

## Executive Function Skills and Their Effect on the Academic Life of Students

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### Abstract

Executive function skills are skills that assist individuals in achieving their objectives. They are relevant not only to academic settings, but are also of import in other areas of life. As a result of their importance, they have become the focus of many studies. Executive function skills are essential in order to be successful in academia, as well as in the professional development of the individual. From an organizational point of view, these skills are regarded to be indispensable in increasing the effectiveness of human resources. The objective of this research is the investigation of student executive function skills and the study of their impact on their academic life. The study sample consists of 165 students at the Mediterranean University of Albania. The descriptive method and quantitative research will be used in this study. The research instrument is the questionnaire, which was distributed online. The testing of the hypotheses is conducted through the use of a 95% confidence interval. The study concluded that executive function skills have a positive impact on the academic achievement of students. The executive function skills most drawn upon by students are: response inhibition, metacognition and time management. Whereas, the executive function skills that students need to further boost are: stress tolerance, task initiation and emotional control.

**Keywords:** student, executive function skills, academic achievement

### 1. Introduction

Some skills are inherent in individuals from birth, while some others can be potentially developed through the course of one's life. Executive function skills belong to the second category. They are concerned with the continuous expansion of the human mind. Executive function skills assist with the achievement of objectives, time management, working memory, creativity and beyond. Recognizing and enhancing them has an impact on the individual's academic and personal growth (Allan, Hume, Allan, Farrington, & Lonigan, 2014). Executive function skills are applicable in both school (Serpell & Esposito, 2016) and the workplace. Companies prefer employing people who possess enhanced executive function skills and work on improving them. Executive function skills are viewed as directly linked to people's success in the workplace. As a result, they are considered to be an individual's most valuable asset. Not all executive function skills can be developed similarly. Some particular skills are more developed than others. Analyzing personal strengths and weaknesses helps an individual to focus on those areas that are in need of improvement. Neglecting such issues can have negative effects in an individual's present and future. The objective of this research is the investigation of student executive function skills and the study of their impact on their academic life.

## 2. Literature Review

The study of the human mind is quite complex and filled with obstacles. The executive function skills research area is complex and distinct. The analysis of executive function skills adds further value to various scientific studies concerned with societal advancement. Detailed research in this field can shed light on different aspects of the functioning of the human brain.

Many scholars have conducted research on executive function skills (Duckworth, Tsukayama, & May, 2010; Dawson & Guare, 2010; Welsh, Nix, Blair, Bierman, & Nelson, 2010; Latzman, Elkovitch, Young, & Clark, 2010; Knouse, Feldman, & Blevins, 2014; Serpell & Esposito, 2016). The largest part of researchers has centered on the study of the link between executive function skills and achievements in the field of mathematics (Jacob & Parkinson, 2015).

Extant research has shown that executive function skills have a positive impact on academic achievement (Duckworth, Tsukayama, & May, 2010; Knouse, Feldman, & Blevins, 2014; Latzman, Elkovitch, Young, & Clark, 2010; Welsh, Nix, Blair, Bierman, & Nelson, 2010; Fuhs, Nesbitt, Farran, & Dong, 2014). The further enhancement of executive function skills can result in an increase of academic achievement.

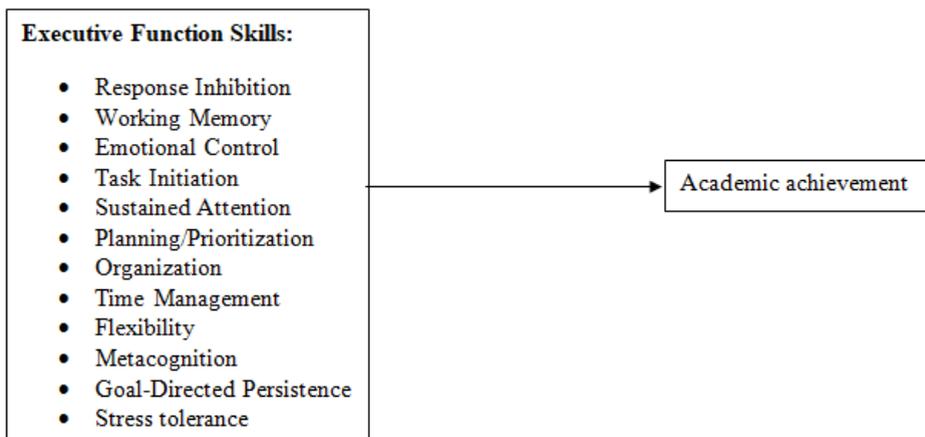
The research questions for the study are:

1. Which Executive Function Skills are most established in students?
2. Which Executive Function Skills need further improvement by students?

