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Executive Tasks and Cognitive Flexibility and Their Relationship to Academic Achievement amongUniversity Students with Attention Deficit Hyperactivity Disorder

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Abstract

The current study measured the executive tasks and cognitive flexibility and their relationship to the academic achievement of female students of the college of education at Imam Abdulrahman bin Faisal University in the Kingdom of Saudi Arabia. The study sample included 200 female students. The study applied a test of executive tasks, cognitive flexibility, and a scale of attention deficit hyperactivity disorder for adults prepared by the researchers. The results showed a statistically significant relationship between the scores of students with attention deficit and hyperactivity on the executive tasks scale and its dimensions (planning, organization, purposeful action, self-monitoring, and total score), cognitive flexibility, and academic achievement, which necessitates the need to design empirical research to reduce the severity of attention deficit hyperactivity disorder among undergraduate students because it will have a positive impact on their academic achievement.

Introduction

Recent studies have proven that attention deficit hyperactivity disorder not only affects schoolchildren, but also extends to include students in the stage of adulthood, where the number of students suffering from this disorder in adulthood represents a ratio of 1:30 adults(Koojietal 2010).Adults with attention deficit hyperactivity disorder and impulsivity suffer from negative effects of this disorder, which reflects on executive tasks, social, academic and other aspects of their lives.Students who suffer from attention deficit hyperactivity disorder may also have some accompanying psychological problems such as anxiety and mood disorders.They also suffer from daily challenges in their studies, at work, and at home, such as difficulty obtaining a stable job, difficulty in social relationships, and a possible risk of engagement in some illegal behaviors (Kotsopoulos, et al, 2013).Within the limits of the researchers' knowledge, few studies in the Arab environment deal with attention deficit in adulthood as studies of attention deficit hyperactivity disorder in the region rather focus on measuring and diagnosing disorder in childhood and school time. Accordingly, the researchers studied the subject, and examined the extent to whicha group of female students at the college of education show symptoms of this disorder and its relationship to executive tasks.Studying this disorder is important as it can affect the academic achievement of female students and their future career planning.

Executive functions trigger the execution of a series of cognitive tasks with conditioning and control of behavior.It also helps in boosting cognitive flexibility (Stevens, 2003).Executive functions affect the academic achievement and efficiency of individualswith attention deficit hyperactivity disorder. The defect in executive functions in students with attention deficit hyperactivity disorder may lead to a defect in academic achievement, and other problems relating to the academic life of students(Al-Zahra, 2018).Cartwright(2008)stated that Piaget postulated that cognitive flexibility is a cognitive ability possessed by each individual. It appears according to the expected change in thinking patterns due to the factors of maturity and growth. Ttherefore, cognitive flexibility and executive tasks may be affected by students with attention deficit hyperactivity disorder, and in turn this will affect their academic achievement, which the current study seeks to reveal.Therefore,the research problem is defined in the following question:

1- Is it possible to achieve a causal model that shows the relationship of influencing and being influenced (both directly and indirectly) among the study variables (cognitive flexibility, executive tasks and academic achievement)?
2- Is there a relationship between the average scores of students with attention deficit hyperactivity disorder on the executive tasks scale, the dimensions of their (planning, organization, purposeful action, self-monitoring, and the total score) and academic achievement?

3- Are there differences between the mean scores of students with attention deficit hyperactivity disorder on each of the dimensions of executive tasks scale (planning, purposeful action, organization, self-monitoring), their total score and academic achievement?

Objective of the study

The current study aims at determining the relationship between executive tasks, cognitive flexibility and academic achievement among female students with attention deficit hyperactivity disorder at the college of education, as well as identifying female students who suffer from attention deficit hyperactivity disorder, which persisted with them from childhood until adulthood, according to the diagnostic indications listed in the Fifth Diagnostic Statistical Manual, and whose academic achievement may be affected as a result of the presence of this disorder.

Significance of the study

The significance of study arises from achieving the following:

1- Measuring the executive tasks of female students at the undergraduate level can contribute to the provision of services and training programs to improve these tasks and thus raise the level of academic achievement.
2- Identifying female students who suffer from a decline in cognitive flexibility and executive functions helps in providing them with assistance so that they can succeed in their professional life later on.
3- The significance of the study also appears in the selection of its sample of university students as the available studies deal with attention deficit hyperactivity disorder and executive functions in childhood rather than adulthood.
4- Adding tools to the Arabic library for measuring and diagnosing attention deficit hyperactivity disorder at the university stage, which was not available before excepting in childhood.

