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Construction of the executive profile of university students with anxiety symptoms

Construção do perfil executivo de universitários com sintomas de ansiedade

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Abstract

Objective
The present study investigated the effect of anxiety symptoms on the executive functioning of students, in order to build a profile of the executive functioning of this population.

Method
Thirty-three college students diagnosed with anxiety were assessed using an executive functions battery.

Results
The results showed lower inhibitory control, cognitive flexibility and focused attention for the group of students with high anxiety. In addition, this group showed lower motivation and capacity for both management and self-regulation.

Conclusion
This work contributed to the mapping of the different executive function factors in the effect of anxiety on cognition. The expansion of this understanding offers better possibilities for the development of interventions strategies and management of executive dysfunctions, with repercussions on the quality of life and school performance of these students.

Keywords: Anxiety; Cognition; Executive functions; Neuropsychology; Students.

Resumo

Objetivo
O presente estudo investigou o efeito dos sintomas de ansiedade sobre o funcionamento executivo de estudantes, com o intuito de traçar um perfil do funcionamento executivo dessa população.

Método
Trinta e três universitários diagnosticados com ansiedade foram avaliados por meio de uma bateria de funções executivas.

Resultados
Os resultados indicaram menor controle inibitório, flexibilidade cognitiva e atenção focada no grupo de estudantes com altos níveis de ansiedade. Além disso, esse grupo apresentou menor motivação e capacidade tanto de gestão quanto de autorregulação.

Conclusão
Este trabalho contribuiu para o mapeamento dos diferentes fatores das funções executivas envolvidos no efeito da ansiedade sobre a cognição. A ampliação desse entendimento oferece melhores possibilidades para o desenvolvimento de estratégias de intervenção e manejo das disfunções executivas, com repercussões na qualidade de vida e no desempenho acadêmico desses estudantes.

Palavras-chave: *Ansiedade; Cognição; Funções executivas; Neuropsicologia; Estudantes.*

Data from the World Health Organization indicate high rates of individuals in the world population diagnosed with Anxiety Disorder (World Health Organization [WHO], 2017). The estimate is 264 million cases, 21% in the regions of the Americas (WHO, 2017). In Brazil, Anxiety Disorders are the most prevalent among psychiatric disorders (Muller et al., 2015). Due to its high prevalence and due to its economic, social, political and mainly mental health impacts investigation of the effects of anxiety in different segments of the Brazilian population is necessary.

Muller et al. (2015) conducted a systematic review on the role of executive functions as a neurocognitive endophenotype in Anxiety Disorders. The results of the study indicate a lack of literature on the subject, given that they only found studies on Obsessive Compulsive Disorder. In addition, the authors point out that studies on anxiety executive functioning tend to assess specific subdomains and that comparisons among studies are complex due to the use of different tests. The systematic review indicates the need for further studies that should help overcome those methodological limitations; they should also help to understand the role of neurocognitive endophenotypes considering the number of executive components and their impacts on Anxiety Disorders.

According to Diamond's (2013), the term "Executive Functions" (EF) is understood as a family of hierarchical mental processes necessary in situations involving planning and monitoring of goal-directed behaviors. The literature (Diamond, 2013; Miyake et al., 2000) suggests the existence of three core EF, namely: inhibitory control, working memory and cognitive flexibility. The articulated functioning of the core EF would allow the emergence of other EF, called higher order, such as reasoning, planning and problem-solving abilities.

In this model, inhibitory control is understood as the ability to control one's attention, behavior, thoughts and/or emotions in order to suppress an internal or external stimulus and act in a way that is more appropriate to the situation. Working memory, in turn, involves retaining information and manipulating that information mentally, and is essential for reasoning and creativity, for example. Finally, cognitive flexibility is a cognitive resource that allows us to change perspectives, including spatial flexibility, when we observe an object from a new angle, or interpersonal flexibility, which involves the ability to understand another individual's way of thinking, that is, to put oneself in another person's shoes (Diamond, 2013).

College life represents a unique environment where the effective use of complex executive function skills, such as planning, organization, and self-regulation of behavior, are often required. For example, students are expected to independently manage extracurricular routines and activities, long-term assignments, projects, and exams preparation. Thus, to be academically successful, college students should be able to organize materials and time, plan ahead, engage in goal-targeted activities, and inhibit inappropriate or ineffective behaviors that could potentially hinder their

goal-targeting efforts and hold on to them. Additionally, self-monitoring helps students reflect on themselves and determines what helped them succeed or what hindered them. From there, they can self-check to ensure that they are taking the appropriate steps toward personal and academic success (Dawson & Guare, 2012).

