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Relationships between cognitive strategies, motivational strategies and academic stress in professional examination candidates

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Abstract

Introduction. The objective of this research study was to establish interdependence relationships between cognitive learning strategies, motivational strategies toward study and academic stress, as variables of the Competency Model for Studying, Learning and Performing under Stress (SLPS), in a group of professional examination candidates.

Method. Participating were a total of 179 candidates who sought to obtain posts as primary school teachers. The variables were measured using previously validated self-reports. The study design was linear ex post-facto, with inferential analyses (ANOVAs and MANOVAs).

Results. The results showed very significant, positive interdependence relationships between cognitive learning strategies and motivational strategies toward study. In addition, very significant, negative relationships were found between motivational strategies toward study and academic stress. However, direct interdependence relationships did not appear between cognitive learning strategies and academic stress.

Discussion. These results show that subjects with a high level of cognitive learning strategies used more motivational strategies toward study than subjects with a medium level, and these in turn used more motivational strategies than subjects with a low level. Moreover, they also show that subjects high in motivational strategies toward study suffered less academic stress than the medium and low subjects in this variable. Consequently, the results suggest that these variables are interrelated, and that both cognitive and motivational strategies can be worked on, not only as support for study, but also as prevention of academic stress and its negative effects, especially in highly stress-prone contexts.

Palabras clave: SLPS Competency Model, learning strategies, motivation, academic stress, professional examination candidates.

Resumen

Introducción. El objetivo de esta investigación fue establecer las relaciones de interdependencia entre las estrategias cognitivas de aprendizaje, las estrategias motivacionales hacia el estudio y el estrés académico, como variables del Modelo de Competencia para Aprender, Estudiar y Rendir en contextos de Estrés académico (CAERE), testado en opositores universitarios.

Método. Participaron 179 aspirantes al ingreso en el cuerpo de Maestros. Las variables fueron medidas mediante autoinformes previamente validados. El diseño fue carácter ex post-facto lineal, con análisis inferenciales (ANOVAs y MANOVAs).

Resultados. Los resultados mostraron relaciones de interdependencia significativas en sentido positivo entre las estrategias cognitivas de aprendizaje y las estrategias motivacionales hacia el estudio. Además, se encontraron relaciones igualmente significativas, pero en sentido negativo entre las estrategias motivacionales hacia el estudio y el estrés académico. Sin embargo, no aparecieron relaciones de interdependencia directas entre las estrategias cognitivas de aprendizaje y el estrés académico.

Discusión. Estos resultados evidencian que los sujetos altos en estrategias cognitivas de aprendizaje utilizan más estrategias motivacionales hacia el estudio que los sujetos medios y estos, a su vez, utilizan más estrategias motivacionales que los sujetos bajos. Por otro lado, evidencian también que los sujetos altos en estrategias motivacionales hacia el estudio sufren menos estrés académico que los sujetos medios y bajos. En consecuencia, los resultados sugieren que estas variables están interrelacionadas entre sí, y que pueden trabajarse tanto las estrategias cognitivas como las motivacionales no solo como apoyo al estudio, sino también como prevención del estrés académico y sus efectos negativos, especialmente en aquellos contextos donde su aparición es altamente probable.

Palabras clave: Modelo CAERE, learning strategies, motivation, academic stress, professional examination candidates.

Introduction

After completing their university studies, many Spanish graduates face competitive processes for gaining access to public employment; they may even need repeated trials to overcome this hurdle. Graduates in primary and early childhood education are one example; professional examinations are a prerequisite to attaining a teaching post in public schools. In order to make their best showing on these exams, candidates may spend one or more years preparing the different professional as well as personal and emotional competencies. According to some prior evidence, socio-emotional competencies seem to have an important impact on achieving one's academic hopes (Oberle, Schonert-Reichl, Hertzman & Zumbo, 2014).

