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Stability in Maternal Autonomy Support and Child Executive Functioning

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Abstract The purpose of this study was to examine the role of early and current maternal autonomy support, and of its stability over time, in predicting child executive functioning (EF). Seventy-eight mother–child dyads participated in two visits when children were aged 15 months (T1) and 3 years (T2), allowing for the assessment of maternal autonomy support (T1 and T2) and child EF (T2). The results showed that autonomy support at 15 months and the average level of autonomy support displayed by the mothers between 15 months and 3 years were significant predictors of child EF, whereas current autonomy support was not. Group comparison techniques showed that children of mothers who displayed low autonomy support at both 15 months and 3 years performed the worst on EF. These results speak to the relevance of using multiple assessments of parenting behavior when examining its impact on child cognitive development.

Keywords Stability · Parenting · Early versus current · Maternal autonomy support · Child executive functioning

Introduction

Despite growing evidence that early and current parenting behavior as well as its stability over time have important implications for child functioning (Fraley et al. 2012;

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Landry et al. 2001), much remains to be investigated to understand the course of parental influences on child development over time. In fact, parenting behavior is often assessed only once and assumed to have an enduring influence on children's development. Moreover, studies of stability and change in parenting have yet to examine an aspect of child cognition that has sparked a great deal of interest in recent years: executive functioning (EF). Though a large body of research has provided compelling support for the importance of EF in child functioning, far less research has been devoted to studying the environmental factors that could contribute to EF development during early childhood. Recently, maternal autonomy support has begun to be identified as an important predictor of child EF (Bernier et al. 2010; Bibok et al. 2009; Hammond et al. 2012; Hughes and Ensor 2009). However, maternal autonomy support is typically assessed once only; therefore, the role of early versus current maternal autonomy support, and of its stability over time, in predicting child EF has never been investigated.

EF consists of a set of higher-order cognitive processes, such as impulse control, set-shifting and working memory, which are critical for cognitive, social, and psychological functioning (Bell and Deater-Deckard 2007; Blair 2002; Diamond 2013). EF can be reliably assessed starting in toddlerhood and shows meaningful variation within normally developing children of varying ages (e.g., Carlson 2005; Carlson et al. 2004; Diamond et al. 2007). In fact, some aspects of EF probably emerge as early as the end of the first year of life (Diamond 2013), and individual differences assessed in toddlerhood are moderately stable into the preschool years (Carlson et al. 2004; Hughes and Ensor 2007). Studies of EF in preschoolers and older children have led to the crucial finding that this set of higher-order cognitive processes is linked to school readiness (Blair and

Peters 2003), academic performance (e.g., Biederman et al. 2004; Bull et al. 2008; St. Clair-Thompson and Gathercole 2006), social and moral competence (e.g., Clarke et al. 2002; Kochanska et al. 2000), theory of mind (e.g., Benson et al. 2013; Hughes and Ensor 2007; Moses and Tahiroglu 2010), and early onset disorders, including attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (e.g., Clarke et al. 2002; Pennington and Ozonoff 1996; Semrud-Clikeman et al. 2010). Overall, there is compelling support for the idea that individual differences in EF are meaningful for child functioning; much less is known, however, about the mechanisms that underlie the development of such individual differences.

One increasingly documented predictor of child EF is maternal autonomy support (Bernier et al. 2010; Bibok et al. 2009; Hammond et al. 2012; Hughes and Ensor 2009). Maternal autonomy support refers to parenting behaviors aimed at supporting children's goals, choices, and sense of volition (Grolnick and Ryan 1989). One of its central components is scaffolding, which refers to the ways in which parental guidance enables children to achieve levels of problem solving that they could not reach on their own. Autonomy support also consists of taking the child's perspective and respecting his or her rhythm, and ensuring that the child plays an active role in successful completion of the task. Studies have found that better parental autonomy support is related to higher child performance on EF tasks, either concurrently (Bibok et al. 2009) or longitudinally (Bernier et al. 2010; Hughes and Ensor 2009). However, a recent study by Hammond et al. (2012) suggested that the nature of the relations between autonomy support and EF changed over time, which led the authors to propose that these changes may be due to modifications in parental autonomy support itself. The authors therefore recommended that future research examine how stability and change in autonomy support relate to individual differences in child EF.

