

# The Relationship between Parenting Style and Children's Executive Function

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## Abstract

The family environment has a crucial influence on children's cognitive development. Parenting style refers to the standard strategies and patterns that parents use in their child-rearing, and the executive function (EF) of children terms a series of cognitive control capacities that contribute to individual achievements. The aim of this study is to clarify the relationship between parenting style and children's EF and try to provide suggestions for parental education. To investigate the mechanism of the relationship between parenting style and the development of EF, we arranged (a) the definitions and measurements of parenting style and EF, (b) the literature reviews of the relationship between parenting style and global/specific EF, (c) the possible mechanisms of the efficiency or deficit of parenting style on EF. In addition, the effects of demographic variables are also considered in the discussion. Findings indicate that a positive parenting style enhances EF development, while negative parenting styles diminish the opportunity for EF to develop. The mechanism that operates in the relationship is unclear but could probably be explained based on social cognitive theory.

## Keywords

Executive functions; Parenting styles; Preschool

## Introduction

As the primary environment for early childhood development, the quality of the family context can exert a major influence on the development of children's cognitive processes (Arranz et al., 2010). Executive function (EF), as a collection of the specific higher-level cognitive processes (e.g., working memory, cognitive flexibility, inhibitory control), is closely associated with a person's academic achievement, socioemotional competence, and resilience throughout life (Fay-Stammach et al., 2014). As EF is Influenced by a child's broader environment, especially family factors, the parent-child relationship assumes primary importance in its development (Fay-Stammach et al., 2014). Primarily through parental input and parent-child interactions, the family context (e.g. interaction, stimulation, parenting behaviors) shapes the development of positive cognitive skills and later the executive function processes (Campos et al., 1989). The various features in parent-child interactions and parental strategies can be characterized by Baumrind's theory of parenting styles. Parenting style in caregiving could lead to efficiency and deficit of EF development. To afford a better understanding of the importance of parental variables and how they could contribute to children's cognitive development, this article will discuss the relationship between parenting

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style and executive function as well as the possible underlying mechanism of how parenting styles operate on EF.

## Literature review

### Parenting Style

Parenting style refers to the standard practices and strategies that parents use in child-rearing. As the major caregivers during early childhood, children's cognitive development is particularly dependent on parents for stimulation, nurturance, and regulation (Fay-Stammach et al., 2014), while parents reveal differences in the way they attempt to control and socialize their children.

Baumrind's (1966) landmark research identified three parenting styles—permissive, authoritarian, and authoritative. The three models are categorized based on the parenting behaviour features along two key dimensions: demandingness (also called warmth) and responsiveness (also named control or structure).

Demandingness refers to the extent to which parents control their children's behaviour or demand their maturity. In other words, it is associated with the number of structures parents posed on their children, and the level they are involved in their children's life. The responsiveness is related to the degree parents accept their demands and is sensitive to children's emotional and developmental needs. To be specific, responsiveness refers to the extent of the affection, love, and warmth that the parent gives to their child. Different Parenting styles can be defined by these two dimensions and reflects the overall condition.

### *Authoritative (High in Demandingness and High in Responsiveness)*

The authoritative parent values both autonomous self-will and disciplined conformity. These parents set rules and enforce boundaries by having an open discussion, allowing bidirectional communication, and providing their kids with reasoning and explanation for their actions. For example, before punishing a child for sitting in a chair and not being allowed

to move around, they will explain to the child that this punishment is due to their inappropriate behaviour. Explanation allows children to have a sense of autonomy and teach them about values, morals, and goals. Their disciplinary methods are confronted, i.e., reasoned, negotiable, outcome-oriented, and concerned with regulating behaviours. Authoritative parents are affectionate and supportive. When the child is facing challenges, they provide appropriate scaffolding, but also allow autonomy and encourage independence. They are characterized by "clear and demanding parental direction", with their warmth and responsiveness while transmitting reasonable expectations to the child. (Baumrind, 1966).