The Competency Model of Studying, Learning and Performing under Stress (SLPS)

The purpose of this model is to explain learning in stressful contexts, and it serves as the theoretical foundation for the research presented in this report. The effects of academic stress in the learning process have been previously studied in the context of neurobiology (Concerto et al., 2017) and in the sphere of higher education (Gelabert & Muntaner-Mas, 2017). However, the SLPS Competency model takes its approach from educational psychology and from learning competencies; it is structured around Biggs's 3P Model (Biggs & Tang, 2011) and its three moments of *Presage, Process, Product,* as used in other educational studies (Freeth & Reeves, 2004, McMahon, O'Donoghue, Doody, O'Neill, & Cusack, 2016).

According to Biggs and Tang (2011), there are certain forerunners to the learning situation (presage variables), such as its context, and the characteristics of students; these interact systemically with process variables and product variables (academic stress, in the present study). Process variables, for their part, act as mediators between presage and product variables, and include concepts/principles, procedures (skills and meta-skills), and attitudes/habits when facing the cognitive and emotional aspects of the learning process and the specific examinations in question. According to the SLPS Competency Model, all these variables would form part of the competence needed for executing professional examinations (de la Fuente, 2015; de la Fuente et al., 2014). Some of these variables have been selected for the present investigation, and are described below in more specific detail. See Figure 1.

