

Predicting Executive Dysfunctions Based on Attachment and Parenting Styles in Students

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Abstract: Executive functions refer to the use of cognitive processes to control thoughts and emotions. Given the importance and impact of executive functions, it seems that understanding the factors that influence executive functions' development is useful to prevent individuals' problems and to help their further promotions. The present study is to predict executive dysfunctions based on parenting styles and attachment styles in students. This is a descriptive correlational study. The statistical population of this study included all students of regular elementary schools in Tabriz, Iran in the academic year of 2018-19, among whom, 700 were selected by multistage clustering sampling method. In the next step, their parents were asked to complete Coolidge neuropsychological and personality scale, the Kinship Center Attachment Questionnaire (KCAQ), and Baumrind parenting styles questionnaire. The data were analyzed using multivariate analysis of variance. The results showed that positive adjustment development, negative behaviors, permissive style, authoritarian style and authoritative style are correlated with the executive dysfunction. Positive adjustment development, attachment style and authoritative parenting style had a negative correlation, and the attachment style of negative behaviors, and permissive and authoritarian parenting styles had a positive correlation with the executive dysfunctions. The findings of the present study show that attachment and parenting styles in childhood correlate significantly with the development of executive functions and may be considered for prediction of executive dysfunctions.

Keywords: Parenting Styles, Attachment Styles, Executive Functions

1. Introduction

Executive function is a general term and comprises components that, despite differences, form a common paradigm together [1]. Executive function is a high-level cognitive process with the purpose of control thoughts and emotions in order to shape goal-directed behavior [2, 3]. Barkley suggested that functions such as organization, decision making, working memory, motor control, time perception, future prediction, reconstruction, inner language, and problem solving can be considered as the most important neurological executive functions [4].

Research has shown the crucial role of executive functions in the development of children's mental ability [5], academic achievement [6], personality [7], and social skills [8]. Research has also shown that disorders in children's executive functions can lead to many problems including aggression, inattention, behavioral and communication problems [9] and also social incompatibility [10]. It can be argued that executive functions start to develop during the neonatal period [4] and that the major development of executive functions occurs between the ages of 3 and 7 and

continues slowly until adolescence [11].

Children are prone to be influenced by their environment at different periods, and there is also evidence that at an early childhood, children's executive functions are more likely to be affected by the environmental factors [12]. Also, given that most childhood is spent in family, the effect of the family atmosphere on the development of executive functions is more significant [13]. Accordingly, research has shown that family environment and parenting quality influence the development of executive functions as environmental variables [14].

Behaviors, beliefs, and customs and traditions of parents in dealing with their children and their educative methods often follow a repetitive and relatively consistent framework, referred to as parenting styles [15].

A study by Carlson et al. showed that parenting styles are associated with the development of executive functions [11]. Using a computer task, Sosik-Vasic et al. also investigated the relationship between executive functions and parenting styles. The results showed that authoritarian style leads to more mistakes of children in performing the tasks, while the authoritative style that allows the child to experience more and make better decisions leads to a better performance in the related tasks [16].

Studies have also shown that attachment styles are among the environmental variables that influence the development of executive functions [17]. In general, attachment can be defined as the emotional atmosphere that governs the child's relationships with his caregiver. The main result of the interaction between the child and the mother is to create a kind of affective attachment to the mother, which makes the child feel happy and excited when he interacts with the mother and makes him feel calm near the mother in stress [18].

Attachment is a powerful emotional bond that is formed in everyone for particular others. Early attachment experiences with caregivers conduct future feelings, thoughts, and behavior in relationships with others. Research has shown that childhood attachment plays a decisive role in the later stages of life. More recent studies have shown that executive functions are one of those which are influenced by children's attachment style [19]. More precisely, researchers have suggested that different attachment styles at the age of 2 can predict working memory and attention, which are subsets of executive functions. And different attachment styles have been shown to influence significantly the development of self-regulation ability, as one of the components of executive functions [20].

Given the importance and impact of executive functions, it seems that understanding the factors that influence executive functions' development is useful to prevent individuals' problems and to help their further promotions [21]. However, the effects of social and environmental factors affecting the development of executive functions have not been studied sufficiently [17]. The present study aimed at prediction of executive functions based on parenting styles and attachment styles in children.

2. Method

This is a descriptive correlational study. Informed consent was obtained from the subjects and their guardians. The parents and patients were informed about the test to be performed by psychologist. The statistical population of this study included all students of regular elementary schools in Tabriz, Iran in the academic year of 2018-19, among whom, 700 were selected by multistage clustering sampling method. In the next step, their parents were asked to complete the Coolidge neuropsychological and personality scale, Kinship Center Attachment Questionnaire (KCAQ) and Baumrind parenting styles questionnaire. 31 questionnaires were excluded from statistical analysis due to incomplete answering. So, the final sample size was reduced to 669 subjects. This study was approved by Medical Ethics Regional Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1398.311).

