

# Dimensions of developmental function of family in predicting the executive functions of deaf students

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## Abstract

**Introduction:** The current research was conducted to evaluate the dimensions of developmental family function in predicting the executive functions of deaf children.

**Method:** The research method is descriptive-correlational. For this purpose, 60 people were selected among the deaf students with mean age of 10 years and three months at Mashhad using cluster sampling method. Data collection tool was Developmental Family Function Assessment Questionnaire (DFFAQ) and Kulij Psychological Neurology Questionnaire (Alizadeh and Zahedi, 2005). To analyze the data, Pearson correlation and stepwise regression were used. Findings revealed a significant positive correlation between developmental family function and executive functions of deaf students ( $p < 0.01$ ,  $r = 0.44$ ), positive significant correlation between developmental family function and organizing ( $p < 0.05$ ,  $r = -0.31$ ) and positive significant correlation between developmental family function and decision-making-planning ( $p < 0.01$ ,  $r = 0.31$ ), and positive correlation between developmental family function and inhibition ( $p < 0.01$ ,  $r = 0.27$ ). Findings of multiple regression analysis suggest that components of developmental family function can predict executive functions components of deaf students ( $p < 0.01$ ). In total, findings of this research revealed that developmental family function (attention and regulation, intimacy, etc.) is effective in predicting executive functions of deaf students.

**Key words:** executive functions, developmental family function, organizing, decision-making-planning, inhibition

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## Introduction

A deaf person is a person who cannot communicate with members of society verbally due to hearing loss and their hearing is not effective enough to engage in a normal life and they are not able to learn the environmental language through hearing. Millions of people in the world suffer from moderate to severe hearing impairment (Heward, 2006; Baltussen and Smith, 2012).

Family is a natural organization using communicative and functional patterns over time, and these patterns form the family structure. In addition to determining the role of family members, it determines the scope of each member and facilitates the exchange of views among the members (Minuchin and Fishman, 2005). The term "executive function" refers to a wide range of conscious meta-cognitive processes, such as planning, organized searching, impulse control, targeted behavior, goal representation, using flexible strategies, selective attention, attention control, start of actions, fluency of actions and self-assessment and performance (Kiyon-Coola, 2007, quoted by Obeidi Zadeghan, 2007; Rhine-Kahlback, 2003). Executive functions include several psychological functions such as decision-making, planning, inhibition, planning for action and movement outputs. In fact, executive functions undertake the planning of actions, and the development of new movement outputs in response to adaptive external situations (Reynolds and Kamphaus, 2004; Hughes, 2002). Executive functions refer to a set of cognitive capabilities, including self-regulation, inhibition, strategic planning, cognitive flexibility, time perception, impulse control, and working memory which assist people in performing learning tasks, intelligence actions, and educational issues. Neuro-cognitive executive functions are important structures, playing a vital role in directing and controlling behavior (Alizadeh, 2006). The presence of a person with hearing impairment causes many unique and different challenges for a family (Van Eldik, Treffers, Veerman & Verhulst, 2004; Slaby and Gaura, 2003). Hearing sequence, which is one of the hearing memory functions, was determined by Conway, Pison and Kronberg in 2009. Results revealed there are several methods to determine the sequence delay. Visual sequence and touching sequence in deaf children were determined to investigate the relationship between visual sequence and touching sequence and hearing sequence. Findings revealed that deaf children have delay in all three areas (Rhine-Kahlback, 2004). In the auditory teaching model, the child gains the ability of learning new information through listening alone. This process is required to achieve hearing learning, which involves four different levels of development of hearing. Recognition is the most basic hearing skill. This awareness relates to presence or absence of sound. The recognition occurs when the initial auditory cortex records that the sound is present. Studies have indicated that deaf children have impairment in the executive functions (Soltani and Sharif Daramadi, 2005), and this impairment is more because of secondary factors such as family, school, and environmental factors (Horn, 2004). There is correlation between damage to language and defect in executive functions (Oberg, 2007). Family,

