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ORIGINAL PAPER

Daily Sources of Autonomy-Supportive and Controlling Parenting in Mothers of Children with ASD: The Role of Child Behavior and Mothers' Psychological Needs

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Abstract
This study aimed to gain more insight in the sources of daily parenting among mothers of children with autism spectrum disorder (ASD). Specifically, we examined associations between daily variations in child behavior, mothers' psychological needs, and mothers' controlling and autonomy-supportive parenting. Moreover, the study examined the potential mediating role of daily vitality and stress within these associations. In total 41 mothers (M_{age} = 41.84 years) of children with ASD (M_{age} = 10.92 years, range 7–15) participated in a 7-day diary study. Multilevel structural equation modeling revealed that both daily child behavior (i.e., externalizing problems and prosocial behavior) and mothers' psychological needs relate to day-to-day variation in parenting behavior. Daily stress and vitality played an intervening role in most of these associations.

Keywords Autism Spectrum Disorder · Controlling parenting · Autonomy support · Psychological needs · Child behavior · Diary study · Self-determination theory

Many parents would agree that, when it comes to rearing children, one day is not the same as the other. On some days, parents are patient and sensitive towards their children, whereas on other days, parents experience difficulties to stay attuned to their children's perspective and are even inclined to interact with them in a more pressuring or impatient fashion (Dix 1991). Recent diary studies in community samples have indeed shown that controlling and autonomy-supportive parenting behaviors can vary considerably on a daily basis (Aunola et al. 2017; Van der Kaap-Deeder et al. 2018). In parents of children with autism spectrum disorders (ASD), however, this short-term variability in parenting behaviors has not been addressed yet. The lack of research attention for the daily parenting dynamics in this group is unfortunate, given that the symptoms (e.g., deficits in social interactions) and behaviors (e.g., tantrums) of children with ASD confront parents almost on a daily basis with diverse and unique challenges (Pottie et al. 2009).

Research among parents of typically developing children has identified both child behavior (e.g., problem behaviors) and parental experiences (e.g., stress) as crucial determinants of daily parenting behavior (Aunola et al. 2017; Repetti et al. 2015). In terms of parents' own experiences, studies grounded in self-determination theory (SDT; Deci and Ryan 2000) have recently shown that the daily satisfaction and frustration of parents' own needs for autonomy, competence, and relatedness are important sources of daily controlling and autonomy-supportive parenting (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017). Furthermore, these studies have begun to uncover the mechanisms linking daily child behaviors and parents' psychological needs to parenting behavior. More specifically, findings point to the intervening roles of experienced vitality and stress (Van der Kaap-Deeder et al. 2018).

In order to advance insight in the sources of daily parenting among mothers of children with ASD, this study aims to investigate whether daily variations in both child behavior

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and in maternal needs-based experiences relate to daily variation in parenting (i.e., controlling and autonomy-supportive parenting). In addition, this study aims to unravel some of the mechanisms underlying these daily relations, thereby examining the intervening role of vitality and stress.

Daily Autonomy-Supportive and Controlling Parenting

The quality of parenting plays a substantial role in children's development (Collins et al. 2000). This is true not only for typically developing children, but also for children with ASD (Bader and Barry 2014). According to SDT (Deci and Ryan 2000), a broad theory on human development which is applied increasingly in research on parenting in general (Joussemet et al. 2008) and in specific populations (Shea et al. 2013), parents can either foster or undermine their child's development by nurturing or thwarting their child's psychological needs (Soenens et al. 2017). Specifically, parents can foster or thwart satisfaction of the needs for autonomy (i.e., the need to experience self-direction), relatedness (i.e., the need to feel connected with others), and competence (i.e., the need to feel effective in accomplishing goals). When satisfied, people experience a sense of authenticity (autonomy need satisfaction), personal effectiveness (competence need satisfaction), and reciprocal care (relatedness need satisfaction). In contrast, frustration of these needs manifests in feelings of pressure and obligation (autonomy need frustration), failure and inferiority (competence need frustration), and social alienation (relatedness need frustration). While satisfaction of these three needs is fundamental for children's well-being and thriving, frustration of the needs jeopardizes psychological well-being and increases risk for ill-being and psychopathology (Vansteenkiste and Ryan 2013).

One type of parenting behavior that is considered particularly crucial for the satisfaction of a child's psychological needs, is autonomy support (Ryan and Deci 2017). Autonomy-supportive parents essentially promote their child's volitional functioning, that is, they create room for the child to be authentic and to behave on the basis of self-endorsed goals and interests (Joussemet et al. 2008). Key elements of autonomy-supportive parenting include fostering task enjoyment, encouraging dialogue, providing choice, attuning to the child's pace of development, and using inviting language (Soenens et al. 2017). In contrast, controlling parenting behaviors are more likely to thwart children's psychological needs (Soenens and Vansteenkiste 2010). Controlling parenting involves the use of pressuring tactics to force children to think, behave or feel in a specific way. Such pressuring parenting is distinct from more constructive parental attempts to structure and regulate the child's behavior. Indeed, in SDT, controlling parenting is distinguished from providing parental structure, which involves parental attempts to guide and adapt the environment to facilitate children's competence (Grolnick and Pomerantz 2009). Controlling parenting can manifest in a number of ways, including parents' use of psychological control (i.e., the use of insidious and manipulative behaviors, such as guilt-induction, to dominate the child's psychological world; Barber 1996) and over-reactive discipline (i.e., the tendency to respond in a hostile and impatient way towards the child; Prinzie et al. 2007).

A growing literature in the general population shows that autonomy-supportive and controlling parenting behavior relate differentially to children's adjustment. Whereas autonomy support enhances children's well-being and psychological development (Grolnick et al. 2018; Joussemet et al. 2008), controlling parenting diminishes children's healthy development and increases their risk to develop problem behavior (Barber et al. 2005; Costa et al. 2016). Among children with ASD, recent studies have confirmed that controlling parenting also negatively impacts child development (Bader and Barry 2014; Dieleman et al. 2017). To our knowledge, no study evaluated directly the potential beneficial effects of autonomy-supportive parenting in youth with ASD yet. However, two studies in the educational context do suggest that teachers' autonomy support fosters more adaptive outcomes (e.g., fewer behavioral problems, improved scholastic outcomes) among children with ASD (Reutebuch et al. 2015; Shea et al. 2013).

In the general parenting literature, most studies on autonomy-supportive and controlling parenting tap into dispositional, interindividual differences in parenting, asking parents to report on their usual style of interacting with children. However, recent theory and research point to the importance of studying parenting from a more dynamic perspective (Repetti et al. 2015). Research in general populations has convincingly demonstrated that parents vary considerably in their parenting behavior from situation to situation and from one day to the other (Dix 1991; Holden and Miller 1999; Repetti et al. 2015). Several diary studies have now shown that both autonomy-supportive and controlling parenting fluctuate substantially on a daily basis (Aunola et al. 2013; Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017). Moreover, this daily variability in parenting has been shown to relate to daily variation in children's psychological functioning and adaptation, with children reporting more well-being on days when parents are perceived as autonomy-supportive and more ill-being on days when parents are perceived as controlling (Aunola et al. 2013; Van der Kaap-Deeder et al. 2017).

