

Contribution of parenting style and executive function of parents to the development of executive function of pre-school children in Minangkabau families

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KEYWORDS	ABSTRACT
Executive function Minangkabau Mother Parenting style Pre-school children	<p>Minangkabau is one of the largest ethnic groups in the Indonesian archipelago. Minangkabau cultural values still strongly influence the daily lives of people in West Sumatra including in terms of parenting. The parenting that is applied and how the characteristics of parents (parents' cognitive abilities) have a significant influence on children's development, especially executive function abilities that will facilitate children's abilities in terms of academics and in terms of adapting to various challenges so that they remain healthy, especially mentally. The critical and significant development process of the emergence of executive function (EF) occurs during pre-school age which is a period of development of brain plasticity. This study aims to measure how much parenting style and executive function of parents contribute to the level of executive function of early childhood in Minangkabau families. This study measured the level of parenting style, parental executive function, and executive function of children aged 2 years to 5 years 11 months (N=272) using the Parent Scale, The Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A), Behavior Rating Inventory of Executive Function-Preschool Version (BRIEF-P) based on parent reports. The results showed that in general, parents' Executive Function and Parenting Style significantly influenced children's Executive Function with a contribution of 12.1%.</p> <p>This is an open-access article under the CC-BY-SA license.</p> 

Introduction

Executive functions (EFs) are high-level cognitive processes (e.g., working memory, inhibitory control, and set-shifting) that emerge during early development (early childhood), and are fundamental to academic achievement and self-regulation (Suor, Sturge-Apple, Davies, & Jones-Gordils, 2019). With this ability, a person can retain information in their mind, control inappropriate responses, respond flexibly according to changing environmental conditions, and act according to direction and purpose (Zelazo et al., 2016). These mental processes are

needed by young children to be able to face new challenges, resist temptations and distractions, and use reasoning in solving problems (Diamond, 2013).

Executive functioning (EF) is related to various aspects of school achievement and cognitive development in children and adolescents (Sosic-Vasic, Kröner, Schneider, Vasic, Spitzer, & Streb, 2017). Empirically, studies have shown that children's EF is associated with both short- and long-term academic outcomes, including early math, language, and literacy skills in children (Blair & Razza, 2007; Fuhs, Nesbitt, Farran, & Dong, 2014; McClelland, Acock, Piccinin, Rhea, & Stallings, 2013; Schmitt, Geldhof, Purpura, Duncan, & McClelland, 2017). According to Semenov and Zelazo (2019), children who have good EF skills tend to perform better academically, learn more from the same amount of instruction and have better aspects of life (higher SES, lower criminality, better physical and mental health).

Well-formed EFs in early childhood (pre-school) are known to be predictors of children's future development (Kao, Nayak, Doan, & Tarullo, 2018). EF skills provide an important foundation for children's success in learning and adapting (Meuwissen & Zelazo, 2014), especially in preschool age which is a period of high cognitive plasticity (Cuevas et al., 2014; Bernier, Carlson, Deschênes, & Matte-Gagné, 2012; Farah et al., 2006). According to Cheng, Lu, Archer, & Wang, (2018), the development and construction of EF during the first 3 years of life is different from the following years, but it is important to remember that this period is recognized as a period of significant growth, which can be a helpful point in terms of measuring EF development in early life. Thus, it is best to measure EF when children enter preschool age, as preschool age is identified as a time when EF abilities develop rapidly (Garon et al., 2008). A supportive environment including sensitive and responsive parenting is key to success at this stage of development (Zvaraa, Keimb, Boone, & Anderson, 2019).