### *Authoritarian (High in Demandingness and Low in Responsiveness)*

The authoritarian parenting style is marked by controlling and dictatorial characteristics with a preference for punitive and forceful measures (Bun et al., 1988). While both authoritarian and authoritative parenting styles demand high standards, the latter parents demand blind obedience by using reasons such as "because I said so". They only allow one-way communication through rules and orders. Any attempts to reason with them are seen as backtalk. These parents use stern discipline and often employ harsh punishment (e.g., corporal punishment) to control children's behaviour. Their disciplinary methods are coercive, i.e., arbitrary, preemptory, and domineering. Contrary to authoritative parents, authoritarian parents are unresponsive to their children's needs and are generally not nurturing because they only discipline children with tough orders but demonstrate little reasoning behind their policy, therefore children could hardly acquire guidance on their behaviours. Also, they usually justify their treatment of their kids as tough love.

### *Permissive (Low in Demandingness and High in Responsiveness)*

Permissive parents behave in a non-punitive, acceptant, and affirmative manner toward the child's behaviours (e.g., impulses, desires) (Baumrind, 1966). Permissive parents are very responsive to the child's emotional needs, but

they have a contradiction in the boundaries of enforcement. For instance, If the child engages in inappropriate behaviour, permissive parents may still use toys or food as a bribe to get their children to behave. Permissive parents prefer their children to view them as friends rather than as authority figures. They do not enjoy control or authority over their children and therefore refuse to take the role of monitoring or directing their children's behaviour. They attempt to avoid overt power through using reason, and manipulation and engage in few rules and demands toward their children. Even when there are rules, they are not consistently enforced, and they allow considerable freedom for their children. Consequently, children with permissive parents always make major decisions generally reserved for adult guardians without guidance. (Bun et al., 1988).

Baumrind (1991) also identified a fourth parenting style: neglecting–rejecting parenting style, in which the parents display neither demandingness nor responsiveness and fail to monitor the behaviour of their child by creating a structure. The neglectful parents are indifferent to their children's needs and are not involved in their lives. Children with neglectful parents probably have mental issues, such as depression, physical abuse, or child neglect during their childhood. Due to the lack of involvement in the children's lives and the relatively low degree of demandingness and responsiveness, it is not significant to discuss the effects of “neglectful parental practice” on a child's development, relative to the other three parenting styles. Therefore, we will mainly emphasize the influence of the initial three parenting styles in this article.

#### **The Measure of Parenting Style**

The Parenting Practice Questionnaire (PPQ; Robinson et al., 1995) is a reliable and widely-used measure of the parenting type. The questionnaire generates scores on three main parenting styles consistent with Baumrind's (1966) authoritarian, authoritative, and permissive styles. Dividing the total scores by the number of questions in each section could

obtain the calculated score for that the three categories of parenting, and the highest calculated score indicates your preferred parenting style. PPQ is a 62-item survey with responses for each item on a 6-point Likert scale ranging from “never” to “always”, while each option corresponds to a specific score (e.g., “never” represents 1 score, “always” represents 6 scores). The items yield scores for each parent's level of authoritative, authoritarianism, and permissiveness. The higher the score for each parenting style, the more often the parent engages in behaviours consistent with that style. The three-factor structure of the scale was confirmed by the developers (Robinson et al., 1995) and it has been previously validated in the Croatian sample (Krupić et al., 2020). The internal consistency reliability was high for the present sample ( $\alpha = .86$  for authoritative,  $\alpha = .80$  for authoritarian, and  $\alpha = .81$  for permissive).

#### **Executive Function**

Executive functions (EFs, also called executive control or cognitive control) refer to the ability to control attention, cognition, and behaviour. The development of EF is one of the core achievements of early development (Fay-Stammbach et al., 2014), and it generally includes three core-specific cognitive processes: inhibitory control, working memory, and cognitive flexibility (also called set-shifting, mental flexibility) (Lehto et al., 2003). These executive functions enable goal-directed action and adaptive responses to novel or ambiguous situations. It also allows planning, concentration, remembering instructions, and completing multiple tasks (Hughes et al., 2004). As the collection of various cognitive skills, EFs are considered to be significantly essential for physical and mental health, academic and life achievement, as well as cognitive and social-psychological development.

