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ORIGINAL PAPER

Toddler Temperament, Parent Stress, and Autonomy Support

Eftichia Andreadakis[1] · Julie C. Laurin[1] · Mireille Joussemet[1] · Geneviève A. Mageau[1]

Abstract
The present study examined how toddler temperament (negative affectivity, effortful control, and surgency) and parent stress relate to parents' use of autonomy support (AS) when making requests. Based on past studies pointing to parent stress and toddler difficult temperament as possible risk factors, we proposed a mediation model where toddler temperament was expected to be related indirectly to parents' use of autonomy-supportive practices via parent stress. Parents ($N = 181$) reported how often they used autonomy-supportive practices when asking their toddlers ($M_{age} = 27.7$ months) to engage in important, yet uninteresting activities. They also answered questions regarding their toddler's temperament and their own stress levels. A complete mediation hypothesis was supported for negative affectivity but not for the other temperament dimensions. Both toddler negative affectivity and effortful control were indirectly related to parents' AS, via parent stress. However, effortful control was also directly associated with parent AS over and above parent stress, while surgency was not related to parent stress or parent AS. The present findings underline the need for more research on how to mitigate the impact of difficult temperamental characteristics so as to preserve parents' support for their toddlers' need for autonomy.

Keywords Toddlers · Autonomy support · Negative affectivity · Effortful control · Parent stress

Highlights
- Parents' socialization role is key during toddlerhood but it can be challenging.
- Toddler temperament may affect parental stress, known to hinder parenting quality.
- Parents rated how much they use autonomy-supportive practices when making requests.
- Toddler negative affectivity was linked to less autonomy support, via parent stress.
- Toddler effortful control was linked to more autonomy support (directly/indirectly).

When parents recognize that their children's needs and feelings are different from their own, yet respect and support their children's unique ideas, interests and feelings, and explain why their requested activities are important and meaningful, their parenting would be described as autonomy-supportive (Grolnick et al. 1997; Joussemet et al. 2008a). Autonomy (or self-determination), a fundamental and universal psychological need, is defined as the experience of authentically endorsing and concurring with one's behaviours (Chirkov and Ryan 2001; Ryan et al. 2016). According to self-determination theory (SDT; Deci and Ryan 2000; Ryan and Deci 2017), all individuals benefit from having this need met no matter their age.

Autonomy and Toddlerhood

Although SDT posits that autonomy support is important at any age (Ryan and Deci 2017), autonomy support during toddlerhood is of particular interest because it is during this period that toddlers' self-concept begins to emerge, as well as their exploration and self-regulation (Kochanska et al. 2001; LeCuyer-Maus and Houck 2002; Erikson 1963; Kopp 1982). These new capacities allow them to internalize an increasingly large number of requests and expectations (Gralinski and Kopp 1993; Smetana et al. 2000). It is also at this developmental stage that parents begin to engage actively in the process of socializing their children wherein they focus on teaching them the values, norms, and socially

✉ Mireille Joussemet
m.joussemet@umontreal.ca

[1] Department of Psychology, Université de Montréal, C.P. 6128, succursale Centre-Ville, Montréal, QC H3C 3J7, Canada

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appropriate behaviours and skills that will enable them to function effectively within their society (Maccoby 1984; Zigler and Child 1973). This can prove to be quite difficult during toddlerhood (i.e., between 16 to 36 months of age; Lally et al. 2003) as there are many demands placed upon toddlers that are not enjoyable (e.g., clean-up, going to bed) and self-regulation abilities are only emerging. As such, the task of socializing a toddler can prove to be more taxing for parents who wish to foster their toddler's compliance while also trying to be autonomy-supportive (Deci et al. 2013; Shaw et al. 2000). It is thus imperative to explore the factors that may impede parents from using autonomy-supportive practices with their toddlers in socialization contexts, i.e., when parents request that their toddlers engage in a task, ("Do" demand context; Kochanska and Aksan 1995) despite the latter's disinterest or resistance.

Autonomy Support

Key Elements

Two important elements of autonomy support (AS) are providing rationales and conveying empathy (Deci et al., 994; Koestner et al. 1984). Firstly, *giving reasons* for requests is important as rationales help children come to better understand the value underlying these requests. For toddlers, being a model and using short (versus long) rationales are favoured by autonomy-supportive parents (Andreadakis et al. 2018) and seem to convey coherence in addition to being developmentally appropriate. Secondly, *acknowledging children's perspective and feelings* helps toddlers feel that their subjective experience is understood and given consideration (Deci et al. 1994; Grolnick et al. 1997). The validity of using these practices in request contexts was recently supported in two studies conducted amongst parents of toddlers (Andreadakis et al. 2018; Laurin and Joussemet 2017). In addition to offering empathy and rationales, parents who value autonomy-granting to a greater extent also report *describing problematic situations in an informational and neutral way* (i.e., without attacking the child's character) and *modelling the requested behaviours* (Andreadakis et al. 2018).

Child Concomitants

According to SDT, optimal human development, internalization of rules, and well-being depend on the satisfaction of the fundamental psychological need for autonomy. Numerous studies have shown the benefits of AS for children and adolescents (see Joussemet et al. 2008a, for a review; Vasquez et al. 2016, for a meta-analysis). Parents' AS has been associated with school-aged children's observed engagement (Ng et al. 2004) and creativity (Grolnick et al. 2002), self-reports of self-esteem (e.g., Grolnick et al. 2000), autonomous motivation (Grolnick et al. 1991), competence (Beiswenger and Grolnick 2010), and intrinsic life goals (Froiland and Worrell 2017), as well as objective indicators of academic achievement (Joussemet et al. 2005). Regarding the benefits for toddlers, AS has been positively associated with observed exploratory behaviours, (Grolnick et al. 1984), executive functioning, (Bernier et al. 2010; Matte-Gagné and Bernier 2011), security of attachment (Whipple et al. 2011), and longitudinal increase in observed committed compliance (Laurin and Joussemet 2017).