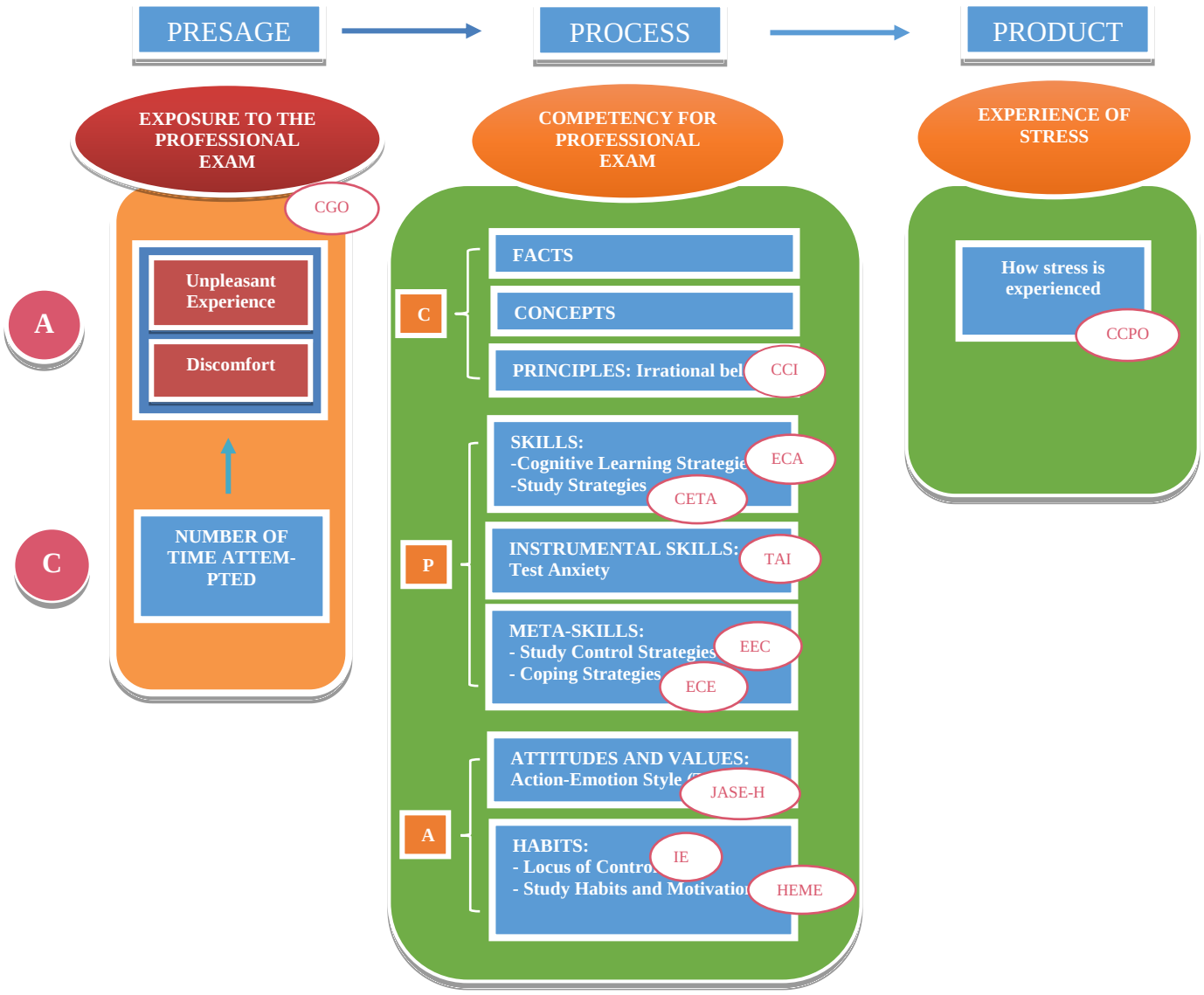

Figure 1

SLPS Competency Model, for Studying, Learning, and Performing under Stress (de la Fuente, 2015), showing variables and some of the instruments used to measure them

Cognitive learning strategies

This variable refers to *cognitive meta-skills* that the individual uses when processing information, in other words, skills that transform the information until it becomes part of one's own knowledge. These skills involve control over one's thoughts, emotions and actions during learning, thus making it a self-regulated activity (Zimmerman, 1995; Zimmerman &

Labuhn, 2012). Recent evidence has associated self-regulated use of these strategies with variables such as academic achievement (Kizilcec, Pérez-Sanagustín & Maldonado, 2017), stress-related behaviors like procrastination (de Palo, Monacis, Miceli, Sinatra & Di Nuovo, 2017) and academic motivation (Karlak & Velki, 2015; Yue, 2015).

Student characteristics and methodologies used have both proven to be important variables for increasing the number of cognitive learning strategies, which in turn moves the student toward a deeper learning approach (Gargallo, Morera & García, 2015). There are different types of strategies, including the use of memory (memorization), of summaries or text simplification to draw out the main ideas (summarizing), of organizing the material that is being learned and dividing it into interconnected parts (organization) and of connecting it to prior knowledge or personal involvement (elaboration). Recent studies show that students with better grades rely more on strategies of elaboration and organization, while those with lower grades stick more to information selection and literal memorization (Rodríguez, Piñeiro, Regueiro, Estevez & Val, 2017).

Motivational strategies for study

This variable refers to *meta-motivational skills* that the student uses in day-to-day studying. Traditionally, the literature distinguishes between intrinsic motivation, related to the subjects' personal motives, and extrinsic motivation, related to external rewards or reinforcement. Research studies consider that, of these two alternatives, intrinsic motivation is a better predictor of performance (Ross, Perkins & Bodey, 2016) and of persistence (Renaud-Dubé, Guay, Talbot, Taylor & Koestner, 2015).

On the other hand, there are current references in the scientific literature that relate achievement motivation to academic stress (Karaman & Watson, 2017), and consider academic stress to be a negative predictor of intrinsic motivation and a positive predictor of demotivation (Liu, 2015). Motivational strategies can be taught, as is proven by the effectiveness of certain support programs in increasing not only motivation, but also self-regulation and performance, in university students (Wibrowski, Matthews & Kitsantas, 2016).

Academic stress

In the educational context, unlike the clinical or healthcare context, this variable relates to interfering thoughts that the student may engage in, regarding lack of control, arbitrariness in the grading, the high demands of the situation, or his/her own lack of competence for tak-

ing the tests. These thoughts usually involve physiological, emotional or behavioral effects (de la Fuente, 2015). In educational psychology research with university students, stress has been related to variables such as social support, optimism/pessimism and self-esteem (Fernández-González, González-Hernández & Trianes-Torres, 2015).

Although the study of stress in the educational sphere is still limited, there is growing interest (Mehmet & Watson, 2017), and there is already evidence that relates academic stress to performance (Veena & Shastri, 2016), to satisfaction in study (Chraif, 2015), and to certain processes, whether cognitive (e.g. memory, attention) or motivational (Serlachius, Hamer & Wardle, 2007) in nature. One recent study, for example, considers the influence of motivation and academic stress in preparing for self-directed learning (Heo & Han, 2017).