To our knowledge, no research has addressed the daily dynamics of parenting among parents of children with ASD. Even though recent diary studies have demonstrated that

there is marked daily variability in the well- and ill-being (e.g., positive and negative affect, stress) of parents of children with ASD (Hartley et al. 2017; Pottie et al. 2009; Smith et al. 2010; Timmons et al. 2016), no study has examined to what extent these parents' autonomy-supportive and controlling parenting vary on a daily basis. Because parents of children with ASD face many unique challenges in helping their child to adjust to the daily demands of everyday life, we anticipate that these parents will display substantial daily variability (i.e., within-person differences) in both autonomy-supportive and controlling parenting behaviors. Having established such daily variability in parenting, an important goal for research is then to identify the sources of this daily variability.

Child and Parent Characteristics as Sources of Daily Variation in Parenting

Several theoretical models of parenting have conceptualized parenting as a multi-determined phenomenon, with both child behaviors, parent characteristics, and contextual determinants affecting parenting in a complex fashion (Belsky 1984; Belsky and Jaffee 2006; Grolnick 2003). Given that parenting varies on a daily basis, studies have begun to also examine the daily antecedents of daily parenting behavior, thereby focusing mainly on child and parent characteristics.

Child Behavior as a Source of Daily Parenting Behavior

Both studies in the general population (De Haan et al. 2013; Janssens et al. 2017; Pinquart 2017) and studies among children with ASD (Dieleman et al. 2017; Taylor and Seltzer 2011) have shown that children's behavioral problems, and externalizing problems in particular, evoke generally higher levels of controlling parenting. Consistent with these findings, a recent diary study in the general population showed that parents report more controlling behavior on days when children display more (externalizing) problem behaviors (Aunola et al. 2017). Although the daily variability in problem behaviors of children with ASD has been shown to relate to parents' daily affect (Hartley et al. 2016; Mihaila and Hartley 2016), it has not been examined whether such daily variation in problem behavior is also related to daily variation in parents' controlling parenting.

In contrast, research in the general population has identified prosocial child behavior (i.e., intentional actions aimed to benefit others such as helping and sharing) as an important precursor of more need-supportive parenting (Carlo et al. 2011; Newton et al. 2014; Pastorelli et al. 2016). Although, to the best of our knowledge, this association has not been examined at the daily level nor among parents of children with ASD yet, we reason that it is easier for parents to be autonomy-supportive on days when children present much spontaneous prosocial behavior.

Parents' Own Experiences as a Source of Daily Parenting Behavior

In addition to child behaviors, parents' own psychological experiences also matter a great deal for how parents interact with their children (Belsky 1984; Belsky and Jaffee 2006; Grolnick 2003). In this regard, SDT states that the three basic psychological needs for autonomy, relatedness, and competence are not only important for children's development and well-being, but also for parents' own functioning and way of interacting with others (Ryan and Deci 2017). Research in the general population has shown that parents who experience greater psychological need satisfaction are better able to attune to their child's psychological needs by being autonomy-supportive (Van der Kaap-Deeder et al. 2015) and that parents whose own needs are frustrated are more inclined to engage in controlling parenting (De Haan et al. 2013). Such findings have not only been demonstrated when examining individual differences in parenting (i.e., between-person variability), but also when examining daily variability in parenting behavior (i.e., within-person variability) in typically developing populations (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2018). Thus, the daily variability in psychological need-experiences of parents can account for the day-to-day variability in parents' autonomy-supportive and controlling behaviors.

In parents of children with ASD, however, less attention has been paid to the association among parental psychological needs experiences and parenting. This is unfortunate because parents rearing a child with ASD face various challenges and even threats to their own psychological needs (Dieleman et al. in press; Rodrigue et al. 1990). For example, these parents are at risk to feel isolated from friends and family (i.e., relatedness frustration) (Woodgate et al. 2008), to have lower levels of self-efficacy (i.e., competence frustration) (Karst and Van Hecke 2012), and to experience financial and time constraints (i.e., autonomy frustration) (Karst and Van Hecke 2012). In one relevant, cross-sectional study, Dieleman et al. (2018) showed that parents' frustration of the psychological needs experienced within the relationship with the child with ASD was related to more controlling parenting. Clearly, there is a need for more research addressing the role of parents' needs in parenting a child with ASD and, in particular,

for research examining this role in the context of daily parenting behavior.

Vitality and Stress as Underlying Mechanisms in the Relations Between Child Behavior, Parents' Psychological Needs, and Daily Parenting Behavior

A next step in advancing the understanding of the daily relations between child behavior, parental needs-based experiences, and parenting behavior, concerns the examination of underlying mechanisms. On the basis of previous research, we put forward two variables that have been linked with both child behaviors and with psychological needs experiences and that might be proximal precursors of parenting behavior (Ryan and Deci 2008; Weinstein and Ryan 2011): vitality and stress. While vitality refers to the experience of physical and mental energy (Ryan and Frederick 1997), stress refers to the appraisal that challenges exceed one's capacity or resources (Selye 1956).

Several studies in the general population, both at between- and within-person levels of analysis, have shown that need satisfaction relates to more vitality and less stress (Reis et al. 2000; Ryan et al. 2010; Van der Kaap-Deeder et al. 2018; Weinstein and Ryan 2011). Need frustration, on the other hand, has been shown to be predictive of higher stress levels and reduced levels of vitality (Campbell et al. 2017; Van der Kaap-Deeder et al. 2018; Weinstein and Ryan 2011). These findings suggest that experiences of volitional functioning, close relations and efficacy are energizing and vitalizing and protect people from experiencing stress. On the other hand, experiences of being pressured into activities, social exclusion, and failure drain one's energy and come with symptoms of stress (Ryan and Deci 2017).

Additionally, there is empirical evidence for the impact of child behavior on parents' stress levels. Several studies, both in typically developing children and in children with ASD, have shown that children's problem behaviors predict stress in parents (Lecavalier et al. 2006; Mackler et al. 2015; Neece et al. 2012). Prosocial child behavior, on the other hand, has been associated with decreased levels of stress among parents of children with ASD (Huang et al. 2014; Totsika et al. 2015). While there is a lack of research examining the impact of children's behavior on parents' vitality, herein we reason that on days children would display high levels of problem behavior, parents would have less energy available, whereas children's prosocial behavior on a given day might fuel parents' physical and mental energy that day.

In turn, both parental vitality and stress have been identified as proximal precursors of parenting behaviors. Studies on parental stress in parents of children with ASD (Chan and Lam 2016; Shawler and Sullivan 2015) and without ASD (Conger et al. 1995; Grolnick et al. 1996; Van der Kaap-Deeder et al. 2018) have shown that stress renders parents vulnerable to engage in controlling parenting. In contrast, studies in the general population have demonstrated positive associations between parents' positive mood and vigor (which can be considered as indirect indicators of parental vitality) and parental resources strongly involved in autonomy-supportive parenting such as psychological availability during parent–child interactions (Danner-Vlaardingerbroek et al. 2013) and parents' capacity for perspective taking (Isen 2000).

Overall, these findings suggest that parents who experience high levels of stress are at risk to become more self-centered and to enforce their own agenda on their child (i.e., controlling parenting). Parents who feel full of physical and/or mental energy, on the other hand, have the resources to be available for and to focus on the child's perspective and to promote their child's volitional functioning. Accordingly, parental experiences of stress and vitality are likely to be involved in parents' daily engagement in controlling and autonomy-supportive practices. Moreover, these experiences are expected to play an important intervening role in associations of both child behavior and parents' psychological needs with daily parenting behavior. Although these daily associations and the intervening role of vitality and stress have been mainly examined in general populations, it can be hypothesized, based on theory (Ryan and Deci 2017) and preliminary findings (Chan and Lam 2016), that the same processes are present in parents raising children with ASD.

