Basic psychological needs, emotional regulation and academic stress in university students: a structural model according to branch of knowledge

Ramón Chacón-Cuberos [1]

Eva María Olmedo-Moreno [1]

Amador Jesús Lara-Sánchez [2]

Félix Zurita-Ortega [3]

Manuel Castro-Sánchez [3]

[1] Department of Research Methods and Diagnosis in Education. University of Granada (Spain); rchacon@ugr.es; emolmedo@ugr.es

[2] Department of Didactics of Musical, Plastic and Corporal Expression. University of Jaén (Spain); alara@ujaen.es

[3] Department of Didactics of Musical, Plastic and Corporal Expression. University of Granada (Spain); felixzo@ugr.es; manuelcs@ugr.es

Corresponding author:

Manuel Castro-Sánchez

Department of Didactics of Musical, Plastic and Corporal Expression.

University of Granada (Spain)

manuelcs@ugr.es

Resumen

The present study which is descriptive and cross-sectional in nature, pursues the objective of developing a structural equation model which integrates basic psychological needs, emotional regulation and academic stress in a sample composed of 2736 university students [♂ = 33.8% (n=924); ♀ = 66.2% (n=1812)] with a mean age of 23.33±5.77 years. The main instruments used were the basic psychological needs scale (Reggiani, 2013), the emotional regulation scale (Gómez-Ortiz et al., 2016) and the academic stress questionnaire (García-Ros et al., 2012). Results show a positive relationship between the need of autonomy and the two dimensions of emotional regulation -cognitive reappraisal and expressive suppression-. Cognitive reappraisal did not exhibit any relationship within the social science students examined. Further, the needs of autonomy and competence were positively related with cognitive reappraisal, and negatively related with expressive suppression. The greatest correlation strength was revealed in students studying health sciences. Finally, it was revealed that health science students made better use of emotional regulation in order to control academic stress. This highlights the importance of developing emotional regulation and satisfying basic psychological needs within higher education.

Keywords: basic psychological needs; emotional regulation; academic stress; university students

Introduction

The university stage is characterised as the period in which the young adult begins higher studies with the aim of obtaining a qualification that will enable them to effectively insert themselves into the job market (Arnett, 2016; De la Iglesia, 2012). Leaving academic questions to one side, this period results in great psychological complexity for the young person. This has been described as the emergent adult phase and is defined by Arnett (2016). In this stage, the individual will experience a type of emancipation during which the peer group has a large social influence to the detriment of the familial aspect of their environment (Marques, Santos, Galvão, Mascarenhas, &

Justino, 2018).

Further, university students must combine their university studies with work activities that allow them to obtain a financial income in cases where they do not receive economic support to study (Sánchez-Gelabert, Figueroa, & Elias, 2017). All of this is combined with the intrinsic difficulties associated with the higher studies undertaken by the young person. These include vocational factors, motivation, academic tasks, cooperative working and new forms of teaching, all of which could generate stressful situations which are both general and academic in nature. This leads the student to perceive themselves as being incapable of facing daily situations (Muenks, Wigfield, Yang, & O'Neal, 2017; Soysa & Wilcomb, 2015).

Studies such as those developed by Beiter et al. (2015) and Sladek, Doane, Luecken, & Eisenberg (2016) show the high prevalence of stress that exists in current society. With six out of every ten adults shown to suffer, stress has been shown to be a special protagonist in the university context. This is due to the transition between educational stages, leaving the family home and, academic and work problems. These can end up causing concentration problems, eating disorders and depression, amongst other problems (Haidar, De Vries, Karavetian, & El-Rassi, 2018; Sladek et al., 2016). In defining the concept of stress, Beiter et al. (2015) linked it to the relationship system established between the human being and the situations they experience. Stress occurs when the individual forms the perception that the situation surpasses their personal resources to deal with issues, attacking their wellbeing.