In contrast, environments that hinder the need for autonomy have a significant negative impact on children's adjustment and rule internalization (Barber and Harmon 2002; Grolnick 2003). Research has shown that when school-aged children's need for autonomy is thwarted, they are at a higher-risk of developing poorer self-regulation skills (e.g., Gershoff 2002), externalizing problems (Joussemet et al. 2008b), internalizing problems (e.g., Barber and Harmon 2002; Morris et al. 2002), as well as experiencing peer rejection (Deković and Janssens 1992). Controlling parenting toward preschoolers has also been linked to internalizing and externalizing child problems (Olsen et al. 2002), while controlling parenting toward toddlers was found to predict impoverished behavioural self-regulation at 3.5 years of age (Laurin and Joussemet 2017) as well as later anxiety, at age 8 (Laurin et al. 2015). It thus seems important to identify what might prevent parents from supporting their children's autonomy, especially during toddlerhood, a period in which children acquire abilities that support their emerging individuality (Houck and LeCuyer-Maus 2002).

Parent Stress

It is now well-recognized that parenting does not take place in a vacuum and is affected by stressors. Stress typically results from a perceived unbalance between perceptions of demands in relation to the available resources for meeting these demands (Deater-Deckard 2004; Lazarus et al. 1977). Stressful situations are thus appraised as demanding and taxing for resources; such situations have been defined as "unpredictable, uncontrollable, and overloading" (Cohen et al. 1983). Studies have shown that stress can make parents more irritable, impulsive, and psychologically unavailable; characteristics that make parents less likely to be autonomy-supportive (Conger et al. 1984; McLoyd et al. 1994). In other words, AS requires time and psychological availability that parents lack when they are stressed (Grolnick 2003). In high-stress situations, parents also tend to focus

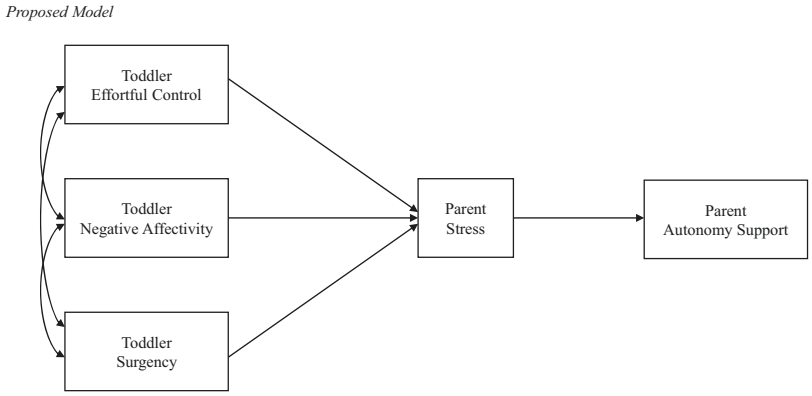

Fig. 1 Proposed model

on the immediate task and since AS involves offering rationales and empathy, it may seem incompatible with such stressful situations and be particularly difficult to sustain.

High-stress conditions have indeed been found to make parents less responsive and helpful, as well as more critical, restrictive, and punitive towards children (e.g., Leinonen et al. 2003; Zussman 1980). Stressors have also been shown to be negatively associated with parent sensitivity (e.g., Crnic et al. 1983) and negative/stressful life events (e.g., death, illness) reported by mothers are associated with less autonomy-supportive parenting towards their adolescents (Grolnick et al. 1996). Importantly, experimentally induced stress prompts more controlling parenting behaviours during mother-child interactions in a guided learning task (Robichaud et al. 2020). Finally, parents of toddlers were found to adopt more controlling parenting practices after a more stressful day at work (Repetti 1994; Repetti and Wood 1997). It thus appears that the stressors under which parenting takes place make it difficult to put AS into practice.

In addition to such contextual stressors, or (a) *pressure from above*, other types of pressure may compromise parenting quality (Grolnick 2003). Indeed, parents may also experience (b) *pressure from within* themselves (e.g., pressure to "perform", Grolnick et al. 2002; Ryan 1982) and/or (c) *pressure from below*, which refers to pressure emanating from their child. Undeniably, children's temperament can also represent a source of stress for parents and hinder the use of AS.

Child Temperament

In early childhood, temperament is commonly used to describe children's different emotional, attentional, and motor tendencies, as well as their self-regulation capabilities (Rothbart and Bates 1998). These genetically based individual differences in reactivity and self-regulation appear early in life, are relatively stable and influence parent-child dyads (Rothbart and Bates 2006). Some studies suggest that a difficult child temperament is associated with mothers' higher levels of stress (Mäntymaa et al. 2006; Mulsow et al. 2002) and research has clearly demonstrated a link between children's difficult temperament and poorer parenting quality (for a review, see Paulussen-Hoogeboom et al. 2007; Scaramella and Leve 2004).