Symptoms of anxiety are often observed in college students due to, among other factors, academic demands and financial concerns (January et al., 2018). These pressures can cause heightened concern, tension, anguish, difficulty in planning and concentrating, as well as physiological manifestations such as tachycardia, sweating and hyperventilation, triggering manifestations of emotional, physical and behavioral symptoms that characterize anxiety (O'Donnell, 2017).

Despite the existence of a large literature on anxiety, few studies address the relationship between executive functions and anxiety in university students. In the study conducted by Ajilchi and Nejati (2017) with students from a university in Iran, significant differences were found between healthy participants and anxious participants regarding working memory, inhibitory control, planning, sustained attention, decision-making and cognitive flexibility. However, these results were found only in self-report questionnaires, with no differences between the groups in the neuropsychological tasks used, highlighting the importance of new studies that can delve these contradictions.

There is a need to produce knowledge that can help Brazilian college students to deal with stress and anxiety, as well as help assessing the impact of these symptoms on their executive functioning. In the same direction, mapping different aspects of executive functions in order to understand the effect of anxiety on cognition, whether through self-report and/or standardized instruments, will allow us to understand which executive aspects need to be stimulated and which should be preserved. In view of these demands, it is important to conduct an array of studies that would allow us to understand the executive profile of students with anxiety in order to develop intervention strategies for symptoms and management of executive dysfunctions. The objective is to provide quality of life, well-being, improved academic performance and development of prophylactic measures for this population.

Thus, this study seeks to investigate the relationship between anxiety symptoms and executive functions in college students, aiming at building a profile of the executive functioning of this population.

Method

Participants

Students from different undergraduate courses participated in this investigation; they were recruited through posters displayed in the university premises, posts uploaded on social media and the set up of an exhibition stand on campus. These students were welcomed by a project of the *Rede de Apoio ao Estudante* (Student Support Network) that offers individual or group psychological care to students at the *Serviço de Psicologia Aplicada* (Applied Psychology Service) of this institution.

Participants who did not have a diagnosis of Anxiety Disorder, according to the DSM-5 (American Psychological Association [APA], 2014), as well as subjects who had comorbidities, such as a diagnosis of depression, schizophrenia and use of drugs, were excluded from this study. For inclusion, participants should have a diagnosis of anxiety as presented in the DSM-5 (APA, 2014), be enrolled and attending university and obtain a score considered to be at least 30 points in the Spielberg State-Trait Anxiety Inventory, 1970.

Each participant was informed that his/her participation was voluntary and was assured that they could withdraw their consent at any time, without having to explain their reasons and without any type of penalty. They were also assured that any information that identified them would not be disclosed and would be maintained as strictly confidential. At the end of data collection, names were removed and replaced with codes so that there would be no possibility of identifying the participants.

Although the risks of this study were minimal, subjects were warned that there was a possibility of feeling some emotional discomfort when answering some questions on the scales used. Should the respondents feel uncomfortable, the execution of the protocol would be discontinued and the data collected would be discarded. Further, all interviewees had the right not to answer any specific question that was asked.

The results of the evaluations were used exclusively for research purposes and would be disclosed in articles to be published. Since the end of data collection, all material has been kept in a confidential file starting with the beginning of the data collection process and will remain so for at least 5 years, in accordance with Resolution No. 466/12 (Ministério da Saúde, 2012).

Before the start of data collection, all participants were informed about the investigation and about their rights; they all filled out and signed the Free and Informed Consent Form, approved by the Local Scientific Research Ethics Committee (Project No. 1,184,920).

Instruments

Sociodemographic data form: a digital form to be self-filled out with sociodemographic data at the beginning of the interview with information about life, health, academic experience and family.

Five Digit Test (FDT): The Five Digit Test aims to assess the processing speed, executive functions and attention of patients regardless of their native language, using reading and counting. The FDT has four stages: reading, counting, choosing and alternating. In the first stage, digits are presented in quantities that correspond to their values, where the subject must simply recognize and name the numbers. In the second stage, some asterisks are presented, which must be counted. In the third stage, numbers are presented again, but in quantities different from those they represent, and the subject must count them and return out loud the number of numbers present. In the last stage, some groups of numbers are delimited by a thicker border, and the individual must alternate between the rules of the first and third stages, depending on the thickness of the border surrounding each set of numbers (Campos et al., 2016). The assessment is made considering the time it takes the individual to read/count each sign and inhibit automatic responses in the four stages. As measures, two executive indices were adopted: inhibition (selection time) and flexibility (alternation time).

