its nomological network we adopt the well-validated SDT framework (Deci and Ryan 2000). Studies following this framework consistently demonstrated that positive parent-child interactions relate to parental feelings of need-satisfaction (i.e., less parenting

stress) and more need-supportive parenting. Conversely, greater parent-child conflict has been associated with feelings of need-frustration and more need-thwarting parenting (Vansteenkiste and Ryan 2013; Ryan and Deci 2017). Although SDT-research within special needs populations is limited, we assume similar relations among families of children with ASD, CP, and DS based on SDT's universality claim (Deci and Ryan 2000). We hypothesize that, across all groups, qualitative parent-child relationships (i.e., indicated by low EE) will be associated with fewer feelings of parenting stress and more need-supporting parenting behaviors, and that more stressed-out family climates, especially indicated by high levels of parental Criticism, will relate to more parenting stress and more need-thwarting parenting. We expect that the relations between EOI and parental stress and parenting behaviors will be less clear, and may differ between the special needs groups and the comparison group.

The present study

The first aim of this study is to examine group differences in EE-point estimates, parenting stress, and parenting behaviors among parents of children with ASD, CP, DS, and ND. The second aim of this study is to address the nomological network associated with EE through the examination of associations between EE and parenting stress and parenting behaviors within and across groups. This cross-disability approach allows us to explore disability-(a)specific parent-child processes. Furthermore, given that previous studies highlighted strong relations between parental Criticism and children's externalizing behavior (Rea et al. 2020; Greenberg et al. 2006), we additionally analyzed whether significant relations between EE and the parental factors remained while controlling for externalizing child behavior.

Method

Participants

Speech samples and questionnaire data were gathered from 447 parents, of which 159 parents had a child with ASD (*M*_{age} = 10.80 years, 77.4% boys), 67 parents raised a child with CP (*M*_{age} = 12.44 years, 64.2% boys), 54 parents had a child with DS (*M*_{age} = 13.12 years, 48.1% boys), and 167 parents raised a child without any known disability (*M*_{age} = 13.31 years, 58.1% boys). Overall, children were on average 12.25 years old (*SD* = 2.45, range = 6.07 - 17.97 years) and 64.7% of the children were boys. Mothers were the main informants in this study (*n* = 415, 92.8%), with an average age of 42.90 years (*SD* = 5.49). The majority of the participants (87.4%) were married or lived together with the biological parent of the child. The demographic characteristics of the participants are described in Table 1.

The severity of the child's disability varied largely in each disability group. In the ASD-group, parents reported an average total T-score of 90.03 (*SD* = 15.30, range = 43-131) on the Social Responsiveness Scale (SRS; Constantino and Gruber 2005; Roeyers et al. 2011), indicating that the large majority of the children experienced serious (85.0%, T-score > 75) or moderate (13.3%, 61 < T-score < 75) difficulties in social responsiveness compared to the neurotypical populations. In the CP-group, reports on the Gross Motor Function Classification System (GMFCS; Palisano et al. 2008) indicated that 24.6% of the children functioned at level I (i.e., the child can walk without restrictions but has limitations in more advanced motor skills), 36.9% at level II, 15.4% at level III, 7.7% at level IV and 15.4% of the children functioned at level V (i.e., the child has very limited motor abilities). The majority of the children had spastic CP (78.8%), 9.1% had dyskinetic CP, 3% ataxic CP, and 9.1% a mixed type of CP. In the DS-group, approximately half of the children (51.0%) had a mild ID (IQ range = 50-69). A quarter of the parents (24.5%) reported that their child had a moderate ID (IQ-range = 36-49), 10.2% were reported to have a severe ID (IQ range = 20-35), and 14.3% of the parents did not know the ID-classification of their child. Also in the

ASD- and CP-group, respectively 73.0% (n = 116) and 74.6% (n = 50) of the parents provided reports on the intellectual functioning of their child, of which respectively 4.3% (n = 5) and 40.0% (n = 20) of the parents indicated that their child had an ID (IQ-score < 70) (APA 2000).

Procedure

This study is part of an ongoing larger longitudinal project on psychosocial development in children with and without developmental disabilities in Flanders, Belgium. Parents were included in this study if their child: (1) had received an official diagnosis of ASD, DS, or CP based on the DSM-IV-TR or DSM-5 criteria, and (2) was between 6 and 17 years. To verify the ASD diagnoses, several parents provided the diagnostic reports and all parents clarified when and by whom the diagnosis was made, and which instruments were used. Parents of children with ASD were contacted through autism-service centers, schools, and online groups that provide support to families of a child with ASD. The CP-group was identified through seven Flemish service centers for children with physical disabilities. Parents of children with DS were recruited with the support of Flemish family organizations for DS, specified centers, schools, and an online support group for Belgian and Dutch parents of children with DS. Parents with a child without any known disability were included from the Flemish Study on Temperament and Personality across Childhood (FSTPC; De Pauw 2010). In the ND-group, parents reported on possible diagnoses, and children with any known disability were omitted. Data were gathered through parent-report questionnaires and speech samples were administered in the family home or through telephone since an excellent agreement between both procedures has been described (Beck et al. 2004). All speech samples were audiotaped and transcribed to facilitate subsequent coding. Each sample was coded by the first author of this manuscript, who followed the official training program by Magaña-Amato (Magaña-Amato 1993), and one or two research assistants, who were trained by the first author. This

training included a detailed review of the manual, memorization of the coding rules and definitions, practice coding, and discussion of results. Inconsistencies in codings were discussed within the research team. The coders reached substantial interrater reliability, with Cohen's kappa (κ) = .76 for EE-overall, κ = .74 for EOI, κ = .73 for Criticism and κ = .66 for Warmth (all p 's < .001) (Landis and Koch 1977). Written informed consent was obtained from all participants and the study received ethical approval from the Institutional Review Board of the host University.

Measures

Expressed Emotion. Parents were given the standard instruction to speak for five uninterrupted minutes about what kind of person their child is and how they get along together (Magaña-Amato et al. 1986). EOI and Criticism were coded based on content and tone (i.e., tonal inflections and tonal range) following Magaña-Amato's FMSS coding protocol (Magaña-Amato 1993). EOI-coding relied on: caregivers' expression of self-sacrificing or overprotective behavior (e.g., "*I give up everything for her*"), display of intense emotions (e.g., crying), description of excessive detail about the past, statements of strong feelings of love for the child or willingness to do anything for the child, and positive comments. Criticism was coded based on the initial statement, the description of the quality of the parent-child relationship, and expressions of critical remarks (e.g., "*He is incredibly annoying*"). Parental Warmth was coded based on early EE-rating systems (Vaughn and Leff 1976), indicated by warmth in tone of voice, expressions of interest, sympathy, concern, and empathy towards the child (e.g., "*He is also good at basketball, whenever he has a match, I try to be there*").