This is in line with the broader contention that the stability of parental behavior may exert an important influence on children's developmental trajectories (e.g., Bornstein 2002; Collins et al. 2000). Numerous studies have demonstrated that parenting can change over time (Holden and Miller 1999), but little is known on how these changes relate to child development (Gutman and Feinstein 2010). Overall, the empirical studies that investigated the relation between different patterns of consistency and change in parenting and child development report that children of mothers who are consistently high in their positive parenting behaviors across time have more positive outcomes than children who experience consistently lower positive parenting behaviors or inconsistent parenting behaviors across time (Beckwith et al. 1992; Frye et al. 2010; Landry et al. 2001; Mattanah 2005). However, previous studies

mainly focused on maternal responsiveness, while it is increasingly well-documented that parenting is multidimensional (Grusec and Davidov 2010) and that other aspects of parental behavior have unique contributions to child functioning, above and beyond those of maternal responsiveness/sensitivity (e.g., Meins et al. 2001; Moran et al. 2008). Autonomy support is one of those aspects of maternal behavior that has been shown to have unique contributions to child functioning, over and above maternal sensitivity (Bernier et al. 2010; Bernier et al. 2014). While emerging evidence suggests that there is moderate stability in maternal autonomy supportive behaviors between infancy and the preschool years (Matte-Gagné et al. 2013), the role of its stability over time in predicting child functioning has never been investigated.

Closely related to the issue of stability in parenting across time is the issue of early versus current parenting. The role of early versus current experience in shaping human development is one of the central questions tackled by developmental research. All developmental theories assume that early experience plays some role in shaping later adaptation. What is usually debated is whether early experience plays a unique and enduring role in the developmental process beyond the influence of subsequent experience. Some authors have suggested that few, if any, effects on later development are attributable to early experience (Clarke and Clarke 2000; Kagan 1996; Lamb et al. 1984; Lewis 1997). Associations between early experience and later outcomes are said to persist because the experience (e.g., the family environment) is relatively stable and has concurrent effects on the outcomes (e.g., Lamb et al. 1984; Lewis 1997). However, other researchers have provided evidence that early interpersonal experiences persist in their influence on later adaptation (Sroufe et al. 1990; Vandell et al. 2010), even after accounting for current circumstances (Fraley et al. 2012; Roisman et al. 2005; Sroufe et al. 2005). One of the most important aspects of early interpersonal experience is parenting. Consequently, a great deal of debate about the enduring significance of early experience directly or indirectly concerns the impact of parenting.

Countless studies have demonstrated that parenting plays a central role in many aspects of child functioning, but few studies have examined simultaneously the contributions of early and concurrent parenting behaviors. While high levels of early parental competence may set the stage for children's healthy development, later parenting behaviors may change this developmental course. Hence, studies on the relative contribution of early versus current parenting behaviors are necessary to better understand the unfolding of parental influences on child development. Previous studies have sometimes supported the important role of early parenting, sometimes of later parenting

(Beckwith et al. 1992; Bradley et al. 1988; Landry et al. 2001). For example, in a study by Bradley et al. (1988), parental responsiveness at 6 months was related to child classroom behaviors at 10 years, after accounting for concurrent parental responsiveness, but 10-year responsiveness was not related to classroom behaviors when earlier scores of responsiveness were controlled, supporting the predominance of early experience. In contrast, parental involvement at 10 years was related to child concurrent academic achievement after accounting for earlier parental involvement, but earlier involvement was not related to achievement when later scores of involvement were controlled, supporting the role of current experience. These results suggest important roles for either early or later parenting behaviors that depended, in part, on the developmental domain studied.

Moreover, research shows that using multiple observations of parenting behavior is sound on psychometric as well as developmental levels, as it allows for more reliable measurement while providing an arguably more accurate view of the child's overall experience with this parent (Bernier et al. 2012; Ellenbogen and Hodgins 2004; Grossmann et al. 2002; Kochanska and Murray 2000; Tarabulsy et al. 2005). Indeed, having more than one assessment of the same parenting behavior across time can reduce measurement error and yield a more accurate estimate of the average level of the behavior as displayed by the parent in everyday life. This is illustrated well by the results of Lindhiem et al. (2011), who found incremental increases in effect sizes of relations between maternal sensitivity and child outcomes with increasing numbers of observations of maternal sensitivity. Thus, composite scores of parenting may yield better prediction of child EF than single measures.

