A Comprehensive Conceptual Review: Exploring the Link Between Parental Mentalization and Parental Executive Functioning and their Influence on Parental Behaviors

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Mashael Altwijri, Ph.D. *

Abstract

This paper aims to conduct a comprehensive conceptual review, exploring the link between parental mentalization (PM) and parental executive functioning (EF) and their influence on parental behaviors. The intent is to introduce the Jay Belsky theoretical model that illustrates the processes that determine parental behaviors, followed by an overview for the four parental constructs chosen for this study: parental sensitive responsiveness and parental scaffolding/support for autonomy, parental mentalization, and parental EFs by linking parental behaviors theoretically to parental mentalization and parental EFs. Then, a special section explains the theoretical background that links PM with parental EFs. Following that, the paper will critically explore studies that investigate the relationships between 1) parental mentalization and parental behaviors, 2) parental EFs and parental behaviors, and 3) parental mentalization and parental EFs, each among mothers of preschoolers three to five years old and synthesize them to provide an initial revised evidence-based conceptual model. Lastly, it concludes with a discussion that summarizes supported links in the model and highlights the existing gap in the literature and limitations upon the constructs and measures.

Keywords: parental, mentalization, Executive function, behavior

مراجعة مفاهيمية شاملة: استكشاف العلاقة بين التفكير الأبوي و وظائف الجهاز التنفيذي وتأثيرهما على سلوكيات الأبوين

د. مشاعل بنت عبدالله التويجري

المستخلص

تهدف هذه الورقة إلى إجراء مراجعة مفاهيمية شاملة، تستكشف الرابط بين التفكير الأبوي والوظائف التنفيذية الأبوية وتأثيرها على سلوكيات الأبوين. تبتدأ هذه الورقة باستعراض نموذج جاي بيلسكي النظري الذي يوضح العمليات التي تحدد السلوكيات الأبوية، متبوعة بنظرة شاملة للسلوكيات الابوية الأربعة المختارة في هذه الدراسة: الاستجابة الحساسية الأبوية، والدعم الأبوي للاستقلالية، والتفكير الأبوي، والوظائف التنفيذية الأبوية. بالاضافة لذلك، تخصص هذه الورقة جزء لمناقشة الخلفية النظرية التي تربط التفكير الابوي بالوظائف التنفيذية الأبوية. ثم بعد ذلك، تستكشف الورقة بشكل نقدي الدراسات التي تحقق في العلاقات بين ١) التفكير الأبوي وسلوكيات الأبوين، ٢) الوظائف التنفيذية الأبوية وسلوكيات الأبوين، و٣) التفكير الأبوي والوظائف التنفيذية الأبوية -وكانت العينة فيها الأمهات اللاتي لديهن أطفال في سن ما قبل المدرسة من ثلاث إلى خمس سنوات- وتلخصها لتقديم نموذج مفاهيمي أولي قائم على الأدلة. أخيراً، تختتم الورقة بمناقشة تلخص الروابط المدعومة في النموذج وتبرز الفجوة الموجودة في الأدبيات والقيود المفروضة على المفاهيم والقياسات.

الكلمات المفتاحية: العقلية الوالدية، الجهاز التنفيذي، سلوكيات، الوالدين

Introduction

Variations in children's academic performance have been significantly linked to differences in early executive function skills during preschool years (Shaul, Schwartz, 2014). Friedman and colleagues reported that those executive function skills are 80% inherited (Friedman, Miyake, Young, DeFries, Corley, & Hewitt, 2008), however parental behaviors were found to be an important

* **Assistant professor in early childhood - Department of early childhood - College of education and human development- Princess Nourah bint Abdulrahman University.**

mediator (Diamond, 2002; Bernier, Carlson, & Whipple, 2010). Parental behaviors, or early parent-child interaction, were proposed by Vygotsky to be the base to develop and enhance children's cognitive processes, where providing contingent responses through gradual interpersonal interactions would prompt the competence of children social cognition skills (Vygotsky, 1980).

Two parental behaviors have been specifically linked to children's variation in self-regulation and executive functioning skills important to academic success (Distefano, Galinsky, McClelland, Zelazo, and Carlson, 2018; Lucassen et al., 2015). The first is parental sensitive responsiveness, which is defined as responding appropriately and consistently to the child's signals or demands (Bernier et al., 2010), and the second is parental scaffolding/support for autonomy. This parental behavior is the act of providing a child with an age-appropriate problem-solving activity and helping him/her as the task gradually increases to beyond his/her independent capability (Bernier et al., 2010). Both parental sensitive responsiveness and parental scaffolding/support for autonomy have been investigated primarily in relation to children's outcomes, and although some parental training programs reported successful results, many failed to be effective with all parents or to have a long-lasting effect. This motivated scholars to identify the underlying factors associated with differences in parental sensitive responsiveness and parental scaffolding/support for autonomy to enhance our understanding on how best we can promote children's EFs development trajectories.

Jay Belsky developed a theoretical model that illustrates the processes that determine parental behaviors, emphasizing three factors: parental characteristics and psychological functions, child characteristics, and social support (Belsky, 1984). Although all factors are equally important, the parental characteristics have been investigated the least. Therefore, notwithstanding the important role of child characteristics and other environmental factors on parental behaviors, investigating some parental social and cognition mechanisms could unfold underpinning links.

In the last two decades, emerging evidence suggests that parental mentalization (PM) (Luyten, Nijssens, Fonagy, & Mayes, 2017; Slade, 2005) and parental executive functioning (EFs) (Miyake & Friedman, 2012; Bernier et al., 2010) play critical roles in parenting behaviors where variations manifested even among typically developing individuals. Both PM and parental EFs have been explored in relation to parental sensitive responsiveness and parental scaffolding/support for autonomy (John, Oztachtaci, & Tarullo, 2018; Lee, Baker

& Whitebread, 2018; Shaffer & Obradovic, 2016; Distefano et al., 2018), and recently, some studies have started to explore some theorized links between these two functions (Turner, Wittkowski, & Hare, 2008; Rutherford, Byrne, Crowley, Bornstein, Bridgett, & Mayes, 2018). However, the available literature pertaining parental mentalization and parental EFs in relation to parental behaviors are few and lack initial organization.

