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Research Article

The Relationship between Self-Efficacy, State-Trait Anxiety and Cognitive Test Anxiety: A Study among University Students in Argentina

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Abstract

This study aims to explore and analyze the relationship between general self-efficacy, state and trait anxiety and test anxiety in private university students of psychology and psycho-pedagogy careers from Argentina. Results showed positive correlations between trait anxiety and test anxiety, and between state anxiety and test anxiety. Negative correlations emerged between general self-efficacy and state anxiety, trait anxiety and test anxiety. It was possible to verify that high levels of general self-efficacy together with low levels of trait anxiety predicted 27% test anxiety variance. While similar results were found in previous works, these findings amplify the scope of research to specific contexts such as Latin American university students. It is recommended to continue the study of these variables in situations as close as possible to the exam situation and considering changes in educational setting worldwide due to the COVID-19 pandemic, thus allowing the promotion of student's welfare throughout programs that promote general self-efficacy as a protective variable.

Keywords: self-efficacy; state-trait anxiety; test anxiety; university students; Argentina.

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Mental health among university students has become a growing concern to take into examination since it can have a direct influence on the prosperity and development of communities, and it remains the main factor regarding educating efficient workforces (Shirbim et al., 2008). In light of the increase in prevalence and intensity of issues related to mental health in this population (Zivin et al., 2009), approaching this segment beholds special relevance, since the organization and demands in academic environments may lead students to adaptive responses that generate anxiety, considerable psychosocial issues and decreased performance (Pérez et al., 2011).

In pursuit of their educational goals, university students confront many challenges and demands that need to be dealt with, exposing themselves to both psychological and physical health impairment (Al-Qaisy, 2011; Doron et al., 2015). To meet these requirements, studies have shown anxiety as an emotion associated with the learning process and academic achievement (Linnenbrink-Garcia & Pekrun, 2011; Shakir, 2014). Moreover, it has been established that anxiety is prevalent among university students, pointing out that alongside depression it is one of the most common psychological problems in this population. (Raja Mahmoud et al., 2012). Although moderate amounts of anxiety are desirable to solve problems, achieve effective actions and accomplish better academic performance, when its level become more intense and recurrent, it can negatively influence behavior, turning into a

dysfunctional or pathological anxiety that can seriously interfere with normal life (Álvarez et al., 2012; Fernández-Castillo & Gutiérrez Rojas, 2009);

Anxiety can be described as an individual emotional reaction experienced when faced with a situation that is of critical importance for the subject, and it can be identified as fear of failure, punishment or ridicule, involving fear of something (ranging from objects to social situations) and different intensity depending on the way in which the anxiogenic situation is perceived (Bertoglia Richards, 2005). Although it is a complex and difficult concept to define because there are several factors that intervene, it still is the most prevalent class of mental health disorders (Macauley et al., 2018; Spielberger, 1966).

Spielberger (1972, 1989a, 1989b) formulated the state-trait anxiety theory, which defines state-anxiety as an "emotional state", modifiable in time, characterized by subjective feelings of tension, apprehension, nervousness, and worry, and by activation or arousal of the autonomic nervous system. Contrary to the transitory nature of anxiety states, trait anxiety is linked to a tendency or a characteristic in relatively stable individuals to perceive stressful situations as dangerous and threatening, and to a disposition to suffer state anxiety more frequently or with greater intensity as a response to such situations (Balsamo et al., 2013; Ries et al., 2012; Spielberger et al., 1970; Spielberger & Sydeman 1994).

While many factors contribute to college students anxiety, both trait and state anxiety have been studied and showed high levels in academic settings, stating that there may be several stressors that can cause this such as examinations, lack of time to undertake academic activities and academic overload (Morales-Rodriguez & Pérez-Mármol, 2019). In this regard, the importance of anxiety in educational environments urged test anxiety as a concept, considering it a specific form of academic anxiety defined by context specific stimuli and academic subject reactions regarding evaluation situations (Cassady, 2010; Furlan et al., 2015; Von der Embse et al., 2018). Recent studies have suggested that between 15 and 22% of students exhibit high levels of test anxiety (Putwain & Daly, 2014; Thomas et al., 2018), while according to Furlan et al. (2011) Argentinian students test anxiety prevalence is estimated at 10%.