Parents' EE was examined using the whole EE-construct (i.e., EE-overall) and its underlying domains (i.e., EOI, Criticism, Warmth). Following Magaña-Amato's FMSS coding protocol (Magaña-Amato 1993), EE-overall was coded as either low (i.e., low/borderline

coding for EOI and low/borderline coding for Criticism) or high (i.e., high coding for EOI and/or high coding for Criticism). In line with previous research on EE, the EE-domains were given an ordinal ranking: 0 (low), 1 (borderline), or 2 (high) (e.g., Kubicek et al. 2013; Greenberg et al. 2006).

Parenting stress. Parents rated their feelings of stress in the parent-child system on 40 items of the Dutch version of the Parenting Stress Index (PSI; Abidin 1986; NOSI; De Brock et al. 1992). Five subscales from the PSI were included in this study, rated on a six-point Likert-scale, ranging from 1 (*Totally disagree*) to 6 (*Totally agree*). Three stress domains particularly related to the frustration of parents' own psychological needs: role restriction (i.e., autonomy frustration; e.g., "*I often have the feeling that the wishes and needs of my child control my life*"), attachment stress (i.e., frustration in relatedness; e.g., "*It bothers me that my feelings towards my child are less close and warm than I expected*") and stress related to parental competence (i.e., competence frustration; e.g., "*I often have the feeling that I can't handle things very well*"). Two domains of stress related to feelings of frustration in the social context: marital stress (e.g., "*Raising this child has caused more problems in the relationship with my partner than I had expected*"), and social isolation (e.g., "*Since I have children, I have much less opportunity to see my friends and/or make new friends*"). Cronbach α 's ranged from .70 (attachment stress in the DS-group) to .90 (role restriction in the CP-group).

Autonomy-support. Parents rated their autonomy-supportive parenting behavior using a reduced version of the well-validated Autonomy Support Scale of the Perceptions of Parents Scale (POPS; Grolnick et al. 1991). This version included seven items (e.g., "*I allow my child to decide things for himself*"), which were scored on a five-point Likert scale ranging from 1 (*Completely not true*) to 5 (*Completely true*). Cronbach α 's ranged from .76 (ASD-group) to .86 (DS-group).

Responsivity. Parents' responsiveness towards their child was assessed using the responsivity scale from the Child Report of Parenting Behavior Inventory (CRPBI; Schaefer 1965). This scale consisted of seven items (e.g., "*I find it important to show my child that I love him/her*") rated on a five-point Likert scale, ranging from 1 (*Completely not true*) to 5 (*Completely true*). Cronbach α 's ranged from .74 (DS-group) to .82 (ND-group).

Psychological control. Parents filled out the parent version of the Psychological Control Scale (PCS; Barber 1996; Bart Soenens et al. 2006), to examine key aspects of psychologically controlling parenting, such as guilt induction, shaming, love withdrawal and using controlling language (e.g., "*I blame my child for other family members' problems*"). The eight items were scored on a five-point Likert scale, ranging from 1 (*Completely not true*) to 5 (*Completely true*). Cronbach α 's ranged from .69 (ASD-group) to .79 (CP-group).

Overreactive parenting. Parents completed the overreactivity scale from the Parenting Scale (Arnold et al. 1993; Prinzie et al. 2007) to assess the extent to which they respond with irritation, anger, frustration, or impatience towards their child. This scale consisted of seven items (e.g., "*When I am angry or tensed, I constantly criticize my child*") rated on a five-point Likert scale ranging from 1 (*(Almost) never*) to 5 (*(Almost) always*). Cronbach α 's ranged from .78 (ASD-group) to .95 (DS-group).

Externalizing child behavior. Children's externalizing behavior was assessed using the broadband scale externalizing problems of the Child Behavior Checklist (CBCL; Achenbach 2001). Parents indicated how often their child displayed rule-breaking (17 items; e.g., "lies and cheats") or aggressive behavior (18 items; e.g., "destroys things belonging to others") over the past six months on a three-point Likert scale, ranging from 0 (*Never*) to 2 (*Often*). Cronbach α 's ranged from .88 (ND-group) to .92 (CP-group).

Data Analysis

In the preliminary analyses, we explored group differences in demographic factors, and whether these factors and children's disability severity significantly related to EE. To examine the first research objective, we investigated group differences in EE (i.e., EE-overall, EOI, Criticism, and Warmth) using post-hoc contingency table analysis (Beasley and Schumacker 1995). Group differences in parenting stress and parenting behaviors were examined with two MANOVAs, given the high correlation between the parenting stress domains (r varying from .38 to .73) and the parenting variables (r varying from -.22 to .58) (Table 2). As a second research objective, we examined associations between the EE-domains and the parenting factors (i.e., parenting stress and parenting behaviors) and whether these relations differed across groups. Therefore, two-way MANOVAs with Sum of Squares Type III, accounting for unequal sample sizes were performed. 'Group' (i.e., ASD, CP, DS, ND) and EE-domains (i.e., EOI, Criticism, Warmth) were included as independent factors and all parenting stress domains or parenting behavior scales were simultaneously included as dependent variables (Table 3). Additionally, we added child externalizing behavior as a control variable, to investigate the robustness of the associations among EE and parenting stress and behaviors.

Results

Preliminary analyses

Analyses examining group differences in demographic factors indicated that children with ND and DS were older compared to children with ASD ($F(3,443) = 39.94, p < .001$). Corroborating previous research (Loane et al. 2013), informants of children with DS were significantly older compared to the informants of other groups ($F(3,443) = 37.64, p < .001$). In line with prevalence studies (Loomes et al. 2017; Stanley et al. 2000), significantly more boys were present in the ASD- and CP-group, compared to the DS-and ND-group ($\chi^2(3) =$

20.83, $p < .001$). More children with a disability attained special education compared to the ND-group ($\chi^2(3) = 176.56, p < .001$), but there was no group difference concerning the child's living situation ($p > .05$). More fathers participated in the DS-group ($\chi^2(6) = 29.26, p < .001$) and more higher educated informants participated in the ASD- and ND-group ($\chi^2(6) = 19.93, p < .05$) compared to the other groups. Furthermore, we examined associations between these demographic factors and EE. EE was only significantly related to the child's and the informant's age, but not to the other demographic factors ($p > .05$). Parents of older children with ND expressed more Criticism compared to parents of younger children ($F(2,164) = 4.83, p = .01$), and older parents of children with ASD expressed less Criticism ($F(2,156) = 4.45, p = .01$) compared to younger parents. Therefore, the child's and informant's age were added as control variables in further analyses. EE only related to the child's disability in the ASD-group, where parents who expressed more thoughts and feelings of EOI reported more difficulties in social responsiveness, measured with the SRS (Constantino and Gruber 2005) ($F(2,156) = 4.75, p = .01$). EE did not significantly relate to the degree of motor problems in the CP-group (assessed with the GMFCS; Palisano et al. 2008), nor with the IQ-score or classification of intellectual functioning in the DS-group ($p > .05$).