Objectives and hypotheses

The *general objective* was to describe significant, relevant interdependence relationships among the variables evaluated. Based on the theoretical underpinnings of these variables, the *hypotheses* were as follows:

Hypothesis 1. Low-medium-high levels of the variable *cognitive learning strategies* will determine the same level of interdependence with the variable *motivational strategies toward study*.

Hypothesis 2. Low-medium-high levels of the variable *motivational strategies toward study* will negatively determine the level of interdependence with the variable *academic stress*.

Hypothesis 3. Low-medium-high levels of the variable *cognitive learning strategies* will negatively determine the level of interdependence with the variable *academic stress*.

Method

Participants

The sample was composed of 79 candidates with an undergraduate degree in Primary Education and who were competing for places as in-service teachers. A random selection was made from academies in Almería (Spain) that prepare students for these professional examinations; subsequently, a random selection was taken of the students who were enrolled at these. All study participants manifested their willingness to participate in the study beforehand. In reflection of this population group, our sample is mostly women (n = 164), with ages

ranging from 21-45 years (M = 24.02; SD = 4.99). One in five candidates held a graduate degree in addition to the required undergraduate degree in primary education; just over half the research participants were preparing these tests for the first time.

During the research process, there was a certain percentage of experimental mortality (< 5%), because the field work required 3-4 sessions, and this type of class usually meets only once per week. Moreover, not all subjects were able to answer all questionnaires, either because of student dropout at the academies, or because they were absent on the day a questionnaire was administered. Nonetheless, mortality was considered low and attributable to normal causes, without any overall effect on the results.

Instruments

Cognitive Learning Strategies Questionnaire (in Spanish, ECA; Hernández & García, 1995). This instrument, in its original version in Spanish, with paper-and-pencil format, was used to measure the variable *cognitive learning strategies*. A total of 44 items are divided into 4 factors: memorization (11 items), summarizing (11 items), organization (10 items) and elaboration (12 items). This questionnaire is a classic in the scientific literature; it has been previously validated and used in many research studies, and has well-established validity and reliability (Rodríguez, Piñeiro, Regueiro, Estevez & Val, 2017). Total reliability for the scale is high (α = .875).

Questionnaire on Study Habits and Motivational Strategies (in Spanish, HEME; Hernández & García, 1995). This instrument, in its original version in Spanish, with paper-and-pencil format, was used to measure the variable *motivational strategies toward study*. This questionnaire has been previously validated and used in many research studies, and has well-established validity and reliability (Rodríguez, Morales & Manzanares, 2016). Total reliability for the scale is high (α = .877). It has a total of 44 items, divided into 13 factors and 4 dimensions. See Table 1.

Table 1
Factor structure of HEME

Dimension 1: Usefulness and desire to study	F1. Finding usefulness and applicability F6. Self-questions and extension F7. Expectations of success F8. Rest and pacing F9. Self-induced desire to study

Dimension 2: Attention and Expectations of success	F2. Attention F3. Positivity F4. Self-induced capacity for success F11. Control of distractions
Dimension 3: Reinforcement and positive affect	F5. Self-satisfaction and reinforcement F10. Self-reinforcement and rewards F12. Rest and relaxation
Dimension 4: Study techniques	F13. Study techniques

Questionnaire on Interfering Thoughts about the Professional Examination (in Spanish, CCPO; de la Fuente et al., 2014) This instrument, in its original version in Spanish, with paper-and-pencil format, was used to measure the variable academic stress, based on its cognitive correlates. It contains 10 items, for which the subject must indicate how often he or she experiences them, their intensity, duration, the degree of interference and the situation in which they take place. A student's total score for each item is the mean of the first four (frequency, intensity, duration, degree of interference).