In general terms, test anxiety is an emotional-cognitive phenomenon that causes an anticipatory response in individuals that aim to avoid or keep potential damage under control, and it can be related to external factors (type of exam, study method and management of study time, among others) or personal factors such as an individual's perception of the exam situation (Álvarez et al., 2012). Accordingly, individual variability in the manifestation of test anxiety can be shaped by situational, historical and personality-based factors (Sotardi et al.,

2020), including intrapersonal variables (e.g. self-efficacy and motivation), social influences (e.g. performance expectations and social support) and demographic variables (Von der Embse et al., 2018).

Students can perceive tests as a threat, leading to harmful anxiety that can gradually become a stable trait associated with feelings of inadequacy (Conde, 2004; Ergene, 2003). During examination, students with high test anxiety are more likely to experience elevations in anxiety as an emotional state, with the appearance of more self-centered worries and task irrelevant thoughts that interfere with attention and performance, characterizing test anxiety as a situation-specific personality trait (Spielberger et al., 1978; Spielberger, 2010). Further research showed that in some students, test anxiety produces negative emotional reactions which can prevent them from performing up to their academic potential (Onyeizugbo, 2010), and excessive levels of test anxiety can have maladaptive consequences and lead to lower performances and low levels of selective attention (Castellanos Cárdenas et al., 2011; Fernández-Castillo & Gutiérrez Rojas, 2009).

People generate and develop self-perceptions about their own capacity that function as mediators to achieve goals and make decisions (Ornelas et al., 2012). In addition, their behavior can be better predicted by the beliefs that individuals have about their own abilities than by what they can actually do, since these perceptions help to delineate what it is that people do with the skills and knowledge they possess to handle novel and challenging tasks (Balogun & Olanrewaju, 2016; Pajares & Schunk, 2001). In the framework of Social Cognitive Theory, Bandura (1977, 1955) introduced self-efficacy as a concept stating that behavior and motivation are conditioned by thoughts and regulated by two types of expectations: efficacy, related to the conviction that one can execute the behavior required; and outcome, linked to the belief that a given behavior will lead to desired outcomes.

Self-efficacy can be characterized as a broad and stable personal competence that determines how effective a person's behavior can be in dealing with stressful situations (Choi, 2004; Luszczynska et al., 2005). Furthermore, the perception people have of their own effectiveness is a fundamental variable in human competence because it influences the strategies, motivation and persistence necessary to achieve a goal, and it also affects the emotional response to complex situations (Borzone Valdebenito, 2017).

In academic settings, although self-efficacy may be projected as a specific domain factor, a higher or lower self-efficacy level can be also interpreted in a general manner to identify the global trust or the generalized judgment when students face novel or stressful situations (Bueno-Pacheco et al., 2018; Luszczynska et al., 2005). Students with a lower level of self-

efficacy have difficulties in coping with their tasks by considering them more difficult, thus generating high levels of stress and anxiety that affect academic performance (Asayesh et al., 2018). In this regard, the mediating role of self-efficacy between mood and cognitive performance in the university population has been emphasized, pointing out its contribution as an indicator of mental and physical ill health, and its influence on academic performance and the development of adaptive academic goals (Chau & Vilela, 2017; Morales-Rodriguez & Pérez-Mármol, 2019).

This paper aims to explore and analyze the relationship and influence between the variables of general self-efficacy, state and trait anxiety, and test anxiety in a group of private university students of psychology and psycho-pedagogy careers in Buenos Aires, Argentina. This study introduces the following hypotheses:

Hypothesis 1: Students with higher levels of general self-efficacy will have lower levels of trait, state and test anxiety.

Hypothesis 2: High levels of general self-efficacy coupled with low levels of trait anxiety predict lower levels of test anxiety.

Method

Design and participants

The study design was a descriptive correlational study with a non-experimental cross-sectional design (Hernández Sampieri et al., 2010).

A non-probabilistic convenience sample was used, consisting of 301 university students between the ages of 18 and 54 (M = 24.64, SD = 5.14), 238 women and 63 men, all students of psychology and psycho-pedagogy at Universidad del Salvador, in Buenos Aires (Argentina).

Measures

Sociodemographic and academic data questionnaire: elaborated ad hoc, this 5-question instrument collects information from the sample regarding the sociodemographic profile (sex, age, employment status) and the academic profile (career and failed subjects).

Cognitive Test Anxiety Scale – S-CTAS (Cassady & Johnson, 2002): Argentine adaptation reported an internal consistency of α = .88 (Furlan et al., 2009; Furlan et al., 2011). This unidimensional scale measures cognitive manifestations of test anxiety in university students, and it consists of 16 items with four response options from 1 (not common in me) to

4 (very frequent in me), with higher values indicating higher level of test anxiety. Sample items include “I lose sleep over worrying about examinations” and “My mind goes blank when I am pressured for an answer on a test”. The present study has shown an internal consistency estimated by Cronbach’s coefficient alpha = .82 (16 items).