Family context is identified as an important predictor of children's EF development (Korucu, Litkowski, Purpura, & Schmitt, 2019). Previous research has found evidence that children's EF is related to parents' EF (Bridgett, Burt, Laake, & Oddi, 2013; Korucu, Litkowski, Purpura, & Schmitt, 2019), especially during early childhood (preschool) (Cuevas et al., 2014). Bridgett et al. (2018) conducted a study to examine the influence of parenting behaviors on children's EF development. The results showed that genetics and the socialization process (parenting behavior) uniquely contribute to the development of children's EF. This shows that parenting behavior contributes to children's EF which is also related to the EF abilities possessed by parents (Korucu, Litkowski, Purpura, & Schmitt, 2019).

During their interactions with their children, parents act as teachers who assist their children in acquiring higher-order cognitive skills, especially in tasks that require problem

solving. This process of parent-guided learning is most prevalent after the age of 2 years with the development of language skills encouraging children's capacity to internalize their parents' approaches to problem solving (Grusec & Davidov, 2010). In the process of parent-child interaction that involves this learning, parents indirectly facilitate the development of children's EF (Suor, Sturge-Apple, Davies, & Jones-Gordils, 2019). Although it is known that the relationship between parental EF and children's EF is due to genetic influences (Gagne & Saudino, 2010), it is also important to measure the role of parenting in the relationship between these two variables.

Parental characteristics play a significant role in shaping the family context and child development (Korucu, Litkowski, Purpura, & Schmitt, 2019). Several studies have examined which contexts of parent-child interaction are most closely related to children's EF development (Suor, Sturge-Apple, Davies, & Jones-Gordils, 2019). Based on the proximal regulation mechanism framework, Calkins (2011) explains how behaviors must be regulated within parents first before parents regulate interactions between themselves and their children. Parents who have low EF skills usually also have a parenting style that is less than optimal in their daily lives (Susic-Vasic, Kröner, Schneider, Vasic, Spitzer & Streb, 2017). However, from research conducted by Korucu, Litkowski, Purpura, and Schmitt (2019), although parental EF is related to children's EF, parental EF is not significantly related to parenting or parenting practices.

This difference could be influenced by cultural differences in the context of the families who participated in the study. From previous research, it is known that the parent-child relationship and its relationship with children's EF tend to be culturally sensitive (Portes et al., 2000). According to Farzand, Çerkez, and Çavuşoğlu (2017), culture is an important variable that affects parenting style. In other words, parents from different cultures may use different parenting styles. Hill (1995) said that the same parenting style can produce different effects on children in different cultures. Parenting style itself is a description of a parent's overall feelings about the child through body language, tone of voice, emotional display, and quality of attention (Baumrind, 1971).

One of the main tasks that children must learn during their psychosocial development is to voluntarily comply with the norms and rules of their cultural or social group. This is an implicit learning process where children learn from the process of imitation and habituation of behavioral patterns that exist in their culture. However, the process is largely guided by parents through parenting (Röttger-Rössler, Scheidecker, Jung & Holodynski, 2013). According

to Röttger-Rössler, et al. (2013), evaluating parenting practices based on American and European culture needs to be done from a cross-cultural perspective, because it may not be valid for other cultures outside of it because it is closely related to the cultural values that exist in a particular society.

This research was conducted on families from the Minangkabau ethnicity. The Minangkabau are one of the largest ethnic groups in the Indonesian archipelago (Sanday, 2002). They are well known by cultural anthropologists because they combine two seemingly antagonistic aspects of the matrilineal kinship system and the patriarchal concept of Islam (Blackwood, 1995). The Minangkabau are well integrated into the so-called "modern and urban" Indonesian society, and play an important role in the political, economic and cultural spheres of Indonesia (Röttger-Rössler, Scheidecker, Jung & Holodynski, 2013).

We chose this ethnic culture because of its uniqueness, especially in relation to the matrilineal family structure. Matrilineal means that kinship is determined by maternal descent and is therefore important for determining, for example, land use and ownership rights and inheritance. The main social unit in matrilineal kinship systems is the mother's "extended family" and the mother is usually the primary caregiver of the children in a family unit (Röttger-Rössler, Scheidecker, Jung & Holodynski, 2013).