Research Question 1: How similar and different are Expressed Emotion, parenting stress, and parenting behaviors across groups?

EE-point estimates. One-fifth of the participating parents ($n = 92, 20.6\%$) received an overall high rating on EE, of which 47 parents (51.1%) were rated high only on EOI, 35 parents (38.0%) received a high rating only on Criticism, and 10 parents (10.9%) received a high rating on both domains. Descriptive analyses indicated that the majority of parents expressed low levels of EOI (48.3%), low levels of Criticism (57.9%), and high levels of Warmth (59.1%). Contingency table analyses indicated group differences regarding EE-

overall, Criticism, and Warmth. Parents of children with ASD and CP exhibited more high EE compared to the ND-group. Moreover, parents of children with ASD expressed more Criticism compared to the ND-group, and less Warmth compared to the other groups (all p 's $< .05$). No group differences were found regarding EOI (Figure 1).

Parenting stress. A two-way MANOVA indicated that all scores on the parenting stress domains differed significantly between groups. Parents of children with ASD reported substantially more role restriction and marital stress compared to parents of children with CP and DS, who in turn reported higher levels on these domains compared to parents of children with ND. Parents in the ASD-group also reported slightly more attachment stress and moderately more competence stress compared to all other groups. Parents of children with a disability reported substantially more feelings of social isolation compared to parents of children with ND (all p 's $< .05$).

Parenting behavior. Results revealed significant group differences in all parenting behaviors. Parents of children with ASD or ND reported moderately more autonomy-supportive parenting behavior compared to parents of children with CP or DS. A small group difference was observed concerning responsive parenting behavior, where parents of children with a disability reported higher levels compared to the ND-group. Parents of children with ASD or ND reported slightly more psychological controlling parenting compared to parents of children with CP or DS. Large group differences were observed concerning overreactive parenting. Parents in the ASD-group reported substantially more overreactive-parenting compared to the other groups, and the ND-group also reported more overreactive parenting compared to the CP-and DS-group (all p 's $< .05$) (Table 2).

Research Question 2a: How does Expressed Emotion relate to parenting stress within and across groups?

A two-way MANOVA was used to identify significant associations between the EE-domains and parenting stress, and whether these associations differed across groups (Table 3a). Concerning EOI, one significant association was observed, indicating that marital stress was significantly lower among parents coded low on EOI compared to parents coded borderline ($p = .02$) or high on EOI ($p = .03$). Expressions of Criticism were significantly associated with diverse parenting stress domains. Parents with a higher coding on Criticism reported more feelings of attachment and competence stress (all p 's $< .05$). Moreover, parents who expressed borderline or high expressions of Criticism reported significantly more feelings of role restriction and marital stress compared to parents with low expressions of Criticism (all p 's $< .05$). One significant interaction effect was observed, indicating that the relation between parental Criticism and social isolation differed across groups ($p < .05$). Whereas parents of children with DS who expressed high Criticism reported more feelings of social isolation compared to parents with a low or borderline coding, this association was not significant in the ASD-, CP- or ND-group ($p > .05$). Furthermore, parents exhibiting high Warmth reported significantly fewer feelings of role restriction, attachment stress, competence stress, and marital stress compared to parents with a low or borderline coding (all p 's $< .05$). One interaction effect was significant ($p = .02$), indicating that only parents of children with ASD who received a high coding on Warmth reported more feelings of social isolation compared to parents with a low-borderline coding (Figure 2a).

Research question 2b: How does Expressed Emotion relate to parenting behaviors within and across groups?

Furthermore, we examined the relations between EE-domains and parenting behaviors, and whether these differed across groups (Table 3b). Parents with a high coding on EOI reported more autonomy-supportive parenting behavior compared to parents with a low ($p < .05$) or borderline coding ($p = .03$). Concerning parental Criticism, parents low on Criticism

reported less psychologically controlling and overreactive parenting compared to parents coded borderline ($p < .05$ and $p < .001$, respectively) or high on Criticism ($p = .01$ and $p < .001$, respectively). Two significant interaction effects indicated that the association between Criticism and the need-supportive parenting behaviors differed across groups. Whereas parents from the ND-group who expressed low or borderline Criticism engaged in more autonomy-supportive and responsive parenting compared to parents with a high Criticism coding (all p 's $< .05$), these associations were not significant among the disability-groups ($p > .05$). Parents with a high coding on Warmth reported significantly more responsive parenting ($p < .05$), less psychologically controlling ($p < .001$), and less overreactive parenting ($p < .001$) compared to parents with a low-borderline coding. One interaction effect was significant, indicating that whereas parents of children with DS and ND who expressed high Warmth reported more autonomy-supportive parenting compared to parents with a low-borderline coding (all p 's $< .01$), this association was not found among the ASD-or CP-group ($p > .05$) (Figure 2b).

Additionally, we tested whether the relations between EE and the parental factors remained while controlling for child externalizing behavior. Partial Spearman rank-order correlations between parental Criticism and externalizing child behavior indicated significant associations in each group, ranging from $r = .27$ ($p = .02$) in the ASD-group to $r = .47$ ($p < .001$) in the DS-group. After repeating the same analyses while controlling for externalizing child behavior, parental Criticism was no longer significantly related to marital stress ($p = .30$), autonomy-supportive parenting ($p = .37$) and psychologically controlling parenting ($p = .55$). Also, the relation between parental Warmth and role restriction ($p = .42$), marital stress ($p = .17$), responsive parenting ($p = .29$) and overreactive parenting ($p = .26$) were insignificant. However, other main and interaction effects were replicated.

Discussion

Although there is substantial evidence that the family emotional climate is a crucial determinant for child and parental well-being, research on EE among children with special needs is limited (Sher-Censor 2015; Rea et al. 2020; Thompson et al. 2018). Moreover, point estimates of high EE among parents raising a child with a disability and the conceptual meaning of the EE-construct among these populations need further attention. This study examined group differences in EE-point estimates, parenting stress, and parenting behaviors, and their mutual relationships, across four study groups: parents of children with ASD, CP, DS, and without any known disability.