Therefore, the intent of this paper is to introduce the model followed by an overview for the four parental constructs: parental sensitive responsiveness and parental scaffolding/support for autonomy, parental mentalization, and parental EFs by linking parental behaviors theoretically to parental mentalization and parental EFs. Then, a special section explains the theoretical background that links PM with parental EFs. Following that, the paper will critically explore studies that investigate the relationships between 1) parental mentalization and parental behaviors, 2) parental EFs and parental behaviors, and 3) parental mentalization and parental EFs, each among mothers of preschoolers three to five years old and synthesize them to provide an initial revised evidence-based conceptual model. Lastly, it will conclude with a discussion that summarizes supported links in the model and highlights the existing gap in the literature and limitations upon the constructs and measures.

Conceptual model

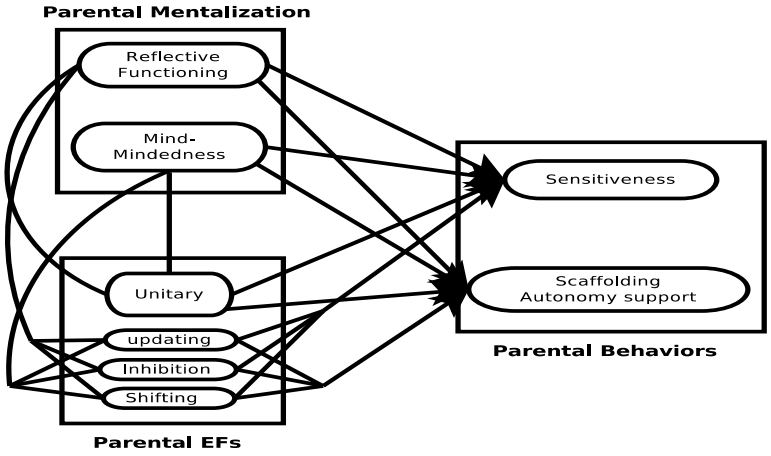

Figure 1. Proposed conceptual model

The interplay of the main constructs included in this review is illustrated through the conceptual model on figure 1, which builds on Belsky's (1984) theoretical notion that multiple pathways and factors influence parenting behaviors (Cicchetti & Rizley, 1981; Gonzalez, 2015). However, this model aims to take a

step further and capture 1) the specific associations between two parental mechanisms (parental mentalization and parental EFs) and two parenting behaviors (parent sensitivity, and parental scaffolding/support for autonomy) that manifest through parent-child interaction, and 2) the relationship between the two parental mechanisms and their subconstructs of parental mentalization (PRF, MM) and parental EFs (unitary, updating, inhibition, and shifting).

Overview of the Main constructs

1. Parental Behaviors, Parent-Child Interaction

Again, the two parental behaviors and the optimal outcomes for this model, were chosen and recognized for their association with children EFs and their important role in promoting school readiness and later academic performance among preschool children (Bernier et al., 2010). Parental sensitive responsiveness refers to responding appropriately and consistently to the child's signals or demands (Bernier et al., 2010). And parental scaffolding/ support for autonomy refers to the act of providing a child with an age-appropriate problem-solving activity and helping him/her as the task gradually increases to beyond his/her independent capability (Bernier et al., 2010; John et al., 2018), and refers to providing a child with an active role during playing that successfully led to task completion through scaffolding and respecting his/her rhythm (Bernier et al., 2010). Responsive parents gradually equip their children with the tools to self-regulate, the foundation of EFs skills, while parents who provide their children with age-appropriate solving-problem or learning experiences facilitate EFs skill development.

Both parental behaviors have been assessed through observing the interaction between a parent with a child while engaging in different tasks. For preschool-age children, many different validated scales have been implemented to evaluate parental sensitivity and parental scaffolding/support for autonomy including but not limited to: contingent responsiveness demonstrated through parents' sensitivity and prompt responsiveness to child cues, verbal and physical scaffolding in which parent guides child's learning by providing meaningful language, actions, and helpful hints that promote their skill development, and autonomy support expressed through parent giving choices, being flexible, encouraging and praising when needed, and finally follow the child's pace (Distefano et al., 2018; Merz, Landry, Montroy, & Williams, 2017).

In the conceptual model, two parental mechanisms are theoretically proposed to be associated with the varied demonstration of parental sensitivity and parental scaffolding/support for autonomy among parents of preschool

children. To enhance the clarity of those proposed links, theoretical justifications are provided and accompanied with definitions and approaches to assess each construct.

2. Parental Mentalization (PM)

Parental mentalization is the first parental mechanism proposed to influence both parental behaviors. PM is based on mentalizing theory (Fonagy, Steele, Steele, Moran, & Higgitt, 1991; Ensink et al., 2015), which indicates that the capacity to understand one's own and others' mental states—intentions, feelings, desires, and thoughts—can help make sense of and be able to predict the action(s) of others (Slade, 2005). This natural and crucial capacity is reflected through two functions: the cognitive process that is similar to perspective-taking or metacognition, and the emotional process, which is the ability to hold or regulate thoughts or emotions (Slade, 2005; Sharp & Fonagy, 2008). Both mentalizing processes are necessary for sensitive and autonomy support interactions. While perspective taking would facilitate consideration about interpersonal and external thought and aid in understanding inner status, the regulation ability facilitates a parent being more responsive and non-reactive (Slade, 2005; Sharp & Fonagy, 2008).

To illustrate, when a parent has the capacity to think and reflect on their child's inner states (underlying intention, feeling, or thoughts) that result in their child's external behaviors, these thoughts and perspective taking will simultaneously help them to inhibit their spontaneous reaction and respond appropriately to their child's needs. Also, through reflection, knowing that these external behaviors may have some logical reasons behind them may lower the parents' tension and increase their capability to support and attend appropriately to their child's needs. This can be clearly depicted in a situation where, for instance, a child is trying to button his shirt but got frustrated for not being able to do so easily. A parent who thinks in terms of mental states and acknowledges the role of feelings and desires upon external behaviors will recognize the possibility for his child's tears (feeling frustrated from failing in the desire to accomplish a task) and where this understanding simultaneously could lower the tension associated with "crying behavior" and give the parent the opportunity to scaffold with some strategies, thereby guiding and supporting the child.

Broadly, parental mentalization encompasses two constructs: parental reflective functioning, and mind-mindedness. The two constructs may share the foundation of caregivers thinking about their child in terms of mental state,

which prompted some studies to mix these constructs without clarifications and interchange the terms (Luyten et al., 2017). However, the functions are distinct (McMahon & Bernier, 2017), as parental reflective functioning emphasizes the capacity to link child behaviors with his/her mental states while mind-mindedness has generally represented the frequency of mind-related comments. More details about the two parental mentalization constructs and their assessments are explained in the following.