Barratt Impulsiveness Scale (BIS): This scale has 30 questions related to manifestations of impulsivity which must be self-answered, Each question must be answered considering one's own behavior on a four-point Likert-type scale, as follows: 1 = rarely or never; 2 = once in a while; 3 = frequently; 4 = almost always/always. The score can range between 30 and 120, with high scores indicating impulsive behavior (Malloy-Diniz et al., 2010).

State-Trait Anxiety Inventory: This inventory has two scales. In the state version, the participant should answer the questions describing how he or she feels at that particular moment, "now". In the trait format, the patient describes how he or she feels "generally". Both scales are scored on a 4 point Likert-type scale; the state version scores range between: 1- not at all; 2- a little; 3- quite a lot; 4- very much; the trait version scores range between: 1- almost never; 2- sometimes; 3- frequently; 4- almost always (Fioravanti et al., 2006).

N-back: The participant is exposed to a sequence of numbers after being instructed to identify the stimulus that is presented at the same time (0-back), one (1-back), two (2-back), three (3-back) positions prior to each new stimulus. This task involves maintenance, updating and manipulation of information and is considered a measure that assesses auditory working memory. The maximum number of correct answers that the participant can achieve in each series is 10, considering two numerical sequences for each of the four conditions. The result is calculated by summing the correct answers at all levels, considering a single value as a measure of working memory (De Nardi et al., 2013).

Bateria Psicológica para a Avaliação da Atenção (BPA, Psychological Battery for the Assessment of Attention): These are three tests, which assess attention modalities individually (concentrated, divided and alternating). The number of items follows a pattern of 400 stimuli, and in each test, they are distributed in 20 lines with 20 stimuli each. The measurement is calculated considering the target stimuli that the person marked correctly, subtracted from the errors and omissions that they made. The index of general attention capacity is calculated by adding the points of each of the tests, with a maximum 360 possible points (Marín Rueda & Monteiro, 2013).

Tower of London: In this test, the participant must arrange three colored spheres on three vertical rods of different sizes. The first rod holds three spheres, the second two and the third only one. A total of 12 problems are presented and the participant is asked to solve them by assigning each sphere to the respective rod shown, using a limited number of movements and moving only one sphere at a time. After each problem, the spheres return to their initial position, and through this task it is possible to observe and analyze the participant's planning ability. The answers are calculated based on the number of movements performed in each problem. Correct answers represent that the solution was reached with the minimum number of movements. A correct answer on the first attempt is worth 3 points, on the second two points and on the third, one point, which totals a maximum 36 possible points (Paula et al., 2012).

STROOP: The test consists of three 21.5 x 14 cm cards, each containing six rows of four items, totaling 24 items on each card. The first card consists of rectangles arranged in six rows of four items, to which the participant is asked to name the colors of the stimuli presented. On the second card, instead of rectangles, there are words (each, never, today, everything) printed in capital letters, in the colors green, pink, blue and brown, randomly arranged. On this card, the participant was asked to name the colors of the words. On the last card, the stimuli were names of colors (brown, blue, pink and green) printed in the colors green, pink, blue and brown, in such a way that the ink color of the print and the name of the color written on the card never matched. In this last stage, the subject was asked to name the colors of the print and avoid reading the names of the colors. Scores are given according to the execution time and correct answers on each card. The interference effect is observed in the third card, as reading must be inhibited in order to name the color (Silva et al., 2017).

Barkley Deficits in Executive Functioning Scale (BDEFS): The BDEFS is a self-report scale in which the participant indicates the frequency of certain behaviors and thoughts related to deficits in executive functions. It is a usual 4-points Likert-type scale. Questions 1-21 are related to time management; questions 22-45 are related to self-organization/problem solving; 46-64 to self-restraint; 65-76 to self-motivation and questions 77-89 to emotions self-regulation (Godoy et al., 2015).