#### **Inhibitory Control**

The three core executive functions are inhibitory control, working memory, and cognitive flexibility. Inhibitory control involves controlling one's attention, behaviour, thoughts, and emotions to override a strong internal

predisposition or external lure to select a more appropriate behaviour to complete their goal (Diamond, 2013). For example, successfully suppressing the craving for eating cake while dieting requires the use of inhibitory control; for the students in the class, the inhibitory control helps them to selectively attend and focus their attention on the content that the teacher delivers, and to suppress other stimuli such as a novel. Without inhibitory control, we would be interfered with by the impulses, old habits of thought or action (conditioned responses), and/or stimuli in the environment. Thus, inhibitory control helps us to change and choose the way we react and behave rather than being unthinking creatures of habit.

### ***Working Memory***

Working memory involves holding information in mind and mentally working with it. There are two types of working memory distinguished by content—verbal WM and nonverbal (visual or spatial) WM. Working memory plays a crucial role when considering alternatives, seeing connections between seemingly unrelated things to derive a general principle, and also pulling apart elements from an integrated whole, exploring the relationship among items or ideas. Hence it is critical for our reasoning and creativity.

Working memory is widely used in various situations, i.e., resolving math problems, mentally reordering items (such as reorganizing a to-do list), translating instructions into action plans, and incorporating new information into your thinking or action plans (updating). WM enables us to bring conceptual knowledge, rather than perceptual input, to affect our decisions, and it further helps us to make plans and decisions by considering our past and future hopes (Diamond, 2013).

It is noticeable that WM (holding information in mind and manipulating it) is distinct from short-term memory (just holding information in mind). Firstly, they are linked to different neural systems (working memory relies more on the dorsolateral prefrontal cortex while short-term

memory does not need the involvement of the dorsolateral prefrontal cortex. Furthermore, they show different developmental progressions. The short-term memory develops earlier and faster relative to the WM.

### ***Cognitive Flexibility***

Cognitive flexibility is concerned with changing perspectives or approaches to a problem, and it can flexibly adjust the cognitive processing to new demands, rules, or priorities. It allows the process of switching across two different tasks and dealing with multiple concepts (Diamond, 2013). Flexibility can help us to take advantage of sudden and unexpected opportunities. As the third core EF, cognitive flexibility is based on the other two core aspects of executive function and comes in much later in development (Davidson et al., 2006). It enables us to change perspectives spatially (e.g., “What would this look like if I viewed it from a different direction?”) and also interpersonally (e.g., “Let me see if I can see this from your point of view”). To archive the process of changing perspectives or thinking outside the box, we need to inhibit (or deactivate) our previous perspective and load into WM (or activate) a different perspective. Cognitive flexibility is often measured by using a wide array of task-switching and set-shifting tasks. The Wisconsin Card Sorting Task is a mostly widely-used and classic test (Stuss et al., 2000).

### ***Measure of EF***

Assessment of executive function involves gathering data from several aspects of cognitive skills and synthesizing the information to figure out the trends and patterns across time and setting. Apart from standardized neuropsychological tests, the executive function can also be measured by behaviour checklists, observations, interviews, work samples, and different kinds of instruments (e.g., performance-based, self-report) are used.

The Behaviour Rating Inventory of Executive Function (BRIEF) (Gerard et al., 2000) is a widely-used questionnaire to explore the global executive composite. The setting of the questionnaire is designed to examine eight



aspects of EF in children and adolescents aged 5–18. It consists of 86 items in eight non-overlapping clinical scales and two validity scales and acquires the parent to rate the child's behaviour on a 3-point Likert scale (never, sometimes, and often). Collectively, the items represent a child's global executive composite (GEC), a measure of overall EF. Higher ratings indicate greater impairments in child functioning as perceived by the parent. The BRIEF demonstrated good reliability, with high internal consistency reliability ( $\alpha$ 's = .82 – .98) in the original norming sample as well as with the current sample ( $\alpha$  = .95 for the GEC) (Gerard et al., 2002). Besides, as reported by parents, BRIEF is considered to be a more ecologically valid measure of child EF compared to the EF assessment conducted in the laboratory surrounding and used computerized standard tasks (Isquith et al., 2005).

It is noticeable that the BRIEF questionnaire focused on a child's deficits rather than competencies. In line with Lam et al. (2018), the absence of deficits does not imply the improvement of skills, which may result in differential relations between a child's deficits/skills and parental positivity/negativity.