Group differences in Expressed Emotion, parenting stress and parenting behaviors

The large majority of parents expressed low levels of EE ($n = 355, 79.4\%$), which highlights overall positive family climates. The point estimates of high EE among the ASD- (25.8%) and ND-group (13.8%), corroborates previous ratings among parents of children with ASD (21.5-27.5%) (Greenberg et al. 2006) and parents of children with ASD expressing EE towards their child with no ASD (10.5%) (Griffith et al. 2015). Although there are no studies evaluating EE among children with CP and DS, the point estimates of high EE among the CP-group (28.4%) and DS-group (16.7%) tend to be lower than previously reported among parents of children with asthma (43%) (Wamboldt et al. 2000) or ID (30-60%) (Laghezza et al. 2010). It might be plausible that parents of children with asthma exhibit more high EE because these parents regularly face acute situations, which elicit over-concern, whereas parents of children with CP might face more continuous concerns about the care of their child. Additionally, parents of children with DS might exhibit less high EE due to more positive personality traits and fewer maladaptive behaviors in children with DS, which results in less parenting stress and higher levels of well-being compared to families of children with other intellectual or developmental disabilities (Stoneman 2007; Beck et al. 2004).

Supporting Thompson et al.'s (2018) suggestion that parents of children with developmental disabilities exhibit elevated levels of high EE, our findings illustrated that the emotional climates among families of children with ASD (25.8% high EE), and to a lesser extent also families of children with CP (28.4% high EE), might be more stressed-out and require further attention. Parents of children with DS (16.7%) exhibited similar levels of high EE compared to the ND-group (13.8%), which corroborates previous descriptions of family climates among families of children with DS as warm, close and harmonious (Skotko et al. 2011; Hodapp 2007). Moreover, parents of children with ASD expressed more Criticism compared to the ND-group and less Warmth compared to the other groups, which might be related to both child and parental characteristics. On the one hand, the elevated levels of emotional and behavioral difficulties among these children with ASD might be frustrating for parents to manage (Baker et al. 2011; Griffith et al. 2015; Greenberg et al. 2006) or ASD-characteristics might challenge parents to understand their child's feelings and emotional state (Dieleman et al. 2018b). On the other hand, some of these parents might also face additional difficulties to express sympathy, concern, and empathy during the speech samples because they also exhibit autism-related traits (cf., broader autism phenotype) (Hickey et al. 2019). Interestingly, expressions of EOI showed to be equally distributed across groups, corroborating previous studies showing no significant differences in EOI expressed by parents towards their child with ASD and their brother or sister without ASD (Griffith et al. 2015).

Furthermore, the study findings indicated that having a child with a disability impacts parents' feelings of stress and well-being in different life domains (Peer and Hillman 2014). Group differences with large effect sizes ($\eta^2 = .16$ to $.26$) indicated that parents across all disability-groups reported substantially higher levels of stress in their personal freedom (i.e., more role restriction), partner relation (i.e., more marital stress), and relatedness with their social network (i.e., more social isolation) compared to parents of children with ND.

Moreover, parents of children with ASD experienced the highest levels of parenting stress in all domains, except for the domain of social isolation. This finding corroborates previous research, indicating that parenting stress in families with a child with ASD tends to be higher compared to other types of neurodevelopmental disabilities, and therefore warrants attention and intervention (Hayes and Watson 2013; Seltzer et al. 2000; Valicenti-McDermott et al. 2015).

Small to medium group differences were found concerning parenting behaviors, except for overreactive parenting. Parents of children with a disability reported more responsive parenting compared to the ND-group, which might relate to previous findings indicating that parent-child relationships among families of children with a disability are often described as close and intense since parents strongly attune to their child's needs for both physical and emotional support (Whittingham et al. 2013). Additionally, parents of children with ASD or ND reported more autonomy-supportive parenting behavior, psychological controlling, and overreactive parenting compared to parents of children with CP or DS. Regarding autonomy-supportive parenting, it has been suggested that parents of children with DS tend to be more directive in their interactions with their children than parents whose children are developing without disabilities (de Falco et al. 2011; Glenn et al. 2001). Also, parents of children with CP might face additional challenges to support their child's autonomy due to their child's physical limitations and dependency on parental support (Dieleman et al. 2019). Furthermore, parents of children with ASD might be more inclined to use disciplining techniques or respond with frustration, anger, or impatience towards their child when they are struggling to manage or understand their child's behavior (Dieleman et al. 2017; Dieleman et al. 2018b). Although parents of children with ASD reported large elevated levels of overreactive parenting ($r^2 = .16$), the levels of psychologically controlling parenting and autonomy-supportive parenting were similar compared to the ND-group. Overall, these

findings warrant further inquiry, preferably by studies addressing both quantitative and qualitative differences in parenting using alternative measures of parenting, such as interviews and observations.

Similar associations between Expressed Emotion, parenting stress and parenting behaviors across groups

In line with previous studies investigating EE and parenting stress in one single disability (Hastings et al. 2006; Hickey et al. 2020; Yiğman et al. 2020), our findings support the idea that the nomological network of EE-parenting stress is highly similar across youth with and without a disability. Across all groups, parents who expressed more Criticism or less Warmth towards their child reported more feelings of frustration in all three psychological needs: autonomy (i.e., role restriction), relatedness (i.e., attachment stress) and competence (i.e., competence stress). Moreover, in each group, more expressions of Criticism and EOI, and fewer expressions of Warmth significantly related to feelings of stress beyond the parents' own psychological needs, into the parent-couple relationship (i.e., marital stress). This finding corroborated previous research among parents of children with ASD, suggesting that emotionally challenging parent-child relationships might have a spillover effect on the parent-couple relationship (Hickey et al. 2019). Furthermore, a significant interaction effect indicated that a sense of social isolation related to more expressions of Criticism in each group, but only significantly in the DS-group. This sense of social isolation was also related to fewer expressions of Warmth among the CP-, DS- and ND-group, and contra-intuitively, with more Warmth in the ASD-group. Although more research is needed to replicate this finding, it might be plausible that parents of children with ASD who express a lot of concern and empathy towards their child might also feel isolated from their social context. On the one hand, these parents might experience their child's need for their parent to be emotionally and physically present as an expression of love and connectedness, but on the other hand, this

intense parent-child dynamic might limit their freedom to meet with friends and family (Dieleman et al. 2018b).