2. 1. Parental Reflective Functioning (PRF)

PRF is the first parental *mentalization* construct I will introduce. The reflection capacity generally is influenced by childhood experience and environmental factors, however, Slade (2005) indicted that the parental reflective capacity is context- and relationship-specific, developing since pregnancy. It specifically refers to the caregiver's capacity to reflect on her own mental states and to view her child's behaviors in light of his or her mental states (feelings, desires, intentions or wishes). It also entails the caregiver's capacity to understand that both her own and her child's mental states are plausible to change and can shape their interaction as well as their interaction can influence both of their mental states (Luyten et al., 2017). Although this definition depicts a unitary capacity, recently PRF has received increased interest and number of advanced investigations, which have brought up another multidimensional approach to view and assess this construct (Suchman et al., 2010; Smaling et al., 2016; Luyten et al., 2017). More details about both views and the different approaches to measure PRF are in the following.

Parental Reflective Functioning Assessments

Thus far, there are two forms to assess parental reflective functioning: semi-structured interview and self-report questionnaire. The semi-structured interview, called the ***Parent Development Interview (PDI)***, measures PRF by inviting caregivers to provide a coherent description and representation of their current parenting experience with their child. The PDI (Slade, 2005) has a 45-items, takes 60-90 minutes to administer and involves intensive training for coding eligibility. The revised version of PDI-R has 30 items and several other translated versions exist, consisting of 20/22 items. The PDI specifically meant to reflect on the parent-child relationship by examining parent representation of themselves as a parent, their representation of their children, and their relationship with their children (Sharp & Fonagy, 2008). The PDI was originally designed to be analyzed for an overall score of parent reflective functioning, reflecting the unitary view of the construct. The overall scoring system ranges

from -1 to 9. -1 to 0, which is rare, reflects bizarre attribution of reflective functioning; 1 to 2 reflects limited ability to reflect; 3 to 4 shows the parent can acknowledge the mental state but inconsistently; 5 is considered the average; and a score of 6 to 9 reflects a high reflective capacity.

More recent studies, however, analyzed the PDI using a multidimensional construct approach with either a two-factor (self-focused and child focused) (Suchman, DeCoste, Leigh, & Borelli, 2010) or a three-factor (self-focused, child focused, and relationship-focused) (Smaling, Huijbregts, Van der Heijden, Van Goozen, & Swaab, 2016). Those modifications and new approaches are built on the theoretical notion that individual interpersonal and intrapersonal dimensions represented in the PDI could be associated differently with other parental mechanisms and behaviors (Suchman et al., 2010; Smaling et al., 2016). Notwithstanding the value of this multidimensional approach as it is possible that parental capacity to understand and reflect on their own mental states might dissociate from parental capacity to reflect on their child's mental states and might differ in levels. However, for a parent to be sensitively responsive and to demonstrate the scaffolding strategies, reflecting on their own, their child and the relationship in term of mental states are meaningful pathways to exemplify those practices.

The self-report questionnaire, called ***Parent Reflective Functioning Questionnaire (PRFQ)***, also follows the multidimensional approach while highlighting another set of factors. PRFQ measures PRF through caregivers rating their agreement with 18 phrases that represent three relative but independent factors: *pre-mentalizing modes* (inability to understand or pay attention to child's feelings or thoughts), *interest/curiosity in child's mental state* (parents interested in thinking about the child's feelings), and *certainty about the child's mental state* (accuracy regarding parents' thoughts about their child's feelings, intentions). PRFQ is easy to administer and intended to be used as a screening tool with parents of children birth to five years old (Luyten et al., 2017; Luyten et al., 2017). The PRFQ was developed based on both exploratory and confirmatory factor analyses, where each of the three factors is reflected in six items and scored on a seven-point Likert scale (Luyten et al., 2017).

Scoring low in pre-mentalizing mode (poor at identifying mental states), moderate in certainty, and high in the interest and curiosity would reflect a high parental reflective capacity, where a total score cannot be calculated as a means to reflect the multidimensionality nature of PRF, according to the developer of PRFQ. To justify, parents with high reflective functioning will be able to recognize

their child's external behavior derives from inner feelings or thoughts, moderately consider the opacity of their child inner state, and will have a genuine interest regarding the inner state of their child. The cognitive and emotional processes of those PRF factors could resemble the path of demonstrating sensitive responsiveness where a parent who understand that crying may be derived by an inner thought or feeling, but simultaneously moderately unsure of the exact states while having a genuine interest to know and comfort her child will be more likely to respond appropriately and in a timely manner. Also, a parent who tends to support her child's autonomy needs to address and be interested in the thoughts and feelings of her child engaging in tasks as a way to promote the child's capability. Therefore, the multidimensionality with these factors seems plausible to be associated with parental sensitive behaviors and parental scaffolding/autonomy support. Not to mention, differentiation among the PRFQ factors is probable as some factor could be more associated with parental sensitiveness than parental scaffolding

Comparing PRF assessments' forms and approaches

Both forms to assess PRF have some benefits. The interview form can capture at a deeper level the processes that indicate the reflection capacity via parents giving coherent responses that refer to both their own and their child's mental states and how reflecting on those inner feelings, intentions, and thoughts would affect their interactions and responses. The self-report form, on the other hand, can reduce the reliance on verbal ability which could indirectly influence caregivers' response which in turn could eliminate the coding error chances. However, while the interview could be time consuming, the self-report might not reflect the whole PRF capacity.

In addition, regarding the dimensionality of the construct, both theoretical approaches are valuable, but still need further validations. Using the PDI with the two/three factor analysis can help us specify and better understand the role of specific PRF factors on different dimensions of parental mechanisms and behaviors, but the unitary might be more meaningful as it meant to capture the whole capacity of PRF. On the case of PRFQ, all factors also seem important in relation to both of the parental behaviors, and not having a total score would not reflect the whole capacity of PRF. However, those factors reflect how parents view their child' mental states and are used as a screening tool, which also might further our understanding on how different representations of child would influence parental responsiveness and supportiveness.

2. 2. Mind-mindedness (MM)

MM is the second *mentalization* construct which refers to a mother's tendency to treat her child as an individual with his or her own mind (McMahon & Bernier, 2017). MM, similar to PRF, taps into parental representation of their child. However, MM refers specifically to the verbal interpretation of a child's behaviors that capture mother's attunement of her child's mental states, which include emotions, motivations, and goals (McMahon & Bernier, 2017). Those verbal interpretations could indicate the representation the parents have in their mind regarding their child's mental states, which is similar to PRF in terms of the emotional and cognitive processes which underlay the representation and promotes their sensitive responses and autonomy support.