The research hypotheses for the study are:

- H1a: Executive function skills have an impact on the academic achievement of students ( $\alpha=0.05$ ).
- H1b: Elements of executive function skills have the same impact on the academic achievement of students ( $\alpha=0.05$ ).

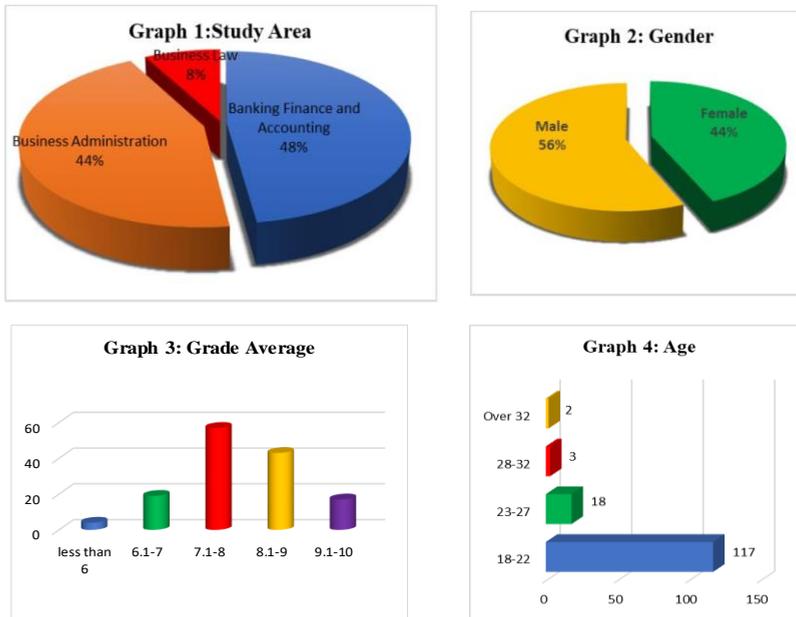
The literature review generates the following conceptual model:



## 3. Methodology

This study employs quantitative research and the research instrument is the questionnaire (Dawson & Guare, 2010). The questionnaire was distributed online. The research instrument is divided into two parts. The first part contains questions on twelve elements of executive function skills (response inhibition, working memory, emotional control, task initiation, sustained attention, planning/prioritization, organization, time management, flexibility, metacognition, goal-directed persistence, stress tolerance), and the second part consists of demographic questions. Questions are evaluated according to a 7-point Likert-scale, ranging from point one: "Strongly disagree" to point seven: "Strongly agree" (Vagias, 2006). The period during which the questionnaire was distributed is October 2017 – January 2018. The study sample consists of 165 bachelor students at the Mediterranean University of Albania. Questionnaires valid for the purposes of analysis are 140.

The rate of response return for the questionnaires is 85%. The descriptive data of the study sample are shown in the graphs below.



The software utilized in the study for conducting the analysis are JASP-0.8.5.1 and SPSS 20. Table 1 data analysis shows the value of the reliability coefficient Cronbach's  $\alpha=0.856 (>0.7)$ . This conveys the data are valid for usage in this study.

**Table 1:** Reliability coefficient Cronbach's  $\alpha$

	Cronbach's $\alpha$
scale	0.856

*Note.* Of the observations, 165 were used, 0 were excluded list-wise, and 165 were provided.  
\* minimum acceptable value 0.7.

#### 4. Empirical Analysis

Which Executive Function Skills are most established in students?

Three Executive Function Skills are most established among students: response inhibition, metacognition and time management. The element of response inhibition is most established in students. It is the ability to process thoughts before making actions, or evaluating a situation before acting. Second, metacognition is the ability think critically about a situation, which includes self-monitoring and self-evaluation in solving problems. Third, time management infers the effective management of time. Table 2 shows the analysis of the data provided.