#### **Relationship between EF and PS**

Early childhood is a critical period for understanding the parental influence on EF. During this period of dynamic developmental processes and neural plasticity, the emergence of cognitive skills, which is the output of the neural systems, is highly dependent on the stimulation from a child's broader environment, where the family context assumes to be particularly significant. As the main source of nurturance and stimulation, parents influence children's cognitive skill development and later the development of executive function through the process of parental input and parent-child interaction (Eisenberg et al., 2005). Positive parental practices provide children with opportunities to develop cognitive skills through enriched interactions (e.g., reading to children) (Bradley et al., 2011), and therefore promote the development of executive functions, which

represents a constellation of cognitive processes. The characteristics of parental practice illustrated in the interaction (e.g., discipline, control, responsiveness, and the scaffolding for children's problem-solving) lead to various implications to the cognitive skills and then attempt to predict the general tendency of EF development. On this basis, the parenting style employed in raising the child could be considered a predictor of children's executive function development (Fay-Stammach et al., 2014).

#### ***The Relationship between Authoritative Parenting Style and EF***

Since the executive functions are highly sensitive to the environmental context, demandingness and responsiveness in the surrounding environment can highlight both the efficiency and the dysfunction of EF. Concurrent (i.e., Susic-Vasic et al., 2017) and longitudinal studies (i.e., Sulik et al., 2015) showed that negative parenting reduces EF, while positive parenting enhances them. Extreme disturbance in caregiving (e.g., maltreatment) is associated with deficits in EF development.

An authoritative parenting style had been associated with healthier and more positive cognitive developmental outcomes compared to the use of authoritarian or permissive parenting styles. Children of authoritative parents are likely to perform higher levels of positive, compliant behaviours, sociability, and the ability to self-regulate emotions and behaviours (Baumrind, 1966). These characteristics allow children to show better socialization in the communities, take appropriate actions in various situations, and complete social and academic tasks successfully. These are considered to be the indication of a better EF development.

The research has shown that authoritative parenting practices, for instance, effective scaffolding, positive parental demands, and high quality of communication within the family, could contribute to children's EF development. A longitudinal study on the relationship between parental warmth and children's effort control

found that warm, positive parent-child interactions and supportive parenting behaviours have been proved to promote the development of effortful control and subsequently emotion regulation (Eisenberg et al., 2005). Specifically, authoritative parenting practice includes regulating their children's emerging skills, providing clear and consistent discipline, supporting autonomous behaviours, and offering stimulating interactions. Consequently, their children develop better impulse control, working memory, and self-regulatory strategies. These abilities represent higher developmental processes in core aspects of EF (Bernier et al., 2010).

Besides the benefits of parenting styles for the development of EF, several studies revealed that parenting styles are associated with EF deficits and lead to externalizing behaviour problems (EBP, i.e., aggression, delinquency, and hyperactivity) and other social difficulties (e.g., Timidity, anxiety, withdrawal). Generally, the more that parents engaged in authoritative parenting, the fewer parent-reported EF problems their children had. To a recent meta-analysis on externalizing behavioural problems (EBP) (Pinquart, 2017), prenatal warmth, behavioural control, autonomy granting, and the authoritative parenting style are proved to be the factors that are concurrently and longitudinally related to fewer EBP in children.

For the children suffering from cognitive injury, pre-injury family factors acted as the predictor of certain cognitive aspects of executive function as well as the overall executive functioning outcome score (Nadebaum et al., 2007). Parenting style as a significant aspect of family context has been shown that could influence the following development of EF. Regarding children with traumatic brain injury (TBI), Nadebaum, Anderson, and Catroppa (2007) found that a more democratic parenting style (e.g., authoritative parenting) is predictive of more positive cognitive aspects of executive functioning following TBI. Besides, parenting style is also considered to be the mediator of the effects of the injury on executive skills across

time and either highlight or attenuate the executive dysfunction and its negative outcomes (Potter et al., 2013). For children suffering from TBI, parenting style and available resources could aid in the identification of children at risk for increased executive difficulties after the injury (Potter et al., 2013). Wade and colleagues found that warm, responsive parenting and the absence of parental negativity (e.g., parental hostility, neglect) could result in positive child behavioural outcomes after injury (Wade et al., 2011).