Mind-Mindedness Assessments

MM also has two forms/approaches to assess its construct. The first is a verbatim transcript of a 20-minute videotaped **observation** for a parent and his/her child, usually in a play context. The observation scores based on the frequency of the parent's comments that address his/her child's mental states, so any comments that refer to the child's feelings, wishes, thoughts, and intentions would capture the spontaneous reflection of the caregiver's mentalizing capacity. These mental-related comments are then dichotomously classified (indicate an accurate reflection of child's feelings or thoughts) or non-attuned (indicate a misinterpreting of child's feeling or thoughts) which are then calculated proportionally. Using more of the appropriate comments than the non-attuned would classify as a high MM. This observational approach is plausible to especially capture the link between MM and parental sensitivity where the attuned and appropriate comments fall closely similar to the criteria of responding sensitively and appropriately to child's needs. It is possible that a parent who recognizes and interprets a child's behavior in terms of mental states with high accuracy is more likely to be sensitive and curious to respond to her/his child's needs.

The second approach is the **interview,** in which the parent is asked to describe his/her child in five minutes and the verbatim responses are analyzed. Those descriptors are initially coded in four categories: temperament, physical, general, and mental; only the mental descriptors would count as MM comments (McMahon, Bernier, 2017). However, as the mental descriptor seems still broad, a group of researchers created new coding system called *valence* where the descriptors are classified into a more in-depth representation of parent mentalizing his/her child: positive, neutral,or negative (McMahon & Bernier, 2017),

highlighting the role of parental attitudes toward child's behaviors and intentions (McMahon & Meins, 2012). Referring positively to child's mental states can indicate a status of positive affect toward the child which increases the likelihood to respond sensitively to child's needs.

Comparing MM assessments approaches

The two approaches to measure MM are distinct and more likely to capture different aspects of MM. A big difference between both approaches is that although there is no clear guidance regarding the age range for each, the observational approach is usually administered in infant and toddler studies while the interview approach is in preschoolers and older age studies. Also, the observation is an online tool and seems to capture the in-the-moment capacity, reflecting closely the real-life parent-child interaction. On the other hand, the interview, although validated, is an offline tool and may miss the depth and representation depicted via observation. In addition, the two coding systems for both approaches are different. In the interview, the valence coding system considers whether the mental state comment is positive, neutral or negative, rather than the accuracy of the mental state comment which the appropriate/attune factor is targeting in the observation approach. This leads to the assumption that each assessment approach may tap on different perspectives and yield different results. However, viewing the child's mental states negatively could be comparable to non-attuned comments in the observational approach, so when the parent refers to child's mental states in a negative way there is a chance to be biased and inaccurate.

Along with exploring different theoretical views and approaches to assesses the two constructs of parental mentalization, and how in general this social cognitive parental mechanism could influence parental behaviors, emerging interest to investigate another underlying parental cognition capacity, such as parental executive functioning, seems promising. This could be associated with both the parental mentalization and parental behaviors. The literature is full of different theoretical models defining general EFs, however, it is still lacks regarding those functions within parental contexts and is disorganized, especially in relation to parental sensitive responsiveness and parental scaffolding behaviors. A comprehensive overview of the parental EFs construct's definitions, views and approaches to assess will be justified.

3. Parental Executive Functioning (EFs)

Parental EFs is the second parental mechanism construct that proposed to be associated with parental sensitive responsiveness and parental

scaffolding/autonomous support. The general construct of EFs refer to a set of higher-level cognitive processes with the main purpose of enabling the individual to regulate his/her actions and thoughts through influencing the lower-level processes (Friedman & Miyake, 2017), and in parental context, facilitating attainment of caregiver's daily tasks and interactions with her/his child. With literature full of functions identified as EFs (working memory, shifting, inhibition, planning, etc), three main approaches indicated to assess parental EFs construct/s.

Some scholars approach EFs as a unitary construct, which indicates that the functions are inseparable—a combination of cognitive processes that develop with the same capacity level within an individual—and thereby should be assessed through a task that integrates all functions at once (e.g. Carlson, Mandell, & Williams, 2004; Friedman & Miyake, 2004). Others view EFs processes as being dissociable, meaning that each function could be at a different capacity within an individual and hence should be assessed separately (e.g. Diamond, 1991). For example, a mother could be having a high working memory, enabling her to hold and manipulate information related to her child's needs, but simultaneously could have low inhibition ability that disables her from holding her immediate negative response to her crying child. For this dissociable approach, therefore, implementing only one integrative task to assess all functions dependently could provide misleading findings.

The third group of scholars proposed an integrative framework that fostered further investigations using an exploratory and confirmatory factorial analysis. Both of which support partially the first and second theoretical views by integrating them and emphasizing the capacity of the executive functions' similarity to some degree, and simultaneously, that it is also possible for some individuals to have a higher capacity on one function than the other (Garon, Bryson, & Smith, 2008; Miyake et al., 2000; Friedman & Miyake, 2017). This approach, however, only includes three core functions that identify frequently in parental contexts. The first is updating/working memory, referring to the ability to hold, manipulate, and update tasks on mind. The second, inhibition, restrains and holds immediate responses. Shifting, the third core function, refers to intentionally switching from one task to the other following external feedback.

Parental Executive Functioning assessment

Before exploring tools used to assess parental EFs as either unitary or dissociable, it is important to evaluate the common two forms: performance-based or behavioral self-report-based assessments. Both forms have been used

among clinical and non-clinical populations, where a greater ecological validity was reported for the self-report assessments, indicating levels of propriety to be used within parental context. However, Buchanan (2016) argued that self-report assessments might not be valid among non-clinical populations as we might think due to high association between EFs scores based on self-report and some personality characteristics (neuroticism and low conscientiousness), while there was no association with EFs based on the performance. Some explanations could be that some of those EFs self-reports share some variance with personality constructs (reflecting personality rather than capturing the EFs exclusively), or it could be that individuals with—for example—a conscientious personality are perceiving themselves negatively (awareness of personal mistakes influences personal perception).

Notwithstanding Buchman's argument, he also emphasized that these indications are held accurate only for the EFs self-reports used in his study. Therefore, both forms will be introduced in the following to address both arguments. Not to mention, with the literature full of EFs assessments, the review will include only tools that are used and reported frequently within parental contexts and capture the three executive functions (working memory/updating, inhibition, and shifting). The tools will be organized in two sections based on their approaches: the dissociable (a task for each function) and the unitary (all functions are assessed at once). Also within each section is a classification based on their formats (performance-based versus self-report behavioral tool). An evaluation and comparison for the included tools will also be discussed.