The present study aimed to first examine different patterns of change and stability in maternal autonomy support between 15 months and 3 years in relation to child EF performance. It was expected that children of mothers who were consistently highly autonomy supportive would be more successful on EF tasks than children experiencing consistently low maternal autonomy support. Our second objective was to examine the respective relations of early (15 months) and current maternal autonomy support with child EF performance at 3 years of age. Given previous studies that suggested important roles for either early or later parenting behaviors that depended, in part, on the developmental domain studied, we could not formulate a priori hypotheses. The third objective was to examine the relation of a composite average score of autonomy support at 15 months and 3 years with child EF performance at 3 years. Based on previous literature, we expected that the average level of autonomy support between infancy and preschool years would be a clearer predictor of child EF than either early or current autonomy support in isolation.

Method

Participants

Seventy-eight middle-class mother-infant dyads (45 girls and 33 boys) living in a large Canadian metropolitan area participated in this study. Families were recruited from random birth lists provided by the Ministry of Health and Social Services. Criteria for participation were full-term pregnancy and the absence of any known physical or mental disability in the infant. Family income varied from less than $20,000 CDN to more than $100,000 CDN, with an average of $70,000 CDN. Mothers were predominantly Caucasian (82 % of the sample) and French-speaking (81 % of the sample). They were between 20 and 45 years old ($M = 31$). They had between 9 and 18 years of formal education ($M = 15$) and 67 % had a college degree.

Procedure

The dyads took part in two home visits, when children were 15 months (T1; $M = 15.5$, $SD = 0.9$, range 13.5–18.0) and 3 years of age (T2; $M = 36.8$ months, $SD = 0.8$, range 35.5–38.5). Both visits lasted between 60 and 90 min. In order to assess maternal autonomy support in age-appropriate contexts, mothers were asked to help their children complete tasks that were designed to be slightly too difficult for the children (one tower of blocks and two puzzles at T1, and a block sorting task, involving to sort blocks by color in different bags, at T2), such that they would require some adult assistance to complete them. These 10-min interactions were videotaped and later coded for maternal autonomy-supportive behaviors (see below). At T2, EF tasks described below were also administered.

Measures

Maternal Autonomy Support

Mother-infant dyads were asked to complete a challenging task together when infants were 15 months and 3 years of age (T1 and T2). Following Whipple et al. (2011) rating system, maternal behaviors were rated on four Likert scales assessing the extent (1–5) to which the mother (1) encourages her child in the pursuit of the task, gives positive feedback, and uses a positive tone of voice (verbally supportive behaviors); (2) takes her child's perspective and demonstrates flexibility in her attempts to keep the child on task; (3) follows her child's pace, provides the child with the opportunity to make choices, and ensures that the child plays an active role in the completion of the task; (4) intervenes and adapts the task according to the infant's needs and minimizes the use of controlling

techniques. Given the inter-correlations among the four scales (ranging from .43 to .90), they were averaged into a total autonomy support score (α = .89 at T1 and α = .84 at T2). A randomly selected subset (n = 40 at T1 and n = 42 at T2) of videotapes were coded independently by two raters. Inter-rater reliability was satisfactory, ICC = .86 at T1 and ICC = .93 at T2. The T2 data were not available for six participants due to technical difficulties with the recording equipment. These mothers did not differ from others on socio-demographics or background measures. Given this absence of differences, the data were considered missing at random, and therefore handled with multiple imputation as recommended by Schlomer et al. (2010; see Preliminary Analyses section for details).

Child Executive Functioning

EF was measured at 3 years with several tasks chosen based on Carlson's (2005) measurement guidelines with the aim of maximizing detection of individual differences in three dimensions of EF: working memory, inhibitory control, and set-shifting. Psychometric research indicates that these tasks provide reliable measurement of individual differences and that these differences are stable across time (Beck et al. 2011; Carlson 2005).

Delay of Gratification (Kochanska et al. 2000)

The experimenter placed snack treats in a bowl in front of the child and asked him or her to wait 5, 15, 30 and then 45 s before taking the treat. Scores consisted of the four waiting times.

Day/Night (Gerstad et al. 1994)

The experimenter asked the child to say "day" when shown black cards displaying stars and a moon, and to say "night" for white cards displaying a sun. The task consists of 16 trials, yielding the percentage of correct answers as final score.