In relation to the academic context, Haidar et al. (2016) define stress as something linked to the educational ambit, from which a number of factors are derived such as the educational stage, academic obligations, teaching methods or expectations about the future of the student (Haidar et al., 2016). Specifically, García-Ros, Pérez-

González, Pérez-Blasco, & Natividad (2012) state that academic stress is linked to four basic dimensions. The first one represents academic obligations and is defined as the set of tasks that must be completed by the student in order to obtain a positive assessment. The second is linked to future expectations and refers to career goals of the student and their need to obtain the marks high enough to grant access to this career. Interpersonal difficulties represent the third dimension which is associated with the problems derived from the relationships between classmates and the need to work cooperatively. Finally, García-Ros et al. (2012) point out the difficulty of communicating one's own ideas as a stressful agent, since this competence is not usually explicitly targeted until starting higher education. Due to the negative consequences of academic states of stress, and their tight relationship with university dropout rates, it is of interest to study some of the factors that may be associated with it, such as levels of motivation or the capacity for emotional regulation (Campbell, Soenens, Beyers, & Vansteenkiste, 2018).

In relation to motivational factors, in particular those linked with the type of qualification being studied, self-determination theory (Ryan & Deci, 2017) provides a useful insight. This theory centres on the types of motivation that influence whether a task is completed. These form a continuum in which lesser or greater degrees of self-determination are seen. In the zone relating to less self-determination, demotivation is found. The medium zone is characterised by extrinsic motivation and the zone with more self-determination relates to intrinsic motivation (Johnson, Taasoobshirazi, Clark, Howell, & Breen, 2016; Ryan & Deci, 2017). In this way, this theory defines the existence of three innate needs – autonomy, competence and relatedness – which are linked to personal development and permits the development of intrinsic motivations when carrying out a task, such as those involving academic or sporting activities (Fenton, Duda, & Barrett, 2016; Goldman, Goodboy, & Weber, 2017). The need for

autonomy is related with the effort of the individual to determine their own behaviour, whilst the need for competence is linked with the capacity to control the outcome of their actions. Finally, the need for relatedness is associated with the individual's satisfaction towards the social world in the context in which they develop (Johnson et al., 2016).

Gross & John (2003) developed one of the main theoretical models to explain emotional regulation in young people. This defines emotional regulation as the process through which people influence the emotions they feel, and concerns their approach to expressing and controlling these emotions. Although this theory is based on the development of five strategies of emotional regulation, two of the most employed are cognitive reappraisal and expressive suppression (Gómez-Ortiz, Romera, Ortega-Ruiz, Cabello, & Fernández-Berrocal, 2016). The first is linked with the way of cognitively interpreting the information received by an individual, modulating its emotional significance and one's ability to deal with it. The second refers to the nature of the emotional response and the capacity to decrease expressive behaviour resulting from the emotion being felt (Gross, 2015; Gross & John, 2003). In this sense, it could be assumed that higher levels of emotional regulation may be linked with lower levels of academic stress, providing a research matter of interest (Seligowski, Lee, Bardeen, & Orcutt, 2015).

In reviewing recent studies addressing the proposed line of research, Van den Broeck, Vansteenkiste, De Witte and Lens (2008) demonstrated through a structural equation model, that higher levels of basic psychological needs were inversely linked to states of exhaustion associated with stress and the demands of the work context. Likewise, Campbell et al. (2018) analysed stress, basic psychological needs and sleep quality in students during the exam period. They concluded that higher levels of

academic stress during this period were associated with lower levels of the need relating to autonomy and poorer sleep quality. Another example of a related study is that developed by Ranasinghe, Wathurapatha, Mathangasinghe, & Ponnamperuma (2017). This revealed that those university students who presented a greater capacity for emotional regulation were those who showed lower levels of academic stress, in addition to better academic performance.

Thus, the present study presents the following objectives: (a)

- To define an explanatory model of the existing relationships between basic psychological needs, emotional regulation and academic stress in university students.
- To analyse the associations between the variables included in the model in students of social sciences and health sciences through a multi-group analysis.