The Present Study

The overall goal of this study is to advance the understanding of the daily dynamics of parenting among parents raising a child with ASD. A *first specific aim* of this study was to examine day-to-day variation in controlling and autonomy-supportive parenting of mothers of children with ASD. We expected to find significant daily variation in both controlling and autonomy-supportive parenting. A *second aim* was to investigate the associations of both daily child behavior (i.e., behavioral problems and prosocial behavior) and mothers' psychological needs experiences (i.e., need satisfaction and need frustration) with daily parenting behavior. We hypothesized that daily variation in maladaptive child behavior and maternal need frustration would relate positively with daily variation in controlling parenting, whereas daily variation in prosocial child behavior and maternal need satisfaction would be associated positively with daily variation in autonomy support. A *third aim* of this study was to examine whether daily vitality and stress within the parent–child interaction would represent intervening mechanisms in the

relations assumed between child behavior and mothers' psychological needs on the one hand and mothers' parenting behavior on the other hand. We hypothesized that both vitality and stress would, at least partially, account for the associations of child behavior and mothers' needs with daily parenting.

Method

Participants and Procedure

Participants were 41 Belgian mothers (M_{age} = 41.84 years, SD = 4.56, range 32–55) of children with ASD aged between 7 and 15 years (70.7% boys, M_{age} = 10.92 years, SD = 2.05). The majority of the mothers were married (75.6%), 7.3% were living together with their partner (without being married), and 14.7% were single/divorced. Regarding mothers' educational status, the majority (80.5%) had received higher education (i.e., bachelor or master degree), 17.1% completed secondary school and 1 mother (2.4%) completed primary school.

Mothers were recruited through two different channels: (a) the registries of two autism services centers in Flanders (Belgium) that provide support-at-home, and (b) announcements placed on websites regarding ASD. In order to participate, families had to meet the following inclusion criteria: the child (1) had received a formal diagnosis of ASD based on the DSM-IV-TR or DSM-5 criteria, and (2) was aged between 7 and 16 years. In order to verify the ASD diagnosis, parents provided the diagnostic evaluation of their child or gave permission to contact the psychiatrist or center that had assessed the child. The diagnostic evaluations were inspected thoroughly in collaboration with an expert on ASD diagnosis and assessment. When the diagnostic evaluation was not conducted by a multidisciplinary team and/or did not include the Autism Diagnosis Observation Schedule (ADOS) (Lord et al. 2012) or the Autism Diagnostic Interview—Revised (ADI-R) (Rutter et al. 2003, 2008), the information was deemed insufficient and the child's diagnosis was verified by conducting an ADOS-2. In total, six children were tested additionally with an ADOS-2 by a trained researcher. Each of these children scored above the cut-off for ASD (i.e., total score $\geq$ 7). In addition, parents reported about their child's current ASD symptoms on the Social Responsiveness Scale (Constantino and Gruber 2005; Roeyers et al. 2011). All children had a total T-score above 60, indicating high levels of current autism symptoms.

The researchers visited all participating mothers at home to explain the study. During this home-visit an informed consent was signed, background characteristics were assessed and mothers received a paper-and-pencil, baseline questionnaire. Mothers also received a personal code to get access to the online diary questionnaire and were instructed on the use of the online questionnaire. For seven consecutive days, they were asked to report each evening (after their child went to bed, or before going to bed themselves) about their own experiences and behavior and about their child's behavior during the past day, starting on a Monday evening. The online tool registered the date and time when mothers filled out the questionnaires. Data filled out on the wrong day (5.92%) were not included in the analyses. Four mothers preferred to fill out the diaries on paper, rather than using the online platform. These mothers received an exact copy of the diary questionnaires on paper and were asked to note the date and time for each day. In order to avoid missing data, mothers received a daily reminder to fill out the questionnaires via text message or e-mail (depending on personal preference and only with their consent).

Measures

Person-Level Measures

Autism Severity In order to control for the level of autism severity, as perceived by the mother, the Social Responsiveness Scale (SRS) (Constantino and Gruber 2005; Roeyers et al. 2011) was administered. This parent-report questionnaire assesses the child's ASD symptoms over the past 6 months, based upon the social impairments, social awareness, social information processing, capacity for reciprocal social communication, social anxiety/avoidance, and autistic preoccupations s/he exhibited (e.g., *My child prefers to be alone rather than with others*). This 65-item measure is rated on a 4-point Likert scale ranging from 1 (*not true*) to 4 (*almost always true*). Cronbach's alpha of the SRS in this study was 0.96.

Day-Level Measures

All scales were adapted and shortened to make them suitable for a diary format and to limit participant burden. Likert scales, ranging from 1 (*completely not true*) to 5 (*completely true*), were used for all scales, unless indicated otherwise. The internal scale reliabilities (i.e., Cronbach's alpha) were estimated using multilevel modeling and in accordance with recommendations by Geldhof et al. (2014). The between- and within-person alpha coefficients of all scales are presented in Table 1.

Table 1 Between-person and within-person alpha coefficients, means, standard deviations, between-person intra-class correlations, and within-person correlations between the study variables

Daily measurement	Between-person level α	Within-person level α	*M*	*SD*	ICC	1	2	3	4	5	6	7	8
Externalizing child behavior	0.92	0.84	1.68	0.61	0.52								
Internalizing child behavior	0.91	0.68	2.17	0.79	0.66	0.55^{***}							
Prosocial child behavior	0.86	0.69	2.79	0.62	0.44	-0.27^{***}	-0.40^{***}						
Need satisfaction	0.96	0.78	3.71	0.55	0.48	-0.14^{**}	-0.22^{***}	0.19^{***}					
Need frustration	0.93	0.71	1.92	0.54	0.46	0.28^{***}	0.35^{***}	-0.07	-0.67^{***}				
Vitality	0.92	0.72	3.39	0.79	0.50	-0.25^{***}	-0.29^{***}	0.27^{***}	0.65^{***}	-0.54^{***}			
Stress	0.89	0.85	0.42	0.43	0.38	0.38^{***}	0.23^{***}	-0.06	-0.38^{***}	0.44^{***}	-0.44^{***}		
Autonomy supportive parenting	0.84	0.71	3.45	0.50	0.39	-0.09	-0.07	0.27^{***}	0.34^{***}	-0.11^{*}	0.36^{***}	-0.24^{***}	
Controlling parenting	0.87	0.68	1.74	0.43	0.40	0.51^{***}	0.22^{***}	-0.06	-0.16^{**}	0.32^{***}	-0.25^{***}	0.49^{***}	-0.15^{**}

$^{*}p < .05$; $^{**}p < .01$, $^{***}p < .001$

Daily Child Behavior[1]

Externalizing and Internalizing Child Problems

Mothers reported about their child's aggressive (4 items, *Today my son/daughter was aggressive*), rule-breaking (3 items, *Today my son/daughter lied)*, withdrawn/depressive (3 items, *Today my child preferred to be alone, rather than with others)*, and anxious/depressive (3 items, *Today my son/daughter was scared or anxious*) behavior during that day. These items were selected, on the basis of their suitability for a diary format, from the Child Behavior Checklist/6–18 (CBCL; Achenbach and Rescorla 2001). The items for aggressive and rule-breaking behavior were averaged into an overall score for externalizing problems, and the items for withdrawn/depressive and anxious/depressive behavior were averaged into an overall score for internalizing problems.