Dissociable tool*:*

1. **Performance-based assessments**

The Stroop Task (Stroop, 1935): An EFs measure used to assess the **inhibition** function. The task is suitable to be used with individuals aged 15-90. In this task, parents will be asked to name the word, which is either "red," "blue," or "green," where these words are written in different colors, too. The score is calculated by subtracting the responses for incongruous trails (when text does not match the color) from the congruous trails (when text matches the color). Therefore, the parent's ability to intentionally ignore the strong appeal to reading the word and say the name of color could depict their ability to intentionally inhibit some automatic negative responses.

Backward Digit Span *from Wechsler Adult Intelligence Scale* 4th edition (L-NS,WAIS) (Wechsler, 2008): An EFs measure used to assess the

updating/working memory function for individuals aged 16-90. This task was found to be consistently related to parenting (Mazursky-Horowitz et al., 2018) as parents need to consistently monitor and update their minds during their daily caring tasks and fulfilling their own and child's needs. This ability, thus, could be captured through presenting parents with increasingly longer series of numbers and asking them to repeat the series of numbers back to the researcher. Being able to remember and manipulate the old series with the new series and repeat it backward again requires holding the new series in mind and manipulate the reading perspective from forward to backward. In this task, higher updating/working memory is based on their raw t-score and their longer spans of recollection.

Dimensional Change Card Sort **(DCCS)** (National Institutes of Health Toolbox Cognition Battery, or NIHTB-CB; Zelazo, P. D., 2006): The computerized DCCS is recognized in the literature as a tool to assesses **shifting** ability for individuals aged 7-85 (although it possibly requires some updating and inhibition control abilities). In the DCCS, parents are presented with pictures of various shapes and colors. Before each trial, a direction pops up saying "shape" or "color" for the participant to sort correspondingly. In this task, parents need to switch mentally from sorting based on shape or color, a core ability that facilitates mentalization and scaffolding behaviors where mothers are required to switch back and forth from her own needs and feelings to her child in order to effectively care, interact and support her child's learning and autonomy. The score in DCCS is based on accuracy and reaction time, where the age is adjusted and a score of 100 represents an average performance.

2. Self-report-based assessments

The Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A) (Roth, Isquith, & Gioia, 2005) is a valid self-report questionnaire designed to assess several components of EFs for individuals aged 18-90. It has 75 items divided into nine subscales. As mentioned above, the main reason to administer the self-report tool when assessing parental EFs is to increase the ecological validity, and BRIEF-A luckily has three subscales where the criteria of each subscale closely resembles its match of the three parental EFs functions targeted in this review: inhibit for inhibition function, shift for shifting function, and working memory for updating/working memory function.

Unitary tool:

1. **Performance-based assessments**

Minnesota Executive Functioning Scale™ (MEFS™) (Carlson & Zelazo, 2014): An adaptive, virtual card-sorting task delivered on a tablet to assess the **unitary** construct of EFs (inhibition, working memory, and cognitive flexibility). Used for children above the age of two and adults; it has five age-based introductory levels, and implements a standardized age-based score. When MEFS is used with adults, he/she will be invited to play a task-like game starting at the fifth level (the highest introductory level), where the researcher introduces the task and starts the first practice. The task will include showing two boxes and covered cards where the player will be asked to sort them based on the rules showing in the top of the screen. If the adult is literate, he/she can complete the task until he/she either progresses through the highest level (with more difficult rules), or keeps failing until the game is over. The scoring system is based on reaction time and accuracy. MEFS is easy to administer (takes 7-10 minutes) and provided in many languages, but requires short training for the assessor and needs contracts with the developer to be used.

The Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A) (Roth et al., 2005) can also be used to assess the unitary construct of parental EFs. The unitary construct can be represented by a summary of all subscale scores to reflect the global EFs composite where the internal consistency was high (Cronbach's alpha .96 to .98). Another way to assess the unitary construct to reflect the elements in the unitary and diversity model can be through calculating a summary of only the three functions (inhibit, shift, and working memory), however, it has not been validated yet.

Comparing parental EFs assessment approaches and forms

As it has been discussed through the above section, both the self-report and the performance-based tools seem valuable to use within parental context. Also, in this review, adapting the unitary and diversity model via implementing unitary and dissociable tools are beneficial for two reasons. First, the three EFs seem to be strongly relevant with varying degrees to parents being sensitively responsive and being able to demonstrate scaffolding practices. The second is regarding the structure of the model where it is possible that mother's daily tasks and interactions with her child required the reliance on all functions at once, depicting the effective integration of those skills. On the other hand, it is also possible that different EFs processes will be differentially related to the two parental behaviors and parental mentalization as well. For instance, parental

inhibition is important for mother being able to respond sensitively and appropriately to a distressed child. Also,updating might be especially important for parental mentalization as updating refers to holding and manipulating information in mind, while in parental reflective functioning, parents need to have both her own and her child's mental states and behaviors in mind to facilitate interactions and the accomplish other tasks. Therefore, incorporating both the unitary and the dissociable views via assessing all functions at once and each separately may further clarify the theorized association in this review. The theorized justification will further discuss the proposed link between parental mentalization and parental EFs.

4. Parental mentalization and parental EFs-association

Theoretically, the processes of both constructs align with each other. While the main purpose of the set control process of EFs is to regulate one's thoughts and behaviors (Miyake & Friedman, 2012) which require coordinating responses of both emotional and cognitive processes (Decety & Jackson, Sommerville, Chaminade, & Meltzoff, 2004), parental mentalization also involves an emotional process akin to holding and regulation, which then aims to reduce reactive responses, as well as foster a cognitive process akin to metacognition about thought and internal state (Slade, 2005; Sharp & Fonagy, 2008).

In addition, those constructs seem to share a bidirectional relationship with two theoretical justifications. First, it is assumed that being able to reflect on mental state will empower parental EFs, and vice versa. According to Zelazo (2015), reflection is the precursor of EFs, as both require intentional effort. This can be demonstrated when parents reflect on their own and their children's mental states and simultaneously acknowledge the internal and subjectivity of their contexts, which in turn facilitates the inhibition processes. Parents, then, will be able to manipulate information using working memory and switch their focus from external behaviors to internal, such as desires, feelings, or thoughts. On the other hand, it has been theorized that parental mentalization has four dimensions: automatic versus controlled, mentalizing regarding self versus others, external versus internal, and cognitive versus affective (Luyten et al., 2017). Maintaining a good balance of these dimensions would demonstrate an efficient capacity of mentalizing (Luyten et al., 2017). Thus, for parents to be able to regulate their thoughts and emotions so they can acknowledge the child's perspective, they need sufficient shifting capacity (Gonzalez, 2015). Having higher self-control also facilitates reflecting on thoughts and feelings, especially within distress contexts (Gonzalez, 2015). For example,

when a parent is encountered with challenging behaviors, with high self-control, they will be less reactive and more responsive, simultaneously enabling the capacity to mentalize, and consider internal reasons behind such action(s).