Three dimensions of temperament are central to the study of child development. *Surgency* refers to the level of extraversion and sensation seeking a child exhibits (Putnam et al. 2001). *Effortful control* characterizes the ability to inhibit a dominant response and/or to activate a subdominant response in order to regulate behaviours and emotions (Putnam and Rothbart 2006; Rothbart and Rueda 2005). Finally, *negative affectivity*, the core dimension of difficult temperament (Lee and Bates 1985; Rothbart and Bates 2006), is said to be precisely what makes "difficult" children harder to parent (Chess and Thomas 1984). It is characterized by irritability, negative mood, intense negative reactions, an inability to be soothed (including sadness; Rothbart et al. 1994), fear of novelty, and anger proneness (Sanson et al. 2004). The literature on child temperament and parenting has paid relatively more attention to negative affectivity, whereas some studies have examined the link between effortful control and the parent-child relationship. In contrast, associations with levels of toddler surgency has yet to be examined in this socialization context.

A high level of child negative affectivity may contribute to parent stress by augmenting the demands placed on parents (Maccoby 2000). Children who exhibit high negative affectivity are at a heightened risk for parenting interactions that are hostile/harsh parenting (Katainen et al. 1999; Kochanska et al. 2004), strict, critical, authoritarian (Lerner 1993; Zhou et al. 2004), autonomy-thwarting (Armour et al. 2018; van der Bruggen et al. 2010), and considered maltreatment (Lowell and Renk 2017). Similarly, parents of children who have *low* levels of self-regulation experience greater stress (Coplan et al. 2003).

Toddlers who exhibit low levels of effortful control also tend to evoke more punitive and non-supportive parenting behaviours (Eisenberg et al. 1999; Lytton 1990).

It thus appears that child temperament, parent stress, and parenting behaviours are interrelated. Some studies have shown that parents' well-being mediates the association between children's temperament and parents' behaviours (Laukkanen et al. 2014; Teti and Gelfand 1991) but there is only some indirect support for the mediating role of parent stress in the association between child temperament and parent AS. A wealth of studies has documented the link between (a) child difficult temperament and greater parent stress, (b) child difficult temperament and poorer parenting, as well as (c) parent stress and poorer parenting. Experimental work also showed that parent stress prompts more controlling parenting (Robichaud et al. 2020). However, the indirect relation between toddler temperament and parent AS via parent subjective experience of stress has yet to be studied explicitly.

Present Study

The main goal of the present study was thus to test a mediation model (see Fig. 1), where toddler temperament was hypothesized to be associated with parent stress, which in turn would be linked to less parent AS. We first expected toddler negative affectivity, a form of "pressure from below," to be positively associated with parent stress, whereas effortful control would be negatively associated with parent experience of stress. Greater self-control in children should indeed make parenting less challenging. In contrast, no hypothesis could be made regarding levels of surgency because the relation between parenting and this extraverted, sensation seeking tendency has, to our knowledge, never been examined and the relation could be either positive or negative. Indeed, while a more "upbeat" temperamental tendency with higher positive affect may facilitate parents' daily lives, higher sensation seeking could also be more taxing, requiring parents' alertness and energy. In turn, we expected parent stress to be linked to less autonomy-supportive practices. Finally, we expected a negative indirect association between toddler negative affectivity and parent AS via parent stress, and a positive indirect association between toddler effortful control and parent AS via parent stress.

With non-experimental data, alternative models must also be considered. Given that parent-toddler relationships are transactional in nature (Sameroff 2009) and that temperament can be affected by the environment (Putnam et al. 2002), parents' greater use of autonomy-supportive strategies could also have a reciprocal effect on toddlers' ability to self-regulate, a key factor in their manifestations of negative affectivity, effortful control and surgency. High parent AS could thus be linked to increased self-regulation as evidenced by high effortful control, high surgency and low negative affectivity, which in turn would be negatively linked to parent stress. An alternative model reflecting these predictions was thus tested.

Method

Participants

The study took place in the Montreal area, in the province of Québec (Canada). The majority of the sample was recruited from child care centres but some participating parents were recruited through parent associations and parenting blogging websites. Once ethical approval was obtained, child care principals interested in the study facilitated recruitment by sending out letters, posting a recruitment flyer and/or, by allowing the researchers to recruit interested parents on site. The principal investigator always communicated with parents (i.e., by face-to-face or telephone contact) prior to giving them access to the online questionnaire, in order to confirm their eligibility. The inclusion criteria for parents were to be able to read and write in French and to have a toddler aged between 18 and 36 months. Parents were informed that only one parent per family could fill out the questionnaire and they were then asked to decide among themselves who would participate.

A total of 181 parents participated in the study (144 mothers, 36 fathers, one unknown; only one participating parent per family). The majority of the sample spoke French at home (89.5 %) and the average age of their toddler (91 boys; 90 girls) was 27.07 months (SD = 5.48). The average age of parents was 33.78 years-old (SD = 4.82), ranging from 21 to 45 years old. Most (67.4%) had a university degree and were either married or in a common-law relationship (92.3%). Finally, the majority of participants (73.5%) identified themselves as Canadians, while 22.7% categorized themselves as "Other" (e.g., African, Italian, Mexican, Arabic origins). No specific screening or recruitment procedures were used in order to attain equal proportions of boys and girls.

Procedure

After completing the consent form, parents could proceed to fill out their questionnaire. A list of parenting practices was first presented, in random order. Next, parents were asked to answer questions about their toddler's temperament, their own general stress, and to provide socio-demographic information. The entire questionnaire took approximately one hour to complete. Participants were able to access the

questionnaire at any time and complete it at different intervals. Once completed, participants were mailed a $20 CAD compensation.