**Table 2:** Most Established Executive Function Skills

	Valid	Missing	Mean	Minimum	Maximum
Response Inhibition	140	0	17.05	3	21
Time Management	140	0	16.06	5	21
Metacognition	140	0	16.39	5	21

Which Executive Function Skills need further improvement by students?

Executive function skills less established in students are: stress tolerance, task initiation, and emotional control. One of the challenges students struggle most is stress management. Stress has been termed the health epidemic of the 21<sup>st</sup> century,

and needs be managed and kept under control, in order for individuals to better cope with stressful and uncertain situations. Students often encounter difficulty in meeting deadlines. They find it challenging to turn in their assignments on time. A sizable amount of introspection is required in order for them beginning to comply with their given task deadlines. Emotional control comes third as least established skill in students. Emotions have a negative impact on student performance. They need to additionally concentrate on the controlling of emotions in order to improve their academic performance.

**Table 3:** Least Established Executive Function Skills

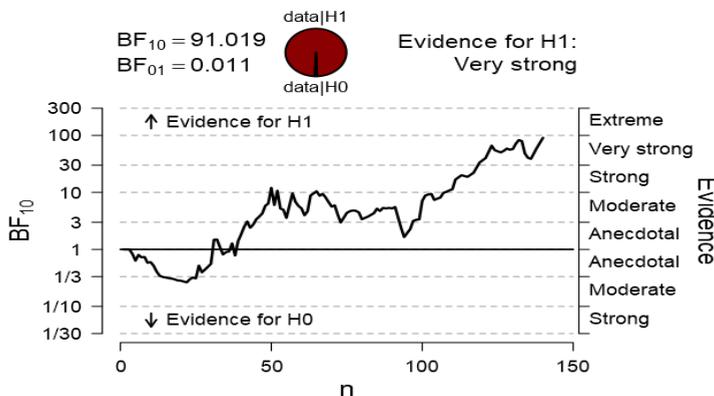
	Valid	Missing	Mean	Minimum	Maximum
Emotional Control	140	0	13.92	3	21
Task Initiation	140	0	13.89	5	21
Stress tolerance	140	0	8.571	3	15

H1a: Executive function skills have an impact on the academic achievement of students ( $\alpha=0.05$ ).

Table 4 conclusions of the analysis demonstrate that executive function skills have an impact on student academic achievement. Between the two variables there exists a significant statistical positive correlation with correlation coefficient  $r=0.308$  and  $BF_{10}=91.02$ . This study shows that the development of skills is highly important for students as they have a direct impact on their academic achievement. The analysis concludes that hypothesis H1a is supported with a confidence interval 95%. Schematically the analysis is shown in Graph 5.

**Table 4:** Bayesian Pearson Correlation

		r	$BF_{10}$
Executive Function Skills	- Student Academic Achievement	0.308	91.02



**Graph 5:** Executive function skills and student academic achievement

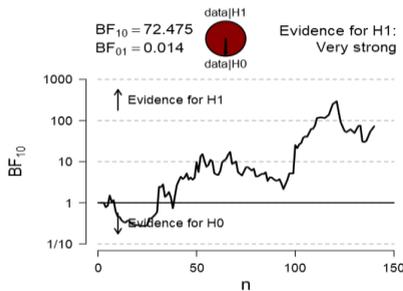
H1b: Elements of executive function skills have the same impact on the academic achievement of students ( $\alpha=0.05$ ).

Table 5 data shows that of 12 elements of the executive function skills, only 7 have a positive impact on academic achievement. The elements that have the most impact on student academic achievement are: response inhibition, working memory, sustained attention, planning/prioritization, time management, flexibility and metacognition. The above seven elements and student academic achievement have a significant statistical correlation. While, the elements that do not have an impact on student academic achievement are: emotional control, task initiation, organization, goal-directed persistence, and stress tolerance. Of the elements that do not have an impact on student academic achievement, there exists an

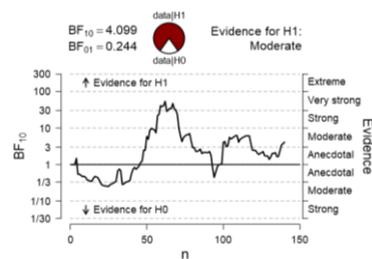
insignificant statistical negative correlation between stress tolerance student academic achievement. Hypothesis H1b is rejected, since only 7 of the elements have an impact on student academic achievement. The conclusions of the analysis are presented in a more detailed manner in Table 5 and schematically in Graphs 6-17.