Because the instrument is newer and consequently less tested, we performed confirmatory factor analysis in this case. The resulting structure comprised two factors and 10 items: Factor 1, *thoughts about maladaptive emotions*, containing 5 items; and Factor 2, *thoughts about negative outcomes*, containing another 5 items. Construct validity is high (Chi-squared = 90.718, *df* = 34, NFI Delta 1 = 0.821, RFI = 0.848, IFI = 0.805, TLI = 0.860, CFI = 0.890, RMSEA = 0.055, HOELTER .05 = .292, HOELTER .01 = 337). Total questionnaire reliability is also good (α = .820).

Procedure

Questionnaires were administered over several weeks in ordinary class situations; consequently, some subjects were absent on certain class dates and did not answer all the questionnaires. Participants were assured that the information would be treated confidentially, and were asked to answer the items as honestly as possible. Subjects were thanked for their participation and the more important research implications were explained to them.

Data was compiled and processed on a voluntary basis, with the informed consent of the students, and in acceptance of the Ethical and Deontological Principles of Psychology. Data were processed in an anonymous format and as a group, and stored in a protected data-

base at the university. The Bioethics Committee of the University of Almería approved both the project and the instruments.

Data analyses

An ex post facto design was used. The statistics referring to instrument reliability were found through Cronbach's alpha. In the case of the less established instruments, confirmatory factor analysis was also performed. Group distribution (low-medium-high) for the independent variables was established through K-means clustering analysis. Finally, ANOVA and MANOVA were used as the inferential analyses (post hoc: Sheffe). These analyses were carried out using the computer programs SPSS (v.22) and AMOS (v.22).

Results

Interdependence relationships of the variable cognitive learning strategies with the variable motivational strategies toward study (Hypothesis 1)

First, low-medium-high levels of the IV *cognitive learning strategies* determined very significant effects on the total dependent variable *motivational strategies toward study* [$F(2,146)=20.280$, $p<.001$, $eta^2=.217$, observed power=1, (1 < 2, 3, $p<.001$; 2 < 3, $p<.01$)].

On the other hand, on the multivariate tests, low-medium-high levels in the IV *cognitive learning strategies* determined a very significant joint effect on the four dimensions of the dependent variable motivational strategies toward study [(Pillai=.290), $F(8,288)=6.116$ $p<.001$, $eta^2=.145$, observed power=1], with equally significant partial effects on dimensions *D1-usefulness and desire to study* [$F(2.146)=14.789$, $p<.001$, $eta^2=.168$, observed power=.999, (1 < 2, $p<.05$; 1, 2 < 3, $p<.001$)], *D2-Attention and expectations of success* [$F(2,146)=7.100$, $p<.001$, $eta^2=.089$, observed power=.926, (1 < 2, $p<.05$; 1 < 3, $p<.001$)] and *D4-Study techniques* [$F(2,146)=14.786$, $p<.001$, $eta^2=.168$, observed power=.999, (1 < 2, 3, $p<.001$)].

The multivariate tests also indicated that low-medium-high levels in the IV *cognitive learning strategies* determined a very significant joint effect on the thirteen factors of the dependent variable *motivational strategies toward study* [(Pillai=.359), $F(26,270)=2.273$ $p<.001$, $eta^2=.180$, observed power=.999], with equally significant partial effects on the factors *F1-Finding usefulness and applicability* [$F(2,146)=12.200$, $p<.001$, $eta^2=.143$, observed

power=.995, (1 < 2, p<.01; 1 < 3, p<.001)], *F2-Attention* [F(2,146)=6.082, p<.01, eta^2=.077, observed power=.881, (1 < 2, p<.05; 1 < 3, p<.01)], *F3-Positivity* [F(2,146)=7.768, p<.001, eta^2=.096, observed power=.947, (1 < 2, p<.01; 1 < 3, p<.001)], *F4-Self-induced capacity for success* [F(2,146)=4.343, p<.05, eta^2=.056, observed power =.746, (1 < 3, p<.05)], *F6-Self-questions and extension* [F(2,146)=11.164, p<.001, eta^2=.133, observed power=.991, (1 < 3, p<.001; 2 < 3, p<.01)], *F7-Expectations of success* [F(2,146)=4.885, p<.01, eta^2=.063, observed power=.797, (2 < 3, p<.05)] and *F9-Self-induced desire to study* [F(2,146)=4.121, p<.05, eta^2=.053, observed power=.722, (1 < 3, p<.05)].