Measures

Autonomy-Supportive Parenting Practices

Autonomy-supportive parenting practices were evaluated in a "request" context, wherein parents ask their toddlers to enact important, yet not always enjoyable tasks. This context was made explicit to parents by first providing examples (e.g., pick up toys, put on a hat, take a bath). Next, participants were asked to add examples of the daily requests they make to their toddler. Parents were then presented with a list of eight autonomy-supportive practices (see Andreadakis et al. 2018) for which they rated how often they use each practice on a 6-point Likert scale, ranging from 0 (*never)* to 5 *(all the time)*. The stem preceding the listed practices was "When you ask your toddler to do something s/he doesn't like doing (e.g., getting dressed, taking a bath, picking up toys), how often do you…" or "Once you realize that your toddler is not listening to your request, how often do you…" Examples of items include "If your toddler asks why s/he has to do it, explain why it's important" and "Acknowledge your toddler's feelings (e.g., anger, fear, etc.) with a sound such as *Hmm…* and/or by naming the feeling". These eight autonomy-supportive practices have shown good internal consistency ($\alpha =$ 0.74). This scale also demonstrated convergent and predictive validity as it correlated positively with parents' attitude toward AS and toddler rule internalization (Andreadakis et al. 2018). Items were averaged and the mean score was used in subsequent analyses.

Toddler Temperament

The French version of the very short form of the Early Childhood Behaviour Questionnaire (ECBQ) was used to measure the three dimensions of toddler temperament (Putnam and Rothbart 2006). Parents were presented with 36 items (12 items per dimension) asking them how often a particular behaviour occurred within the last two weeks. Parents rated each item on a 7-point Likert scale ranging from 1 *(never)* to 7 (*always*; Putnam et al. 2006). Negative affectivity (internal consistency: $\alpha = 0.69$) refers to the display of negative emotions such as sadness and irritability (e.g., "When s/he asked for something and you said *no*, how often did your child have a temper tantrum?"; Putnam et al. 2001). Effortful control (internal consistency: $\alpha = 0.75$) refers to a child's capacity to self-regulate (e.g., "When told *no*, how often did your child stop the forbidden activity"; Frick and Morris 2004; Rothbart 2005). Surgency/extraversion (internal consistency: $\alpha = 0.64$) refers to a child's level of activity, positive anticipation, sensation-seeking and the extent to which his/her emotional reactivity tends towards high levels of positive affect (e.g., "When encountering a new activity, how often did your child get involved immediately?"; Rothbart 2004). The mean score of each subscale was computed and used in subsequent analyses.

Parent Stress

The French version (Lesage et al. 2012) of the Perceived Stress Scale (PSS-10; Cohen et al. 1983) was used to measure to what extent parents appraised situations in their lives as stressful throughout the preceding month. They were presented with 10 items (internal consistency: $\alpha =$ 0.84) and were asked to rate how often they felt or thought about a certain situation, on a 5-point Likert scale ranging from 0 *(never)* to 4 *(very often*; e.g., "In the last month, how often have you… been upset because of something that happened unexpectedly?"). The sum of the item scores was used in subsequent analyses. Scores could thus range from 0 to 40, with higher scores indicating greater stress (i.e., the more likely parents perceive that environmental demands exceed their ability to cope). The French version of this scale also had good internal consistency ($\alpha = 0.88$ in the present study).

Analyses Plan

Preliminary analyses explored correlates of missing data. It also explored the associations between our key variables and determined the presence of potential confounds in our data. Based on past studies, we identified toddler and parent age and sex as potential covariates.

Next, path analyses were conducted with AMOS 24 to test the direct and indirect relations implied by our proposed mediation model (see Fig. 1). Being limited by our sample, a path analysis was the best alternative to structural equation modelling. A bias-corrected (BC) bootstrap resampling procedure using 5000 samples was used to estimate 95% confidence intervals (CI) for the direct and indirect effects (Efron and Tibshirani 1993; MacKinnon et al. 2004). Missing data was estimated using the expectation-maximization algorithm and multiple imputations available in SPSS. These imputed datasets ($N = 100$ datasets) were then aggregated into a single imputed dataset for the main analyses. The proposed mediation model was an unsaturated model, where parent stress was modelled to fully mediate the associations between toddler temperament and parent AS (model 1). The model fit for this unsaturated model was assessed using multiple fit indices, including the Comparative Fit Index (CFI), the Tucker–Lewis Index

(TLI), the Root Mean Square Error of Approximation (RMSEA), and the model's chi-square statistic (χ^2). A non-significant chi-square statistic indicates a good model fit, while CFI and TLI values exceeding 0.95 indicate an excellent fit to the data (Hu and Bentler, 1999). RMSEA values should also be below 0.05, with the upper bound of their confidence intervals ideally not exceeding 0.08 (Browne and Cudeck 1992). If it was found to be above the recommended threshold of 0.08, the close-fit test was used to assess whether the RMSEA significantly differed from a 0.05 value. In the case of unsatisfactory fit, indicating that a full mediation hypothesis did not fit the data, we estimated the direct links from toddler temperament to parent AS to identify whether partial mediation was more likely for some temperament dimensions (model 2). We also tested an alternative full mediation model, where parent stress would not mediate the associations between toddler temperament and parent AS but rather, parent AS would be directly linked to toddler temperament, which in turn would be associated to parent stress (model 3). For every model in this article, all exogenous variables were free to covary and all covariates were modelled to predict all endogenous variables.

Results

Preliminary Analyses

We first tested whether participants with missing data exhibited a different pattern of results on our key variables and covariates. Correlational analyses comparing participants with missing and nonmissing data were all non-significant (*p*s range between 0.153 and 0.984).