Materials and methods

Design and participants

The present study has a non-experimental, ex post-facto design. It is descriptive and cross-sectional in nature and was conducted within Spanish university students. A single measurement was taken in only one group, forming an overall sample of 2736 university students with a self-reported age of between 18 and 35 years (M = 23.33; SD = 5.77). The sample was distributed amongst 66.2% (n=1812) females and 33.8% (n=924) males. Convenience sampling was conducted assuming randomisation of participants through selection of natural groupings (Merino-Marban, Mayorga-Vega, Fernández-Rodríguez, Estrada, & Viciana, 2015). Selection criteria was determined as: (a) To be studying for a university degree during the academic year of 2018/2019; (b) To be registered full-time for university classes. Exclusion criteria were: (a) To not

suffer from any type of pathology that impeded completion of the questionnaire; (b) To not have completed more than 50% of the credits registered for. The students who took part in this study belonged to 19 Spanish universities, representing 66.6% (n=1822) of students undertaking social sciences (child education, primary education, pedagogy, social education, law, geography, history and economics) and 33.4% (n=914) of students undertaking health sciences (psychology, sport sciences, nursing, nutrition and pharmacy). Likewise, 87.4% (n=2392) of participants were studying in a blended way, while 12.6% (n=344) did so online. Finally, a total of 3114 participants initially completed the survey, however, 378 questionnaires had to be eliminated due to incomplete or incorrect completion.

Instruments

The instruments used in this study are:

- Basic psychological needs scale, initially validated by Sheldon & Hilpert (2012) and adapted into Spanish by Reggiani (2013). This questionnaire is composed of 12 items (e.g. "1. The tasks I complete fit my interests") which are rated along a Likert type scale with five response options (1 = Totally disagree; 5 = Totally agree). An example is "1. The exercises I complete fit with my interests". The items of this questionnaire are grouped according to three basic dimensions: Need for autonomy (Items 1, 4, 7 and 10), need for competence (Items 2, 5, 8 and 11) and need for relatedness (Items 3, 6, 9 and 12). Internal consistency of $\alpha=0.858$ was obtained for this scale, this being considered as acceptable.

- Emotional regulation questionnaire, developed by Gross & John (2003) and validated in Spanish by Gómez-Ortiz et al. (2016). This scale is composed of 10 items (e.g. "1. I keep my emotions to myself"), which are rated along a Likert

type scale with 7 response options (1 = Completely disagree; 7 = Completely agree). This questionnaire groups emotional regulation into two dimensions: Expressive suppression (items 1, 2, 3 and 4) and cognitive reappraisal (items 5, 6, 7, 8 and 9). This instrument presents adequate internal consistency with a Cronbach alpha of $\alpha = 0.817$.

- The evaluation of academic stress scale has been validated in university students by García-Ros et al. (2012). The questionnaire rates the level of academic stress according to 21 items (e.g. "1. Completing exams") rated with a 5 point Likert scale (1 = No stress; 5 = A lot of stress). According to this instrument stress is grouped into four dimensions, these are: Academic obligations (items 1, 5, 7, 9, 10, 14 and 15 of the questionnaire), records and future prospects (items 16, 17, 18, 19, 20, 21), interpersonal difficulties (items 8, 12 and 13) and, expression and communication of one's own ideas (items 2, 3 and 4). Internal consistency of the present instrument was acceptable with a value of $\alpha = 0.889$.

Procedure

In the first instance, participation of the university students in the study was requested. This process was carried out through an information pack that was put together by the department of Musical, Artistic and Corporal Expression of the University of Granada. In it the objectives of the study were detailed, alongside the research instruments and the way data was to be handled. Further, this document was used to obtain written informed consent from all participants.