General Self-Efficacy Scale - GSE (Schwarzer & Jerusalem, 1995): Argentine adaptation reported an internal consistency of α = .76 (Brenlla et al., 2010). This unidimensional scale measures a general sense of perceived self-efficacy, and it consists of 10 items with 4 response options from 1 (never) to 4 (always), with higher values indicating higher level of perceived self-efficacy. Sample items include “I can always manage to solve difficult problems if I try hard enough” and “If I am in trouble, I can usually think of a solution”. The present study has shown an internal consistency estimated by Cronbach’s coefficient alpha = .84 (10 items).

State-Trait Anxiety Inventory - STAI (Spielberger et al., 1970): argentine adaptation reported an internal consistency of α = .76 for state anxiety, and .73 test-retest reliability coefficient for trait anxiety (Leibovich de Figueroa, 1991). This inventory consists of two scales, with 20 statements each. The state anxiety scale evaluates a temporary emotional state, characterized by subjective, consciously perceived feelings of attention and apprehension together with hyperactivity of the autonomic nervous system. This scale evaluates the intensity of anxiety at the moment of answering the questionnaire, and it consists of 20 items with 4 response options from 1 (not at all) to 4 (very much). Sample items include “I feel upset” and “I feel calm”. The trait anxiety scale evaluates how frequently the subject feels anxious in order to assess their propensity to experience anxiety and whether this is a stable trend. This scale evaluates anxiety in a general matter, and it consists of 20 items with 4 response options from 1 (almost never) to 4 (almost always). Sample items include “I am happy” and “I feel nervous”. Both scales have items that denote the presence or absence of anxiety, and they score directly or inversely depending on the case. The higher the score, the higher the level of state and trait anxiety. The present study has shown an internal consistency estimated by Cronbach’s coefficient alpha = .92 (20 statements) for state anxiety, and .88 (20 statements) for trait anxiety.

Procedure

All procedures and authorization to collect data was requested from and granted by university authorities. The research was conducted in accordance with the principles expressed in the Declaration of Helsinki (World Medical Association [WMA], 2001). A brief explanation of the main points of the study was given to the students, who were also

informed that their collaboration was voluntary and anonymous, and that the data would be used for scientific purposes only. Subjects were informed they would not receive any financial compensation, and that they could withdraw their answers at any time. Time to complete the questionnaires was estimated to be 15 minutes.

Data analysis

This study used correlations (Pearson's r) to study the association between trait / state anxiety, test anxiety and general self-efficacy levels in university students. Effect sizes were extracted using Pearson's r coefficient and following Cohen's (1992) standards (10 = small, 30 = medium and 50 = large). A simple linear regression model was used to analyze the predictive power of trait anxiety and general self-efficacy (independent variables) on cognitive anxiety before examinations (dependent variable). The effect size was measured using Cohen's (1992) f^2 method (0.02 = small, 0.15 = medium and 0.35 = large). The data obtained was analyzed using IBM SPSS Statistics 25.

Results

Table 1 shows the average age of the sample and its corresponding standard deviation, as well as the distribution of the sample according to their sex, career, history of failed subject/s (at least one subject was not approved in the final exam) and employment status. The average age of the sample is 24,64 years (*SD* = 5,14). There is a higher prevalence of female students (79.1%), most of whom study psychology (87.7%), haven't failed academic subjects (72.8%) and have a job (71.1%).

Table 1.
Sociodemographic characteristics in a sample of private university students of psychology and psycho-pedagogy careers (Argentina, Year 2019).

Variable	*N*	%
Age *M* = 24.64 (*SD* = 5.14)	301	100
Sex		
Female	238	79.1
Male	63	20.9
Career		
Psychology	263	87.7
Psychopedagogy	37	12.3
Failed subject/s		
Yes	82	27.2
No	219	72.8
Works		
Yes	214	71.1
No	87	28.9

Table 2 shows the results of the correlations between GSE, STAI-S, STAI-T and S-CTAS. Analysis between the variables found positive and significant associations ($p < .01$) between STAI-T and S-CTAS $r(299) = .47$, and between STAI-S and S-CTAS $r(299) = .35$. On the contrary, there were significant negative correlations ($p < .01$) between GSE and STAI-S $r(299) = - .26$, GSE and STAI-T $r(299) = - .46$, and GSE and S-CTAS $r(299) = -.36$. Effect sizes were low to medium in all cases.