Dimensional Change Card Sort (DCCS; Zelazo 2006)

Children were introduced to two boxes with target cards (i.e., a red truck and a blue star) affixed to the front. The experimenter presented a series of cards (red and blue trucks and stars) and instructed children to sort cards by shape. After six trials, the rule was changed and the child had to sort the same cards by color. The score consisted of the number of cards correctly sorted on the six post-switch trials.

Bear/Dragon (Reed et al. 1984)

The experimenter introduced children to a "nice" bear puppet and a "naughty" dragon puppet. Children were

Table 1 Mean, standard deviation (SD) and range for all variables

Variable	Mean	SD	Range
Maternal autonomy support			
15 months	3.61	1.01	1.33–5
3 years	2.80	0.99	1–5
Average	3.21	0.83	1.25–4.67
Child EF task performance			
Delay of gratification			
5 s	4.81	0.73	1–5
15 s	13.83	3.47	1–15
30 s	27.15	7.49	1–30
45 s	39.45	13.69	2–45
DCCS	5.48	1.13	0–6
Day/night	57.08	35.56	0–100
Bear/dragon	6.51	1.90	2–10

asked to follow the bear's requests (e.g., touch your nose) but to refrain from following the dragon's requests. After practice trials, there were 10 test trials, alternating in a pseudo-random order commands by the bear and the dragon. Scores corresponded to the number of correct responses (0–10).

Data Analysis

To maximize the sample size, we included cases with missing values (for the six mothers whose autonomy support data at T2 were not available due to technical difficulties) in the analyses by estimating missing data. The multiple imputation procedure available in SPSS 20.0 was used to impute data for autonomy support at T2. Five imputations were used, with missing data estimated from the T1 autonomy support data.

In line with studies supporting the validity of a unitary EF construct at preschool age (Hughes et al. 2010; Wiebe et al. 2008; Wiebe et al. 2011) and in order to reduce the probability of Type-I errors, we created a composite score of EF by averaging the standardized EF task scores. A composite score of maternal autonomy support was also created by averaging the 15-month and 3-year total autonomy support scores (r = .38, p < .001). Table 1 presents descriptive statistics for all main variables used in this study: maternal autonomy support at 15 months and 3 years, the composite score of maternal autonomy support, and child 3-year EF task scores.

In order to examine the outcomes of different patterns of maternal autonomy support across infancy and the preschool years, three univariate analyses of variance (ANOVA) were used to compare the EF performance of children experiencing different patterns of maternal autonomy support across time. Groups of continuity and

change in maternal autonomy support across time were created according to three different categorization criteria (median split, standard deviation, and clustering procedure) proposed by different research groups, allowing us to test the robustness of the results.

Next, correlations were used to examine the respective relations of early (15 months) and current maternal autonomy support with child EF performance at 3 years of age and the relation of the composite average score of autonomy support at 15 months and 3 years with child EF at 3 years. The extent to which socio-demographic variables (child gender and precise age, number of siblings, and maternal education) were related to EF performance at 3 years was examined. Maternal education was related to the child EF composite score ($r = .35, p < .01$). Thus, we co-varied maternal education when predicting 3-year EF in correlational analyses. No other relations were found between child EF and socio-demographics.

Results

Based on prior studies on continuity and change in behaviors (Beckwith et al. 1992, Belsky et al. 1991; Mayzer et al. 2009; Schulenberg et al. 2004), four groups were first created: mothers who were consistently high (group 1) or low (group 2) on autonomy support at 15 months and 3 years, those who were high during infancy and low during preschool years (group 3) and those who were low during infancy but high during preschool years (group 4). High and low autonomy support status was determined by median splits on the autonomy support scores at 15 months and 3 years: mothers who were above the median were considered to be high and mothers below the median were considered to be low. However, to diminish the error inherent to median splits (MacCallum et al. 2002), mothers with a score less than .4 standard deviation from the median at both time points were removed ($N = 13$). Group sizes and related means and standard deviations for child EF are presented in Table 2.

Table 2 Mean and standard deviation values of child EF performance for the four groups of maternal autonomy support created with a median split

Patterns of autonomy support	N	Child EF	
		Mean	SD
High-high	19	.21	.37
Low-low	18	−.23	.78
High-low	17	.15	.46
Low–high	11	−.10	.49

In order to examine differences in child EF performance between these four groups of stability of autonomy support, we conducted an ANOVA, which revealed a trend-level main effect of stability patterns [$F(3,61) = 2.49, p = .06$]. We thus conducted post hoc least significant difference (LSD) tests to probe differences between the groups. Post-hoc tests revealed that children of mothers who were consistently highly autonomy-supportive showed better EF performance ($M = .21$) compared to their counterparts whose mothers were consistently low on autonomy support ($M = -.23$). No other differences were found between the groups.