Second, regarding effects of the dimensions of *cognitive learning strategies* on the total score for dependent variable *motivational strategies toward study*, we observe very significant effects of low-medium-high levels in the dimensions *D1-Memorization strategies* [F(2,163)=8.660, p<.001, eta^2=.096, observed power=.967, (1 < 3, p<.001; 2 < 3, p<.05)], *D2-Summarizing strategies* [F(2,168)=13.127, p<.001, eta^2=.135, observed power=.997, (1 < 3, p<.001; 2 < 3, p<.01)], *D3-Organization strategies* [F(2,171)=18.881, p<.001, eta^2=.181, observed power=1, (1 < 2, 3, p<.001)] and *D4-Elaboration strategies* [F(2,168)=25.121, p<.001, eta^2=.230, observed power=1, (1 < 2, 3, p<.001)]. See Table 2.

Table 2
Significant interdependence relationships between levels of cognitive learning strategies (IV) and its dimensions, with total score, dimensions and factors of motivational strategies (DV)

	Cognitive learning strategies (Total)		
	Low (1) n = 25	Medium (2) n = 80	High (3) n = 44
Motivational Strategies (Total)	3.19 (.44)	3.54 (.31)	3.76 (.37)
Dimensions:			
D1-Usefulness and desire to study	2.97 (.58)	3.29 (.50)	3.65 (.50)
D2-Attention and Expectations of success	2.90 (.46)	3.22 (.44)	3.35 (.56)
D4-Study techniques	4.04 (.89)	4.62 (.49)	4.79 (.46)
Factors:			
F1-Finding usefulness and applicability	2.85 (.82)	3.43 (.70)	3.72 (.65)
F2-Attention	2.73 (.84)	3.21 (.68)	3.37 (.80)
F3-Positivity	2.65 (.61)	3.20 (.68)	3.32 (.80)

F4-Self-induced capacity for success	3.20 (.62)	3.38 (.47)	3.57 (.54)
F6-Self-questions and extension	2.54 (1.01)	3.01 (.89)	3.56 (.81)
F7-Expectations of success	3.10 (1.11)	3.16 (96)	3.76 (.1.31)
F9-Self-induced desire to study	2.91 (.69)	3.21 (.66)	3.41 (.78)
	Memorization strategies (D1)		
	Low (1) n = 42	Medium (2) n = 98	High (3) n = 26
Motivational Strategies (Total)	3.38 (.43)	3.55 (.38)	3.78 (.25)
	Summarizing strategies (D2)		
	Low (1) n = 17	Medium (2) n = 72	High (3) n = 82
Motivational Strategies (Total)	3.24 (.56)	3.47 (.34)	3.69 (.35)
	Organization strategies (D3)		
	Low (1) n = 14	Medium (2) n = 85	High (3) n = 75
Motivational Strategies (Total)	2.99 (.42)	3.53 (.35)	3.64 (.36)
	Elaboration strategies (D4)		
	Low (1) n = 49	Medium (2) n = 79	High (3) n = 43
Motivational Strategies (Total)	3.23 (.40)	3.60 (.32)	3.72 (.35)

Interdependence relationships between level of motivational strategies toward study and academic stress (Hypothesis 2)

First, low-medium-high levels of the IV *motivational strategies toward study* determined significant effects of the total dependent variable *academic stress* [$F(2,28)=7.200$, $p<.01$, $eta^2=.340$, observed power=.906, (3 < 2, $p<.01$)].

On the other hand, on the multivariate tests, low-medium-high levels in the IV *motivational strategies toward study* determined a significant joint effect on the two dimensions of the dependent variable academic stress [(Pillai=.342), $F(4,56)=2.885$ $p<.05$, $eta^2=.171$, observed power=.745], with equally, very significant partial effects on the dimensions *D1-Thoughts about maladaptive emotions* [$F(2,28)=5.415$, $p<.01$, $eta^2=.279$, observed power=.803, (3 < 2, $p<.05$)] and *D2-Thoughts about negative outcomes* [$F(2,28)=5.397$, $p<.01$, $eta^2=.278$, observed power=.802, (3 < 2, $p<.05$)].