Literature Review

The study of Taconnat et al. (2009) aimed to know the effect of age on a sample of adults and the elderly and the role of cognitive flexibility in the process of remembering. The study sample consisted of 62 young men whose ages ranged between (20-40).The results showed lower performance among the elderly in remembering words in addition to forgetting many of them, and the older individuals used cognitive flexibility to help memory performance, and the results showed that the most effective factor in remembering is cognitive flexibility.A study by (Sinha,etal, 2008) concluded that executive tasks disorder among students with attention deficit hyperactivity disorder was the main reason behind the academic failure of these students, the study sample consisted of 250 secondary school students.The results ofa study by(Sheldon, 2007)concluded that the most disruptive executive tasks for students with attention deficit hyperactivity disorder were planning and regulating behavior.In addition, Ran (2009) conducted a study that aimed to test the relationship between cognitive flexibility,adaptation and achievement. The sample of the study consisted of 42 students from New York University. The results showed that students with high flexibility were more accomplished and more adaptable to new or emergency situations.

Tan (2005) also conducted a study aimed at studying the relationship between cognitive flexibility and achievement motivation among secondary school students in Singapore schools. Resultsindicated a positive significant correlation between cognitive flexibility and motivation to achieve.

The current study deals with an under-researched topic as it focuses on the study of attention deficit and hyperactivity disorder among university students because of its influence on their academic life. The study also focused on addressing the relationship between executive tasks and cognitive flexibility and studying the extent to which students with attention deficit and hyperactivity disorder are affected.

Research Methodology

(260) female students enrolled in the BA level at the College of Sciences and Human Studies at Imam Abdul Rahman bin Faisal University for the academic year (2020/2021) participated in the study. Their ages ranged between (18- 22) years.The exploratory sample consisted of (60) female students, and the following table shows the distribution of the female students of the exploratory sample of the study. The main study sample included (200) female students and Table (2) shows the distribution of the sample according to specialization.

Measurements of the study

To achieve the objectives of the study, answer its questions and verify its hypotheses, the researchers prepared the several measurement tools. The researchers designed the study tools for data collection. The first scale for cognitive flexibility, and the second scale for executive tasks, and third scale attention deficit hyperactivity disorder Test. The scales were developed and modified from the relevant literature. After collecting the initial items for the study, scales were given to group of experts review to examine the face validity of the items and suggestion were given and corrected accordingly. Each scale measured by several items that were scaled on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was used to examine the internal reliability of the cognitive flexibility scalewith (α =0.761) and executive tasks with (α =0.77), and attention deficit hyperactivity disorder test (α =0.77).

Results of the Study

First hypothesis:It is possible to achieve a causal model that shows the relationship of (both directly and indirectly) influencing and being influenced among the study variables (cognitive flexibility, executive tasks and academic achievement).

To achieve a causal model that shows the relationship of influencing and being influenced within the framework of the existing relationships among the study variables, the structural equation modeling method was used in the Amos24 program.The model generating position was used to reach the best causal model that determines mutual influencerelationships among the study variables for the study sample.First, the structural equation model for the indirect effects among the variables of the study, flexibility, and executive tasks on achievement. Figure (1) illustrates the structural equation model among the study variables.

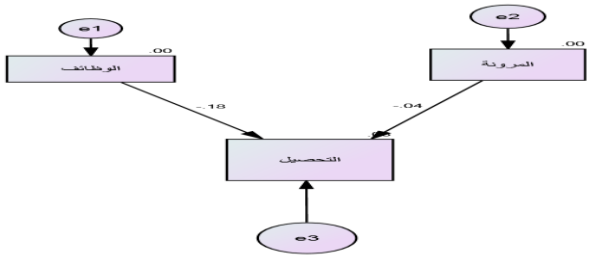

Figure 1. Structural equation model

The variables of the current study shown in Figure (1) are divided into three types:

1) Independent variables: These are the variables of cognitive flexibility and executive tasks.
2) Dependent variable: it is the variable affected by the independent variables and the intermediate variables, and it is the academic achievement variable.
3) (e1: e3) represents the measurement error at each of the dimensions to which it belongs.

The structural equation model shown in Figure (1) had good conformance quality indicators as shown in Table (1), where the values of the conformity quality indicators fell within the ideal range for each indicator. This indicates the good conformity of the model to the data.

Table 1.Values of Quality Indicators of the Model Conformity

Category	Index	Notes
Absolute fit	RMSEA	RMSEA.000 < 0.08 more better
Incremental fit	CFI	CFI 1.00 > 0.85 acceptable
	TLI	TFI 1.48 > 0.85 acceptable
Parsimonious fit	Chisq/df	Chisq/df .327 < 3.0 more ideal

Table (1) shows that the structural equation model had good and statistically acceptable matching quality indicators.It is clear from figure (1) that there are direct and indirect effects between cognitive flexibility and academic achievement at a significance level of 0.01, and the value of the direct effect between executive tasks and academic achievement is significant at a significance level of 0.001.

Second: The direct effects model between the study variables, and Figure (2) shows the structural equation model between them.