Table 1 presents the descriptive statistics for the study variables and their zero-order correlations. Regarding the three dimensions of toddler temperament, negative affectivity was found to correlate negatively with effortful control but was not linked to surgency. In contrast, effortful control and surgency were positively related. The associations between the main variables were coherent with our proposed mediation model. The frequency of use of autonomy-supportive practices was negatively correlated with toddler negative affectivity, whereas they were positively correlated with effortful control. AS was also positively correlated with toddler surgency. Consistent with our prediction, parent stress was found to be negatively associated with autonomy-supportive practices and toddler effortful control. The expected positive link between parent stress and negative affectivity was also found. There was no significant linkage between parent stress and toddler surgency.

Table 1 Means, standard deviations, and zero-order correlations between study variables

	1	2	3	4	5	6	7	8	*N*	*M*	SD
Surgency (T)									177	4.649	0.605
Negative affectivity (T)	−0.126								177	2.962	0.644
Effortful control (T)	0.184*	−0.286***							177	4.427	0.673
Stress (P)	−0.095	0.348***	−0.374***						176	26.318	6.685
Autonomy-supportive practices (P)	0.218**	−0.205**	0.325***	−0.252***					178	3.834	0.760
Toddler age (months)	0.043	0.091	0.192*	0.090	0.181*				180	27.072	5.475
Parent age (years)	−0.174*	0.088	−0.019	−0.008	−0.136	0.096			174	33.776	4.822
Toddler sex	−0.200**	0.175*	0.098	−0.036	−0.120	−0.060	−0.004		181	Boys: 91 (50.3%) Girls: 90 (49.7%)	
Parent gender	−0.069	0.184*	−0.045	−0.103	−0.236**	0.046	0.279***	0.006	180	Mothers: 144 (79.6%) Fathers: 36 (19.9%)	

T toddler, *P* parent

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

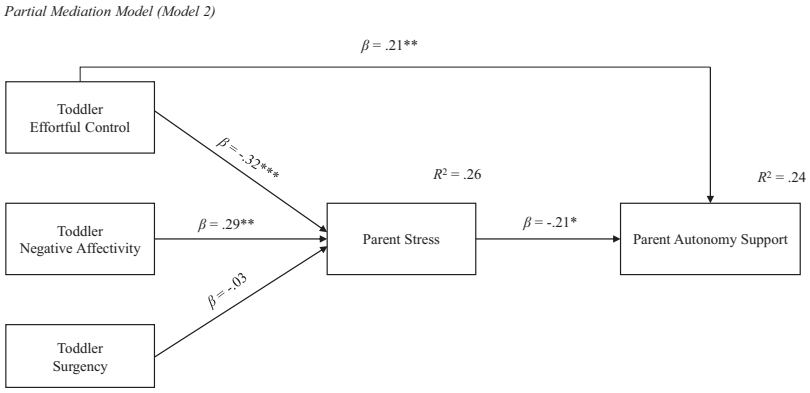

Fig. 2 Partial mediation model (Model 2). Note. Parent and toddler age and sex were included as covariates in this model. All exogenous variables were set to covary. β represents the standardizedcoefficient and R2 the percentage of explained variance. To simplify the figure, covariate paths and covariate variables are not presented. *$p <$ 0.05; **$p < 0.01$; ***$p < 0.001$ (bias corrected).

We then examined the relations between the study variables and potential covariates (i.e., age and sex of both parents and toddlers). Independent samples t-tests first showed that girls had greater levels of negative affectivity ($M = 3.074$, SD = 0.624) than boys ($M = 2.849$, SD = 0.648) in this sample, $t(175) = -2.354$, $p = 0.020$, $\eta^2 = 0.031$, while boys were reported to display higher levels of surgency ($M = 4.770$, SD = 0.594) than girls ($M = 4.529$, SD = 0.594), $t(175) = 2.695$, $p = 0.008$, $\eta^2 = 0.040$. Following Cohen's recommendations (η^2 = effect size, 0.01 = small, 0.06 = medium, 0.14 = large; Cohen 1988), both of these differences are considered small. Toddler sex was not related to effortful control, parent autonomy-supportive behaviours, nor parent stress (all $ps > 0.05$). Independent sample t-tests also indicated that compared to mothers ($M = 2.902$, SD = 0.653), fathers reported that their child displayed higher levels of negative affectivity ($M = 3.201$, SD = 0.559), $t(174) = -2.465$, $p = 0.015$, $\eta^2 = 0.034$, while mothers reported higher levels of autonomy-supportive practices ($M = 3.923$, SD = 0.757) than fathers ($M = 3.472$, SD = 0.677), $t(175) = 3.218$, $p = 0.002$, $\eta^2 = 0.056$. These differences are both considered small. There was no difference in reported effortful control, surgency or stress between mothers and fathers (all $ps > 0.05$). Finally, toddler age was linked to effortful control ($r = 0.192$, $p < 0.05$) and autonomy support ($r = 0.181$, $p < 0.05$), while parent age was related to surgency ($r = -0.174$, $p < 0.05$) and marginally linked to autonomy support ($r = -0.137$, $p = 0.08$). Based on these results, age and sex of both parents and toddlers were included as covariates in our main analyses.

Principal Analyses

Proposed Mediation Model (Model 1)

The proposed model was a full mediation model, where toddler temperament characteristics were associated with parent stress, which in turn was linked to parent autonomy-supportive practices. All four covariates (i.e., age and sex of both parents and toddlers) and toddler's temperament were treated as exogenous variables, while parent stress and parent autonomy-supportive practices were treated as endogenous variables. This model showed poor fit indices, $\chi^2(3) = 10.416$, $p = 0.015$, TLI = 0.420, CFI = 0.952, RMSEA = 0.117 [0.045, 0.198], thus refuting a full mediation hypothesis.