Second, regarding effects observed from the dimensions of *motivational strategies toward study* on total dependent variable *academic stress*, significant effects can only be noted from low-medium-high levels of the dimension *D2-Attention and Expectations of success* [$F(2,29)=7.135$, $p<.01$, $eta^2=.330$, observed power=.904, ($3 < 1$, $p<.01$)]. See Table 3.

Table 3
Significant interdependence relationships between levels of motivational strategies toward study (IV) and its dimensions, with total score and dimensions of academic stress (DV)

	Motivational strategies for study (Total)		
	Low (1) n = 10	Medium (2) n = 14	High (3) n = 13
Academic stress (Total)	2.48 (.35)	2.52 (.38)	2.01 (.34)
Dimensions:			
D1-thoughts about maladaptive emotions	2.34 (.47)	2.40 (.43)	1.88 (.40)
D1-thoughts about negative outcomes	2.63 (.34)	2.64 (.45)	2.14 (.38)
	Attention and Expectations of success (D2)		
	Low (1) n = 11	Medium (2) n = 13	High (3) n = 10
Academic stress (Total)	2.59 (.32)	2.22 (.40)	1.95 (.39)

Interdependence relationships between the level of cognitive learning strategies and academic stress (Hypothesis 3)

First, low-medium-high levels of the IV *cognitive learning strategies* did not determine any significant effect on the total dependent variable *academic stress.* Notwithstanding, certain marginal effects could be observed between the medium-level group in cognitive learning strategies and the high-level group.

Similarly, in the multivariate tests, low-medium-high levels of the IV *cognitive learning strategies* determined no significant effect, whether global or partial, on the two dimensions of the dependent variable *academic stress.* As in the previous case, only certain marginal effects could be observed on the two dimensions of academic stress, mainly between the medium-level group in cognitive learning strategies and the high-level group.

Second, no dimension of the variable *cognitive learning strategies* produced a significant effect on the total dependent variable *academic stress*. Despite this, in all cases we can

observe the same tendency of a lower score in academic stress in the group that scores highly in cognitive strategies, when compared to the other groups, and especially to the medium-level group. See Table 4.

Table 4
Mean scores in academic stress and its dimensions (DV) as a function of level of cognitive learning strategies (IV)

	Cognitive learning strategies (Total)		
	Low (1) n = 10	Medium (2) n = 15	High (3) n = 10
Academic stress (Total)	2.21 (.32)	2.32 (.39)	2.02 (.43)
Dimensions:			
D1-thoughts about maladaptive emotions	2.02 (.41)	2.27 (.57)	1.93 (.46)
D1-thoughts about negative outcomes:	2.41 (.32)	2.38 (.39)	2.11 (.48)
	Memorization strategies (D1)		
	Low (1) n = 10	Medium (2) n = 18	High (3) n = 10
Academic stress (Total)	2.20 (.37)	2.40 (.44)	1.92 (.42)
	Summarizing strategies (D2)		
	Low (1) n = 10	Medium (2) n = 11	High (3) n = 17
Academic stress (Total)	2.31 (.09)	2.22 (.45)	2.20 (.43)
	Organization strategies (D3)		
	Low (1) n = 11	Medium (2) n = 15	High (3) n = 16
Academic stress (Total)	2.21 (.35)	2.36 (.50)	2.27 (.42)
	Elaboration strategies (D4)		
	Low (1) n = 11	Medium (2) n = 16	High (3) n = 12
Academic stress (Total)	2.51 (.30)	2.24 (.49)	2.10 (.43)

Discussion and Conclusions

Overall, these results may be said to confirm our initial hypotheses, as we find significant interdependence relationships that confirm the evidence found in previous studies with other samples (Kormos & Csizer, 2014; Cho & Heron, 2015).