social, and economic factors are involved in executive functions and cognitive capability of the deaf children. Mothers speaking more with their children can develop and improve their executive functions (Kaufman and Kaufman, 2004). Studies have indicated that the growth of executive functions depends on social experiences (Hao, Sue, Chan, 2010). When the parental interactions are high in a deaf child, as the relaxation is high in these communications, the language growth will be greater. The family is composed of people, in which the characteristics of the family members affect each other. Families play a role against the diseases based on systematic patterns (Salami, 2010). Developmental, individual differences, and relationship-based approach (DIR), as a modern and an integrated approach, tries to depict the healthy and optimal path for human development. In this approach, developmental disorders of children, as a set of symptoms needing to be treated individually, are not considered, and the child development and its associated pathology in the context of the interactions of biological, psychosocial, and social factors are not investigated (Greenspan, Wieder, 2006). Each child is born with a unique nervous system, manifesting itself in functions of senses, movements, and sensory, cognitive, and emotional processes. On the other hand, the child's family, affected by culture and certain characteristics of the community, communicates with the child. The quality of child interactions with parents, is affected by child unique characteristics and parent educational style, and determines types of developmental outcomes, such as behavioral characteristics and cognitive, social, and emotional skills of child (Greenspan, Wieder, 2006). In this developmental model, it is stated that all capabilities of humans, such as self-awareness, empathy, problem-solving, and social and emotional skills are produced by acquiring the basic capabilities of humans, such as regulation ability, being attracted by people, social communication, and thinking, and constructed within the social interactions of the child with others, especially parents (Amin Yadi, 2012). Accordingly, Ali et al (2015) conceptualized the functional healthy family functions that create a healthy development path under the title of developmental family function, and they stated that the family system, as a unique unit, should achieve the basic emotional-functional capabilities, which are essential for the healthy psychological development of the family members. These emotional-functional capabilities include attention and regulation. This capability represents the relaxed, comfortable, and regulated family conditions. In the family, in which this capability has been achieved, members know each other's individual characteristics and they consider each other's characteristics, needs, desires, and challenges in communicating with each other, and regulating the family environment. For example, when a child needs high mobility and dynamics, members provide the environment in a way that in which there can be healthy, regulated, and relaxed mobility, rather than limiting and controlling him or her (Greenspan, 2007).

### Symptoms of executive malfunctions (quoted by Halaygan, Kishka and Marshall, 2004)

Cognitive symptoms include short attention span, weak working memory and weak short-term memory, planning and reasoning forms, lack of flexibility in the emerging situations, environmental dependence syndrome, and disorder in selective attention. Behavioral symptoms also include perseveration behavior, undue aggression, emotional symptoms, defect in inhibition of emotions, anger, arousal, sadness, etc.

### Research Tool

#### Developmental Family Functional Assessment Questionnaire (DFFAQ):

Developmental Family Functional Assessment Questionnaire was developed by Ali et al. (2013) according to theoretical basis of the developmental, individual differences, and relationship-based approach (DIR). This questionnaire includes 43 items and 7 subscales, including attention and regulation, being attracted in human relationships, targeted exchange, shared social problem solving, developing the representations and ideas, logical thinking, and discipline. The criterion validity of this questionnaire was reported to be 0.75, 0.93, and 0.92 using McMaster Family Assessment, test-retest coefficient, and Cronbach's alpha, respectively. Each component score is calculated through aggregating the score of the items related to that component divided by the number of the items and the answer to the questions is performed based on the Likert scale ranging from never (0) to always (3) and the score is between 0 and 3. The psychometric characteristics of this tool were examined on 148 mothers of 4-6 years old children at Mashhad kindergartens. They were selected from different Mashhad Municipality districts using multistage cluster sampling. Based on Cronbach's alpha, the internal consistency was obtained at 0.74 for the subscale of attention and regulation, 0.71 for being attracted in human relations, 0.75 for mutual relationship, 0.66 for shared social problem-solving, 0.69 for developing the representations and ideas, 0.58 for logical thinking, 0.53 for discipline, and 0.92 for the whole questionnaire. In a group of 30 people with one month interval, re-test coefficient for the sub-scales was estimated to be 0.53 to 0.84 and it was estimated to be 0.93 for the total questionnaire. The criterion validity of this questionnaire was examined by McMaster Family Function Measurement

Questionnaire and the correlation coefficient was obtained as -0.75. In total, it shows that developmental family function measurement questionnaire has a good validity and reliability to determine the development level of family transformation. A high score in each subscale indicates the family achievement to that level of development and a low score suggests poor function at that level (Ali et al., 2013). Kulij neuropsychology and personality questionnaire: executive functions are assessed according to Coolidge neuropsychology and personality questionnaire version 2000. This test recognizes several neuropsychology and personality disorders in children and adolescents aged 5 to 17 years and it has been developed to assess the child's behavior during one week. As child behavioral problems are scored in this test, high scores in its subscales suggest more problems in the same area. Each disorder has a certain and distinct subset. Two cases of these sub-scales assess the executive functions with 19 items. Parent;s respond in a Likert scale. These two subscales assess the executive functions of three areas of organizing, decision-making-planning, and inhibition. The reliability was obtained as 85% for the organizing and decision-making-planning, and 66% for inhibition subscale. Cronbach's alpha was also obtained at 90% (Alizadeh and Zahedi, 2004).

