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

Sakineh Soltani Kuhbanani

Assistant Professor at Educational Sciences and Psychology Faculty, Ferdowsi University of Mashhad, Mashhad, Iran

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.

Keywords: executive functions, developmental family function, organizing, decision-making-planning, inhibition

Introduction

Deaf person is a person, who cannot communicate with members of society verbally due to lack of hearing loss and his hearing is not effective to spend the normal life and due to hearing loss, he is not able to learn the environment 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 the 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 (kiyan coola, 2007, quoted by Obeidi Zadeghan, 2007; Rhine-Kahlback, 2003). Executive functions include several psychological functions such as decision-making, planning, inhibition, chaining, planning for action and movement outputs. In fact, executive functions undertake the planning of actions, 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, helping people in performing the learning tasks, intelligence actions, and educational issues. Neuro-cognitive executive functions are important structures, playing vital role in directing and controlling the behavior (Alizadeh, 2006). Presence of a person with hearing impairment causes many unique and different challenges for 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, Pisson 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 auditory teaching model, the child gains the ability of learning the new information through listening alone. This process is required to achieve hearing learning, which involves four different levels of development of hearing impairment. 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). As the parental interactions are high in a deaf child and 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 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 need to be treated individually, are not considered, but the child development and its 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 family, affected by culture and certain characteristics of the community, communicates with the child. The quality of child interactions with parents, affected by child unique characteristics and parent educational style, 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 human, 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 put in 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, which this capability has been achieved, members know each other individual characteristics and they consider each other 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 they can healthy, regulated, and relaxed mobility, rather than limiting and controlling his 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 characterizes 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 the Cronbach's alpha, the internal consistency was obtained 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, and 0.69 for developing the representations and ideas, 0.58 for logical thinking, 0.53 for discipline, and 0.92 for 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 -0.75. In total, it shows that developmental family function measurement questionnaire have a good validity and reliability to determine the development level of family transformation. High score in each subscale indicates the family achievement to that level of development and the 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 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 responses in Likert scale. These two subscales assess the executive functions of three areas of organizing, decision-making-planning, and inhibition. The reliability was obtained 85% for the organizing and decision-making-planning, and 66% for inhibition subscale. The Cronbach's alpha was also obtained 90% (Alizadeh and Zahedi, 2004).

Procedure

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 have been 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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Mean (SD) | n |  |
|  |  |  |  |  |  |  |  | 1 | 1.24(0.34) | 60 | 1-attention |
|  |  |  |  |  |  |  | 1 | \*271.27 | 2.210 (0.37) | 60 | 2-working memory |
|  |  |  |  |  |  |  | 1.532 | 333 | 1.77 (0.46) | 60 | 3-decision-making |
|  |  |  |  |  | 0.60\* |  | 7.07 | \*\*677/0 | 1.23 (0.42) | 60 | 4-planning |
|  |  |  |  | 1 | \*\*0.61 | \*\*0.63 | 7.07.9 | \*\*6/0 | 1.49 (0.38) | 60 | 5-inhibition |

\*\*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 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 (R2 = 0.87) suggests that 12% of the variations in executive functions of deaf students through inhibition components, 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 R2 = 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 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 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, Pisvand, and Myomoto, 2010). The birth of deaf children causes special psychosocial problems and emotions for parents, especially mothers at all aspects, and mothers often spend much time for 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 famines, where logical thinking governs, members can act logically and realistically in coping with different issues, they can plan and negotiate logically in facing with the 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).

References

Obeidi Zadegan, A; Moradi, AR. and Robert, F. 2008. Investigating the executive functions in patients treated by Methadone, cognitive sciences news, Issue 75. 39-81

Hassanzadeh, S. Mohseni, N. Afrouz, Gh. and Hejazi, A. (2007) mind theory development in deaf children. Research in the exceptional children area, issue 17, 19-44

Hosseini, M and Samani, S (2012). Evaluating the relationship between dimensions of family function and children self-regulation, Family Research Quarterly Journal, Volume 8, issue 31, 305-317

Rahimi Borji, M (2015) evaluating the role of developmental family function in the depression nature of children. MA thesis. Mashhad Ferdowsi University

Sharifi, Kh., Arizi, H, and Namdari, K. (2005). Investigating the relationship between family function and psychological hardiness in students, Clinical Psychology and Personality Journal, Volume 1, Issue 10, pp. 85-94

Garmabi, M. and Moaleli, G. (2013), Cognitive abilities, mind theory and visual memory for hearing impaired children. Education of Exceptional children, 155, 51-57

Ali, Sh; Amin Yazdi; SA; Abdekhodai; S; Ghanai Chaman Abad; A; Mohareri; F (2013). Development and validation of developmental family function assessment Questionnaire. Psychology and clinical and counseling Journal. 3 (2). 157-176

Baltussen R,Smith. (2012). A.Cost effectiveness of strategies to combat vision and hearing loss in sub-Saharan Africa and South East Asia: mathematical modelling study.BMJ;1-12.

Conway, C. M., & Christiansen, M. H. (2009). Seeing and hearing in space and time: Effects of modality and presentation rate on implicit statistical learning. European Journal of Cognitive Psychology, 21(4), 561-580.

Figueras. , B. , Edwards. , L. & Langdon. (2008). Executive Function and Language in Deaf Children. . Journal of Deaf Studies and Deaf Education, 13,361-377.