Prosocial Child Behavior

Mothers filled out three items tapping into their child's prosocial behaviors (e.g., *Today my son/daughter was nice to other people)*. Two items were selected from the prosociality scale (Caprara et al. 2005), and one item was selected from the Strengths and Difficulties Questionnaire (SDQ) (Goodman 2001).

Daily Psychological Need Satisfaction and Need Frustration[2]

To assess mothers' satisfaction and frustration of the psychological needs for autonomy, relatedness, and competence throughout the day, mothers filled out 12 items from the Basic Psychological Need Satisfaction and Need Frustration (BPNSNF) scale (Chen et al. 2015), six of which tapped into need satisfaction and six of which tapped into need frustration. The items assessing autonomy satisfaction (*Today I felt a sense of choice and freedom in the things I undertook*), relatedness satisfaction (*Today I felt connected with*

[1] Prior to the diary measurement, mothers filled out a number of well-validated baseline questionnaires, including the Child Behavior Checklist/6–18 (CBCL, Achenbach and Rescorla 2001), three items measuring prosocial behavior (two items from the prosociality scale (Caprara et al. 2005), and one item from the Strengths and Difficulties Questionnaire (SDQ, Goodman 2001)), and the complete Basic Psychological Need Satisfaction and Need Frustration (BPNSNF) scale (24 items) (Chen et al. 2015). This allowed us to examine associations between the baseline measurements and the daily measurements of child behavior and maternal psychological needs. The supplementary appendix includes a description of the baseline measurements and a correlation table presenting the correlations between the general and daily measurements.

[2] See Footnote 1.

the people who care about me and who I care about), and competence satisfaction (*Today I felt confident that I could do things well)* were averaged into a composite score for need satisfaction. The items assessing autonomy frustration (*Today I felt forced to do things that I wouldn't choose to do*), relatedness frustration (*Today I felt excluded from the group that I want to belong to*), and competence frustration (*Today I felt insecure about my abilities*) were aggregated into a composite score for need frustration. This adapted version of the BPNSNF scale has been used successfully in previous diary studies reporting high internal consistencies and confirming the two-factor structure of the scale (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017, 2018).

Daily Vitality and Stress in Parent–Child (P–C) Interaction

Vitality

To assess mothers' experienced vitality when interacting with their child, mothers filled out three items about the extent to which they felt vital and energetic when interacting with their son/daughter during the day (*When I spent time with my son/daughter today, I felt very energetic)*. The selection of these items was based on the adaptation of the Subjective Vitality Scale (Ryan and Frederick 1997) reported in a diary study by Ryan et al. (2010). Similar adaptations have been used reliably in studies with a multilevel design (e.g., Mouratidis et al. 2017; Schmitt et al. 2017).

Stress

The degree to which mothers felt stressed when interacting with their child during the day was measured with three adapted items of the stress subscale from the Depression Anxiety and Stress Scale (DASS) (Lovibond and Lovibond 2004). Items were adapted to a parent–child situation (e.g., *When I spent time with my son/daughter today, I found it difficult to calm myself down*) and were rated on a 4-point Likert scale ranging from 0 (*Not at all*) to 3 (*Definitely*). The selection and adaptation of the items was based on van der Kaap-Deeder et al.'s (2018) diary study, in which the same items were successfully used to measure state stress among parents.

Daily Autonomy-Supportive and Controlling Parenting

Autonomy-Supportive Parenting

Four items of the Autonomy Support Scale of the Perceptions of Parents Scale (POPS) (Grolnick et al. 1991) were selected and adapted to assess the degree to which mothers supported children's volitional functioning during the day (e.g., *Today I considered things from my child's point of view*). Previous diary studies have used this adapted scale for daily autonomy-supportive parenting and reported good internal consistency (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017, 2018).

Controlling Parenting

Two scales were administered in order to tap into mothers' controlling parenting behaviors (i.e., over-reactive discipline and psychological control). Mothers filled out three items from the Overreactivity scale of the Parenting Scale (Arnold et al. 1993; Prinzie et al. 2007), which measures the degree to which mothers respond with irritation, anger, frustration, or impatience towards their child (e.g., *Today I raised my voice or I yelled when my child misbehaved*). The selection of items for was based on their suitability for a daily assessment. In addition, mothers filled out four items of the parent version (Soenens et al. 2006) of the Psychological Control Scale (PCS) (Barber 1996), which assess the degree to which mothers engage in psychologically controlling practices (e.g., *Today, I was less friendly with my child if he/she did not see things my way*). This adapted scale was found to be reliable in previous diary-based research (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2018). The items for overreactive and psychologically controlling parenting were averaged into a score for controlling parenting. This aggregation was deemed justified because the correlation between both subscales at the within-person level was .52 ($p < .001$).

Plan of Analysis

The study design consisted of repeated measurements on seven consecutive days (i.e., level 1) nested within 41 mothers (i.e., level 2). To take this hierarchical structure into account, multilevel structural equation modeling was conducted using Mplus 7.3 (Muthén and Muthén 1998–2012). In total, there were 7.99% missing values in the dataset. Because these missing data were missing completely at random (Little's MCAR test: $\chi^2_{(1)} = 0.25$, $p = .62$), full information maximum likelihood estimation with robust standard errors (MLR) was used to handle missing data in the models.

For the first hypothesis, we examined whether there was significant variability in the daily variables by estimating intercept-only models. These intercept-only models allow for an estimation of intraclass correlations (ICC), which reflect the between-person variation. These ICCs shed a light on the approximate level of within-person (i.e., day-to-day) variation.

In order to address the second aim (i.e., to examine the daily associations between child behavior, mothers' needs and parenting behavior), we conducted a two-level structural

equation model (SESM) including the direct effects between the independent variables (i.e., child behavior and mothers' needs) and the daily outcomes (i.e., parenting behavior). The third aim of this study (i.e., to test the intervening role of vitality and stress) was examined by testing a mediation SEM model, including both indirect paths via the intervening variables (i.e., daily vitality and stress) and the significant direct effects between the independent variables and the outcomes. Indirect effects were estimated using the default delta method (Muthén and Muthén 1998–2012). In all two-level SEM models the associations were specified at both the within-person level (i.e., the level of daily variation within mothers) and at the between-person level (i.e., the level of interindividual differences between mothers across the week). The exact specifications of the models are provided in the supplementary appendix B. At within-person level the models included associations of daily child behavior and mothers' daily needs with daily parenting behavior. By including the same associations at the between-person level, the models take into account interindividual differences between mothers and associations at the level of interindividual differences. Because the hypotheses in the current study deal with the level of within-person (daily) variation, we focus only on the within-person (daily) associations between child behavior, mothers' needs, and parenting behavior.

Model fit was evaluated with the ratio of Chi square/degrees of freedom (χ^2/DF), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and comparative fit index (CFI). An acceptable model fit is indicated by χ^2/DF around 2 or lower, a RMSEA and SRMR value of maximum 0.08 and a CFI value of minimum 0.95 (Hu and Bentler 1999; Kline 2010).