Partial Mediation Model (Model 2)

In an exploratory fashion, we added the direct links between each toddler temperament characteristic and parent AS to our initial model, resulting in a saturated partial mediation model. Results from this saturated model revealed that toddler effortful control was directly linked to parent AS over and above parent stress, while no such direct relation was observed for negative affectivity or surgency. These findings suggest that parent stress does not fully mediate the relation between toddler effortful control and parent AS. We thus created a second model by adding a direct link between toddler effortful control and parent AS to the initial model, resulting in model 2 (Fig. 2). This second model, which tested a combination of full and partial mediation depending on toddler temperament characteristics, yielded satisfactory fit to the data, $\chi^2(2) = 2.141$, $p = 0.343$, TLI = 0.983, CFI = 0.999, RMSEA = 0.020 [0.000, 0.151] PCLOSE = 0.491. Although the upper bound of the RMSEA's 95% CI was above the recommended threshold of 0.08, the close-fit test indicated that the RMSEA did not significantly differ from a 0.05 value ($p = 0.491$). This new model also had a better fit to the data compared to the initially proposed mediation model (without any direct path), $\Delta\chi^2(1) = 8.275$, $p < 0.05$, as well as a better fit compared to the saturated partial mediation model (with all direct paths), $\Delta\chi^2(2) = 2.141$, $p < 0.05$.

As can be seen in Fig. 2, toddler negative affectivity was positively linked to parent stress, $\beta = 0.285$, BC$p = 0.001$, BC 95CI [0.149, 0.397], whereas effortful control was negatively associated to stress, $\beta = -0.317$, BC$p < 0.001$,

BC 95CI [−0.473, −0.167]. In contrast, surgency was not related to parent stress, $\beta = -0.031$, BC$p = 0.654$, BC 95CI [−0.191, 0.116]. In turn, parent stress was negatively associated with parent AS, $\beta = -0.214$, BC$p = 0.017$, BC 95CI [−0.399, −0.034]. When examining indirect links, both toddler negative affectivity and effortful control were found to be indirectly related to parent AS, via parent stress. Specifically, toddler negative affectivity was indirectly negatively linked to parent AS, $\beta = -0.061$, BC$p = 0.014$, BC 95CI [−0.124, −0.011], while toddler effortful control was indirectly positively associated with parent AS, $\beta = 0.068$, BC$p = 0.009$, BC 95CI [0.016, 0.154]. Finally, the relation between toddler effortful control and parent AS was not fully accounted for by parent stress; the *direct*, negative relation between toddler effortful control and parent AS was indeed significant, $\beta = 0.214$, BC$p = 0.007$, BC 95CI [0.059, 0.372]. Effect sizes for model 2 were large, explaining 25.6% of the variability in parent stress and 23.7% of parent AS strategies.

Alternative Model

The direct linkage between effortful control and parent AS may suggest the presence of another preferable model. As only experimental designs can attest of the directionality of observed relations, alternative models are indeed always possible and should be explored. Accordingly, we tested another full mediation model, where parent AS would be directly linked to toddler temperament characteristics, which in turn would be associated with parent stress (model 3). As in the previous models, the same covariates were included (i.e., age and sex of both parents and toddlers) as exogenous variables. This alternative variable sequence full mediation model showed poor fit, $\chi^2(1) = 7.381$, $p = 0.007$, TLI $= -0.497$, CFI $= 0.958$, RMSEA $= 0.188$ [0.080, 0.325], PCLOSE $= 0.021$. As such, Model 2 (linking toddler temperament and parent AS through its association with parent stress) was thus retained.

Discussion

In the present study, we examined how toddler temperament, parent stress and parents' use of autonomy-supportive practices in socialization contexts were inter-related. Our main goal was to test a full mediation model, where toddler temperament was hypothesized to be associated with parent stress, which in turn would be linked to less parent AS. Our results did not support this initial model but rather suggested that a combination of direct and indirect associations between the toddler temperamental characteristics and parent AS, via parent stress was supported by our data. Specifically, we found differential patterns of associations between toddler temperament, parent stress and AS depending on the temperamental characteristics; (a) surgency was not related to parent stress (nor to AS when controlling for the other temperamental characteristics), (b) negative affectivity was indirectly related to AS through its relation with parent stress, while (c) effortful control was related to AS, both directly and through its relation with parent stress. About a quarter of the variability in parent stress was explained by negative affect and effortful control, and about the same portion of the variability in the use of autonomy-supportive practices was explained by these temperamental characteristics and parent stress.

The non-significant relation between *surgency* and either parent stress or use of AS could be explained by the fact that this aspect of temperament includes both challenging and rewarding characteristics. Perhaps for some parents, the cheerful aspect of surgency compensates for the high activity involved, while other parents experience high levels of stress with toddlers high in surgency. Future research could further explore parents' perceptions of this temperament component to shed some light on potential moderators of the relation between surgency and parent stress.

Turning to the results pertaining to negative affectivity and effortful control, results suggested that the more parents perceived their toddler as presenting high negative affectivity or low effortful control, the higher stress they reported, which in turn was negatively associated with the AS they reported using when making requests. These indirect relations were significant, suggesting that inasmuch as toddler temperament was linked to parent stress, these characteristics were also related to parent AS. Research on difficult child temperament has previously documented a link with less sensitive parenting behaviours (e.g., Putnam et al. 2002; Sanson and Rothbart 1995), as well as less positive guidance and reinforcement (Calkins 2002; Harrington et al. 1998). In Solmeyer and Feinberg (2011)'s study, children's difficult temperament was not only associated with mothers' parenting behaviours but also with their low levels of psychological well-being, in addition to being associated with mothers' elevated stress levels (Mäntymaa et al. 2006; Mulsow et al. 2002). By testing our proposed model, we aimed to contribute to this literature by explicitly paying attention to the potential mediation by stress.