Procedures

The survey was conducted in a bright, quiet, comfortable setting on the university campus with few distracting stimuli. A side table and two chairs were used, one for the participant and one for the surveyor. In addition, a computer was used for participants to respond in the self-report instruments, and for the surveyor to record scores and observations of the neuropsychological tests. Additionally, printed material related to the applied tasks was used as well as a clock to measure the time of some activities. Participants performed all tasks seated and were required to turn off their electronic devices so that there would be no external interruption during the investigation activities.

Data collection was carried out in two meetings. The first was with a psychiatrist from the team who was in charge of diagnosing anxiety based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (APA, 2014). At that meeting, participants were informed about the content of the survey; they were given the Free and Informed Consent Form; the participants were allowed to ask any questions about the investigation, its processes, and how to fill out the inventories. Participants were also informed about the possibility of interrupting their activities or even withdrawing from the study if they felt any discomfort.

The second meeting lasted an average of one hour and thirty minutes, during which the neuropsychological assessment protocol developed for this investigation was applied. In the protocol first stage, the Sociodemographic Form was filled out, followed by the Five-Digit Test. Next, participants responded to the Barratt Impulsivity Scale and the IDATE-state. Subsequently the participants performed the N-Back, the Psychological Battery of Attention, the Tower of London and the STROOP tasks. Finally, the participants responded to the BDEFS.

Results

Thirty-three college students (27.3% men and 72.7% women) with an average age of 23.48 years and an average academic performance coefficient of 7.72 participated in this study. Based on the level of anxiety revealed by the IDATE-Trait, two groups of participants were formed: high and low anxiety, using the average value of the group's anxiety trait as the cutoff point. Group 1 was formed by students who presented low anxiety considering the values below average scored on the IDATE-Trait (n = 15); Group 2 consisted of students with high anxiety (n = 18). It is important to emphasize that, even though there are statistical differences in these IDATE-Trait scores that allow arranging those students into subgroups, the average score of both subgroups was higher than 40, indicating that all participants had anxiety according to the criteria used in the literature (Fioravanti et al., 2006). According to the Five Digit Span Test scores students with high anxiety showed less control over inhibitory control and articulation of cognitive flexibility in the execution of tasks. In addition, greater difficulty in focused attention was observed in the high anxiety group. On the other hand, the results of this instrument did not indicate a significant difference for alternating, divided and general attention. Furthermore, the results obtained in the N-back test did not indicate a significant difference in working memory. Statistical differences were also not identified in the Tower of London test regarding planning capacity, nor in the STROOP effect test regarding inhibitory control (Table 1).

Table 1
Descriptive Analysis of Variables of Interest and Difference between High and Low Anxiety Groups

Variables	Total sample (*n* = 33)		Low anxiety (*n* = 15)		High anxiety (*n* = 18)		*t*-value	*p*-value
	M	*SD*	*M*	*SD*	*M*	*SD*		
Age	23.48	6.87	24.20	9.21	22.89	4.27	0.53	0.59
Academic Performance Coefficient	7.72	1.30	7.84	1.20	7.56	1.42	-0.62	0.53
BIS - Total Score	86.03	15.50	89.56	14.79	81.80	15.76	-1.46	0.16
BIS - BIS - Motor Impulsivity	18.48	3.31	18.67	3.73	18.27	2.84	-0.34	0.74
BIS - Attentional Impulsivity	18.48	3.93	17.33	3.85	19.87	3.68	1.92	0.06*
BIS - Impulsivity Due to Lack of Planning	50.91	15.86	55.17	13.00	45.80	17.84	-1.74	0.09
BPA - Focused Attention	81.18	16.00	96.16	17.39	84.46	14.78	-2.05	0.04*
BPA - Divided Attention	97.61	17.65	80.11	12.81	82.46	19.55	0.41	0.68
BPA - Alternating Attention	90.85	17.07	99.66	19.41	95.13	15.56	-0.72	0.47
BPA - General Attention	269.64	41.79	275.94	38.17	262.06	45.92	-0.95	0.35
FDT - Inhibition	10.76	8.35	7.44	5.60	14.73	9.49	2.74	0.01*
FDT - Flexibility	22.03	11.18	18.61	9.80	26.13	11.65	2.01	0.05*
IDATE Dash	55.48	7.09	52.47	6.67	58.00	6.58	-2.39	0.02*
IDATE Trace	47.91	8.16	40.33	3.37	54.22	4.81	-9.41	0.00*
TOWER OF LONDON	31.00	3.39	30.78	3.32	31.27	3.58	0.41	0.69
N-1 BACK	19.91	3.29	20.05	2.23	19.73	4.31	-0.27	0.78
N-2 BACK	14.21	5.91	16.44	5.40	13.73	5.48	-1.16	0.16
N-3 BACK	49.33	11.77	14.55	6.06	13.80	5.91	-0.36	0.72
BDEFS - Time Management	11.21	2.51	10.22	2.51	12.40	1.99	2.71	0.01*
BDEFS - Organization	8.15	2.25	7.56	2.38	8.87	1.92	1.72	0.09
BDEFS - Self-control	4.42	1.28	4.11	1.13	4.80	1.37	1.58	0.12
BDEFS - Motivation	8.24	2.57	7.17	2.01	9.53	2.64	2.92	0.01*
BDEFS - Self-regulation of Emotion	12.67	1.74	11.56	1.20	14.00	1.31	5.59	0.00*
BDEFS - Total Score	44.70	7.30	40.61	6.66	49.60	4.53	4.44	0.00*
BDEFS - Symptom Count	27.48	10.78	20.89	8.77	35.40	7.01	5.17	0.00*
STROOP - Card 1	14.88	3.10	14.42	2.93	15.43	3.29	0.92	0.35
STROOP - Card 2	16.14	3.55	15.60	3.60	16.78	3.49	0.94	0.34
STROOP - Card 3	23.13	4.88	21.73	4.53	24.79	4.90	1.85	0.07