Based on this, in this study, parental EF ability and parent-child interaction as seen from the parenting style displayed by parents will be seen from the mother's perspective. From the review conducted, mothers and fathers have different parenting styles towards their children (Putnam, Walls, Myers, & Dee, 2014). According to Cruz-Alaniz, Bonillo and Ballabriga (2018), mothers' EFs have a strong and significant relationship with parenting style, especially in negative parenting practices. Carlson (2003) states that maternal parenting contributes to the development of EF through 3 main aspects of interaction such as scaffolding behavior, stimulation, and sensitivity, and each aspect has a different effect on children's EF.

However, not many studies have examined which aspects of parental EF are significantly related to parenting that can support children's EF development. In addition, the influence of culture on parenting which will also have an impact on children's development also needs to be considered in choosing the cultural context of the family to be studied. Based on the explanation previously described, this study was conducted to examine the relationship between parental Executive Function (EF) and parenting style on preschool children's ability,

seen from the mother's perspective as a representation of parents, this study was conducted involving families from the Minangkabau ethnic group.

Method

This research is a quantitative approach to see the contribution of independent variables to the dependent variable with a series of hypothesis tests or explanatory research with regression analysis techniques. The type of research is correlational research where researchers want to see the contribution of parenting style and executive function of parents to the executive function of preschool children. The sampling technique was carried out using nonprobability sampling method, namely purposive sampling technique. The number of samples in this study was 272 mothers who have pre-school children (3-6 years). The research was conducted by distributing google forms on various social media and online communication by taking into account the characteristics of the research subjects. In addition, the research was also conducted in several institutions (PAUD, TK, etc.) that have been selected to coordinate and cooperate in collecting research data.

Parenting Scale was used to measure parenting style developed by Arnold, O'Leary, Wolff, and Acker (1993) which was later revised by Rhoades and O'Leary (2007) which consist of 30 items. Executive function of parents and children was measured with 2 different measurement tools. Parental executive function was measured using The Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A) scale. BRIEF-A is used to measure adult EF in daily life. BRIEF-A consists of 75 items scored on a scale of 1 to 3 (1 = never, 3 = always) (Roth, Isquith, & Gioia, 2005). Meanwhile, children's executive function was measured using the Behavior rating inventory of executive functioning-preschool version (BRIEF-P) scale. The BRIEF-P is used as a measure of parent reports of children's overall level of executive functioning. The BRIEF-P (Isquith, Gioia, & Espy, 2004) is a standardized rating scale designed to measure the range of executive functioning in preschool-aged children and has demonstrated reliability and validity for detecting EF deficits in children with risk factors or developmental disorders (Gioia, Isquith, Retzlaff, & Espy, 2002). The BRIEF-P consists of 63

statements about behaviors that may be problematic for some preschool-aged children (e.g., "Small events trigger big reactions")

Result and Discussion

1. Results

a. Demographic Data of Participants

Table 1. Demographic data of Participant

<i>Category</i>		<i>Percentage</i>
Mother's Age	18-29 years	11%
	30-39 years	74%
	40-56 years	15%
Children's Age	2 Years - 3 Years 11 Months	21%
	4 Years - 5 Years 11 Months	79%
Children's Gender	Male	53%
	Female	47%
Mother's Education	Elementary School	1%
	Middle School	1%
	High School	31%
	Diploma's Degree	4%
	Bachelor's Degree	53%
	Master's Degree	12%
Primary Caregiver of the Children	Doctoral Degree	1%
	Parents	6%
	Mother	84%
	Father	1%
	Grandmother	6%
	Aunt	2%

The number of participants in this study was 272 parents who have preschool children with an age range of 18-56 years. Most of the parents were 30-39 years old (74%), while the rest were 40-56 years old as much as 15% followed by parents aged 18-29 years as much as 11%. Then, most of the participants involved in this study had children aged 4 to 6 years, namely 215 people or 79%, while the remaining 21% had children aged 2 to 3 years and 11 months. The children's gender almost equal between boys and girls, 53% had boys and 47% had girls.