Second, the bidirectional relationship between these two constructs can be depicted through how the parental mentalizing capacity is assessed, which is (in the PDI) by the degree the caregiver gives coherent and appropriate representation of his/her and his/her child's mental state (Slade, 2005; Zeegers, Colonnesi, Stams, & Meins, 2017). Parents' ability to reflect on the interaction and relationship with his/her child while attending to mental state requires the use of working memory, as this holds and manipulates the inner intentions, feelings, or desires with the external conducts. Also, this process entails shifting ability - where the parent switches his/her thoughts in an organized way between internal and external, his/her own, and his/her child.

In addition to the PDI, the three-factor construct of reflective functioning capacity (pre-mentalization, curiosity/interest, and certainty about child mentalization) (Luyten et al., 2017) also highlights the influence of mentalization on other cognitive and emotional processes. Luyten et al. (2017) claimed that the essential aspects of parent reflective functioning is the understanding of the primary affect state and the link between affect, body, behaviors, and self-experience. Parents need to be able to intentionally consider the internal state through acknowledging the subjective aspects of these thoughts and feelings with the possibility of various interpretations. To have a high reflective functioning capacity, parents need to imagine the mental state (Slade, 2005; Luyten et al., 2017). This ability, in turn, would help parents consider that their child may experience some feelings that influence his/her expressed behaviors and simultaneously help them regulate their emotions and inhibit any intrusive reactive thinking or actions (Slade, 2005). In addition, the moderate level of uncertainty assumed to trigger a reflective process activates the high-effort processing of information, which in turn facilitates the maintenance of information actively in mind to formulate more action-oriented processes that allow for more cognitive flexibility/shifting and inhibition control (Zelazo, 2015). Being very certain about a child's mental state, on the other hand, could hinder these processes and be marked as a sign of being unable to enter the child's subjective world (Luyten et al., 2017). Finally, having a genuine interest and curiosity in the internal state of the child while recognizing the opacity of mental state would infer a competent mentalizing capacity (Luyten et al., 2017).

Literature review

A theory is still a theory until it is evaluated and empirically tested. Therefore, in the following section, I will provide a comprehensive review for studies that explored the proposed links in Figure 1: 1) parental mentalization in relation to parental sensitivity, and parental scaffolding/autonomy support, 2) parental EFs in relation to parental sensitivity, and parental scaffolding/autonomy support and 3) parental mentalization in relation to parental EFs. The inclusion criteria will be 1) parents of preschool-age children aged 3-5, 2) assessment of mentalization using Parent Development Interview (PDI), revised (PDI-R), revised 2 (PDI-R2); Parent Reflective Functioning Questionnaire (PRFQ), Mind-Mindedness Interview (MMI), and Mind-Mindedness Observation (MMO). Further criteria include 3) assess one or all of the EF skills (inhibition, shifting/cognitive flexibility, and updating/working memory), and 4) assess all or any of these parental behaviors of sensitivity and scaffolding/autonomy support.

1. Parental Mentalization and Parental Behaviors (parental sensitivity, and scaffolding/autonomy support)

While no study—to my knowledge—has looked into links between parental reflective functioning and the targeted parental behaviors among parents of preschoolers, five studies examined mind-mindedness in relation to parental sensitivity, and support for autonomy (Colonesi, Polanen, Tavecchio, & Fukkink, 2017; Lok & McMahon, 2006; McMahon & Meins, 2012; Tharner, Altman, & Vaever, 2016; Lundy & Fyfe, 2016), the first of which was conducted in a childcare context. Colonesi et al. (2017) investigated the capacity of thirty-four caregivers (half male, half female) to attune to preschool children (average age 36.15 months) that captured through referring to different aspects of mental states in relation to the caregivers' support for autonomy and sensitive responsiveness. Those caregivers were assigned a child whom they have been with for least 32.93 months. Using the observational approach for MM and the validated Caregiver Interaction Profile Scales—sensitive responsiveness and respect for autonomy scales—caregivers' appropriate mind-related comments were positively associated with their support for autonomy, but moderately associated with sensitive responsiveness (Colonesi et al., 2017).

Sensitive responsiveness captured through a puzzle task for parents and their children was also not associated with maternal descriptors (MMI) using the standard coding system—mental state-related vocabulary within parental context (Lok & McMahon, 2006; McMahon & Meins, 2012). However, in

McMahon and Meins (2012), the new coding system *valence* was used where the comments (regarding the mental state) were divided (as positive, neutral, or negative). Surprisingly, once the positivity of such comments was accounted for, a positive association was found (McMahon & Meins, 2012).

These conflicts in findings using the MMI with different coding systems could lead to a rationale for more research examining the link between parental descriptors of mental state—MMI—and sensitive parenting among parents of preschool children, considering that MM—only when using the observational approach,not the interview—was associated with parental sensitivity among parents of infants (Rosenblum, McDonough, Sameroff, & Muzik, 2008; Bordeleau, Bernier, & Carrier, 2012) and could also pertain to parents of preschoolers. These deviations, however, opted for three possible explanations. First, it could be that MMI lacks its validity capturing parents having their children in mind, "mentalization," in which it would require certain cognitive and emotional processes highlighted as the function of parental mentalization. However, this may not be the ideal explanation as recent evidence investigated the link between the MMI-offline and MMO-online among both parents (Tharner et al., 2016) or only fathers (Lundy & Fyfe, 2016) and found positive associations between parental MMI descriptors and MMO comments relating to their preschool children's mental states. Nor would it be a concise explanation as the MMO was associated with parental sensitive responsiveness among parents of infants.