Recall that data from several mothers had to be removed from the previous analyses because of their proximity to the median ($N = 13$). In addition, careful examination of the data revealed that some mothers in the low-low or high-high group nonetheless had more than one standard deviation between their T1 and T2 scores, which led us to question whether they could reasonably be considered as being stable in their autonomy-supportive behavior. In order to address these issues and thus test the robustness of the above results, another method was used to create groups of stability and change, based on the within-subject similarity or difference between autonomy support scores at the two time points (standard deviation classification criterion). Mothers with more than one point of difference (equivalent to the standard deviation of autonomy support scores on the 5-point scale at both time points: $SD_{T1} = 1.01$; $SD_{T2} = .99$) between their scores at T1 and T2 were placed in decreasing ($N = 34$) or increasing groups ($N = 4$). The elevated percentage of mothers who decreased in their autonomy support (44 %) is consistent with the fact that maternal autonomy support has been found to decrease across time (Matte-Gagné et al. 2013). The other mothers were placed in one of three stability groups: mothers maintaining an autonomy support score above 3.5 at both time points were placed in a high-stable group ($N = 12$), mothers with a score between 2.5 and 3.5 at T1 and T2 were placed in a moderate-stable group ($N = 20$) and mothers maintaining a score below 2.5 were placed in a low-stable group ($N = 8$). Means and standard deviations of child EF for each group are presented in Table 3.

These data were submitted to an ANOVA, which revealed a significant main effect of stability patterns on child EF performance [$F(4,73) = 3.14, p < .05$]. This difference was probed with post hoc LSD tests. The post hoc tests revealed that children of mothers in the low-stable group showed lower performance than all other children. No differences were found between the other groups.

Another method to examine different patterns of continuity across time is proposed by Bornstein et al. (2006), and consists of assigning individuals that show similar

Table 3 Mean and standard deviation values of child EF performance for the five groups of maternal autonomy support created based on the difference between T2 and T1 (SD criterion)

Patterns of autonomy support	N	Child EF	
		Mean	SD
Increasing	4	.11	.06
Decreasing	34	.04	.56
High-stable	12	.31	.23
Moderate-stable	20	−.02	.44
Low-stable	8	−.54	.91

Table 4 Mean and standard deviation values of child EF performance for the four groups of maternal autonomy support created based on the consistency in cluster membership across time

Patterns of autonomy support	N	Child EF	
		Mean	SD
High-stable	37	.15	.38
Low-stable	15	−.31	.89
High-low	6	−.07	.87
Low–high	20	.01	.43

ratings to clusters at each time point with a cluster analytic procedure, and consider the consistency through time in cluster membership for each individual. First, we entered the autonomy support scores at T1 and T2 separately into hierarchical clustering analyses (Ward 1963) from which we identified two distinct clusters at each time point by examining the squared Euclidian distance and the dendrogram. These two clusters represent high autonomy support and low autonomy support: the high autonomy support groups comprise 43 mothers who have an average autonomy support score of 4.38 ($SD = 0.39$) at T1, and 57 mothers who have an average autonomy support score of 3.26 ($SD = 0.99$) at T2. The low autonomy support groups include 35 mothers with an average autonomy support score of 2.66 ($SD = 0.66$) at T1, and 21 mothers with an average autonomy support score of 1.57 ($SD = .35$) at T2. Based on these four initial clusters, four groups of stability and change were created: mothers maintaining the same cluster across time were placed in either a high-stable or a low-stable group, whereas mothers changing from one cluster to another were placed in high–low or low–high groups. Means and standard deviations for child EF in each group are presented in Table 4.

These data were submitted to an ANOVA, which revealed a significant main effect of cluster-stability patterns on EF performance [$F(3,74) = 2.69$, $p < .05$]. This difference was probed with post hoc LSD tests. The post hoc tests revealed that children of mothers who were

Table 5 Partial correlations between maternal autonomy support and child EF performance while controlling for maternal education

	Autonomy support		Child EF
	3 years	Composite	
Autonomy support			
15 months	.34**	.83***	.25*
3 years		.82***	.20
Composite			.31**

* $p < .05$; ** $p < .01$; *** $p < .001$

consistently low (staying in the low cluster) showed lower performance ($M = −.31$) compared to children of mothers who maintained their position in the high cluster ($M = .15$). No differences were found between the other groups.