Furthermore, the limited group-specific associations between EE and parenting behaviors also suggest that the nomological network between EE and certain parenting behaviors (i.e., responsiveness, psychologically controlling, and overreactive parenting) is highly similar across families of children with and without a disability. In line with SDT's framework (Deci and Ryan 2000), our findings demonstrated that need-supportive parenting behaviors related to more qualitative parent-child relationships, and therefore lower levels of EE, whereas need-thwarting parenting behaviors related to more parent-child conflicts, indicated by higher levels of EE. EOI was only related to need-supportive parenting behavior, more specifically autonomy-support, and no significant associations were found with need-thwarting parenting. Next to the finding that EOI only significantly related to marital stress, these associations support the idea that EOI may be a normative and even adaptive part of caring for a child (with special needs), instead of being an indicator for a dysfunctional family climate (Wamboldt et al. 2000; Kubicek et al. 2013). Therefore, we support previous recommendations stating that researchers should primarily focus on the EOI-subdomain 'self-sacrifice/overprotection', rather than the EOI-construct as a whole when they aim to capture the accurate meaning of EOI (i.e., overidentification with the child or overly protective behavior) (Sher-Censor 2015; Rea et al. 2020). Furthermore, parental Criticism was significantly associated with higher levels of need-thwarting parenting behavior (i.e., psychologically controlling and overreactive parenting) in each group. Although to date, no study examined these associations in neurotypical and special needs populations, these findings are in line with previous research demonstrating that dysfunctional parent-child relationships are associated with more controlling parenting behaviors (Cruise et al. 2011; Kim Park et al. 2008). Furthermore, autonomy-supportive and responsive parenting behaviors

were only significantly associated with fewer expressions of Criticism in the ND-group but showed similar patterns in the other groups. In each group, parental Warmth showed significant associations with parenting behaviors that support children's well-being: more responsive parenting, less psychologically controlling parenting, and less overreactive parenting. Autonomy-supportive parenting was also associated with higher levels of Warmth, but only in the DS-and ND-group. It might be plausible that these relations were not observed among parents of children with ASD and CP because these parents might experience more obstacles, and therefore frustrations, to support their child's autonomy due to disability specificities (i.e., limited motor functioning, need for routine and predictability) (Dieleman et al. 2019; Dieleman et al. 2018b). Overall, these strong associations between parental Warmth, on the one hand, and parenting stress and parenting behaviors, on the other hand, supports previous statements that parental Warmth might be an especially valuable construct to assess EE in special needs populations, possibly even more valuable than the EOI-construct (Woodman et al. 2015; Smith et al. 2008).

The finding that the majority of the relations between EE and the parental factors remained while controlling for externalizing child behavior provided additional support for the robustness of these associations. Nonetheless, some relations became insignificant. For example, parental Criticism remained significantly associated with responsive parenting and overreactive parenting, but was no longer associated with autonomy-supportive parenting and psychologically controlling parenting. Therefore, it seems plausible that child characteristics, such as child behavior, play a moderating role in the association between parents' EE and their feelings of stress and parenting behaviors. As suggested by the theoretical process model of Belsky (1984), parents' behavior is shaped by (the interplay of) parental characteristics, as well as child characteristics and contextual sources of stress and support. Following this model, parental Criticism might reflect insensitive parenting behaviors which exacerbates

behavioral problems, and/or expressions of Criticism might be a reaction to challenging child behavior or stressful events, which parents might find hard to manage (Hastings and Lloyd 2007; McCarty et al. 2004).

Relevance for practice and research

Several findings of this study have practical and theoretical implications. First, the study findings demonstrated that although parents might face several challenges, many families of children with and without a disability are resilient and cope effectively. However, the findings also illustrated that especially families of children with ASD, and to a lesser extent families of children with CP, might be at risk for stressed-out family climates. Since EE is perhaps best conceptualized as the result of an interaction between the parent and the child (Greenberg et al. 2006), assessment of the family emotional climate creates possibilities for change and intervention. In this regard, psychoeducation has shown to be a valuable platform for changing parental attributions or interaction patterns (e.g., Smith et al. 2014). Previous research indicated that high EE especially occurs when parents perceive their child to have control over his or her symptoms and behaviors (Lancaster et al. 2014), instead of acknowledging the factors that lie beyond the child's control, such as birth complications, genetics or environmental toxins (Greenberg et al. 2006). Therefore, it might be interesting to thoroughly explore how and why parents perceive their child's behavior in a certain way. To further support a positive family climate, psychoeducation should be accompanied by skills training, addressing problem-solving and communication techniques (Peris and Miklowitz 2015). Furthermore, family interventions addressing emotional arousal or emotion regulation, such as cognitive training or self-soothing strategies, also have proven to decrease the impact of negative interactions or communication on the family climate (Peris and Piacentini 2013). However, further research is needed to develop and evaluate the effects of similar interventions among families of children with ASD, CP, and DS. Second, the unique

assessment method (i.e., free speech) has the advantage of reducing response biases by eliciting spontaneous open-ended responses, rather than asking questions that might prompt parent's responses or trigger social desirability. Therefore, the FMSS-method provides opportunities to reveal parents' thoughts and feelings that might have not been exposed during a structured interview. For example, whereas some speech samples clearly reflected parents coping strategies and resilience, others revealed red flags for parental burnout, such as emotional exhaustion. Third, the study findings support the idea that the FMSS-method can be used as a robust method across a wide variety of populations. Few significant relations were observed between parent's EE and the child's disability severity or other sociodemographic factors, corroborating previous research (e.g., Delvecchio et al. 2014; Boger et al. 2008; Smith et al. 2008). Also, the method has some additional practical benefits for use in practice and research since FMSSs can be effectively administered over the phone, without the presence of a trained coder, and a limited amount of time is needed to administer or code the FMSS (e.g., Beck et al. 2004).