Note: *Significant p-value. BIS: Barratt Impulsiveness Scale; BPA: Psychological Battery for Attention Assessment; FDT: Five Digits Test; IDATE: State-Trait Anxiety Inventory; BDEFS: Barkley Deficits in Executive Functioning Scale.

When investigating participants' self-perception of cognitive functioning, the group of students who presented higher levels of anxiety reported more executive dysfunctions in all indexes, except organization and self-control. These results are consistent with the self-report of greater attentional impulsivity in this same subgroup.

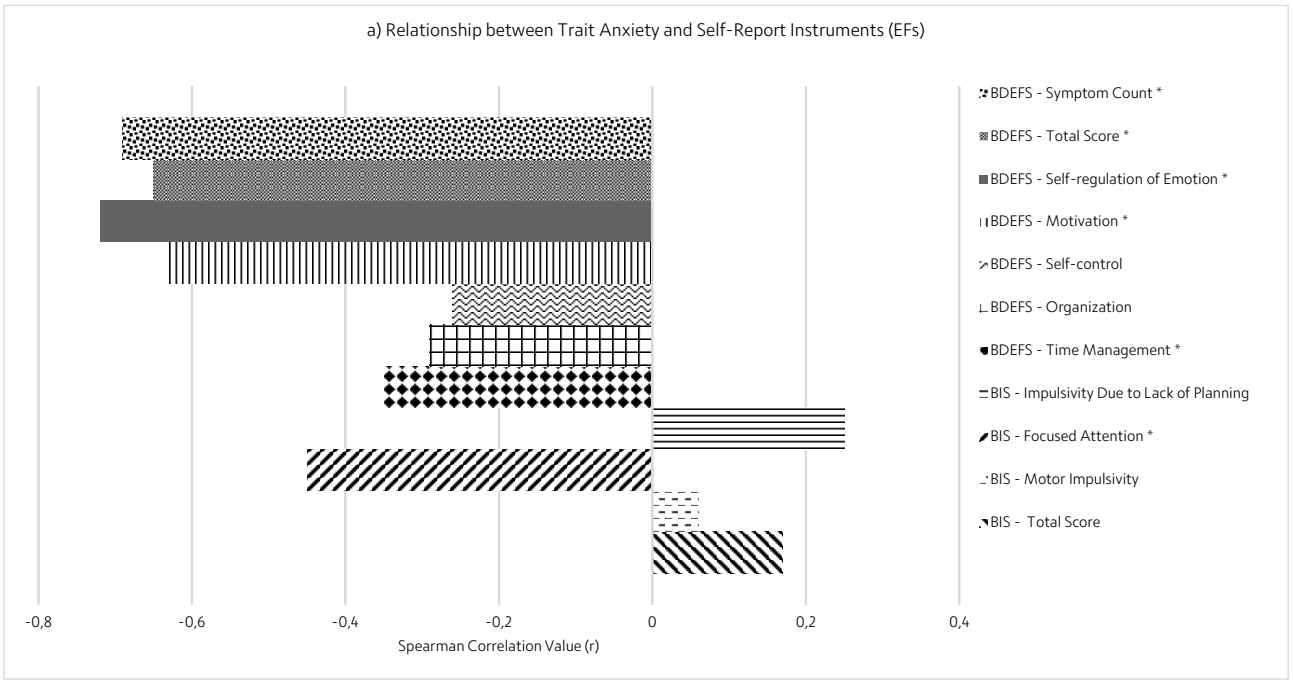
When investigating the effects of trait anxiety on executive functioning, the results suggest that attentional impulsivity presented a negative correlation with this index. In addition, trait anxiety also presented associations with students' self-perception regarding executive dysfunctions, especially emotional self-regulation, motivation and time management. Furthermore, when we sought to associate the level of anxiety with task performance, we found associations of minor magnitude with working memory, global attention functioning and alternating attention (Figure 1).