The second explanation for such conflict could be that using a specific descriptor of mental state—appropriate versus non-attuned, or the valence—is what matters in MMI and thus shows higher association with parental sensitive responsiveness. It is also possible that parents of preschoolers support their children's autonomy more than responding attentively and sensitively, acknowledging the developmental characteristics and needs of this age. In this regard, Lundy and Fyfe (2016) examined parental support for autonomy and scaffolding behaviors in relation to MMI and MMO within the context of parent-child interaction. Thirty-six mothers whose child's average age was 4.05 were invited to participate on MMI, and a puzzle task observation that coded for MMO, and support for autonomy. Comments are considered MMO when they refer to appropriate, current child-thinking processes. Those appear to scaffold the child's mental perspective taking or the child's emotional processes, while comments classified as promoting autonomy refer to parent encouragement for the child to take some responsibility to figure out the next step of problem

solving. The puzzle task captured maternal use of mental descriptors (MMI) when describing her child and her use of mental-related comments (MMO) was positively associated with her support for autonomy (Lundy & Fyfe, 2016). Thus, although this could be the unique study that investigated the link between parental descriptors in relation to parental mental state comments and comments that infer support of autonomy, it confirms the eligibility of using MMI with parents of preschoolers to predict other parental factors.

2. Parental Executive Functioning and Parental Behaviors (parental sensitivity, and scaffolding/autonomy support)

Parental EFs have been examined in relation to a wide range of different parental behaviors, however only four studies have directly examined the association between parental EFs and parental scaffolding (John et al., 2018; Lee, Baker & Whitebread, 2018), parental sensitivity and autonomy support (Shaffer & Obradovic, 2016), or parental support of autonomy (Distefano et al., 2018) among parents of preschool children. John et al. (2018) investigated the link between parental EFs (shifting/cognitive flexibility, inhibition, and verbal fluency) using performance-based tools and parental scaffolding behaviors captured through a videotape observation of parents playing challenging puzzles with their children. Among typical mothers and their child (average child age 49.30 months old), 56% were white and 81% had at least four years of college degrees. Above and beyond parental verbal fluency, parental inhibition and shifting abilities contributed to their scaffolding behaviors (John et al., 2018). Parents who scored high at inhibition and better attention flexibility showed more appropriate and effective scaffolding behaviors (John et al., 2018).

Similarly, parental inhibition ability, but not shifting, was also associated with a composite factor reflecting parental sensitive responsiveness and support of autonomy among diverse caregivers in terms of race, education, and income, where the majority were mothers (Shaffer & Obradovic, 2016). In this study, both inhibition and shifting assessed through performance-based tools and caregivers' sensitive responsiveness and support of autonomy were captured through a videotaped observation entailing five parent-child different tasks (e.g. free play, challenging game, and clean up). It is important to mention that parent sensitivity and autonomy support were coded using a composite score reflecting a factor that entailed three strongly correlated dimensions: sensitive responsiveness, autonomy support, and quality of assessment (Shaffer & Obradovic, 2016).

On the other hand, autonomy support captured through a videotaped observation for a dyadic puzzle task was recently discovered to be highly associated with the unitary construct of parental EFs using MEFS (Distefano et al., 2018). Autonomy support coding was based on these coding items: intervening based on child's needs and providing optimal challenges, the extent of which the parents provide appropriate hints and suggestions, flexibility and empathy to the child's perspective while engage him on tasks, and to what extent a parent provides the child with choices and gives them active roles (Distefano et al., 2018). These clearly integrated some scaffolding functions as being part of the supportive behaviors.

To summarize, investigating the link between parental EFs and parental behaviors highlighted three themes. First, Distefano et al. (2018) found that the working memory, shifting, and inhibition assessed as a unitary construct was highly predictive of parents' support for autonomy behaviors. This relationship exists and accounts for family income and education level. Second, some EFs components assessed individually were also associated with some parental behaviors, where inhibition ability was associated with support for autonomy, parental sensitive responsiveness (Shaffer & Obradovic, 2016), and scaffolding behavior among mothers (John et al., 2018), while higher shifting ability was associated with more parenting scaffolding behaviors (John et al., 2018; Lee et al., 2018). The third, in contrast, found that some components of EFs assessed individually were not associated; Lee et al. (2018) found that parental working memory and inhibition were not associated with parental scaffolding behaviors. Also, Shaffer and Obradovic (2016) found no association between shifting a factor that includes parental sensitive responsiveness and support of autonomy.

The variations in findings could be affected by the coding system used to capture parental behaviors, which appeared to not be sensitive enough to capture individual behavioral constructs as the one used by Shaffer and Obradovic (2016). The variations also may indicate that cultural values and perspective is something to consider when assessing different aspects of EFs (Lee et al., 2018). However, this conflict in those recent and similar studies could lead us to research further using both unitary and dissociable components of EFs in relation to sensitive parenting, scaffolding, and support of autonomy among parents of preschool children.

3. Parental Mentalization and Parental Executive Functioning

Studies that looked into parental mentalization in relation to parent EFs is limited. Only one published study, to my knowledge, examined the link between the unitary construct of parental reflective functioning (PDI-R2) and the components of parental EFs (working memory, cognitive flexibility, inhibition, and planning and verbal fluency) among mothers of children aged 18 months to four years old who reported a substance abuse disorder, and have diverse background where 51% were single (Hakansson, Soderstrom, Watten, Skarderud, & Oie, 2018). Among this clinical population, parental reflective functioning was associated with working memory, cognitive flexibility, inhibition, and planning, however, no unique contribution of any EFs was found in parental reflective functioning after controlling for mothers' IQ and mental health (Hakansson et al., 2018). Additionally, no association was found between parental verbal fluency and parental reflective functioning, which indicated that responding to the PDI is not necessarily influenced by verbal ability, as some would propose. Moreover, when mothers divided into two groups based on their reflective capacity, mothers with lower capacities were found to have more deficiencies in their working memory and planning skills, while mothers with higher capacities had more strength in their cognitive flexibility (Hakansson et al., 2018).

The associations reported by Hakansson et al., (2018) are similar to preliminary findings from a pilot study conducted among non-clinical low income mothers of children aged 18 months to five years old (Altwijri, Hatton-Bowers, Raikes, Esteraich, & Yao, in progress). However, it examines the unitary construct of EFs (MEFS) in relation to the multidimensional construct of parent reflective functioning (PRFQ). Thus far, mothers with low EFs report higher pre-mentalizating modes (inability to understand or pay attention to their child's feelings) and high levels of certainty about their child's feelings and mental states.