Following this, data collection was carried out with 19 public and private Spanish universities participating throughout the months of January until March during the 2018/2019 academic year. Administration of the instruments was conducted in the presence of a survey administrator with the purpose of assuring correct application of

the scales and resolving any doubts that emerged during its completion. Finally, it is noted that the present research followed the ethical principles for research defined in the Declaration of Helsinki in 1975 and later updated in Brazil in 2013.

Data analysis

Data analysis was carried out through the software IBM SPSS® for Windows in its version 23.0. Frequencies and means were employed for the basic descriptive analysis, as was the chi-squared test for determining the significance level, which was fixed at $p < 0.05$. Likewise, the Cronbach alpha coefficient was employed to determine internal consistency of the instruments, setting the reliability index at 95%. Multi-group analysis through structural equations (SEM) was conducted using the software IBM AMOS® in its version 23.0. SEM is used to determine the associations between the variables that constitute the theoretical model (Figure 1) in both groups (students of social sciences and health sciences).
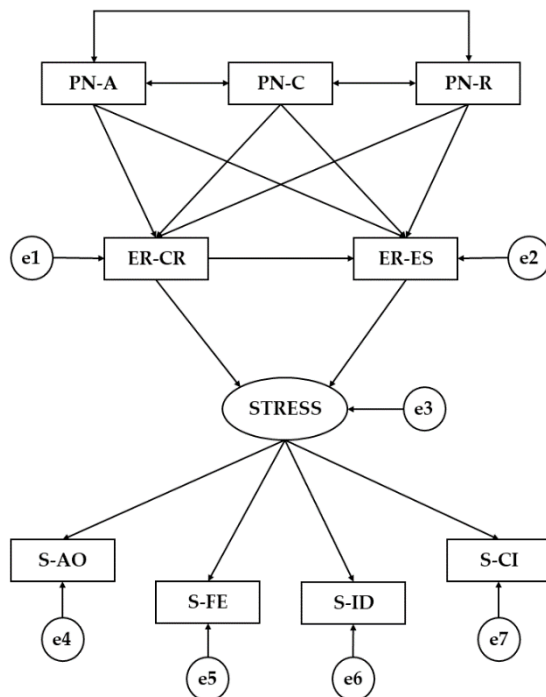
Figure 1. Theoretical model.

1. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relationship; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.

The SEM is constructed by seven observable variables and three latent variables. The observable variables are Emotional Regulation–Cognitive Reappraisal (ER-CR), Emotional Regulation–Expressive Suppression (ER-ES), Stress, Stress-Academic Obligations (S-AO), Stress-Future Expectations (S-FE), Stress-Interpersonal Differences (S-ID), and Stress-Communication of ideas (S-CI). The latent variables are Psychological Need for Autonomy (PN-A), Psychological Need for Competence (PN-C) and Psychological Need for Relatedness (PN-R). The observable variables are those that produce an error term which is represented graphically by a circle, whilst the latent variables do not present error terms and employ bi-directional arrows. The model provides causal explications for the latent variables through the observed associations between the different variables and the indicators.

The bi-directional arrows show the associations between the latent variables (covariance). The uni-directional arrows show the associations between the observable variables and the associated error terms, which are interpreted as multivariate regression coefficients. Prediction errors are associated with the observable and endogenous variables of the model. Likewise, the maximum likelihood method (ML) was employed to estimate the associations between variables as this method is consistent and invariable to changes in scale type.

With the aim of determining the compatibility of the SEM with the empirical information obtained, different indices were employed to determine the fit of the

theoretical model. According to Byrne (2016) non-significant p-values must be obtained, though other fit indices should also be employed as the aforementioned statistic is highly sensitive to sample size. Amongst others, the comparative fit index (CFI), incremental fit index (IFI), normalised fit index (NFI) and the Tucker-Lewis index (TLI) were used. Values higher than 0.90 should not be obtained in order for acceptable fit to be concluded, with values higher than 0.95 indicating an excellent fit. The root mean squared error of approximation (RMSEA) was also employed for which acceptable fit values are identified below 0.08 and excellent fit identified below 0.05.