Limitations, and suggestions for future research

The current study has some limitations. First, although we did control for significant demographic variables (i.e., child's and informant's age) and participants' ethnicity and level of education were representative compared to the Flemish population (Statistics Belgium 2018), our group samples were fairly heterogeneous within and across groups. For example, we did not assess information on household income, job security, the number of children within a family unit, nor the parent's autism-related traits (cf., broader autism phenotype), which might strongly differ across groups and influence the family's emotional climate. Furthermore, only one informant from the family unit participated in the study, of which the majority were mothers (92.8%). The underrepresentation of fathers might influence our findings since previous research among parents of children with ASD indicated that mothers

expressed more Criticism (Hickey et al. 2019) and experienced elevated levels of parenting stress (Foody et al. 2015) compared to fathers. Future research could benefit from including more homogeneous groups and multiple informants to investigate both parent-child relationships as well as possible spillover effects to the parent-couple relationship (Hickey et al. 2019). Moreover, future studies could rely on alternative measures of parenting behaviors, such as observations, and should additionally include measures of child behavior to further disentangle the validity of the FMSS among special needs populations. Second, Benson and colleagues have adapted the original FMSS-method (Magaña-Amato et al. 1986) for use specifically with caregivers of children with ASD (Benson et al. 2010), addressing certain considerations related to the expression of Criticism and the addition of an explicit global code for Warmth (Daley and Benson 2008). Although we did not apply the adapted coding scheme in the ASD-group, driven by a cross-disability perspective, we examined parental Warmth as an important construct, next to EOI and Criticism, in line with early EE-rating systems (Vaughn and Leff 1976). Third, the cross-sectional design of this study does not allow to explore directions of effects. Therefore, for example, it remains unclear whether parenting stress drives EE or whether EE is a determinant of parenting stress and consequently mediates the effect of the child's disability on feelings of parenting stress (Beck et al. 2004). Future longitudinal research is needed to determine the stability of the EE-domains over time and to explore directions of effects. Fourth, more research is needed to further evaluate the validity of the FMSS features across families from different cultures (Sher-Censor 2015). It is plausible that differences between the Belgian and American context might have implicated the coding.

Conclusion

This study aimed to provide insight into EE and its relation with parenting stress and parenting behaviors among parents of children with and without a developmental disability.

The study findings indicated that the large majority of parents expressed low levels of EE (79.4%), suggesting the presence of family resilience and parents' effective coping strategies when facing stressors. Within each group, a stressed-out family climate, especially indicated by more parental expressions of Criticism and fewer of Warmth, related to higher levels of parenting stress and need-thwarting parenting behaviors. These findings suggest that the FMSS-method holds strong potential as a brief but richly informative tool for indexing parent-child dynamics in both practice and developmental research, and to identify parent-child dyads whose relationships are at risk and in need of intervention.

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Table 1 Demographic characteristics study sample

	Autism spectrum disorder (<i>n</i> = 159)	Cerebral Palsy (<i>n</i> = 67)	Down syndrome (<i>n</i> = 54)	Reference group (<i>n</i> = 167)
Child				
Age				
Mean (SD)	10.80 (2.80)	12.44 (2.67)	13.12 (2.57)	13.31 (0.45)
Range	6.18-16.60	6.70-17.97	6.07-17.63	12.35-14.73
Gender				
Boys (%)	123 (77.4)	43 (64.2)	26 (48.1)	97(58.1)
Main living situation				
At home during week and weekends (%)	137 (86.2)	58 (86.6)	43 (79.6)	139 (83.2)
Co-parenting ¹ (%)	17 (10.7)	5 (7.5)	8 (14.8)	23 (13.8)
Care facility/boardingschool ² (%)	4 (2.5)	3 (4.5)	2 (3.7)	0 (0.0)
Missing (%)	1 (0.6)	1 (1.5)	1 (1.9)	5 (3.0)
School				
Regular (%)	107 (67.3)	14 (20.9)	15 (27.8)	161 (96.4)
Special (%)	49 (30.8)	51 (76.1)	38 (70.4)	1 (0.6)
Other or missing (%)	3 (1.9)	2 (3.0)	1 (1.9)	5 (3.0)
Informant				
Relation with child				
Mother (%)	150 (94.3)	60 (89.6)	42 (77.8)	163 (97.6)
Father (%)	9 (5.7)	6 (9.0)	10 (18.5)	4 (2.4)
Other (aunt, grandmother) (%)	0 (0.0)	1 (1.5)	2 (3.7)	0 (0.0)
Mean age				
Mean age mother (SD)	40.24 (5.43)	43.38 (5.16)	48.04 (4.73)	43.92 (4.14)
Mean age father (SD)	43.06 (5.54)	44.87 (4.95)	50.11 (5.12)	46.01 (4.44)
Education level				
Primary school (%)	3 (1.9)	0 (0.0)	1 (1.9)	1 (0.6)
Secondary school (%)	39 (24.5)	27 (40.3)	14 (25.9)	27 (16.2)
Higher education (%)	117 (73.6)	36 (53.7)	35 (64.8)	137 (82.0)
Missing (%)	0 (0.0)	4 (6.0)	4 (7.4)	2 (1.2)

Note. ¹Parenting of the child is shared between the informant and another adult not living with the informant, mostly the other adult is the biological parent of the child (92%) or an aunt/grandparent/sister (8%). ²During three or more days a week.

Table 2 Descriptives and group differences in Expressed Emotion, parenting stress, and parenting behaviors

		Autism spectrum disorder (<i>n</i> = 159)	Cerebral palsy (<i>n</i> = 67)	Down syndrome (<i>n</i> = 54)	Reference group (<i>n</i> = 167)	Total (<i>n</i> = 447)		
		% (n)	% (n)	% (n)	% (n)	% (n)	χ^2	
EE-overall	Low	74.2 ^a (118)	71.6 ^a (48)	83.3 ^{a,b} (45)	86.2 ^b (144)	79.4 (355)	10.36 [*]	
	High	25.8 ^a (41)	28.4 ^a (19)	16.7 ^{a,b} (9)	13.8 ^b (23)	20.6 (92)		
EE-EOI	Low	49.7 ^a (79)	47.8 ^a (32)	48.1 ^a (26)	47.3 ^a (79)	48.3 (216)	5.61	
	Borderline	34.6 ^a (55)	35.8 ^a (24)	42.6 ^a (23)	43.1 ^a (72)	38.9 (174)		
	High	15.7 ^a (25)	16.4 ^a (11)	9.3 ^a (5)	9.6 ^a (16)	12.8 (57)		
EE-Criticism	Low	46.5 ^a (74)	61.2 ^{a,b} (41)	63.0 ^{a,b} (34)	65.9 ^b (110)	57.9 (259)	17.68 ^{**}	
	Borderline	39.0 ^a (62)	26.9 ^{a,b} (18)	25.9 ^{a,b} (14)	29.3 ^b (49)	32.0 (143)		
	High	14.5 ^a (23)	11.9 ^{a,b} (8)	11.1 ^{a,b} (6)	4.8 ^b (8)	10.1 (45)		
EE-Warmth ¹	Low-Borderline	56.6 ^a (90)	41.8 ^b (28)	31.5 ^b (17)	28.7 ^b (48)	40.9 (183)	28.43 ^{***}	
	High	43.4 ^a (69)	58.2 ^b (39)	68.5 ^b (37)	71.3 ^b (119)	59.1 (264)		
		<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>F</i>	η^2
Parenting stress	Role restriction	3.47 ^a (1.09)	3.03 ^b (1.18)	2.91 ^b (1.04)	2.07 ^c (0.64)	2.81 (1.13)	59.55 ^{***}	.26
	Attachment stress	2.02 ^a (0.79)	1.67 ^b (0.59)	1.75 ^b (0.69)	1.66 ^b (0.46)	1.80 (0.66)	9.91 ^{***}	.04
	Competence stress	2.64 ^a (0.79)	2.11 ^b (0.71)	2.08 ^b (0.72)	2.03 ^b (0.58)	2.26 (0.75)	24.05 ^{***}	.08
	Marital stress	3.32 ^a (1.26)	2.48 ^b (1.17)	2.29 ^b (1.00)	1.92 ^c (0.68)	2.55 (1.19)	52.26 ^{***}	.24
	Social isolation	2.71 ^a (0.94)	2.21 ^a (1.04)	2.30 ^a (1.19)	1.71 ^b (0.59)	2.21 (0.98)	35.59 ^{***}	.16
Parenting behavior	Autonomy support	4.14 ^a (0.49)	3.83 ^b (0.53)	3.86 ^b (0.61)	3.99 ^a (0.47)	3.99 (0.51)	8.05 ^{***}	.07
	Responsive	4.43 ^a (0.44)	4.45 ^a (0.41)	4.47 ^a (0.44)	4.29 ^b (0.49)	4.39 (0.46)	4.25 ^{**}	.02
	Psychological control	2.03 ^a (0.52)	1.79 ^b (0.47)	1.81 ^b (0.50)	2.08 ^a (0.49)	1.99 (0.51)	8.11 ^{***}	.05
	Overreactive	2.70 ^a (0.73)	2.08 ^b (0.64)	2.02 ^b (0.57)	2.36 ^c (0.55)	2.40 (0.68)	23.52 ^{***}	.16