These associations are still preliminary and need further investigation considering the lack of studies of parents of preschoolers and highlighting the possible difference among parents across developmental stages. It is worth noting, however, that parental interest and curiosity in mental state (factor) showed no association with the unitary construct of parent EFs among this population, while two recent combined studies have reported that higher interest and curiosity in infant mental states was associated with higher working memory and shifting abilities (Rutherford et al., 2018). Although these studies differ in terms of the population and constructs used regarding EFs, parents

reporting more curiosity on the child's feelings and thoughts could be an important matter during infancy than preschool stage. Communication skills develop during the preschool stage which can facilitate the parent knowing about their children's thoughts and feelings and simultaneously lowering the cognitive effort required; while in infancy, where the major reliance on fulfilling the basic needs of "nutrition, sleep…etc," differences in EFs are sensitive and could require more effortful ability.

Discussion

This paper aimed to explore the proposed role of parental mentalization and parental EFs on parental sensitiveness and parental scaffolding/autonomy support. Also, it intended to explore the relationship between parental mentalization and parental EFs. The significance of exploring the underlying mechanisms that influence parental behaviors is further supported by evidence that predicts child developmental outcomes (Carlson, 2003; Brenier et al., 2010). In Figure 2, the conceptual framework is adjusted based on the review of the literature. The solid line refers to supported links, and the dotted lines refer to partially supported links or studies with conflicting findings, and no line for unsupported links or no supporting research.

After review of the literature regarding parents of children aged three to five, about six empirical studies showed supported findings (Lundy & Fyfe, 2016; McMahon & Meins, 201; Distefano et al., 2018; Shaffer & Obradovic, 2016; John et al., 2018; Lee et al., 2018), so we know that MMI descriptors and MMO comments as indicators of parental mentalization were positively associated with parental support for autonomy (Lundy & Fyfe, 2016) and with sensitive responsiveness, especially when those mental-related comments are stated in a positive way (McMahon & Meins, 2012). Also, parental EFs, the unitary construct and the individual components of parental EFs-inhibition and shifting functions were found to be highly associated with parents providing more autonomy support to their children (Distefano et al., 2018; Shaffer & Obradovic, 2016), and more parental scaffolding behaviors (John et al., 2018; Lee et al., 2018).

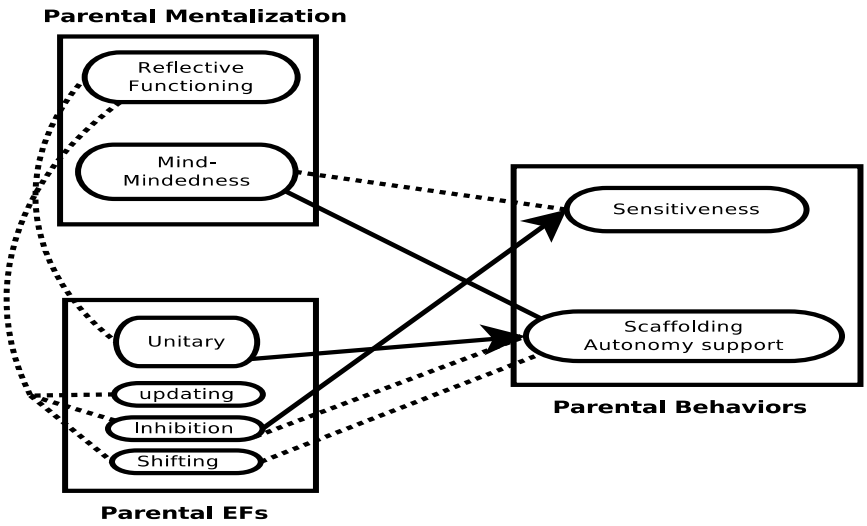

Figure 2. Adjusted conceptual model based on the literature review

Despite these promising findings, the literature is still poor in providing a clear distinction between parental mentalization constructs, and its assessments still lack clarity. No empirical studies have distinguished how MMI differs from the unitary parental reflective functioning (assessed by PDI) as being a separate construct or just a measurement artifact, where both are offline assessments that aim to capture the capacity of the parent having a child in mind. In addition, it is still unclear how the unitary construct of parental reflective functioning assessed through PDI is associated with the multidimensional construct assessed through PRFQ, and how these three factors of PRFQ tap into to global parental reflective functioning. Thus, a further examination is needed.

The literature also still has not indicated clear links between parental reflective functioning and parental sensitivity and scaffolding as well as parental reflective functioning and parental EFs. For my knowledge, no study investigated the link between parent reflective functioning using either the PDI or PRFQ in relation to parental sensitivity, support for autonomy, or scaffolding behaviors during the preschool years and only one published study looked into the link between parent reflective functioning using the PDI and parental EFs, which was among clinical parents of preschool children. This study, however, found positive association between parental working memory, cognitive flexibility, inhibition and planning, but there were no unique contributions to parental EFs in parental reflective functioning when accounted for parental IQ and mental health. Thus, we still do not know if parents of preschool children with high capacity of

reflective functioning would respond more sensitively or will show more support of autonomy and scaffolding behaviors, and we cannot confirm the association between parental reflective functioning and parental EFs among non-clinical parents.

In addition, the associations found earlier between parental EFs and parental behaviors are still unclear as some studies reported some conflicting findings. While John et al., (2018) reported that higher inhibition ability was associated with more parenting scaffolding behaviors, Lee et al. (2018) found no significant association. Therefore, we cannot yet conclude that higher parental EFs would be associated with more parental sensitivity or scaffolding, and further studies are needed.

Conclusion

Many studies that addressed the role of parental mentalizations, especially the parental reflective functioning in relation to parental behaviors and parental EFs, have focused on infancy and toddlerhood stage, and just recently, scholars have started to investigate those links among parents of preschool children. These investigations opted to uncover how social and cognition parental mechanisms interplay and also how they would facilitate a parent being sensitively responsive and demonstrating scaffolding strategies and supporting their preschool child autonomy.

Many questions have been raised for this review, and the mentalization constructs still need specification and clarification, especially regarding the unitary (PDI) and the multidimensional (PRFQ) constructs as how would they be related to parental EFs. There were only three studies that addressed the link between parental reflective functioning and parental EFs (using different components). These studies indicated significant associations, where in one study the PRF unitary assessed by the PDI found to be associated with parental working memory, inhibition and cognitive flexibility (Hakansson et al., 2018), and the other two studies found that higher interest and curiosity assessed by PRFQ were associated with higher working memory and shifting abilities (Rutherford et al., 2018), where these findings increase the likelihood association between the two constructs. However, this evidence is implicated on different populations (substance abuse and mother of infant), and also did not inclusively look at both the unitary and the multidimensional in relation to the unitary and diversity of the three components of parental EFs leaving some gaps to be investigated within typical populations.

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