Hypothesis 1 was confirmed in its totality; with the exception of an isolated factor or dimension, strong interdependence has been shown to exist between cognitive learning strategies and motivational strategies toward study. This relationship suggests that subjects who are low in the use of cognitive strategies also tend to use fewer motivation strategies, and vice versa. Put differently, the use of cognitive learning strategies is not only important for the sake of assimilating content, but it also seems to be an important preventive factor against demotivation and dropout (Duffy & Azevedo, 2015). This once again demonstrates that there is a relationship between cognitive factors and emotional factors during learning, and this relationship may become more critical in high-stakes, high-stress testing (Liu, 2015).

Similarly, *Hypothesis 2* was also solidly confirmed during this investigation. This hypothesis shows that subjects who use more strategies to motivate themselves suffer from less academic stress than do the other subjects. Motivation, therefore, not only makes subjects more persistent in their efforts to meet their goals, but it also prevents stress and its consequences for both health and learning (Karaman, Nelson & Cavazos Vela, 2017). Why this effect of reducing academic stress was significant exclusively in one dimension of *motivational strategies* remains to be explained.

Unlike the above hypotheses, the *third hypothesis* could not be demonstrated clearly and directly in this investigation, given that none of its analyses produced significant results. However, one can clearly make out a tendency in the data, toward the use of cognitive learning strategies being linked in some way to prevention of academic stress (de la Fuente, Zapata, Martínez-Vicente, Sander & Putwain, 2015). Also pointing in this direction is an indirect effect that may be inferred from the weight of cognitive strategies on motivational strategies, together with how the latter have a reducing effect on academic stress, as demonstrated in the previous hypothesis.

Limitations

The limitations of this research are fundamentally in relation to the sample size and composition, which were shaped in turn by the choice of examination for this study. Consequently, when subjects are divided into groups for the analyses, some sectors are minimally represented, even though we do not consider this fact to affect our conclusions. Previous studies have reported gender differences in university students in terms of their motivation and coping with stress; this study's limitation could be resolved by replicating the investigation with other types of examinations and samples (Bonneville-Roussy, Evans, Verner-Filion, Vallerand & Bouffard, 2017).

Another limitation would be directionality in the relationships, since this has been defined based on a theoretical model that is subject to confirmation. For example, it is likely that stress may also influence a subject's assimilation and use of learning strategies and motivational strategies that are within his/her repertory, considering that the stress factor sometimes acts as a block.

Implications in Educational Psychology

One of the most important implications is the need to continue implementing programs that teach learning strategies, at every stage of education and for any type of learning situation, more so when this situation requires sustained effort and is associated with possible stress-producing effects. In the present research, we can observe how such intervention can contribute not only to better assimilation of the subject matter, as was already known, but also to motivation, and hence, to a possible decline in dropout rates. A recent review of the procedures that are available for teaching these strategies may be found in Torrano, Fuentes, and Soria (2017). On the other hand, motivating strategies should also be explicitly taught, since we can observe that they considerably reduce academic stress, and thereby increase possibilities for successful test performance. When working with students who are subjected to stressful situations, one should take into greater consideration the specificities of these contexts (de la Fuente, 2015), which can be identified thanks to research studies such as this.

Future lines for research

A replication of this research study would be advisable, with a larger sample and more consideration of the gender perspective (Bonneville-Roussy, Evans, Verner-Filion, Vallerand & Bouffard, 2017). The objective of such studies, in addition to confirming the first two hypotheses, could be to shed light on the possible relationships between cognitive learning strategies and academic stress, which, as we have stated above, have not been clearly demonstrat-

ed here. They might also seek to verify the impact of the dimensions of motivational strategies whose relationships with academic stress were not significant in this study. Further inquiry into the directionality of the relationships could also be the object of study, as commented in the limitations.

On the other hand, future lines of research ought to take into consideration other variables from the SLPS Competency Model, for a better understand of how all of them interact in high-performance or stress-producing contexts (de la Fuente, 2015). The conclusions could be compared with evidence obtained in other contexts, looking for any significant differences between them.

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