Results

Descriptive Statistics and Preliminary Results

Table 1 shows the means, standard deviations and within-person (i.e., daily) correlations of the day-level variables. To examine the relations between the background variables and the study variables, a MANCOVA was conducted with the child's gender, maternal educational level and marital status as fixed variables, with child's and mother's age and SRS total score as covariates, and with all study variables as dependent variables. For these analyses, the daily variables were aggregated across the seven days. There were no overall multivariate effects for child's gender (Wilk's $\lambda = 0.36$; $F(9,9) = 1.80$; $p = .20$), maternal educational level (Wilk's $\lambda = 0.26$; $F(18,18) = 0.96$; $p = .53$), marital status (Wilk's $\lambda = 0.03$; $F(36,35.46) = 1.57$; $p = .09$), child's age (Wilk's $\lambda = 0.68$; $F(9,9) = 0.47$; $p = .86$), and mother's age (Wilk's $\lambda = 0.37$; $F(9,9) = 1.73$; $p = .21$). There was, however, an overall multivariate effect for SRS total score (Wilk's $\lambda = 0.10$; $F(9,9) = 8.57$; $p < .01$). The SRS total score had an effect on the child's daily internalizing problems ($F(1,31) = 10.75$, $p < .01$) and prosocial behavior ($F(1,31) = 16.39$, $p < .001$). More specifically, the SRS total score related positively to internalizing problems ($b = 0.02$, $p < .01$) and negatively to prosocial behavior ($b = -0.02$, $p < .001$). In the main analyses, we controlled for the effect of the SRS total score on these two variables.

Daily Variability in Controlling and Autonomy-Supportive Parenting

To address our first aim (identifying the daily variation in parenting behaviors), we calculated the percentages of variances located at Level 1 (i.e., within-person variation) by creating random intercepts-only models for each of the study variables. Intra-class correlations (ICC), reflecting the between-person variation, are displayed in Table 1. For autonomy-supportive and controlling parenting, 61% and 60% of the variance was situated at the within-person level, indicating that mothers vary considerably across days in their parenting behaviors. For all other variables, except for externalizing and internalizing child problems, the majority of the variance was also situated at the within-person level, varying between 50 and 62%. For externalizing and internalizing problems, approximately 48% and 34% of the variance was situated at the within-person level respectively. When interpreting these results, it should be taken into account that the variance located at the within-person level also includes error variances. However, the results do suggest that a significant part of the variance is located at the daily level, indicating considerable fluctuations in the variables across the seven days.

Examining the Daily Relations between Child Behavior, Maternal Psychological Functioning and Parenting Behavior

Our second aim was to examine the extent to which daily child behavior (i.e., externalizing problems, internalizing problems and prosocial behavior) and maternal psychological needs experiences (i.e., need satisfaction and need frustration) related to daily parenting behavior. The within-person correlations revealed a differentiated pattern of associations with negative child behaviors and maternal experiences being primarily related to controlling parenting and with positive child behavior and maternal experiences being primarily related to autonomy-supportive parenting. Specifically, externalizing and internalizing problems correlated uniquely with controlling (but not autonomy-supportive)

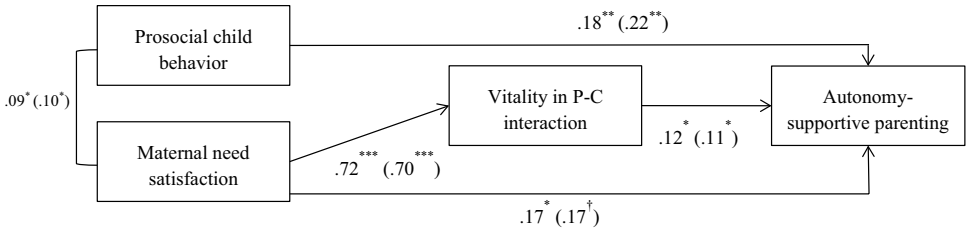

Fig. 1 Daily variation in prosocial child behavior and maternal need-satisfaction predicting daily variation in autonomy-supportive parenting via day-to-day variation in vitality in P–C interaction. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Coefficients shown are unstandardized coefficients. Only significant coefficients are presented. Coefficients between brackets represent the coefficients of the model controlling for the reported vitality and autonomy-supportive parenting of the previous day. *P–C* parent–child

parenting and prosocial child behavior related uniquely to autonomy support (but not controlling parenting). Similarly, need satisfaction correlated most strongly with autonomy-supportive parenting, whereas need frustration was related most strongly to controlling parenting. These findings are consistent with recent theory and research showing that dysfunctional processes involved in parenting are distinct from more constructive processes and with recommendations to study these so-called 'dark' and 'bright' developmental pathways separately (Vansteenkiste and Ryan 2013).

Given these empirical and theoretical arguments and in order to ensure sufficient statistical power to estimate models with a limited sample size, we conducted two separate two-level models (rather than one overall and encompassing model). One model included prosocial child behavior and need satisfaction as predictors of autonomy-supportive parenting and a second model included externalizing and internalizing child problems and need frustration as predictors of controlling parenting. The predictors included in the models were allowed to correlate. Moreover, we controlled for the effect of autism severity by including the effect of the SRS on internalizing child problems and prosocial child behavior.

Results of the first direct effects model (χ^2/DF = 2.08, CFI = 0.97, RMSEA = 0.06, SRMR for the within-person model = 0.00) indicated that the daily variation in both prosocial child behavior and mothers' need satisfaction related positively to the daily variation in autonomy-supportive parenting (respectively, $b = 0.19$, $p < .01$ and $b = 0.23$, $p < .01$). The second direct effects model (χ^2/DF = 2.61, CFI = 0.97, RMSEA = 0.08, SRMR for the within-person model = 0.00) indicated that daily variation in externalizing child behavior and mothers' need frustration related positively to daily variation in controlling parenting (respectively, $b = 0.31$, $p < .001$ and $b = 0.18$, $p < .001$). Daily variation in internalizing problems, however, did not relate to daily variation in controlling parenting ($b = -0.02$, $p = .74$) and was therefore excluded from further analyses.

The Intervening Role of Maternal Vitality and Stress

The third aim of this study was to examine whether daily variation in child behavior (i.e., externalizing and prosocial child behavior) and maternal psychological needs (i.e., need satisfaction and need frustration) related to daily variation in autonomy support and controlling parenting, through daily variation in relationship-specific vitality and stress. Based on the within-person correlations indicating a differentiated pattern of associations (see Table 1), we introduced daily vitality as an intervening variable in the model predicting daily autonomy-support, whereas daily stress was included as an intervening variable in the model predicting daily controlling parenting. In addition, the significant direct paths from the direct effects models were included.

Results of the model predicting daily variation in autonomy support (χ^2/DF = 2.58, CFI = 0.94, RMSEA = 0.08) SRMR for the within-person model = 0.03, indicated that daily variation in mothers' need satisfaction related positively to day-to-day variation in maternal vitality ($b = 0.69$, $p < .001$), which in turn was positively related to daily variation in autonomy-supportive parenting ($b = 0.12$, $p < .05$). This indirect effect of mothers' need satisfaction on autonomy support, via daily vitality, was found significant ($b = 0.08$, $p < .05$). Daily variation in mothers' need satisfaction also continued to be directly associated with daily variation in autonomy support ($b = 0.17$, $p < .05$). Daily variation in prosocial child behavior, however, did not relate to day-to-day variation in vitality ($b = 0.12$, $p = .08$), and only related directly with daily variation in autonomy-supportive parenting ($b = 0.18$, $p < .01$). The final model, including only significant paths (χ^2/DF = 2.62, CFI = 0.93, RMSEA = 0.08, SRMR for the within-person model = 0.02) is presented in Fig. 1.