Greenspan S, Wieder S.( 2006). Infant an d early childhood mental health: A comprehensive, developmental approach to assessment and intervention: J American Psychiatric Publishing, Inc

Greenspan S Wieder S. (editors). Engaging autism: Using the floortime approach to help, children relate, communicate, and think 1 th ed, Da Capo Press; 2006:1-229

Greenspan S.(2007). The Developmental Approach to Family Functioning: The Historical background of the different ways or lenses or theories – all different ways of looking at families – a very complex process. Available from http://www.icdl.com/distance/webRadio/documents/RadioShow2007071807L.pdf Volkmar F R, Pauls D. Autism. The Lancet2003; 362:1133–1141.

Hao, J., Su, Y. J., & Chan, R. C. K. (2010).Do deaf adults with limited language have advanced theory of mind? *Research in Developmental Disabilities, 31* (6), 1491-1501.

Heward, W. L.(2006). Exceptional children : An introduction to special education. (8th ed).;Upper Saddle River, NJ: Merril/Prentice Hall

Horn, D. L., Davis, R. A. O., Pisoni, D. B., & Miyamoto, R. T. (2004).Visual attention, be- havioral inhibition and speech/ language outcomes in deaf children with cochlear implants. *Inter-national Congress Series, 1273,* 332-335.

Hughes C. 2002. Executive functions and development: emerging themes, Infant and Child Development 11(2): 201–209.

Kaufman, A., & Kaufman, N. (2004).*Kaufman assessment battery for children* (2nd ed.). Mn: Circle Pines, American Guidance servicesi

Kurtzer-White E, Luterman D. (2003). Families and children with hearing loss: grief and coping.Ment Retard Dev Disabil Res Rev;9(4):232-5.

J.holzinger, elinger, D.(2011). Enhancing Rsilience to Mental Hel th disorders in deaf School children. in D.H.zand(Eds). Rsilience in deaf children: Adaptation trough

Emerging Adult hood (pp169-205) New York: springer.

Marschark,.M., Hauser, P. C., Deaf Cognition, Foundation and outcomes: Printed in United States of America. Oxford New York.2008.

Mayberry, R. L.( 2002). "Cognitive development of deaf children: The interface of language and perception in neuropsychology". Hand book of Neuropsychology, 2nd Edition, Amsterdam: Elsevier. 8, (Part II): 71**-**107.

Minuchin S, Fishman H. Family Therapy Techniques. Bahari F, Sia F. ed. Tehran:Roshd ; 2005

Mohseni M, Chime G, Panaghi L, Mansoori N. A comparison of family function and expressed eemotion in families with rheumatoid arthritis patients and families with schizophrenia patients. Family Research 2011; 7(3);373-390

Movallali G, Abdollahzadeh Rafi M, Nemati SH(2013).. Comparison of general health status in mothers of hearing and hearing-impaired children. Audiol;22(2):33-39.

Noble,K. G., Norman, M. F.,& Farah,M. J). Neurocognitive correlates of socioeconomic status in kindergarten children. Developmental Science,.2005; 8(1), 4-8.

Oberg, E. (2007).*Assessing executive functioning in chil-dren with a hearing loss*. Unpublished master thesis, Rochester Institute of Technology, Rochester, NY.

Peterson , NR, Pisond, N. D, B., Mivamoto, (2010). Cochlear Implants and spoken Language Processing abilities. Revie and assessment of the literature. Journal of Neural Neurosci. 28(2). 237-250

Pipp-Siegel S, Sedey AL, Yoshinga-Itano C.(2002). Predictors of parental stress in mothers of young children with hearing loss. J Deaf Stud Deaf Educ;7(1):1-17.

Reynolds CR and Kamphaus RW. 2004. Behavior Assessment System for Children manual (2nd edn) (Circle Pines, MN, American Guidance Services).

Rhine-Kahlback, S. (2004**).** *The assessment of develop-mental language differences, executive functioning and social skills in deaf children*. Unpublished doctoral dissertation, Gallaudet University, Washington, DC.

Salimi A. (2010). Relationship between family functioning and responsibility in adolescents with visual impairments in comparison with normal juvenile [dissertation].Tehran IRAN: University of Social Welfare and Rehabilitation Science.

Slaby, T. & Gaura, T. (2003) Self – efficacy and personal goal setting, American education research journal, 39,903–910.

Soltani Kouhbanany , S. Comparison executive Function in deaf and hearing student s in Mashhad . Tehran International Congress of Educational Psychology, 2011.

Soltani Kouhbanany , s. Khsroorad. R.Failure and education of deaf children. Ilam. Havar Publication. ,2014.

Soltani Kouhbnani ., S. Khoosrorad, R. Executive function and mental health in exceptional children. Sabzevar University of Medical Sciences. In press., 2015.

Tunali B, Power TG.(2002). Coping by redefinition: Cognitive appraisals in mothers of children with autism and children without autism. Journal of Autism and Developmental Disorders.;32(1):25-34

Turnball, A. P. , Turnball, H, R. , Shank, M. , & Smith, S. Exceptional lives: Special education in todays schools (4 th ed. ). 2004;Upper Saddie River, NJ: Merrill/Prentice Hall

van Eldik T, Treffers PD, Veerman JW, Verhulst FC.(2004). Mental health problems of deaf Dutch children as indicated by parents’ responses to the child behavior checklist. AmAnn Deaf;148(5):390-5.

Wauters L Marschark M. Cognitive functioning in deaf adults and children. In Marschark M, Spencer P. E (Eds.), Oxford handbook of deaf studies, language, and education, New York:Oxford University Press. 2011;1 (20):486–499

Zadeh Mohamadi A, Malek Khosravi GH.A preliminary study on the psychometric properties and validity of the Scale

Family Assessment Device (FAD).Journal Familily Research 2006;2(5):69-89.