**Table 5: Bayesian Pearson Correlation**

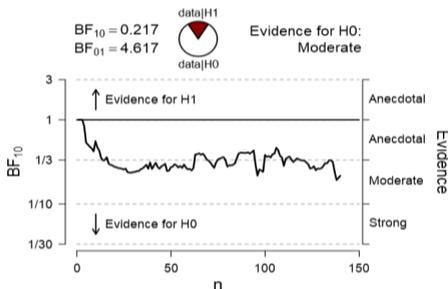
		r	BF <sub>10</sub>
Response Inhibition	- Student Academic Achievement	0.303	72.475
Working Memory	- Student Academic Achievement	0.229	4.099
Emotional Control	- Student Academic Achievement	0.102	0.217
Task Initiation	- Student Academic Achievement	0.101	0.212
Sustained Attention	- Student Academic Achievement	0.253	9.361
Planning/Prioritization	- Student Academic Achievement	0.330	272.526
Organization	- Student Academic Achievement	0.130	0.334
Time Management	- Student Academic Achievement	0.185	1.134
Flexibility	- Student Academic Achievement	0.247	7.743
Metacognition	- Student Academic Achievement	0.263	13.627
Goal-Directed Persistence	- Student Academic Achievement	0.102	0.214
Stress tolerance	- Student Academic Achievement	-0.176	0.906



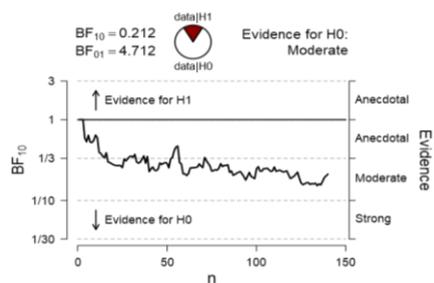
**Graph 6: Response Inhibition and Student Academic Achievement**



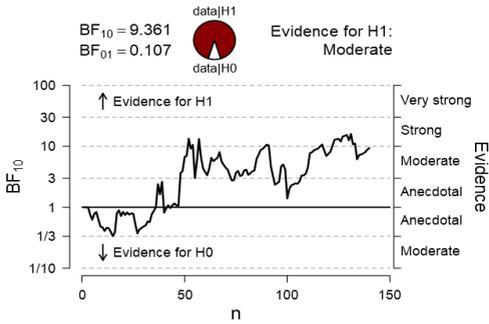
**Graph 7: Working Memory and Student Academic Achievement**



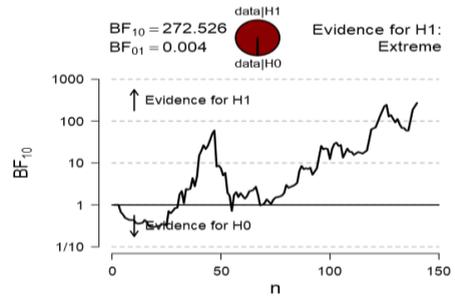
**Graph 8: Emotional Control and Student Academic Achievement**



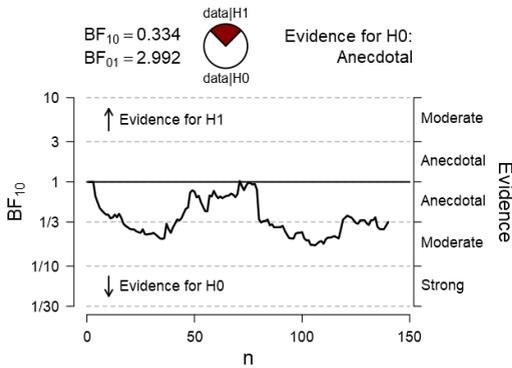
**Graph 9: Task Initiation and Student Academic Achievement**