Coolidge neuropsychological and personality scale (2002): This questionnaire identifies several neurological and behavioral disorders in children and adolescents aged 5-17 years. There is a distinct subscale for each disorder, with two of these subscales including 19 items, are to measure the executive functions. The test is answered by parents on a Likert scale. These two subscales measure executive functions in three areas of organization, decision making-planning, and inhibition. Reliability obtained in Iranian society for organization and decision making-planning subscales was 0.85 and for inhibition subscale, it was 0.66 [22].

Baumrind parenting styles questionnaire (1973): The initial form of this questionnaire has 30 items designed and constructed by Baumrind (1973). The questionnaire measures parental parenting styles through permissive, authoritarian, and authoritative styles on a Likert scale. The psychometric properties of this questionnaire have been evaluated in various studies. For example, Buri examined this questionnaire's validity and reliability using differential and test-retest methods [23]. The results obtained with test-retest method were 0.81 for the permissive style, 0.86 for the authoritarian style, and 0.78 for the authoritative style. The results of the differential method were also satisfactory. In Iran, Minai and Nikzad evaluated the psychometric properties of this questionnaire and the results established the validity and reliability of this questionnaire and its sub-scales in Iranian society [24].

Kinship Center Attachment Questionnaire (KCAQ): This questionnaire was designed to measure children's attachment in the middle-childhood at the age of 3 to 12 and is completed by parents. The questionnaire consists of 20 items. Likert scale is used to score each item from 0 to 5. Factor analysis results confirmed the existence of four factors in the items. The factors of the scale include one total score and four sub-scales: 1. positive adjustment development (6 items), 2. negative behaviors (4 items), 3. emotional reactivity (6 items), and 4. distancing from caregiver support (4 items). Internal consistency and reliability by splitting for this questionnaire were reported to be 85% and 83%,

respectively [25]. Soleimani et al evaluated the psychometric properties of this questionnaire in Iranian society and the results showed the proper validity and reliability of this questionnaire and its subscales [26].

3. Results

The gender frequency of participants is shown in Table 1 based on the descriptive statistics.

Table 1. Descriptive Statistics.

Group	N	Age average	Percentile	Standard deviation
Female	362	8.84	54.11	0.99
Male	307	8.61	45.88	1.13
Total	669	8.73	100	1.04

As shown in Table 2, there is a correlation between positive adjustment development, emotional reactivity, negative behavior, authoritative parenting, permissive parenting and authoritarian parenting with executive dysfunctions. It means that positive adjustment development

and authoritative parenting have negative correlation with executive dysfunctions, whereas emotional reactivity, negative behaviors, permissive parenting and authoritarian parenting have positive correlation with executive dysfunctions.

Table 2. Simple correlation between executive dysfunctions with attachment and parenting styles.

	Mean	SD	1	2	3	4	5	6	7	8
Executive dysfunctions	15.5	6.83	1							
Positive adjustment development	19.04	3.45	-0.29**	1						n
Emotional reactivity	7.31	3.04	0.12**	-0.16**	1					
Negative Behavior	4.3	4.54	0.23**	-0.30**	0.42**	1				
Distancing from caregiver support	5.22	2.35	0.06	-0.07*	-0.03	0.01	1			
Permissive Style	15.93	5.14	0.13**	-0.004	-0.05	0.03	0.004	1		
Authoritarian style	14.75	5.48	0.14**	-0.11**	0.10**	0.20**	-0.002	0.001	1	
Authoritative style	21.78	4.04	-0.17**	0.20**	-0.17**	-0.33**	-0.001	0.012	-.**0.26	1

P<0/05*

P<0/01**.

Before applying multiple regression analysis, the assumption of multiple co-linearity was tested to measure the independence of the predictor variables. Using the software SPSS 25, the tolerance index of variables ranged from 0.66 to 0.93 and the variance inflation factor index was in the range of 1.18 to 1.44. So it can be assumed that the predictor variables are independent of each other and multiple co-linearity did not occur. In addition, the normal curve also shows that no deviation from the normal state has occurred. Table 3 summarizes the regression results.

Table 3. Results of the prediction model of executive dysfunctions based on attachment and parenting styles.

E.S	2 RA	2 R	R
6.35	0.13	0.14	0.37

According to the results of Table 3, multiple correlation coefficient of attachment and parenting styles with executive dysfunctions was 0.37. The attachment and parenting styles predict an overall 0.14 of changes in executive functions.

Table 4. Results of multivariate regression analysis of the dependent variable based on the independent variable.

Model	SS	df	MS	F	Sig
Regression	3791.07	7	541.58	13.39	0.0001
Residual	22681.14	561	40.43		
Total	26472.22	568			

Table 4 presents the results of the variance analysis of the model to investigate the possibility of predicting the variable of executive dysfunction based on attachment and parenting styles.