The relationship between authoritative parenting and child EF (according to the parent report) could be changed when children had a disability. For typically developing children, authoritative parenting was linked to fewer EF problems reported for their children. However, for children with a disability, EF problems were not associated with authoritative parenting (Potter et al., 2013). The evidence from a previous study proved that the behavioral problem of the children with EF deficits like ADHD or ASD diagnosis gets little benefit from authoritative parenting. Instead, the authoritarianism and permissive parenting styles could moderate EF after deficits (Potter et al., 2013).

#### *The Relationships between Permissive and Authoritarian Parenting Styles and EF*

Permissive and authoritarian parental practices are considered to involve certain inappropriate parenting behaviours, which are detrimental to children's EF development (Pechtel & Pizzagalli, 2011). Parents who placed themselves as employing harsh discipline indicated that their child exhibited more deficits in working memory and behavioural inhibition, which was represented by the difficulty in concentrating and controlling impulsiveness (Krupić et al., 2020). The negative parental practice could also result in EF deficits and social difficulties. The finding of the research on EBP showed indirect effects of authoritarian parenting and parental indifference/neglect on children's behaviour problems through the mediation of children's EF deficits. Authoritarian and permissive parenting and the application of harsh control (i.e.,

punishment/harassment of a child) and psychological control (i.e., manipulating a child's cognition/emotions) are associated with higher levels of children's EBP (Vučković et al., 2020).

Research indicates that the children's EF difficulties are positively associated with more significant authoritarian parenting (harsh control and manipulation) and permissive parenting. In other words, as EF problems increased for children, parents reported using both less restrictive (permissive) and more stringent (authoritarian) parenting (Hutchison et al., 2016)

Both permissive and authoritarian parenting have detrimental effects on a child's behaviour, resulting in more significant psychological distress and delinquent behaviours (e.g., substance abuse, school misconduct). Specific to TBI, Yeates, and colleagues (2010) showed that the characteristics of permissive parenting strategies could explain the results. For children who suffered from TBI, significant emotional and behavioural dysregulation are commonly seen. However, permissive parents always offer less supervision and lack a stable structure, and that may be particularly harmful to subsequent development of self-regulation and executive skills due to the lack of scaffolds from caregivers. Consequently, permissive parenting could lead to more serious outcomes of TBI.

Similarly, group contrasts revealed that higher levels of authoritarian parenting (a more punitive method) interfere with the exhibition of appropriate executive behaviours. A high-level authoritarian parental practice could exacerbate executive dysfunction, and associate with greater executive dysfunction following moderate TBI, especially with increasing time post-injury (Potter et al., 2013).

#### *A Transactional View between Parenting Styles and EF*

While the parental practice leads directly or indirectly influences children's EF development, the position of a single-direction relationship is too simplistic of an explanation for the parent-

child interaction. A transactional framework is a more appropriate explanation for the bidirectional relationship between the parenting and child constructs (Baker et al., 2005). The transactional nature of the relationship illustrates that the characteristics of parents and children can interact over time to influence and change one another. For instance, a child's poor inhibitory control capacity can lead to increased parental stress and maladaptive parenting behaviour, and the parental stress was positively correlated with parental authoritarianism (Deater-Deckard, 2004), which means that the parents tend to use more punishment and harsher techniques in general. The elicited rigid parenting can in turn lead to the behavioral problems of children (Deater-Deckard & Scarr, 1996) and further lead to the dysfunction of their EF.

The transactional nature of development postulates that child outcomes are dependent "not on the individual, but the adaptiveness of the relationship between individual and context" (Sameroff & Mackenzie, 2003). In other words, the child's experiences in the surrounding environment (e.g., interactions with caregivers) transform the child's behaviour. Then the child in turn influences the surrounding environment through his/her evolved behaviour. Bidirectional influences continue in this manner and result in changes in child behaviour, parent behaviour, and child-parent interactions over time (Hutchison et al., 2016). This transactional relationship was also supported by Patterson's (1982) coercion theory. Patterson suggests that the caregivers reinforce children's externalizing behaviour problems, which in turn elicits their negative parenting practices. This process continues until one of the participants 'wins' (i.e., the parent relents after the child's insistence on getting what he/she wants).