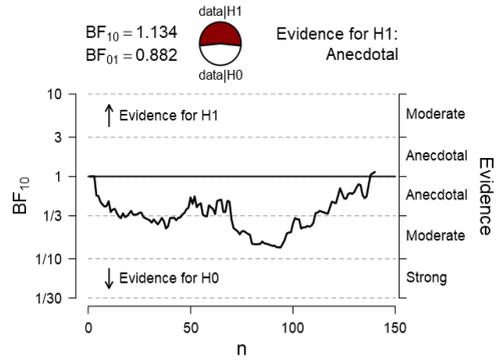
**Graph 10:** Sustained Attention and Student Academic Achievement



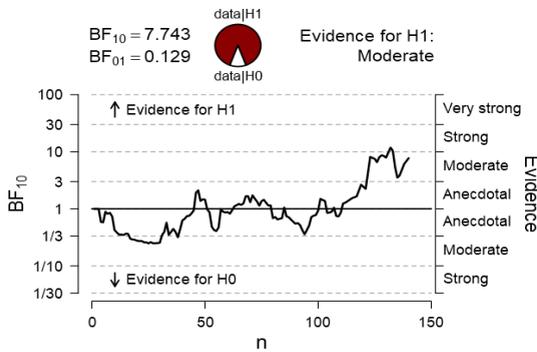
**Graph 11:** Planning/Prioritization and Student Academic Achievement



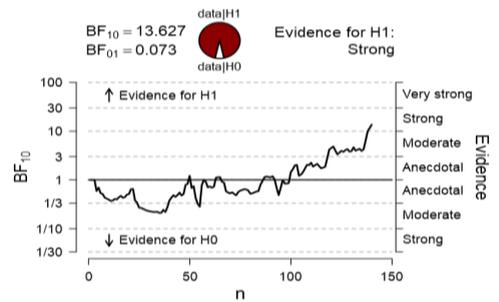
**Graph 12:** Organization and Student Academic Achievement



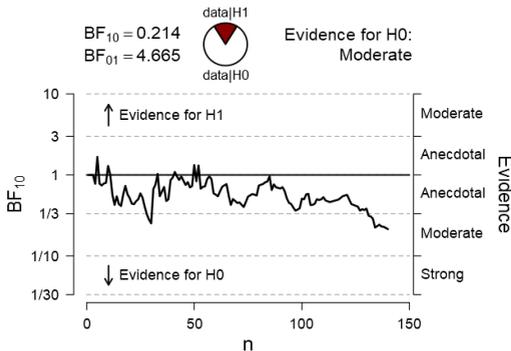
**Graph 13:** Time Management and Student Academic Achievement



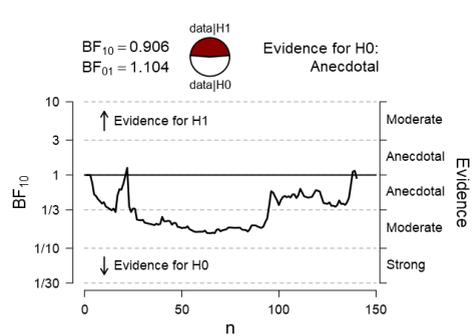
**Graph 14:** Flexibility and Student Academic Achievement



**Graph 15:** Metacognition and Student Academic Achievement



**Graph 16:** Goal-Directed Persistence and Student Academic Achievement



**Graph 17:** Stress tolerance and Student Academic Achievement

## 5. Conclusions and Recommendations

Executive function skills play a definitive role in the professional and personal development of students. This study has concluded that executive function skills most established in students are: response inhibition, metacognition and time management.

While the executive function skills that necessitate improvement on the part of students are: stress tolerance, task initiation and emotional control. Analyzing their weak points assists students in further enhancing such capabilities, whilst working towards transforming them into strengths.

Executive function skills have a positive impact on student academic achievement. There exists a significant statistical correlation between them with correlation coefficient  $r = 0.308$  and  $BF_{10} = 91.02$ . An increase of executive function skills causes an increase in academic performance. Out of 12 elements, only 7 elements: response inhibition, working memory, sustained attention, planning/prioritization, time management, flexibility and metacognition, have an impact on student academic achievement. Whereas 5 elements: emotional control, task initiation, organization, goal-directed persistence, and stress tolerance, do not have an impact on student academic achievement. The conclusions of the study are in line with those of the literature review.

Based on the study's findings, it is recommended of universities to employ such research instruments, in order to analyze, with the aim to galvanize, the most established executive function skills and those less developed among students.

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