Participants in this study have a variety of education ranging from elementary school to completing doctoral education. Most have an undergraduate educational background, 53%, then high school by 30%, the rest have a master's education (12%), diploma (4%), junior high school (1%) and elementary school (1%). Based on the primary caregiver of the children, in

this study had the mother as their child's primary caregiver with a percentage of 84%, with the rest being cared for by both parents, and grandmother then father and aunt.

b. Profiling Mother's Executive Function, Children's Executive Function and Parenting Style

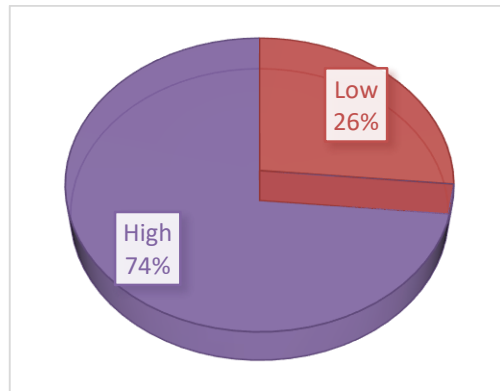


Figure 1. Preschool Children's Executive Function Profiling

From the results of the study, it was found that the distribution of the level of executive function in pre-school children in Minangkabau families. It can be seen from Figure 1 that most of the pre-school children involved in this study have a high level of executive function (74%). While those functioning at a low level only amounted to 26%

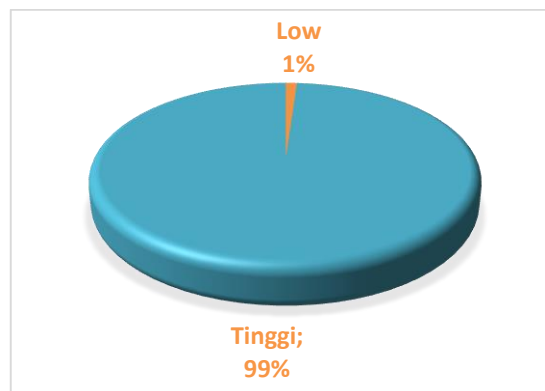


Figure 2. Mother's Executive Function Profiling

The next analysis was conducted to see the distribution of the level of executive function in mothers of pre-school children in Minangkabau families. From these results, it was found that almost all of them had high EF functioning (99%) (See Figure 2).

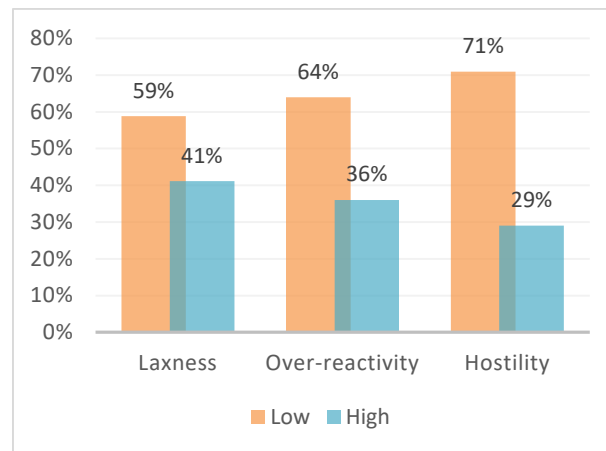


Figure 3. Parenting Style Profiling

From the analysis of parenting styles in this study, it was found that the degree distribution of the types of parenting styles used by parents who have pre-school children in Minangkabau families are Laxness, Over-reactivity and Hostility. In Minangkabau families, the parenting practices of both over-reactivity (64%) and hostility (71%) are low, as well as the level of laxness is low (41%) although almost balanced with high (59%). This shows that ineffective parenting styles in the parts of this study are low, or it can be said that more parenting practices are classified as functioning effectively.

c. Contribution of Parents' Executive Function and Parenting Style to Children's Executive Function

Table 2. Contribution PEV and PS to CEV

Model	R	R ²	Adjusted R squared	Estimation of standard error of measurement
1	.356 ^(a)	.127	.121	.414

Based on the table above, it can be seen that Children's Executive Function is 12.1% influenced by Parents' Executive Function and Parenting Style. Thus, it can be said that 87.9% of the child's Executive Function score is influenced by factors that are outside the research variables.