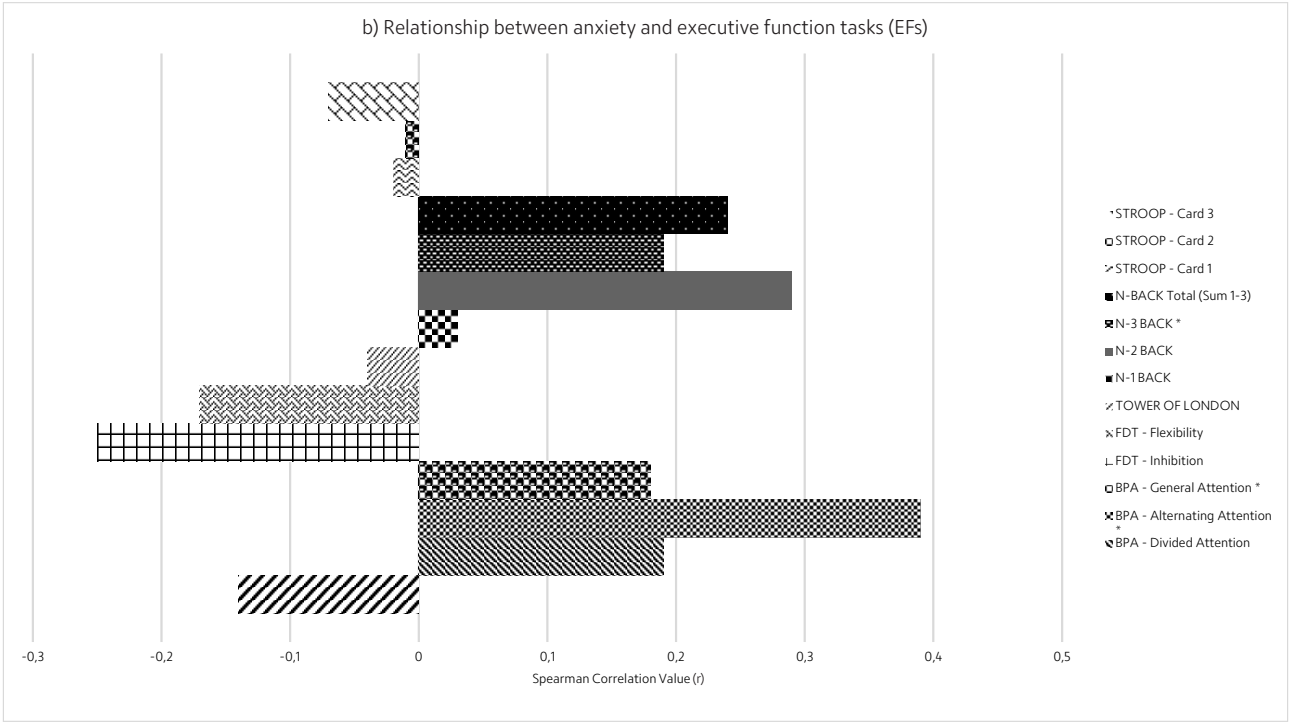
Discussion

This study investigated the impacts of anxiety on the executive functioning of university students through the application of neuropsychological tests and self-report instruments with the purpose of building a profile of executive functioning based on an analysis of its multiple components.