Parent stress fully accounted for the negative association between toddler *negative affectivity* and parent AS. This supports the hypothesis that parents may be less autonomy-supportive with more reactive toddlers because raising such toddlers may be more stressful. This result adds to earlier studies showing positive associations between negative affectivity and harsh disciplinary styles (Kochanska et al. 2004), punishment and/or power assertion (Sanson et al. 2004), and hostile parenting attitudes (Katainen et al. 1997),

by suggesting a mechanism for these relations. By pointing to negative affectivity as a form of stressor for parents (i.e., a form of pressure from below), this result is in accordance with studies documenting a link between children's difficult temperament and parent stress (e.g., Gelfand et al. 1992; Östberg and Hagekull 2000). It thus seems that having to deal with taxing temperamental characteristics could potentially entice parents to experience added stress (Belsky 1984; Lowell and Renk 2017), which in turn could exhaust the regulatory resources required to use AS. This is consistent with self-regulatory theories underlining that self-control abilities are a limited personal resource and may be depleted with use, leaving fewer self-control abilities thereafter (Baumeister 2002).

In contrast, toddlers' self-regulatory abilities, i.e., effortful control, was negatively linked to parent stress and positively related to AS, which first suggests that parents may feel less stressed when they see their toddler as better able to self-regulate. This finding may be explained by the fact that parents may need to monitor their toddlers to a relatively lesser extent when toddlers are better able to do so effectively on their own. Yet, the positive relation between toddler effortful control and parent AS was only partially explained by parent stress, indicating that although lower stress played a role in parents' tendency to support their toddler's autonomy, toddler effortful control was also directly associated with AS, above and beyond its link with parent stress. Toddler effortful control was thus also directly and positively related to parent AS over and above what could be explained by parent stress. It thus seems that having a toddler with more self-regulatory abilities is positively linked to AS, presumably through the relief of parent stress, but it may also be positively associated with parents' use of AS strategies for other reasons, thus suggesting the presence of another potential mediator of the relation between effortful control and parent AS. Perhaps parents raising highly regulated toddlers are not only less stressed, and thus less depleted of their own self-control resources (Baumeister 2002), they may also enter each parent-child interaction with a sense of trust that their toddler will cooperate and grow. Trust in organismic development has in turn been related to AS (Landry et al. 2008), suggesting that parents' trust could be an additional mediator of the relation between toddler's effortful control and AS.

Theoretical Implications of the Retained Model

Child temperament is particularly closely related to parents' behaviours in the early years (Belsky 1984). While prior research clearly showed that negative affectivity puts parents at higher risk of using controlling practices, the present study adds that autonomy-supportive practices may be difficult to maintain when toddlers are perceived as high in negative affectivity and/or low in effortful control. The present study investigated one possible explanation for these results, and provided support for the hypothesis that toddler temperament affects parent stress levels, which in turn are related to the likelihood that parents will use autonomy-supportive practices in socialization contexts. An indirect relation via parent stress was expected, given its tendency to deplete energy, patience, and cognitive resources, which are all needed to maintain AS (Grolnick 2003). Yet, the specific emotions parents may feel when they make requests to highly emotionally labile toddler, such as frustration, shame or helplessness and their links with their general level of stress could be studied further. Perhaps parents' attempt to cope with the stress brought on by their toddlers' intense and lingering emotions by taking over the situation may help them feel in control, despite its risk of thwarting their child's autonomy in the process.

Much like negative affectivity, *lower* toddler effortful control can also certainly "pull" for more controlling or less autonomy-supportive parenting behaviours, whereas toddlers who exhibit *more* effortful control can make it easier for parents to be autonomy-supportive (Grolnick and Ryan 1989). Our findings point to the fact that having to frequently monitor, guide, and redirect the behaviours of toddlers who have less effortful control seems related to parents' use of AS. In contrast, when toddlers take on a more active role in the regulation of on-task behaviours, their parents may feel more comfortable in granting more autonomy. Effortful control thus seems to decrease the parents' burden, helping them to trust their toddlers and support their growing autonomy.

Alternative, Malleable Temperament Model

Another possible way these variables may relate to one another emerge when we conceptualize temperament as malleable. Although temperament is typically seen as biological and (relatively) stable, studies have shown that it develops over time during toddlerhood (Putnam et al. 2002). In fact, it is easier to achieve long-term predictions from temperament after three years of age (Roberts and DelVecchio 2000). Since parents and toddlers have been shown to greatly influence each other in an interactive way (Sameroff 2009), parenting could also influence toddlers' temperament. An alternative model was thus proposed model where parent AS was hypothesized to be associated with temperamental traits, which in turn was expected to be linked to parent stress. Results however suggested that toddler temperament could not fully account for the relation between parent AS and parent stress, such that this alternative model was not deemed preferable.

Taken together, our data suggest that parent stress is a potential mediator of the relation between toddler negative affectivity and parent AS and between effortful control and parent AS, but that other mediators likely play a role in the association between effortful control and parent AS. In contrast, surgency was not related to parent stress, and thus potential moderators of this relation should be explored. These findings greatly contribute to the parenting literature by guiding future grand-scale longitudinal work and experimental studies on the associations among toddler temperament, parent stress and parent AS.