Regarding the mean scores obtained, it is pointed out that there are no population scales available for any of the measures used in this study that allow a delimitation of low, medium or high levels of self-efficacy, state/trait anxiety and cognitive test anxiety. However, the levels found in this sample compared to the range of values of each scale (GSE min-max: 10-40; STAI-S min-max: 20-80; STAI-T min-max: 20-80 and S-CTAS min-max: 16-64) would be showing a medium range within the possible scores.

Table 2.
Correlation between General Self-efficacy, Cognitive Test Anxiety and State and Trait Anxiety in a sample of private university students of psychology and psycho-pedagogy careers (N = 301).

Measure	*M*	*SD*	1	2	3	4
1. GSE	29.62	3.76	-			
2. STAI-S	37.52	9.19	-.26**	-		
3. STAI-T	40.67	8.56	-.46**	.65**	-	
4. S-CTAS	30.90	9.32	-.36**	.35**	.47**	-

**p < .01, *GSE*: General Self-efficacy; *STAI-S*: State-Trait Anxiety Inventory-State; *STAI-T:* State-Trait Anxiety Inventory-Trait; *S-CTAS:* Spanish Cognitive Test

Anxiety Scale

To evaluate the adequacy of the linear regression model proposed, the distribution chart of residuals was analyzed to check the normality of the distribution. The analysis of distribution charts of normal probability and dispersion of residuals confirmed compliance with the assumption of homoscedasticity (Chica Olmo & Frías Jamilena, 2000).

The Durbin-Watson Test produced adequate values showing an absence of autocorrelation of residuals (Pardo & Ruiz, 2005). Finally, tolerance coefficients (0.79) indicated there was no multicollinearity (Hair et al., 2001).

Table 3 shows below the results of the trait anxiety and general self-efficacy model which significantly predicted test anxiety, explaining a 27% variance with a large effect size. These findings imply that high levels of general self-efficacy and low levels of trait anxiety predict lower levels of cognitive test anxiety.

Table 3.
Linear regression model of Trait Anxiety and General Self-efficacy on Cognitive Test Anxiety in a sample of private university students of psychology and psycho-pedagogy careers (N = 301).

	Predictors Data			Model Data			
Predictor	*B*	*β*	95% IC	R^2	R^2 adjusted	*F*	*p*
STAI-T	.422	.39***	[0.30, 0.54]				
GSE	-.545	-.22***	[-0.81, -0.27]	.277	.272	.566***	.38

IC: Index Confidence. ***p < .001

Discussion

The purpose of this research was to explore and analyze the relationship between general self-efficacy, state-trait anxiety and test anxiety variables in a group of private university students of psychology and psycho-pedagogy careers in Buenos Aires, Argentina. The results verified the first hypothesis formulated, evidencing the existence of a significant negative correlation between general self-efficacy and cognitive test and state-trait anxiety. Although the correlations were low to medium, these values are both expected and acceptable for social sciences (Hemphill, 2003). The proposed model also confirmed the second hypothesis, indicating that high levels of general self-efficacy together with low levels of trait anxiety predict lower levels of cognitive test anxiety.

Studies related to state-trait anxiety, test anxiety and self-efficacy are broad among scientific literature. Nonetheless, this study is supported by two circumstances that highlight its relevance. First, this study - to the knowledge of the authors - is the first to analyze the four variables in university students at the same time. And second, this study examines the behavior of these variables in Argentine – Latin American – university population, which is not as widely studied as perhaps other regions. Regarding this matter, it is important to consider the relevance of the cultural factors in psychological and social processes, amplifying the scope of research to specific contexts (Casas Moreno & Blanco-Blanco, 2016).

Although academic self-efficacy is an important aspect, university career paths are crossed by multiple dimensions that students have to face, not all of them strictly educational. In other words, adaptation to academic life is not a segmented process, since the performance of students in academic settings is not determined exclusively by their educational skills. To this matter, general self-efficacy can be considered a more accurate measure, since it acts as a mediating variable that gives a more global view of the student's perception of themselves,

taking into account that people deploy adaptive, functional or dysfunctional strategies which enable them to succeed or fail in everyday life situations. (García-Méndez & Rivera-Ledesma, 2020). Therefore, the study of general self-efficacy and related factors is becoming increasingly relevant in the educational context, since this information could be used to achieve academic success, an effective approach to the educational process, and an improvement in the quality of life of students (Morales-Rodriguez & Pérez-Mármol, 2019).