Results of the model predicting day-to-day variation in controlling parenting (χ^2/DF = 0.27, CFI = 1.00, RMSEA = 0.00, SRMR for the within-person model = 0.01) indicated that both daily variation in mothers' need frustration and in externalizing child behavior related positively to day-to-day variation in maternal stress (respectively,

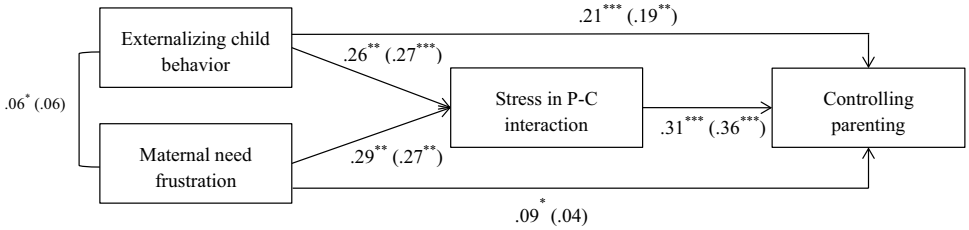

Fig. 2 Daily variation in externalizing child behavior and maternal need-frustration predicting daily variation in controlling parenting via day-to-day variation in stress in P–C interaction. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Coefficients shown are unstandardized coefficients. Only significant coefficients are presented. Coefficients between brackets represent the coefficients of the model controlling for the reported stress and controlling parenting of the previous day. *P–C* parent–child

$b = 0.29$, $p < .01$ and $b = 0.26$, $p < .01$), which in turn was positively related to day-to-day variation in controlling parenting ($b = 0.31$, $p < .001$). Both indirect effects of mothers' need frustration and externalizing child behavior on controlling parenting, via daily variation in stress, were significant (respectively, $b = 0.09$, $p < .01$ and $b = 0.08$, $p < .05$). In addition, daily variation in both mothers' need frustration and externalizing child behavior continued to be directly associated with day-to-day variation in controlling parenting (respectively, $b = 0.09$, $p < .05$ and $b = 0.21$, $p < .001$). This model is presented in Fig. 2.

Supplementary Analyses

We conducted additional, more conservative, tests of the final models by also controlling for the reports of vitality, stress, autonomy-supportive and controlling parenting the previous day. This allowed us to examine whether child behavior and mothers' psychological needs on a given day (i.e., day t) relate to changes in the mediators (i.e., daily vitality and stress) and to changes in the parenting behaviors not only relate to mothers' mean-level scores on these variables across the week, but also relative to their scores reported specifically during the previous day (i.e., changes from day t − 1 to day t). As such, these analyses address even more directly the possibility that daily child behavior and maternal needs experiences relate to stress, vitality, and parenting behaviors on a day-to-day basis. Because it is not possible to control for the previous day of the first day, these analyses was based on a truncated dataset (i.e., only 6 days). The results of the additional model predicting autonomy support (χ^2/DF = 1.78, CFI = 0.95, RMSEA = 0.06, SRMR for the within-person model = 0.12) are presented in Fig. 1 with the coefficients indicated between brackets. Most significant direct paths remained significant when controlling for previous day levels of vitality and autonomy-supportive parenting, but the direct association between daily maternal need satisfaction and autonomy support was no longer significant ($b = 0.17$, $p = .06$). In addition, the indirect associations between daily variation in need satisfaction and day-to-day variation in autonomy-supportive parenting, via daily variation in vitality, was no longer significant when vitality and autonomy support of the day before were controlled for ($b = 0.08$, $p = .08$). However, after removing the non-significant direct path between maternal need satisfaction and autonomy-support, the indirect pathway did remain significant ($b = 0.12$, $p < .01$). The results of the conservative model predicting controlling parenting (χ^2/DF = 0.95, CFI = 1.00, RMSEA = 0.00, SRMR for the within-person model = 0.07) are presented in Fig. 2 with the coefficients indicated between brackets. Most significant direct paths remained significant when controlling for previous day levels of stress and controlling parenting. Only the direct association between daily maternal need frustration and daily controlling parenting was no longer significant ($b = 0.04$, $p = .50$). The two indirect effects of maternal need frustration and daily externalizing child behavior on controlling parenting, via stress in the parent–child interaction, also remained significant when stress and controlling parenting of the day before were taken into account ($b = 0.10$, $p < .05$, $b = 0.10$, $p < .05$, respectively).

Discussion

Research in general populations has convincingly demonstrated that parenting behavior does not only vary substantially between parents, but also across days (e.g., Mabbe et al. 2018a). So, on some days parents might find it easy to act in an autonomy-supportive way, thereby empathizing with the child's perspective and building in choice, whereas on other days, parents might focus on their agenda first and use controlling strategies, such as guilt-induction or threats of sanction, to enforce compliance. Studies in the general population have identified both child behavior (e.g., problem behavior) and parents' own psychological experiences as important predictors of such daily variation in parenting (Aunola et al. 2017; Mabbe et al. 2018a). Unfortunately, these day-to-day dynamics in parenting have remained largely unexamined in parents raising a child with ASD.

This study aimed to advance insight in the daily dynamics of raising a child with ASD by examining (1) the daily variability in mothers' controlling and autonomy-supportive parenting, (2) the daily relations between child behavior, maternal needs-based experiences, and parenting behavior, and (3) the intervening role of vitality and stress within these daily relations.

Antecedents and Underlying Mechanisms of Daily Parenting Behavior

In line with our hypothesis and with studies conducted in general populations (Aunola et al. 2017; Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017, 2018), findings revealed that the majority of the variance in autonomy-supportive and controlling parenting was situated at the level of daily variation within mothers' functioning, rather than at the level of interindividual differences between mothers. This finding indicates that, above and beyond their general, more dispositional (i.e., trait-like) levels of autonomy-supportive and controlling parenting behavior, mothers of children with ASD differ considerably from day to day in the extent to which they support their child's autonomy or rely on more controlling strategies. Such a finding resonates very well with daily reality and seems logical given the multiple challenges encountered by mothers of a child with ASD on a daily basis (Dieleman et al. in press; Pottie et al. 2009). Clearly, not all days are equal in terms of mothers' quality of parenting.

Further, the results demonstrated that the daily associations between child behavior, maternal psychological needs and parenting behavior can be differentiated into a "bright" and a "dark" pathway (see Haerens et al. 2015; Vansteenkiste and Ryan 2013). Specifically, the daily variability in prosocial child behavior and maternal need satisfaction were uniquely related to the variability in autonomy support, whereas daily variability in externalizing child behavior and maternal need frustration were uniquely related to daily variability in controlling parenting behavior. Further testifying to these two distinct pathways, the studied intervening variables of vitality and stress also occupied a unique role herein. The identification of these two distinct pathways is generally in line with the recent observation within SDT-based research that the presence of controlling parenting cannot be equated with the absence of autonomy-supportive parenting (Soenens et al. 2017; Vansteenkiste and Ryan 2013). Indeed, controlling parenting represents a stronger and more direct threat to children's basic psychological needs than a mere absence of autonomy-supportive parenting. Accordingly, the dynamics involved in these two interrelated, yet distinct, parenting constructs are also somewhat distinct. While autonomy-supportive parenting appears to be undergirded mainly by positive parental experiences and adaptive child behaviors, controlling parenting appears to stem from negative parental experiences and dysfunctional child behaviors. Below we discuss in greater detail findings regarding these two pathways towards autonomy-supportive and controlling parenting.