Figure 1

Investigation of the Relationship between Anxiety Symptom Severity and Executive Dysfunction





The results obtained in the executive function tests indicate that the high anxiety group had a lower capacity for inhibitory control. This aspect confirms the hypothesis that high levels of anxiety influence students' executive functioning. According to Ora et al. (2018), in learning processes, inhibitory control acts in situations where concentration is necessary, allowing the

inhibition of inappropriate or unwanted thoughts in order to ensure focus on a given task. In addition, the interference of inappropriate memories distracts and can be detrimental to achieving a defined goal. Students with low inhibitory control may become distracted during classes, unable to maintain focus on an activity and may require more time to complete tasks.

Furthermore, cognitive flexibility also showed hampered performance in students with high levels of anxiety. It is understood that cognitive flexibility plays an important role in university life, such as in situations of presentations in classes, lectures and academic events where professors frequently transition between topics/subjects/ideas and students need to successfully navigate these changes, adapting their thinking to allow for the change in context and content. Cognitive flexibility allows the intentional shifting of the focus of thought, being used when studying and completing tasks or maneuvering between different tasks and concepts in an activity, allowing for the formulation of different solutions to a given problem (Ora et al., 2018).

Our results are consistent with the findings of the study conducted by Ajilchi and Nejati (2017), which also point to deficits in inhibition and flexibility in anxious college students. Despite the common outcome between the studies, methodological differences were present. The results of Ajilchi and Nejati (2017) were based on self-report instruments, while the present study pointed to impairment in inhibitory control and cognitive flexibility based on performance in standardized tasks. The use of hetero-applied instruments allows greater reliability in the inferences of the results found compared to the indices based on the subjects' self-perception.

The results of the self-report instruments in this study suggest greater motivation and greater management and self-regulation capacity in the group of students with low anxiety compared to those more anxious. These results are in line with the findings of Franklin et al. (2018), who also used a self-report instrument for executive functions in American university students and indicated that high levels of anxiety traits predict a deficit over time in self-management, self-organization, self-control, self-motivation and self-regulation of emotions. Thus, it is understood that different levels of anxiety can produce different self-perceptions of executive functioning for each subgroup studied.

The understanding that different levels of anxiety help building distinct executive profiles is consistent with the results found by O'Donnell (2017). However, in the present study, participants who presented higher levels of anxiety obtained worse indices in executive functioning in both tasks and self-report instruments. These results diverge from O'Donnell's (2017), who found the highest executive functioning profile corresponding to the above-average anxiety group. Such divergences may be due to the divergence of the instruments used to measure anxiety and executive functioning.

Conclusion

This study investigated the impact of anxiety on executive functions, with view to map these factors in a population of young university students. A better understanding of these impacts will guide the development of intervention strategies and management of executive dysfunctions in order to contribute to the quality of life and academic performance of these students.

Our results can help in the development and implementation of psychopedagogical and educational processes that would guide students with anxiety in self-regulating their learning. Self-knowledge and self-reflection on their own executive functioning also allow students to monitor the aspects that need to be strengthened. Furthermore, they help in structuring and evaluating

their own learning, in order to develop greater control over interference, emotional regulation, and behavioral change.

The study has some limitations, such as the participation of students from a single university. Furthermore, this study did not use a control group of individuals without a diagnosis of anxiety. Further studies can deepen the understanding of the impact of anxiety symptoms on executive skills that were little explored in the present study, such as working memory and planning. Another interesting aspect for future research will be to explore the difference in results in neuropsychological tests and self-report tests to understand how self-perception bias can be a facilitating or potentiating factor in executive dysfunctions.

References

Ajilchi, B., & Nejati, V. (2017). Executive functions in students with depression, anxiety, and stress symptoms. *Basic and Clinical Neuroscience, 8*(3), 223-232. https://doi.org/10.18869/nirp.bcn.8.3.223

American Psychiatric Association. (2014). *Diagnostic and statistical manual of mental disorders* (5th ed.). APA.

Campos, M. C., Silva, M. L., Florêncio, N. C., & Paula, J. J. (2016). Confiabilidade do Teste dos Cinco Dígitos em adultos brasileiros. *Jornal Brasileiro de Psiquiatria, 65*, 135-139. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0047-20852016000200135&nrm=iso

Dawson, P., & Guare, R. (2012). *Coaching students with executive skills deficits*. Guilford Press.