Regarding the relationship between self-efficacy and state-trait anxiety, the negative correlation found is consistent with previous studies (Contreras et al., 2005; Haycock et al., 1998), meaning that students with low self-efficacy have higher levels of state and trait anxiety. To this regard, Morales-Rodriguez & Pérez-Mármol (2019) indicate that these results may be explained because different tasks - assignments, classes, etc. - can be a source of stress that university students have to deal with. While self-efficacy seems to have a direct effect on academic performance, anxiety seems to have an indirect effect, and so high levels of general self-efficacy could be a protective factor against anxiety, hence improving academic performance (Contreras et al., 2005).

Concerning the negative relationship between self-efficacy and test anxiety, previous studies have also pointed out similar results (Akbaryboorang & Aminyazdi, 2009; Jing, 2007; Mehrabizadeh et al., 2001; Onyeizugbo, 2010; Piemontesi et al., 2009). There is general agreement that students with high self-efficacy have lower levels of anxiety before exams (Salar et al., 2016), while the results of this study are in line with the works of Pajares & Schunk (2001) and Blanco Vega et al. (2012), indicating that students who doubt their own abilities do not assess the difficulties of academic tasks properly, which increases anxiety and makes problem solving more difficult.

In terms of the predictive value of general self-efficacy together with trait anxiety regarding test anxiety, previous studies have shown different outcomes. Onyeizugbo (2010) showed that 49% of the variability in the levels of test anxiety were moderated by trait anxiety, while Morales-Rodriguez (2019) found that only trait anxiety was a significant predictor of self-efficacy. On the other hand, some studies showed that test anxiety can be predicted through self-efficacy, reaching even a 40% predictability. (Bakhtiyarpour et al., 2010; Capa & Loadman, 2001). It is important to point out that a model with all the variables was tested in this study, which resulted in a lower predictability model than the one ultimately presented, showing that state anxiety was not a significant variable for predicting cognitive test anxiety. Consequently, the results of the three variable model showed that trait anxiety along with general self-efficacy accounted for 27% of the test anxiety predictive value. These results

coincide with the idea that there is a greater susceptibility to test anxiety in those who have trait anxiety, since the latter is a lasting personality disposition, and that test anxiety is more appropriately explained taking base in the stable characteristics of students.

Limitations

There are some limitations to this research. First, the use of non-probabilistic convenience sampling, which restricted the characteristics of the sample including only private university students of psychology and psycho-pedagogy careers. To this regard, it would have great value to extend these characteristics to include public university students from other professions, and a more balanced gender distribution to assess differences between them. Second, this study was based on self-report measures, meaning that it is not possible to assure the truthful answers from students reporting anxiety and self-efficacy experiences. Nonetheless, before administration they were encouraged to answer as honestly as possible, and they were assured that their responses would remain confidential and anonymous.

Future research should primarily take into consideration the study of these variables in the context of COVID-19 pandemics, which affected more than 20 million higher education students in Latin America and the Caribbean during 2020 (United Nations Educational Scientific and Cultural Organization [UNESCO], 2020). University students were described as one of the most vulnerable groups to psychological impact from the pandemic, showing an increase in stress and anxiety due to the effects of the virus on their studies, future employment worries and social distance requirements, among others (Cao et al., 2020; Huarcaya-Victoria, 2020). In addition, it would be interesting to study these variables in situations as close as possible to the exam, since it has been stated that better exam performance may not necessarily be associated with low levels of anxiety per se, but rather to decreased anxiety throughout the exam (Ringeisen et al., 2019).

Finally, educators have an important role to play in creating and facilitating rather than debilitating testing environments for students (Von der Embse et al., 2018). In this matter, test anxiety can be affected by various factors, including differences in educational environment, the educational system and the atmosphere of the exam, showing the importance of carrying out programs that promote general self-efficacy as a protective variable (Asayesh et al., 2018). As a result, a considerable part of the difference in test anxiety can also be explained by these factors, which can vary in different universities and social contexts, showing the importance of studying variables such as these that can help promote student welfare.

Conclusion

The purpose of this study was to explore and analyze the relationship and influence between general self-efficacy, state and trait anxiety, and test anxiety in private university Argentinian students of psychology and psycho-pedagogy careers. The results determined the existence of a significant negative correlation between general self-efficacy and cognitive test and state-trait anxiety, and indicated that high levels of general self-efficacy together with low levels of trait anxiety predict lower levels of cognitive test anxiety.

Despite its limitations, the present study supports research of the previous psychological variables in the Latin American region, considering the cultural factors in psychological and social processes, and thus amplify the scope of research to specific educational contexts.

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Competing Interests

The authors have declared that no competing interests exist.

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