#### **Discussion**

According to the previous research, engaging in permissive and authoritarian parenting behaviours is associated with negative EF outcomes for children, while authoritative

parenting is associated with more positive child outcomes (Baumrind et al. 2010).

The mechanism underlying the relationship between parenting styles and EF is so far unclear. From the perspective of social cognitive theory (SCT), learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behaviour. An individual can witness and observe a behaviour conducted by others, and then reproduce those actions. This is often exhibited through "modelling" of behaviours. If individuals see a successful demonstration of behaviour, they can also complete the behaviour successfully in the way they observed, and vice versa (Bandura, 1989). For example, children raised by authoritarian, hostile, and aggressive parents were more likely to exhibit EF deficits, and this association was partially attributable to their difficulties in working memory and inhibitory control. The possible reason is that, when children observe verbal hostility, corporal punishment, and the difficulties of maintaining the attention of their parents, they miss the opportunity to learn behavioural and emotional self-regulation strategies for dealing with social conflicts in constructive ways. They construct low self-regulatory skills via the interaction of "modelling" (Graziano et al., 2010). It seems that negative parenting diminishes children's opportunities to learn positive behaviour and therefore enhances children's dysfunction (Hanisch et al., 2014), whereas positive parenting strategies provide children with clear boundaries and an appropriate level of control that can prevent their future EF deficits (Brendgen et al., 2001). SCT postulate that observational learning is influential to the efficiency and deficit of EF skills.

Similarly, another hypothesis emphasizes that parenting styles can affect the development of children's EF by providing a supportive environment in which the child can practice EF skills and by modelling their children's positive behaviour (Bernier et al., 2010). Specifically, children receive the reasoning from their parents when they misbehave, which contributes to their

learning on utilizing EF skills to regulate their behaviour (i.e., mentally manipulating information during interaction to plan the steps to achieve positive behaviour). By contrast, simply punitive discipline toward a child's misbehaviour and poor self-regulation can in turn impede the development of children's EF skills (i.e., difficulties in inhibiting aggressive response to parental hostility).

The way parenting style operates on EF could be explained by a bidirectional view, which reflects a transactional developmental process (Sameroff & Mackenzie, 2003). There are transactional effects between children and parents, that is, parenting style affects their child, and the evolved child, in turn, influences their parents (Kiff et al., 2011). Parenting styles are considered to be effective predictors of EF development; however, the status of children's EF could also put an effect on the parenting style. For children with EF deficits or cognitive disabilities, it is considerably difficult for their parents to engage in optimal authoritative parenting. For instance, parents of children with behaviour problems tend to use more verbal and corporal punishment and harsher techniques relative to other parents (Johnson, 2005). If a child with deficits is engaging in a temper tantrum to avoid doing a particular task, the parents may find it easier to satisfy the child's demands or to apply punishment to end the temper tantrum quickly, rather than to consider more authoritative options. This will **inertially** lead to more authoritarian or permissive parenting styles in the future. Consequently, children tend to receive less regulation or parental reasoning to guide and adjust their behaviour problems when they show maladaptive behaviour, which then results in deficits in EF development.

Although transactional effects occur between children and parents, longitudinal and intervention research suggest that parent-to-child effects are still larger than the reverse. Parental behaviours, responsiveness, scaffolding, interactive styles, and disciplinary techniques play a significant role in the development of



children's EF skills (Fay-Stammbach et al., 2014). A previous study has found that, among the families with children with EF deficits like ASD, parents' general distress, and higher parent stress predicted higher levels of internalizing and externalizing child behaviours but not the reverse (Zaidman-Zait et al., 2014).

This does not mean that the EF deficit and child's behaviour problems are the parent's fault. Contrarily, it is important evidence to prove the significance of paying attention to and supporting the parents of children with disabilities. Affording parents with the professional method to take care of both children and themselves is well-worthing because neither the parental variables nor the child effects are negligible. Since previous studies often focused on the children and their deficits, parents of a child with special needs might lack support. These parents may get benefit from the education about the potential long-term outcomes of non-authoritative parenting styles and the class targeted interventions on more adaptive parenting practices for challenging children. Prior research indicated that parents who reported more stress also reported a higher level of authoritarian and permissive parenting styles, as well as more controlling parenting practices (Rogers et al., 2009). Parents of children with ADHD or ASD reported more engagement in permissive parenting compared to controls. However, in the previous study, stress was not associated with authoritative parenting, which means authoritative parents could still deliver their warmth and love and transmit their reasoning even when the EF of their child was underdeveloped (i.e., 'I provide comfort and understanding when my child is upset').