Note. EE = Expressed Emotion, EOI = Emotional Over-involvement, M = Mean, SD = Standard deviation, η^2 = Partial eta squared (.01 = small, .06 = medium, .14 = large). ¹Since only two FMSS (0.004%) were coded low on Warmth, the low and borderline categories were merged and coded as (2) Low-Borderline. Values with different superscripts indicate significant differences between groups. *** $p < .001$, ** $p < .01$, * $p < .05$

Table 3 Group differences in the relation between EE-domains and the parental factors (**a** Parenting stress, **b** Parenting behaviors) (total $n = 447$)

a Parenting stress

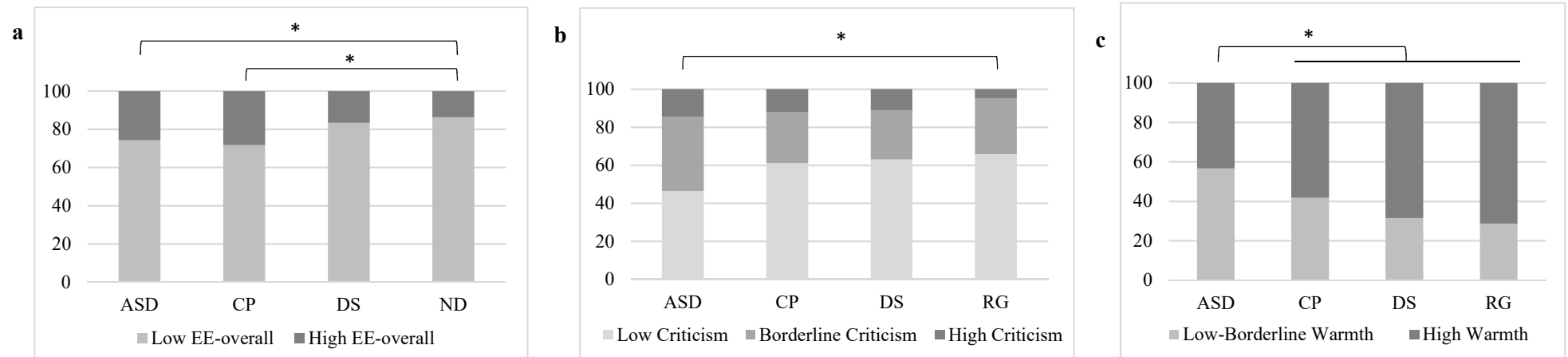
	Emotional Over-involvement							Criticism							Warmth					
	Low	Bord.	High	F _{EOI}	η^2	F _{GroupxEOI}	η^2	Low	Bord.	High	F _{CRIT}	η^2	F _{GroupxCRIT}	η^2	Low-Bord.	High	F _{WARMTH}	η^2	F _{GroupxWarmth}	η^2
	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)					<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)					<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)				
Role restriction	2.77 ^a (.07)	2.90 ^a (.08)	3.06 ^a (.15)	1.85	.01	0.69	.01	2.68 ^a (.07)	3.05 ^b (.10)	3.29 ^b (.16)	9.31 ^{***}	.04	1.94	.03	3.04 ^a (.09)	2.76 ^b (.07)	6.69 [*]	.02	1.28	.01
Attachment stress	1.82 ^a (.05)	1.72 ^a (.06)	1.83 ^a (.10)	1.10	.01	1.14	.02	1.63 ^a (.04)	1.94 ^b (.06)	2.24 ^c (.10)	19.61 ^{***}	.08	0.69	.01	1.99 ^a (.06)	1.67 ^b (.04)	21.50 ^{***}	.05	1.93	.01
Competence stress	2.21 ^a (.05)	2.21 ^a (.06)	2.38 ^a (.11)	1.06	.01	1.07	.01	2.09 ^a (.05)	2.39 ^b (.07)	2.65 ^c (.11)	14.62 ^{***}	.06	1.30	.02	2.45 ^a (.06)	2.11 ^b (.05)	19.89 ^{***}	.04	1.09	.01
Marital stress	2.34 ^a (.08)	2.60 ^b (.09)	2.68 ^b (.16)	3.16 [*]	.01	1.71	.02	2.32 ^a (.07)	2.70 ^b (.10)	2.83 ^b (.17)	6.98 ^{**}	.03	1.16	.02	2.72 ^a (.09)	2.34 ^b (.07)	10.63 ^{**}	.02	0.50	.00
Social isolation	2.18 ^a (.07)	2.26 ^a (.08)	2.35 ^a (.14)	0.73	.00	0.55	.01	2.08 ^a (.06)	2.36 ^b (.09)	2.72 ^c (.15)	10.04 ^{***}	.04	3.30 ^{**}	.04	2.37 ^a (.08)	2.19 ^a (.06)	3.48	.01	3.77 [*]	.03