Discussion

The results showed a significant effect of parenting style and executive function of mothers on the executive function of pre-school children ($p < 0.001$). From the results of data processing, it is also found that parenting style and executive function have a contribution of 12.1% to the development of pre-school children's executive function level. This shows that the parenting style applied by parents and the level of executive function of parents (in this case, mothers) can affect how children's executive function develops, especially at a critical time, namely during pre-school age. As has been explained by several studies that pre-school age is an important period of executive function development (e.g.: Blair, Kuzawa, & Willoughby, 2020, Kim, 2017).

According to Blair et al (2020), children experience a significant and rapid increase in EF during the developmental period of preschool age, which is from 3 to 5 years old. Preschool age is recognized as a critical period for children's EF development (Kim, 2017). According to Cheng et al., (2018), the preschool age period has always been recognized as a period of rapid development in children, making it a helpful point to measure EF development early in life. Well-established EF in early childhood (pre-school) is known to be a predictor of children's future development (Kao, Nayak, Doan, & Tarullo, 2018). EF skills provide an important foundation for children's success in learning and adapting (Meuwissen & Zelazo, 2014), especially in preschool age which is a period of high cognitive plasticity (Cuevas et al., 2014; Bernier, Carlson, Deschênes, & Matte-Gagné, 2012).

The influence of parenting style applied by parents and the level of executive function in mothers on the executive development of pre-school children can be explained by several things. During their interactions with their children, parents act as teachers who assist their children in acquiring higher-order cognitive skills, especially in tasks that require problem solving. This process of parent-guided learning is most prevalent after the age of 2 years, as language development promotes children's capacity to internalize their parents' approaches to problem solving (Grusec & Davidov, 2010). In the process of parent-child interactions that involve this learning, parents indirectly facilitate children's EF development (Suor, Sturge-Apple, Davies, & Jones-Gordils, 2019).

Several studies have examined which parent-child interaction contexts are most closely related to children's EF development (Suor, Sturge-Apple, Davies, & Jones-Gordils, 2019). Based on the proximal regulation mechanism framework, Calkins (2011) explains how behaviors must be regulated within parents first before parents regulate interactions between

themselves and their children. Parents who have low EF skills usually also have a parenting style that is less than optimal in their daily lives (Sosic-Vasic, Kröner, Schneider, Vasic, Spitzer & Streb, 2017).

Less effective parenting styles are influenced by the mental health conditions of parents, especially mothers, who are also known to have an important role in the development of children's executive functions (Gueron-Sela et al., 2018; Hughes et al., 2013; Ku & Feng, 2021). Several studies have shown that depressed and anxious conditions in mothers have a negative impact on the development of children's cognitive function (Field, 2018; Kiernan & Huerta, 2008; Liu et al., 2017). Mothers who experience stress or depression tend to have an impact on parenting and decrease their sensitivity to children's needs (Ku & Blair, 2021). As has been found from several studies that quality and sensitive parenting from parents can provide many benefits to the development of children's executive functions (Bernier, Carlson, & Whipple, 2010; Brandes-Aitken et al., 2020; Fay-Stammach, Hawes, & Meredith, 2014).

Conclusion

The results showed a significant effect of parenting style and executive function of mothers on the executive function of pre-school children. From the results of data processing, it is also found that parenting style and executive function have a contribution of 12.1% to the development of pre-school children's executive function level.

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