De Nardi, T., Sanvicente-Vieira, B., Prando, M., Stein, L. M., Fonseca, R. P., & Grassi-Oliveira, R. (2013). Tarefa N-back auditiva: desempenho entre diferentes grupos etários. *Psicologia: Reflexão e Crítica, 26*, 151-159. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-79722013000100016&nrm=iso

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*(1), 135-168. https://doi.org/10.1146/annurev-psych-113011-143750

Fioravanti, A. C. M., Santos, L. F., Maissonette, S., Cruz, A. P. M., & Landeira-Fernandez, J. (2006). Avaliação da estrutura fatorial da Escala de Ansiedade-Traço do IDATE. *Avaliação Psicológica, 5*, 217-224. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1677-04712006000200011&nrm=iso

Franklin, P., Tsujimoto, K. C., Lewis, M. E., Tekok-Kilic, A., & Frijters, J. C. (2018). Sex differences in self-regulatory executive functions are amplified by trait anxiety: the case of students at risk for academic failure. *Personality and Individual Differences, 129*, 131-137. https://doi.org/10.1016/j.paid.2018.03.019

Godoy, V. P., Mata, F. G. D., Conde, B. R., Souza, C. A. d. O. e., Martins, A. L. G., Mattos, P., Miranda, D. M., & Malloy-Diniz, L. F. (2015). Brazilian Portuguese transcultural adaptation of Barkley Deficits in Executive Functioning Scale (BDEFS). *Archives of Clinical Psychiatry, 42*, 147-152. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-60832015000600147&nrm=iso

January, J., Madhombiro, M., Chipamaunga, S., Ray, S., Chingono, A., & Abas, M. (2018). Prevalence of depression and anxiety among undergraduate university students in low- and middle-income countries: a systematic review protocol. *Systematic Reviews, 7*(1), 57-57. https://doi.org/10.1186/s13643-018-0723-8

Malloy-Diniz, L. F., Mattos, P., Leite, W. B., Abreu, N., Coutinho, G., Paula, J. J., Tavares, H., Vasconcelos, A. G., & Fuentes, D. (2010). Tradução e adaptação cultural da Barratt Impulsiveness Scale (BIS-11) para aplicação em adultos brasileiros. *Jornal Brasileiro de Psiquiatria, 59*, 99-105. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0047-20852010000200004&nrm=iso

Marín Rueda, F. J., & Monteiro, R. M. (2013). Bateria Psicológica para Avaliação da Atenção (BPA): desempenho de diferentes faixas etárias. *Psico-USF, 18*, 99-108. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-82712013000100011&nrm=iso

Ministério da Saúde (Brasil). (2012). Resolução nº 466, de 12 de dezembro de 2012. Aprova as diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos; Revoga as (RES. 196/96); (RES. 303/00); (RES. 404/08). *Diário Oficial da União*, Seção 1. https://www.gov.br/conselho-nacional-de-saude/pt-br/atos-normativos/resolucoes/2012/resolucao-no-466.pdf/view

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "Frontal Lobe" tasks: a latent variable analysis. *Cognitive Psychology, 41*(1), 49-100. https://doi.org/10.1006/cogp.1999.0734

Muller, J. L., Torquato, K. I., Manfro, G. G., & Trentini, C. M. (2015). Executive functions as a potential neurocognitive endophenotype in anxiety disorders: a systematic review considering DSM-IV and DSM-5 diagnostic criteria classification. *Dementia & Neuropsychologia, 9*, 285-294. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1980-57642015000300285&nrm=iso

O'Donnell, P. S. (2017). Executive Functioning Profiles and Test Anxiety in College Students. *Journal of Psychoeducational Assessment, 35*(5), 447-459. https://doi.org/10.1177/0734282916641554

Ora, A., Sahatcija, R., & Ferhataj, A. (2018). Executive function skills and their effect on the academic life of students. *European Journal of Education, 1*(1), 81-88. https://doi.org/10.26417/ejed.v1i1.p81-88

Paula, J. J., Costa, D. S., Moraes, E. N., Nicolato, R., & Malloy-Diniz, L. F. (2012). Contribuições da Torre de Londres para o exame do planejamento em idosos com Comprometimento Cognitivo Leve. *Neuropsicologia Latinoamericana, 4*, 16-21. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S2075-94792012000200002&nrm=iso

Silva, J., Starling-Alves, I., Moura, R., & Haase, V. G. (2017). Teste Stroop Victoria. In A. Julio-Costa, R. Moura, & V. Haase (Eds.), *Compêndio de testes neuropsicológicos: atenção, funções executivas e memória* (pp. 163-174). Hogrefe.

World Health Organization. (2017). *Depression and Other Common Mental Disorders: Global Health Estimates*. Geneva.

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