Next, partial correlations (accounting for maternal education) among maternal autonomy support at 15 months and 3 years, the composite of maternal autonomy support, and child EF at 3 years were computed to address our second and third research objectives. The results are presented in Table 5. Maternal autonomy support at 15 months was associated with subsequent child EF ($r = .25$, $p < .05$), whereas concurrent autonomy support was unrelated to child EF ($r = .20$, ns). Supporting the psychometric value of multiple measures of parenting, the composite of maternal autonomy support was associated with child EF, and this relation appeared to be more reliable ($r = .31$, $p < .01$) than that linking child EF to autonomy support at 15 months, even if 3-year autonomy support (which is part of the composite) was not associated with EF. However, the Steiger's Z correlation coefficient comparison test was not significant ($Z = .78$), indicating that the relation between the composite score of autonomy support and child EF was not significantly greater than the relation between autonomy support at 15 months and child EF.

Discussion

The purpose of our study was to examine the role of early and current maternal autonomy support and its stability over time in predicting child EF performance. We first examined different patterns of change and stability in maternal autonomy support between 15 months and 3 years in relation to child EF performance. The comparison of the four groups created with a median split showed that children of mothers who displayed high autonomy support at both 15 months and 3 years performed better on EF tasks than children of mothers who displayed low autonomy support at both measurement times. This result is

consistent with other studies demonstrating that children of mothers who were consistently more responsive during infancy and other developmental periods had more positive outcomes than children who experienced consistently lower responsiveness across time (Beckwith et al. 1992; Landry et al. 2001; Mattanah 2005).

Furthermore, we found no significant difference on EF between children of mothers who were high on autonomy support at one time point only versus both time points. This result suggests that children may be able to benefit from a high degree of autonomy support at one time point in their development, even if this parenting quality was not consistently available to them. In fact, previous studies have sometimes supported the important role of early parenting, sometimes of later parenting (Beckwith et al. 1992; Bradley et al. 1988; Landry et al. 2001). It should be noted, however, that even if those differences were not significant, children whose mothers were highly autonomy supportive only during infancy appeared to perform qualitatively better on EF ($M = .15$) than those whose mothers were highly autonomy supportive only during preschool years ($M = -.10$). Given our small sample size and related diminished statistical power, the possibility cannot be ruled out that these apparent differences are in fact meaningful and could be detected as significant in larger-scale studies.

The next set of analyses with the five groups of stability and change in autonomy support created based on the within-subject similarity or difference between autonomy support scores at the two time points (standard deviation criterion) demonstrated that children who experienced consistently lower autonomy support across time performed less well on EF tasks ($M = -.54$) than children experiencing a decreasing ($M = .04$) or increasing ($M = .11$) degree of autonomy support, or a consistently high ($M = .31$) or moderate ($M = -.03$) degree of autonomy support across time. These results suggest that experiencing a consistent low degree of maternal autonomy support across time may have the most negative consequences on EF development.

The last set of group comparisons with cluster-continuity patterns confirmed that mothers consistently high in autonomy support across time (staying in the high cluster) had children who performed better on EF tasks than mothers maintaining a low degree of autonomy support (staying in the low cluster). Therefore, the results of the three different sets of analyses using different categorization criteria (median split, standard deviation, and clustering procedure) are consistent, converging to suggest the benefits of experiencing a consistently high degree of maternal autonomy support across time for the development of EF in the preschool years.

Another objective of this study was to examine the relations between child EF performance at 3 years and maternal autonomy support at 15 months, at 3 years, and the average level of autonomy support between these two time points. Maternal autonomy support at 15 months was associated with subsequent child EF, whereas concurrent autonomy support was unrelated to child EF when controlling for maternal education. Despite this latter non-significant relation, the average level of autonomy support displayed by the mother between infancy and preschool years was associated with child EF, suggesting that the common variance between T1 and T2 was especially meaningful in this respect. This is in line with prior research suggesting the value of multiple assessments of parenting (Bernier et al. 2012; Ellenbogen and Hodgins 2004; Grossmann et al. 2002; Kochanska and Murray 2000; Tarabulsy et al. 2005). However, the results did not show significantly increased predictive power with more assessments of autonomy support (although the correlation between the composite of autonomy support and child EF appeared qualitatively greater than those between time-specific autonomy support and child EF). This inconclusive result runs counter to those reported by Lindhiem et al. (2011), who found incremental increases in effect sizes of relations between maternal sensitivity and child outcomes with increasing numbers of observations of maternal sensitivity. This difference may partly be due to differences in design, as Lindhiem and colleagues took multiple and proximal measures of maternal behavior, while we took two distant measures. This suggests that future studies should consider using several assessments of autonomy support, on a shorter time period, to confirm that repeated assessments do increase predictive power of child functioning.