b Parenting behaviors

	Emotional Over-involvement							Criticism							Warmth					
	Low	Bord.	High	F _{EOI}	η^2	F _{GroupxEOI}	η^2	Low	Bord.	High	F _{CRIT}	η^2	F _{GroupxCRIT}	η^2	Low-Bord.	High	F _{WARMTH}	η^2	F _{GroupxWarmth}	η^2
	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)					<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)					<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)				
Autonomy support	3.89 ^a (.04)	3.97 ^a (.04)	4.15 ^b (.08)	4.89 ^{**}	.02	1.60	.02	3.99 ^a (.03)	3.90 ^{a,b} (.05)	3.76 ^b (.08)	3.92 [*]	.02	3.16 [*]	.05	3.82 ^a (.04)	4.00 ^b (.03)	10.74 ^{***}	.07	5.43 ^{**}	.04
Responsive	4.34 ^a (.03)	4.42 ^a (.04)	4.46 ^a (.06)	2.21	.01	0.80	.01	4.45 ^a (.03)	4.42 ^a (.05)	4.16 ^b (.08)	6.00 ^{**}	.03	2.74 [*]	.04	4.35 ^a (.04)	4.46 ^b (.03)	4.52 ^{**}	.03	0.48	.00
Psychological control	1.95 ^a (.04)	1.92 ^a (.04)	1.88 ^a (.08)	0.44	.00	0.77	.01	1.87 ^a (.03)	2.01 ^b (.05)	2.09 ^b (.08)	4.97 ^{**}	.02	1.13	.02	1.96 ^a (.05)	1.92 ^b (.04)	7.49 ^{***}	.05	0.65	.01
Overreactive	2.37 ^a (.05)	2.24 ^a (.06)	2.25 ^a (.10)	1.57	.01	1.16	.02	2.17 ^a (.04)	2.46 ^b (.06)	2.63 ^b (.10)	12.76 ^{***}	.06	1.41	.02	2.44 ^a (.06)	2.23 ^b (.04)	11.85 ^{***}	.08	0.60	.00

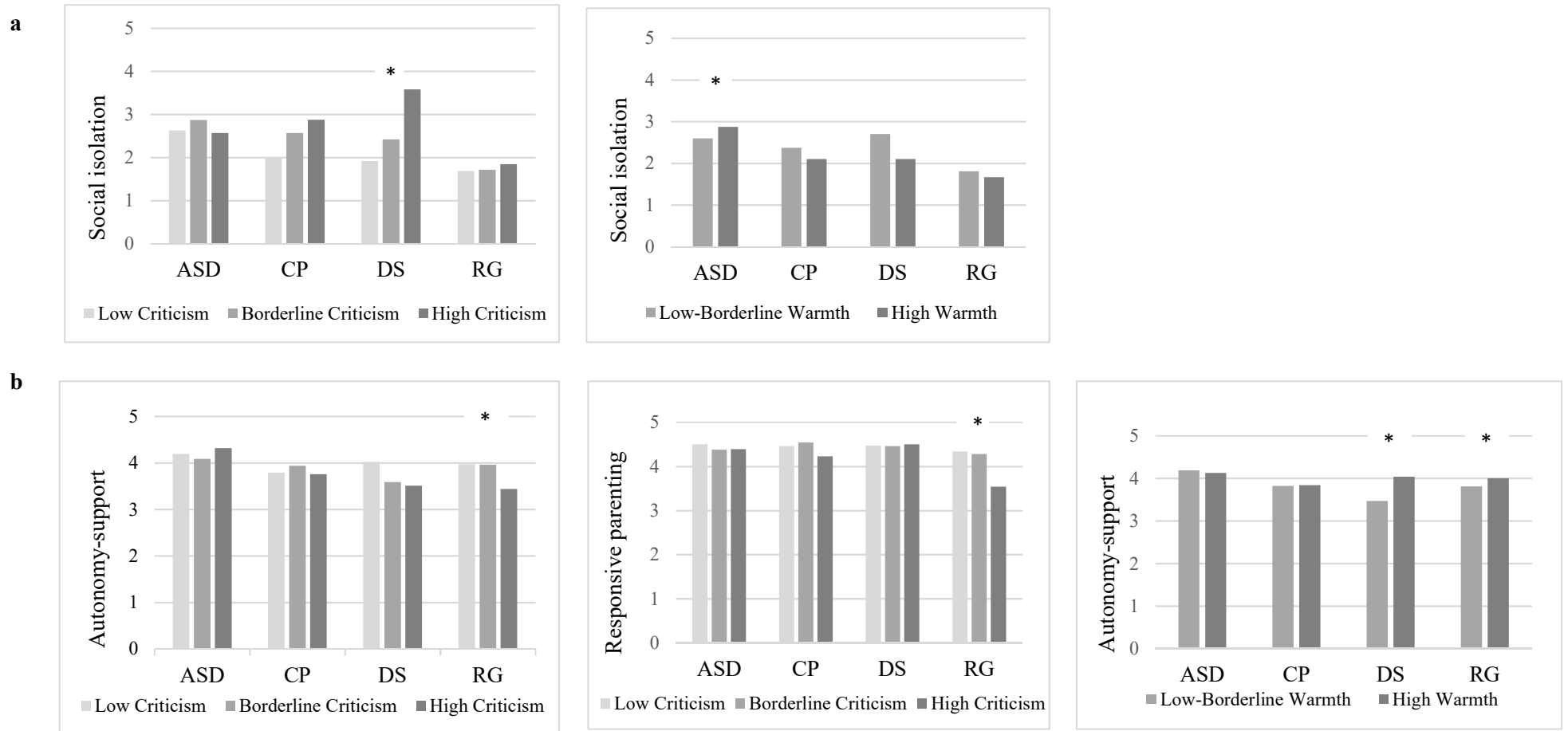
Note. Bord. = Borderline, M = Mean, SE = Standard Error, η^2 = Partial eta squared (.01 = small, .06 = medium, .14 = large). Values with different superscripts indicate significant differences between groups. *** $p < .001$, ** $p < .01$, * $p < .05$

Fig. 1 Group differences in Expressed Emotion (**a** EE-overall, **b** Criticism, **c** Warmth)



Note. EE = Expressed Emotion, ASD = Autism Spectrum Disorder, CP = Cerebral Palsy, DS = Down Syndrome, RG = Reference Group. * $p < .05$

Fig. 2 Interaction between group and EE-domain on parenting factors (**a** Parenting stress, **b** Parenting behaviors)



Note. ASD = Autism Spectrum Disorder, CP = Cerebral Palsy, DS = Down Syndrome, RG = Reference Group. * $p < .05$