The "Bright" Pathway Leading from Maternal Need Satisfaction and Prosocial Child Behavior to Autonomy-Supportive Parenting

This study identified both mothers' psychological need satisfaction and children's prosocial behaviors as antecedents of mothers' daily engagement in autonomy-supportive parenting. In line with research in typical populations (Mabbe et al. 2018a; Van der Kaap-Deeder et al. 2017, 2018), daily maternal satisfaction of the needs for autonomy, competence, and relatedness was related to more daily autonomy-supportive parenting indicating that the daily psychological experiences of mothers of children with ASD predicts their potential to be autonomy supportive. On days when mothers of children with ASD feel like they act in a voluntary way, feel closely connected to others and feel effective in reaching their goals, they are better able to promote volitional functioning and to focus on their child's perspective. The intervening role of vitality within this daily association suggests that the satisfaction of the need for autonomy, relatedness and competence is energizing and vitalizing, which provides mothers with the required resources to focus on their child's perspective and to attune to the child's pace of development. Future research could further identify the processes involved in this association between maternal vitality and autonomy-support, thereby considering for instance the role of psychological availability (Van der Kaap-Deeder et al. 2018) and mindful parenting (Bögels et al. 2010), parental resources that are assumed to play an important role in adaptive parenting.

In addition to the role of psychological need satisfaction, this study is the first to demonstrate an association between daily prosocial behavior of children with ASD and mothers' autonomy-supportive parenting behavior. As expected on the basis of longitudinal studies in the general population (Pastorelli et al. 2016), mothers were more inclined to rely on autonomy-supportive strategies on days that children were displaying higher levels of prosocial behavior. The finding that vitality did not mediate this daily association, suggests that there is something immediately gratifying about these prosocial behaviors that can explain mothers' autonomy-supportive reaction. Presumably, the child's prosocial behavior on a given day signals an openness and empathic stance, which may serve (albeit not necessarily consciously) as a model for the mother to adopt a similar stance towards their own child. That is, much as their child is attentive to others, parents are receptive to their child's perspective, thereby allow greater input and fostering greater

initiative than on other days. The lack of a daily association between prosocial child behavior and mothers' experienced vitality during interaction with the child was inconsistent with past work in ASD populations, which found prosocial child behavior to relate positively to parents' psychological well-being (Huang et al. 2014; Totsika et al. 2015). Possibly, the child's prosocial behavior did not relate to the mother's vitality because prosocial behavior was measured in a general way and not specifically in relation to the mother. Maybe mothers experience more vitality when their child is being prosocial towards them, rather than to other people in general. As this is the first study to examine this association at the level of daily variation, more research is needed to replicate this finding and to explore more explanations for this direct association.

Additional analyses (controlling for mothers' use of autonomy support the previous day) showed that mothers' experiences of need satisfaction and child's prosocial behavior do not only relate to increased feelings of vitality and to autonomy-supportive parenting relative to mothers' vitality and autonomy-support during the week as a whole, but also relative to mothers' experienced vitality and autonomy-supportive parenting specifically the day before. This indicates that positive effects of need-satisfying experiences and prosocial child behavior are transferred on a day-to-day basis and have short-term effects on mothers' well-being and parenting behavior.

The "Dark" Pathway Leading from Maternal Need Frustration and Behavioral Child Problems to Controlling Parenting

As regards the developmental pathway leading towards controlling parenting, this study identified both maternal experiences of psychological need frustration and children's display of externalizing problems as antecedents. As observed in previous studies in the general population (Mabbe et al. 2018a), when mothers experienced active frustration of their psychological needs on a given day, they were more likely to make use of controlling practices, including the use of over-reactive discipline or psychologically controlling strategies. We also found that mothers of children with ASD are prone to use controlling strategies on days when their child exhibits aggressive or rule-breaking behavior. Moreover, analyses controlling for previous-day levels of parenting showed that the negative effect of externalizing child behavior also manifested specifically on a day-to-day basis: when children exhibited externalizing child behavior, mothers' controlling parenting behaviors was elevated compared to the previous day. This latter finding extends longitudinal studies in ASD populations showing that externalizing child behavior predicts inter-individual differences and even rank-order changes in controlling parenting behavior (Dieleman et al. 2017; Taylor and Seltzer 2011). The current data additionally demonstrate that the display of such externalizing behaviors may yield a more immediate or short-term effect, as they related to an increased probability to display a controlling response on a given day compared to other days in the week or even when compared to the previous day more specifically.

In line with our hypothesis, these daily associations were partially mediated by stress in the mother–child interaction. On days that mothers of children with ASD feel their needs for autonomy, competence, and relatedness were frustrated and they noticed their child exhibiting externalizing behavior, mothers felt more stressed and agitated during the interaction with their child. These feelings of stress and agitation lower mothers' threshold of adopting pressuring techniques, probably in an attempt to quickly correct their child's misbehavior and to reduce their own stress. This finding meshes with previous research in the general population demonstrating that parental stress prompts parents to resort to a more pressuring style of interacting with children (Grolnick 2003; Wuyts et al. 2017).

Although using controlling strategies may be an intuitive reaction in order to change the child's behavior and to reduce one's own levels of stress, this might actually backfire and cause a further increase in behavioral problems (Bader and Barry 2014; Dieleman et al. 2017), a deterioration of the child's well-being (Aunola et al. 2013; Van der Kaap-Deeder et al. 2017), and thwarting of parents' own psychological needs (Legate et al. 2013). Accordingly, the associations observed in this study are probably part of a dynamic and reciprocal process in mother–child interactions. Also, this finding is important because parents of children with ASD are known to experience elevated levels of stress, with stress in turn affecting not only parents' personal well-being (Hayes and Watson 2013) but also the quality of their style of interaction with family members (Chan and Lam 2016; Osborne and Reed 2010). The current study identified basic psychological need frustration and externalizing child behavior as important sources of such parental stress and, in doing so, may offer important indications for future prevention and intervention efforts strengthening parents' resilience and quality of parenting.

Whereas the daily display of externalizing problem behavior in children with ASD related to a controlling response in mothers through experiences of stress, daily internalizing child behavior did not. This finding is consistent with other studies in ASD populations demonstrating limited evidence for an effect of internalizing child behavior on parenting (Dieleman et al. 2017; Ventola et al. 2017). Both a diary study in the general population (Aunola et al. 2013) and a longitudinal study in the context of ASD (Greenberg et al. 2006) even found that children's internalizing problem behavior related to decreases in parents'

controlling or critical behavior. Presumably, mothers may experience aggressive or rule-breaking acts from the child on a given day as more disturbing and threatening relative to when a child is being more withdrawn or anxious. Future research could build on this finding by examining how combinations of children's internalizing and externalizing problems differentially affect parenting.