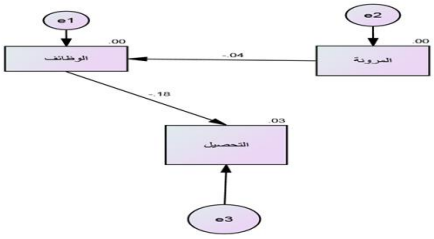

Figure 2.Structural equation model

The variables of the current study shown in Figure (2) are divided into three types:

1) Independent variable: it is the variable of cognitive flexibility.

2) Intermediate variables: they are the influencing and being influenced variables, and the executive tasks variable.

3) Dependent variable: it is the variable affected by the independent variables, and it is the academic achievement variable.

4) (e1: e3) represents the measurement error at each of the dimensions to which it belongs.

The structural equation analysis model shown in Figure (2) had good conformity quality indicators, as shown in Table (2), where the values of the conformity quality indicators fell within the ideal range for each indicator. This indicates the good conformity of the model to the test data. Table (2) shows conformance quality indicators values to the current structural model:

Table 2. Values of Quality Indicators of the Model Conformity

Category	Index	Notes
Absolute fit	RMSEA	RMSEA .000 < 0.08 more better
Incremental fit	CFI	CFI 1.00 > 0.85 acceptable
	TLI	TFI 1.42 > 0.85 acceptable
Parsimonious fit	Chisq/df	Chisq/df .414 < 3.0 more ideal

Table (2) shows that the structural equation model had good and statistically acceptable matching quality indicators.It is clear from figure (3) that there are direct and indirect effects and that the value of the direct effect between cognitive flexibility and executive tasks amounted to (0.04) at a significance level of 0.001, which means flexibility has an indirect effect on academic achievement in the presence of a mediator variable of executive tasks.

Third: The direct effects model among the study variables, and Figure (3) shows the structural equation model between them.

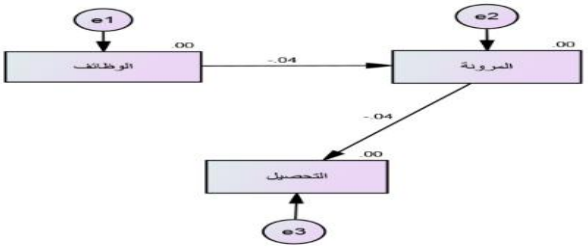

Figure 3. Structural equation model among the study variables

Figure (3) shows the structural equation model between the variables of cognitive beliefs and motivational beliefs in the psychosocial context.

Variables included in the model Figure (3):

1) Independent variable: it is the influencing variable, and it is the variable of executive tasks.

2) Dependent variables: it is the variable affected by the independent variable, and it is the cognitive flexibility variable.

3) (e1: e3) represents the measurement error at each of the dimensions to which it belongs.

The structural equation model shown in figure (3) had good conformity quality indicators, as shown in Table (3), as the values of the conformity quality indicators fell within the ideal range for each indicator, which indicates the good conformity of the model to the data.

Table 3. Values of Quality Indicators of the Model Conformity

Category	Index	Notes
Absolute fit	RMSEA	RMSEA .000 < 0.08 more better
Incremental fit	CFI	CFI .90 > 0.85 acceptable
	TLI	TLI.98 > 0.85 acceptable
Parsimonious fit	Chisq/df	Chisq/df 1.653 < 3.0 more ideal

It is clear from Table (3) that the structural equation model has good and statistically acceptable matching quality indicators.Figure (3) shows that the value of the direct effect between cognitive flexibility and academic achievement is significant at a significance level of 0.001, and that the value of the direct effect between executive tasks and cognitive flexibility is significant at a significance level of 0.001, which means that there are indirect effects of executive tasks on academic achievement through an intermediate variable, cognitive flexibility.

Comments on the three models:

1) The second model has good quality indicators, and all of its relationships are more significant than the first and third models.
2) The reciprocal interactive relationship between cognitive flexibility and executive tasks and their direct impact on academic achievement must be taken into consideration.
3) The direct impact of executive functions on academic achievement is high in the absence of intermediate variables, as in the case of the first and second models, which indicates the importance of the impact of executive tasks on achievement in the case of low cognitive flexibility of the student.

The results agree with the study of (Gioia etal., 2002) which aimed to study the level of executive tasks among students with attention deficit hyperactivity disorder in the secondary stage. The results concluded that students with attention deficit hyperactivity disorder suffer from executive tasks disorder.It also agrees with the study (Sinha etal., 2008), which concluded that executive function disorder among students with attention deficit hyperactivity disorder is the main reason behind the academic failure of these students.It also agrees with the validity of studies that emphasize the importance of attention as a cognitive process in academic achievement, as in the study by Watson and Friedman (2009) indicated the existence of a significant relationship between executive tasks disorder, attention deficit and hyperactivity.Likewise,a study by (Schwebach, 2007) indicated that pupils with attention deficit hyperactivity disorder suffer from executive functions disorder.