According to the Table 4, F=13.39 and it is significant at 0.0001 level. Therefore, it can be concluded that the independent variables (attachment and parenting styles) are capable of predicting the dependent variable (i.e. executive dysfunctions).

Table 5 presents standardized and non-standardized regression coefficients.

According to the Table 5, the correlation between positive adjustment development (-0.46), permissive style (0.18),

authoritative style (-0.14), and authoritarian style (-0.15) and the executive dysfunction is significant at the level of 0.001. Also, the correlation between the negative behaviors (0.14) and executive dysfunctions is significant at the level of 0.05. However, distancing from caregiver support and emotional reactivity did not have a significant effect on predicting executive dysfunctions. In other words, attachment style of positive adjustment development and authoritative parenting style had a negative correlation, and the attachment style of negative behaviors, and permissive and authoritarian parenting styles had a positive correlation with the executive dysfunctions.

Table 5. Standardized and unstandardized regression coefficients of the executive dysfunction prediction model.

Model	Unstandardized coefficients		Standardized coefficients		P
Model	B	SE	β	T	
Stable number	22	2.64		8.33	0.0001
Positive adjustment development	-0.46	0.08	-0.23	-5.64	0.001
Emotional reactivity	0.07	0.09	0.03	0.77	0.43
Negative Behaviors	0.14	0.07	0.09	2.05	0.04
Distancing from caregiver support	0.007	0.006	0.04	1.06	0.28
Permissive style	0.18	0.05	0.14	3.54	0.001
Authoritarian style	0.15	0.05	0.07	1.72	0.001
Authoritative Style	-0.14	0.07	-0.08	-1.97	0.001
Predictors: Parenting styles, Attachment					
Dependent variable: Executive dysfunctions					

4. Discussion

The results of present study showed that parenting styles are able to predict executive dysfunctions, which are consistent with the findings of other studies [17, 16, 11, 14, 27].

In explaining of this relationship, Bernier et al. suggested that the use of authoritarian style in families in their relationship with children provides fewer stimuli to the children and prevents the children from new and varied experiences. This limited experience and low exposure to stimuli undermines the executive functions [17]. Also one of the most important components of executive function is flexibility while making mistakes in children and then using self-regulation to adapt to these situations. In other words, after each mistake, the child gains experience that leads to self-regulation and helps him to solve problems in the future. However, in authoritarian parenting style, due to the harsh discipline, the child is prevented from gaining constructive experiences, and it may make him unable to show proper emotional reactions in under different circumstances [27].

On the other hand, permissive parents use a contradictory discipline in their parenting style that makes children unable to develop properly in terms of executive functions, i.e. flexibility, self-control, and self-regulation [16]. In contrast, authoritative parents, not only transfer social norms to their children, but also due to the lack of impulsive reactions and proper control over their emotions, they allow their children to gain new experiences that sometimes may lead to mistake or failure. Indeed, they allow the child face the consequences of his actions and to show a better management on his emotions in similar situations [28].

The present study also showed that among the attachment style components, the positive adjustment development has a significant relationship with the executive dysfunction. Also, the correlation between negative behaviors and executive dysfunctions was significant. The findings of the present study are in line with the results of some other studies [17, 20, 18, 29]. In explaining this finding, it can be suggested that responsive care and secure attachment style lead to optimal functioning of the child's stress response system, as well as regular functioning of both sympathetic and parasympathetic nervous systems. The proper

functioning of the stress response system and sympathetic and parasympathetic systems would control the production of cortisol hormone [29]. On the other hand, research has shown that there is a significant negative relationship between cortisol levels in the blood and development of executive functions [30]. Simply put, a secure attachment style reduces the production of cortisol hormone, thus improving the development of executive functions. To confirm these results, research on 5 and 6 year-old children has shown that children with secure attachment were better developed at all components of executive functions than other children [31].

In addition, it has been well established that parent-child relationship is multidimensional and different dimensions of it play a unique role in children's functions [32]. The potential impact of early attachment on the development of children's executive function can be related to the relationship with the primary caregivers [33], especially when children are faced with challenging emotional or cognitive conditions [34]. Secure attachment makes the parents encourage the children to explore the environment, giving the child more confidence in the environment and, on the basis of this confidence, he can participate in more problem-solving activities and even take leading roles. This leads to the development of self-regulation and problem-solving as executive functions in the child [20].

5. Conclusion

The findings of the present study show that attachment and parenting styles in childhood correlate significantly with the development of executive functions and may be considered for prediction of executive dysfunctions. It is recommended that future researches in this field use practical tests for data collection, especially in the area of executive functions and also the statistical population include children with clinical problems like ADHD.

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