Limitations

Despite its novel findings, the present study has several limitations that should be mentioned. First, direct and indirect associations were estimated based on cross-sectional data such that a formal test of mediation effects could not be conducted. Indeed, mediation implies the estimation of change, which cannot be estimated using a cross-sectional design. In addition, longitudinal parameters may greatly differ from cross-sectional associations as they depend on the relative stability of the variables over time (Maxwell et al. 2011). Future studies could use longitudinal cross-lagged models which can provide some evidence regarding the strength of the relations between toddler temperament, parent stress, and AS over time (Lewis-Beck et al. 2004) as well as estimate the proposed mediation of parent stress. Importantly, since correlational designs prevent causal conclusions to be drawn, conducting experimental studies would allow researchers to verify whether reducing parent stress can help increase parent AS. Past research has shown that social support is linked to lower parenting stress, especially in children's second year of life (Mulsow et al. 2002). Future studies could perhaps experimentally manipulate parent stress by providing social support to parents of "difficult" toddlers and test whether such manipulation could reduce stress and lead to greater AS practices.

Second, relying on questionnaires provides estimates of parenting behaviours that are dependent on parents' own perceptions of the way they interact with their toddlers. The relations found in the present study may thus have been inflated or deflated due to various biases, such as social desirability (e.g., parents may have over-reported their use of autonomy-supportive parenting practices). Observational data would provide more valid information on parenting behaviours in a given situation, most notably in socialization contexts. Yet, parent reports have the advantage of providing a more global estimate of parenting, as parents have access to multiple interactions that occurred over a full range of situations (e.g., when alone with their child; when late for work).

Third, the self-report measures were all provided by the same parent, which could create a shared method variance bias. It is indeed possible that some of the variance may be explained by the use of a common method (i.e., the variance that is attributable to the method of measurement rather than to the constructs the measures represent; Podsakoff et al. 2003). In addition, because the study is correlational, the direction of associations is unknown (e.g., perceptions of stress might be affected by having a difficult toddler; being stressed might affect perceptions of one's child as being difficult). Thus, the present findings should be interpreted with caution and replicated using multiple informants and an experimental design. Reliability estimates for negative affectivity and especially for surgency were also low, which may explain why surgency was not associated with autonomy-supportive parenting behaviours.

In terms of generalizability, our sample of parents was not very diverse and thus our results may not generalize to the general population. As was previously mentioned, the sample was composed mainly of French-Canadian parents who had a university degree. Future studies should investigate families that come from different cultures, ethnic backgrounds and social economic statuses. Also, the direct path between toddler effortful control and parent AS was added ad hoc based on exploratory analyses. Future research is thus needed to replicate this finding in other samples.

Finally, since the study did not assess parents' personality traits, it is not possible to examine their role in the association between toddler negative affectivity and parents' use of autonomy-supportive practices (Paulussen-Hoogeboom et al. 2007). Yet, future studies would do well to take parent personality traits into account as they influence parents' perception of their toddler temperament (Rothbart and Bates 1998) and of their own parenting practices (Belsky 1984). Parent personality is also an important predictor of stress levels (Mulsow et al. 2002).

Despite the study's methodological limitations, the pattern of findings sheds light on factors that may hinder autonomy-supportive parenting during toddlerhood, an area that has received very limited attention until now. Toddler temperamental characteristics and parent stress can put the parent-child dyad at risk for sub-optimal parenting behaviours, and pointing to stress as a potential mechanism may support further empirical and applied work targeting parents' subjective experiences. For example, future experimental studies could teach parents how to use AS practices early in their child's lives and assess whether such training can contribute positively to toddler temperament. Such AS training could also serve as a buffer against temperamental risk factors and bring about other benefits (e.g., Hart and Newell 2003; Vasquez et al. 2016). For instance, the How-to Parenting Program (Faber and Mazlish 1980, 2010)

teaches parents applicable skills that embody the key components of autonomy-supportive parenting (Joussemet et al. 2014, 2018). School-aged children of parents who followed this programme reported more AS from their parent and their internalizing and externalizing difficulties were significantly reduced. Interestingly, these positive mental health benefits were stronger for children with higher negative affectivity (Mageau et al. 2015). Other shorter interventions have been found effective in teaching AS (Allen et al. 2019) and to lead to positive child outcomes such as positive affect and motivation toward homework (Froiland 2011; Moè et al. 2018).

Future research could also assess the efficacy of parent education addressing parents' beliefs (e.g., Bugental et al. 2002; Walling et al. 2007). Informing parents about temperament may help them be more compassionate towards their child and towards themselves, which could consequently foster stress reduction (Östberg and Hagekull 2000) and facilitate the way they interact with their child. The impact of parenting programmes that couple information about early temperament with AS teachings on parenting practices, parent-child relationships and child well-being could also be assessed. An important next step is thus to identify intervention avenues that decrease parent stress and help them support their toddlers' need for autonomy, even in the face of a more challenging toddler temperament.

Data Availability

Please contact the corresponding author (repository to be determined).

Author Contributions E.A. co-designed the study, collected the data, conducted measurement analyses, and drafted the manuscript. J.C.L. conducted data analyses, collaborated in the interpretation of findings, and collaborated in the writing and editing of the original and final manuscript. M.J. co-designed the study, participated in the interpretation of findings, helped to draft the manuscript, and collaborated in the writing and editing of the final manuscript. G.A.M. assisted with data analyses, collaborated in the interpretation of findings, and helped writing and editing the final manuscript.

Compliance with Ethical Standards

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

Ethical Approval Treatment of participants was in accordance with the Ethical Standards for Research. The University of Montreal's Ethics Committee of the Arts and Sciences Faculty (CERFAS-2013-14-064-D) approved all procedures.

Informed Consents Informed consents were obtained from all participants included in the study.

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