Recommendations and Conclusion

1- Studying the reasons for the low academic achievement of students at the undergraduate level is important. Thus, the researchers draw attention to the necessity of addressing research in this field, especially since the university stage is one of the important stages that prepares students for professional life later on.A student reaching the university level is considered a national treasure that can have a significant role in boosting the well-being of his/her society.

2- Studies have indicated that ADHD has gone beyond childhood andextended to include adulthood. The researchers point out the necessity of designing experimental research to reduce the severity of the disorder among students at the university level because it will have a positive impact on their academic achievement.

3- Executive tasks are important to students in academic achievement and affect their professional life later in terms of the ability to plan and organize their life (Saboya,etal 2009).Therefore, the researchers highlight the necessity of conducting empirical research to improve the executive tasks of students, as it will have a positive impact on their lives.

References

Junaidi, A. (2017). Executive Functions and their Relation to Achievement Motivation and Academic Achievement among Middle School Students with Learning Disabilities. *Arabic Studies in Education and Psychological Studies, 90*(90), 193-159. Dar Almandumah.

American Psychiatric Association(2013). *Diagnostic and Statistical Manual of Mental Disorders,* Fifth Edition.

Kooij, J., &Francken, M.(2010). *DIVA Foundation*, The Netherlands.

Dennis, J., &Vander-Wal, S. (2010). The Cognitive Flexibility Inventory: Instrument Development and Estimates of Reliability and Validity. *CognTher Res,*34, 241–253.

Cañas, J., Quesada, J., Antolí, A., & Fajardo, I. (2003). Cognitive flexibility and adaptability to environmental changes in dynamic complex problem-solving tasks. *Ergonomics*, 46, 482.

Cartwright, K. (2008. *Cognitive flexibility and reading comprehension. Relevance to the future.* In C.C. Block &R.Parris (Eds),Comprehension instruction : Research – Based best practices (2nd ed ., 50-64).New York: Guilford Publishing.

Gioia, G. et al (2002). Math practice and its influence on math skills and executive functions in adolescents with mild to borderline intellectual disability. *Research in developmental disabilities, 34* (5), 1815-1824.

Kooij, J. et al (2010). European consensus statement on diagnosis and treatment of adult ADHD: The European Network Adult ADHD. *BMC Psychiatry* 10(67).

Kotsopoulos, N. et al. (2013). The fiscal consequences of ADHD in Germany: a quantitative analysis based on differences in educational attainment and lifetime earnings. *Journal of Mental Health Policy Econ, 16(*37), 27-33.

Ran, R. (2009). Social Cognition, Automatic and Flexible, No Conscious Goal Pursuit. *Nonconscious*, 1, 20 – 36.

Schwebach, A. (2007). *Competency and social stress in children with ADHD.* Paper presented at the annual conference of the American Psychological Association, Washington, D.C.

Sinha, S. etal. (2008). Executive Function in Williams and Down Syndromes. *Research in Developmental Disabilities: A Multidisciplinary Journal, 34* (1), 46-55.

Schwebach, T. (2007).Executive function in children with intellectual disability - the effects of sex, level and aetiology of intellectual disability. *Journal of Intellectual Disability Research,58*(9), 830-837.

Saboya, B. et al (2009). Executive functions and processing speed in children with mild to borderline intellectual disabilities and externalizing behavior problems. *Child Neuropsychology*, 21,1-21. DOI: 10.1080/09297049.2015.1135421.

Sheldon, T. (2007). *Assessing attention-deficit/hyperactivity disorder. Topics in Social Psychiatry*. New York: Kluwer Academic/Plenum Publishers. ISBN 978-0-306-46388-4. OCLC 51784126

Stevens, T. (2003). The Unity and Diversity of Executive Functions and Their Contributions to Complex "Frontal Lobe" Tasks: A Latent Variable Analysis.*Cognitive Psychology*, 41.

Taconnat, L., Raz, N., Tocze, C., Bouazzaoui, B., Sauzeon, H., Fay, S. &Isingrini, M. (2009). Ageing and organization strategies in free recall: The role of cognitive flexibility. *European Journal of Cognitive Psychology*, *21*(2/3), 347- 365.

Tan, M. (2005). *Examining the Impact of an Outward-Bound Singapore Program on the Life Effectiveness of Adolescents.*Unpublished Master Theses, University of New Hampshire.332

Watson, W., Friedman, N., Emerson, M., Witzki, A., Howerter, A., & Wager T. (2009). The Role of Multidimensional Attention Abilities in Academic Skills of Children With ADHD.*Journal of Learning Disability, 42*(3), 240-249.

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