### Procedure

A questionnaire was used in this research given the nature of research which is quantitative and survey. The research procedure was so that based on the research objectives and the method of completing the questionnaires, developmental family function and the executive function scale were provided for mothers. After collecting the data, they were analyzed using SPSS software.

### Data analysis method

Data of this research were analyzed using correlation analysis and regression analysis. Accordingly, descriptive statistics of mean and SD were calculated to describe the research variables. Then, correlation analysis and multiple regression analysis were used to examine the relationship between the family transformation function and the executive functions of the deaf students.

### Findings

Descriptive findings of mean and SD and findings of correlation between research variables are as follows.

**Table 1: Descriptive findings and findings of the correlation between dimensions of developmental family function and executive functions of deaf students**

[Table 1 goes here](#)

\*\*significance at the level of 0.01

\*significance at the level of 0.05

As shown in Table 1, the lowest score of developmental family function is seen in the working memory components. Data obtained from correlation between the dimensions of developmental family function and executive functions of the deaf students suggest a positive and significant correlation between executive functions of deaf students and all dimensions of the developmental family function ( $p < 0.01$ ). The highest correlation was found between executive functions of deaf students and dimensions of inhibition and planning.

**Table 2: Regression variance analysis of the dimensions of developmental family function to predict executive functions (attention, working memory) of deaf students**

Source of variations	Sum of squares	df	Mean squares	F	Sig
Regression	734.06	1	734.66	7.87	0.002
residual	429.18	59	74.48		
Total	961.23	60			

In addition, findings of multiple regression analysis by stepwise method revealed that the executive functions of deaf students based on the attention and work memory dimensions are predictable ( $p < 0.01$ ,  $F = 7.87$ ). The value of multiple correlation coefficient ( $R^2 = 0.87$ ) suggests that 12% of the variations in executive functions of deaf students through inhibition components and decision-making-planning can be explained.

**Table 3: Regression variance analysis of dimensions of developmental family function to predict the problems of inhibition and decision-making-planning of deaf students**

Source of variations	Sum of squares	df	Mean squares	F	Sig
Regression	95.40	2	45.13	4.13	0.007
residual	76.12	59	10.15		
Total	90.12	60			

Tables 2 and 3 show the regression analysis. Multiple regression analysis findings using stepwise method show that purposeful exchange component can predict the problems of inhibition and decision-making-planning of deaf students ( $p < 0.01$ ,  $F = 4.12$ ). The value of square multiple correlations was obtained  $R^2 = 0.91$ , which is explained through the components of inhibition, planning -decision-making.

## Discussion and Conclusion

The findings suggest that assessing the developmental family function and nature in all dimensions predicts the mental health of a child. In comparing the developmental family function and the nature of the children, we concluded that developmental family function can better predict the depression of children compared to nature (Rahimi Borji, 2015). From the Powers point of view, high levels of anxiety might also result in excessive support parenting and this might limit the development of independent skills in children (Tunile and Power, 2002). However, no significant difference was found between the two groups in the dimensions of attention and regulation, bilateral interaction, development of representations and ideas. This finding suggests that almost all families are faced with the same level of this problem. Diagnosing the deafness in the child has numerous outcomes for the family (Conway and Christiansen, 2009). A person with hearing problem provides unique challenges for the family, which might affect interpersonal relationships (Patterson, Pivand, and Myomoto, 2010). The birth of deaf children causes special psychosocial problems and emotions for parents, especially mothers in all aspects, and mothers often spend much time raising their children (Movallali,

Abdollahzadeh, Nemati, 2013). The complexity of the deafness problems and its untreatable nature and the associated communicative problems impairs the family daily life. The parents of deaf children often experience high anxiety and stress even after years of hearing loss (Pipp-Siegel S, Sedey, Yoshinga-Itano, 2002). Logical thinking of the capability refers to the ability to assess the thoughts and ideas and feelings based on logic and reality. In the families, where logical thinking governs, members can act logically and realistically in coping with different issues; they can plan and negotiate logically when facing challenges, and create a logical relationship between thoughts and feelings (Ali, Aminizadeh, Abdekhodai, Ghanaei and Mohareri, 2014). One of the major problems of deaf children is impaired executive functions (Garmabi et al., 2013; Hasanzadeh et al., 2007; Mayberry, 2002; Figueras et al., 2008). One of the intervening approaches is investigating the developmental dimensions of family. The cognitive functions area of deaf children is directly correlated with developmental family model (J.holzinger, Elinger, 2011).

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