In addition, greater family resources were associated with positive EF, while fewer resources predicted more EF deficits. Thus, more family resources were protective in all families, regardless of the type of injury (Potter et al., 2013). This proved that other factors must be addressed to help improve a child's EF, such as parent stress, family dynamics, or intervention for the disability itself, which are not mentioned

in this study. The findings that the relationship between authoritative parenting and child outcomes were depended on whether the child had a diagnosis resonates, and be dependent on the cultural contexts (Chao, 1994).

Several studies have tested the possibility that other variables may moderate the relationship between parenting and EF in early childhood. Ethnicity, gender, temperament, physiological indices of self-regulation (i.e., indices of sympathetic, parasympathetic, and cortisol stress systems), and prenatal cigarette exposure are all considered. To illustrate, negative parenting was associated less proximally with EF in African American children than in White children (Rhoades et al., 2011). Male gender and low social support tend to result in lower EF (Clark et al., 2013). Besides, Children's temperament can moderate the association between parenting and EF (Conway & Stifter, 2012). Regarding temperament, parenting influences inhibited and exuberant children more strongly than low-reactive children (Conway & Stifter, 2012), while shy children exposed to high stimulation had lower EF than their less shy peers (Blankson et al., 2011). Physiological self-regulation moderated the effects of negative interventions on children's EF, but only within a subset of children characterized by a more mature physiological self-regulation (Holochwost, 2013). Parental stimulation mitigated the adverse effects of cigarette exposure on children's executive attention (Mezzacappa et al., 2011). These findings suggest that the developmental processes that underpin the early emergence of EF involve complex interactions between children's characteristics and environmental contexts. While parenting styles are the strongest predictor of EF development, environmental factors play a mediating role throughout the process.

## **Conclusion**

Previous research has highlighted the importance of parenting style, which is needed to provide the necessary supportive environment for children's EF development (Bernier et al., 2010). The positive parenting style offers children

opportunities and scaffoldings to develop cognitive skills through enriched interactions and contributes to the emergence of EF (Bradley et al., 2011).

In general, there is a significant relationship between parenting styles and children's EF. Parenting styles with their parental practice characteristics correspond to different EF developing outcomes. Both concurrent and longitudinal studies indicate that positive parenting enhances EF, whilst negative parenting reduces them. Authoritative parenting style had been associated with healthier and more positive cognitive developmental outcomes compared to the use of authoritarian or permissive parenting styles, supported by the better performance in resilient and compliant behaviours, sociability, and self-regulating ability of authoritative-directed children (Baumrind, 1966). Authoritative parenting styles predict fewer EF deficits; however, for children with EF defects, their following development was not associated with the level of authoritative parenting (Potter et al., 2013). Authoritarian and permissive parenting styles are considered to involve certain negative parenting practices, are related to poorer EF development for children, and are associated with more significant EF deficits (Hutchison et al., 2016). Specific to TBI, permissive parenting is particularly detrimental to the subsequent EF development.

Although parent-to-child effects rather than the reverse play a more significant role in EF development, the existence of the bidirectional relationship is unignorable. While parenting styles influence EF development and represent by children's behavioural outcomes, the result in behaviour could also elicit changes in parenting styles. A transactional framework could appropriately capture the connection by stipulating that parent and child characteristics interact over time to influence and change one another (Sameroff & Mackenzie, 2003).

The possible model for the relationship between parenting styles and children's EF development discussed in this essay believes that positive

parenting styles and parental practice can lead to the efficiency of children's EF development by providing a supportive environment for learning to utilize EF skills (Bernier et al., 2010), while negative parenting styles diminish children's opportunities to learn positive EF strategies through the "modelling (observational learning)". Furthermore, variables such as family context, gender, temperament, and physiological indices of self-regulation could also moderate the relationship between parenting and EF development in early childhood.

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