Implications

The finding that parenting behavior of mothers of children with ASD can change considerably from day to day can be interpreted as a hopeful finding because it indicates that mothers, irrespective of their general level of parenting behavior, have the potential to be autonomy-supportive and to avoid controlling parenting behavior on a given day. Every day offers new opportunities for mothers to be autonomy-supportive and to avoid being controlling. Also, the reported daily variability highlights the changeability of parenting behavior among mothers of children with ASD and stresses the relevance of interventions aimed at improving parenting behavior in this population. Moreover, this finding warrants caution against the tendency to view parenting as a very stable construct and to use labels to describe only inter-individual differences between parents in terms of parenting style, which may potentially have a judgmental and even stigmatizing effect.

The current study also highlights that interventions aimed at changing parenting behaviors among mothers of children with ASD may be especially beneficial when taking into account both the child's behavior and mothers' need-related experiences. Interventions for parents of children with ASD often only target the child's well-being and development whereas parents' own psychological functioning receives little attention (Lunsky et al. 2017). Although interventions aimed at reducing maladaptive child behaviors might indirectly result in an enhancement of mothers' well-being (Horner et al. 2002), interventions that additionally include mothers' need-based experiences will be more effective in improving their well-being and, in turn, their parenting behaviors. Interventions can, for instance, inform mothers about the impact of maladaptive child behavior on their well-being (i.e., stress and vitality) as well as their parenting behaviors and raise awareness about the importance of self-care for one's basic psychological needs. Moreover, it might be interesting to identify and alter sources of need frustration that impact on mothers' parenting behaviors and to strengthen parents' coping skills to better deal with these need frustrating experiences in parent-focused interventions. Moreover, professionals can also foster vitality and autonomy-supportive parenting in mothers of children with ASD by supporting mothers to identify and engage more in need-satisfying activities (Weinstein et al. 2016).

The finding that stress mediated the daily association between externalizing child problems and controlling parenting offers opportunities to address parents' maladaptive response to externalizing child behaviors. Given that mindfulness reduces parental stress (Cachia et al. 2016) and moderates the stress-inducing effects of child behavioral problems (Jones et al. 2014), one potential way to address parents' controlling responses to externalizing behavior might be by including mindfulness in parent interventions (Bögels et al. 2010; Cachia et al. 2016). If mindfulness in parents of children with ASD gets enhanced, they might become more aware of their own emotions and be better able to self-regulate emotions which might buffer the distressing effect of stress (de Bruin et al. 2014). Mindfulness also allows for a more unbiased and undivided attention towards the child's perspective, which might directly increase parents' ability to act in an autonomy-supportive way (Bögels et al. 2010; Cachia et al. 2016; de Bruin et al. 2014).

Limitations and Future Directions

Although the current results advance our understanding of daily dynamics in parenting behavior among mothers of children with ASD, there are several limitations to the present study. First, the generalizability of the findings is limited by including only mothers as a single informant. Although research in general populations suggests that the role of child behavior and parental psychological needs in parenting behavior is largely similar in mothers and fathers (Aunola et al. 2017; Mabbe et al. 2018a), research has yet to demonstrate this generalization across parental gender in daily parenting behavior in the context of ASD. In addition, by relying on only one informant it is possible that shared method variance explains the reported daily associations (Williams and Brown 1994). For instance, a mother experiencing more need frustration might interpret both her child's behavior and her own parenting behavior more negatively (even when the actual behaviors are not so negative), such that associations between the study variables are inflated. Therefore, future research should include multiple informants (e.g., teacher, child, other parent) or observational measures to replicate current findings and to address problems associated with shared method variance.

The generalizability of the results is also limited due to the sample characteristics. First, the mothers participating in this study were rather highly educated and were more often part of an intact family compared to the national population (Statistics Belgium 2016, 2017). Second, the age range of the children was rather broad, including children from middle childhood to adolescence. Therefore, it is imperative for future research to replicate the current

findings within more specific age groups and to examine whether the reported associations are similar (or different) throughout different developmental stages of the child's development. It might be especially interesting to examine the impact of adolescence, because this developmental period is marked by changes in both the adolescent (e.g., changes in physical, social and cognitive domains) and his/her parent (e.g., changes in parents' roles, expectations, autonomy support) (Picci and Scherf 2015; Soenens et al. in press; van Esch et al. 2018). Possibly, associations between child adjustment, parental experiences, and parental behavior are more pronounced in (early) adolescence compared to middle childhood because there is more daily fluctuation in each of these variables in adolescence. In addition, the recruitment method might constrain the generalizability of the findings. As mothers were recruited through autism-service centers and websites concerning ASD, we are not able to examine whether the participating mothers experience more or less behavioral child problems or need frustration than mothers who do not receive guidance from these services or do not consult ASD-related websites. Therefore, further research is warranted to replicate the current findings in a more heterogeneous group of parents of children with ASD, including parents with more diverse family structures, educational levels and ethnicities, and relying on more diverse recruitment strategies.

Another limitation is that all variables were measured at the same moment in the day, which precludes drawing causal conclusions about the direction of effects. It is possible that child behavior and mothers' psychological needs do not only shape daily parenting behaviors, but that parenting behavior also affects child behavior and mothers' need-related experiences. Indeed, autonomy-supportive and controlling parenting have been shown to be important sources of (daily) child behavior (Bader and Barry 2014; Mabbe et al. 2018b). Moreover, some studies have shown that providing autonomy support can bring about need satisfaction not only in the receiver, but also in the person providing the autonomy support (Deci et al. 2006; Mabbe et al. 2018a). The use of controlling behavior, on the other hand, has been associated with more need frustration in the person who is being controlling (Legate et al. 2013; Mabbe et al. 2018a). So, child behavior, mothers' psychological needs and parenting behavior might be related in bidirectional ways. Although we tried to address this limitation by controlling for the reported vitality, stress, autonomy-supportive parenting and controlling parenting of the previous day, future research should include multiple measurements throughout the day (e.g., using event-related sampling). By separating the measurement of child behavior, psychological needs and parenting behavior across different moments within a day, it will be possible to better capture the bidirectional dynamics between these variables.

It would be interesting for future research to also include a broader range of parental characteristics, such as parents' personality or features of the broader autism phenotype (BAP). For instance, studies in the general population have indicated that parents' personality traits such as neuroticism are related to the quality of parenting (Prinzie et al. 2009). Also, research among parents of children with ASD has suggested that the amount of BAP characteristics in parents relates to their psychological well-being, such as the amount of stress (Ingersoll and Hambrick 2011). Moreover, it would be interesting to address the role of additional child characteristics, such as the level of autism symptoms exhibited by the child. Possibly, there is daily variation in the amount or type of exhibited autism symptoms, which might also shape daily parenting behaviors.

Conclusion

This study aimed to advance the understanding of the daily dynamics in raising a child with ASD. Results showed considerable day-to-day variation in mothers' autonomy-supportive and controlling parenting behaviors. Both daily child behavior (i.e., externalizing and prosocial behavior) and mothers' psychological needs were identified as important sources of daily parenting behavior of mothers of children with ASD. Moreover, vitality and stress as experienced in the mother–child interaction were found to represent important intervening processes within these daily associations. These findings suggest that parenting interventions may need to focus not only on improving parents' quality of interactions with the child but also may need to take into account both the child's behavior and mother's need-related psychological functioning.

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Author Contributions LD conceived of the study, participated in the design of the study, collected the data, performed the analyses, and drafted the manuscript. SD, BS, MV and PP conceived of the study, participated in its design, the coordination, and the interpretation of the data, and helped to draft the manuscript. NL participated in the design of the study, collected the data, participated in the interpretation of the data and helped to draft the manuscript.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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