The fact that maternal autonomy support at 15 months was associated with subsequent child EF, whereas concurrent autonomy support was unrelated to child EF, is consistent with prior findings showing that the way parental scaffolding affects child EF changes over time (Hammond et al. 2012). In fact, previous studies have found the relation between scaffolding and child EF to be significant at some ages and not significant at others (Hammond et al. 2012; Landry et al. 2002). This suggests that timing may be an important factor in the relation between parenting and child EF. The non-significant relation between current maternal autonomy support and child EF raises the possibility that the potential impact of autonomy support on child EF unfolds over time, as the child gradually practices, applies, and integrates the strategies taught by the autonomy-supportive caregiver. This is consistent with the results of a recent study showing that some parenting behaviors had no concurrent but only longitudinal associations with children's subsequent social and motor development (Gutman and Feinstein 2010). Thus, the potential impact of parenting may sometimes take time to unfold. In light of the moderate stability found in autonomy support (see Table 5), it stands to reason that some mothers who were observed to be highly autonomy-supportive at 3 years

had not consistently been so in preceding months or years, and hence a same-day EF assessment may have been too soon to observe putative effects of potentially recent autonomy-supportive parenting. Furthermore, given that infancy is a period of accelerated brain and cognitive development, it may be a particularly sensitive stage for maternal autonomy support to foster the development of the problem-solving skills involved in child EF. However, recall that the correlations between early or current autonomy support and child EF were not very different in magnitude. Thus, although the conclusion that early but not concurrent autonomy support was related to child EF is factual, it would be risky to draw strong conclusions suggesting that early autonomy support is *more* relevant than current autonomy support to child EF. The data rather suggest that the role of current autonomy support in child EF needs further investigation, especially considering that another study did show a relation between scaffolding and concurrent child EF (however, at an earlier age, 2 years; Bibok et al. 2009). Future research is needed to tease apart the different factors that may be responsible for this difference in findings: child age, covariates considered, sampling, and observational context, to name just a few.

Limitations

Our study presents methodological limitations that require consideration. First, the modest sample size represents a limit to statistical power and generalizability, and it will be important to replicate the current findings with larger samples. Moreover, the different tasks used to measure maternal autonomy support at each age could constitute a limit of the present study. Using the exact same task for assessing parenting behaviors at different ages (while retaining age-appropriateness) will be necessary to isolate presumed effects of early and current parenting behavior. However, a recent study using the same measurement contexts as this one replicated meta-analytic results (Holden and Miller 1999) by finding moderate relative stability in maternal autonomy support across time, which suggests that the use of different tasks did not blur the expected phenomenon (Matte-Gagné et al. 2013). Finally, although we have sometimes used causal language for simplicity of expression, the associations observed in this correlational design may not be indicative of causal relations.

Conclusion

Studies on the stability of parenting behaviors are necessary to better understand the nature of parenting and parental influences on children's development. The present study is the first, to our knowledge, to investigate the relation between stability of maternal autonomy support and child EF. It is also one of very few studies to examine simultaneously the influence of both early and current parenting and of its stability on child early cognitive development. The current results speak to the relevance of using multiple assessments of parenting when examining its impact on child development, and the importance of giving careful consideration to when parenting is assessed. This study also raises the possibility that child EF may require not only high-quality parenting, but also consistency in this quality. This is suggested by the association between the composite score of autonomy support and child EF, as well as by the fact that the clearest group differences emerged between children experiencing consistently high versus consistently low degrees of autonomy support over time. Other studies examining the stability of other dimensions of parenting behavior and its relations to other child outcomes, across both shorter and longer delays, at other developmental periods, in different cultures, and in low-income or at-risk samples appear necessary to further the understanding of the mechanisms underlying the relation between stability of parenting and child development.

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