Results

Table 1 presents the values recorded for the variables under study according to branch of knowledge. With regards to basic psychological needs, statistically significant differences were obtained ($p < 0.05$) for the need of autonomy, though no differences were found relating to the remaining variables. The need for autonomy was higher in respondents studying social science degrees (3.61 ± 0.69 *vs*. 3.50 ± 0.67). Similarly, statistically significant differences ($p < 0.005$) were observed for expressive suppression, which was higher in students of health sciences (3.90 ± 1.22 *vs*. 3.59 ± 1.64). Finally, it should be noted that statistically significant differences ($p < 0.005$) were obtained for all dimensions of academic stress, with higher scores being obtained in all dimensions for social science students; academic obligations (3.76 ± 0.74 *vs*. 3.38 ± 0.83), future expectations (3.37 ± 0.89 *vs*. 3.17 ± 0.87), interpersonal differences (2.87 ± 1.07 *vs*. 2.59 ± 0.96) and communication of ideas (3.14 ± 0.96 *vs*. 2.84 ± 0.94).

Table 1. Mean values for all variables according to branch of knowledge

| | | M | SD | EE | Levene Test | | T-Test | |
					F	Sig.	T	Sig.
PN-A	Social Sciences	3.61	0.69	0.02	0.593	0.441	2.651	*
	Health Sciences	3.50	0.67	0.03				

		M	SD	EE	F	p	T	p
PN-C	Social Sciences	4.00	0.58	0.01	0.225	0.635	0.610	0.542
	Health Sciences	3.98	0.58	0.02				
PN-R	Social Sciences	4.08	0.78	0.02	7.364	0.007	0.312	0.755
	Health Sciences	4.06	0.70	0.03				
ER-CR	Social Sciences	4.85	1.06	0.03	0.630	0.428	-0.998	0.318
	Health Sciences	4.91	0.99	0.04				
ER-SE	Social Sciences	3.59	1.34	0.04	7.522	0.006	-4.108	***
	Health Sciences	3.90	1.22	0.05				
S-AO	Social Sciences	3.76	0.74	0.02	9.006	0.003	8.615	***
	Health Sciences	3.38	0.83	0.03				
S-FE	Social Sciences	3.37	0.89	0.02	1.728	0.189	3.910	***
	Health Sciences	3.17	0.87	0.04				
S-ID	Social Sciences	2.87	1.07	0.03	6.221	0.013	4.684	***
	Health Sciences	2.59	0.96	0.04				
S-CI	Social Sciences	3.14	0.96	0.03	0.136	0.712	5.508	***
	Health Sciences	2.84	0.94	0.04				

1. M, Mean; SD, Standard Deviation; EE, Estimated Error; F, F-Test; T, T-Test.

2. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relatedness; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.

3. *, $p < 0.05$; ***, $p < 0.005$.

Important differences in academic stress were shown according to the area of knowledge. For this reason, a structural equation model was carried out in order to better understand the relationship between these variables and how this differed within different student groups. The structural model developed showed good fit indices for the multi-group analysis. The chi-squared test revealed a statistically significant value ($\chi2 = 182.13$; $df = 4.55$; $p < 0.001$). Given the sensitivity to sample size that is presented by this statistic, Byrne (2016) points to the importance of using other indices of standardised fit. In this way, the NFI value obtained was 0.93, the IFI value was 0.94, the TLI value was 0.90 and the CFI value was 0.94, with all of these being acceptable. Likewise, the RMSEA obtained a value of 0.048, which was also adequate and demonstrated an appropriate level of fit of the SEM.

Table 2 and Figure 2 show the regression weights and standardised regression weights of the SEM developed for the social sciences students. Through these it is

possible to determine the associations between basic psychological needs, emotional regulation and stress. Statistically significant associations ($p < 0.005$) are shown at the first level of the model between the three dimensions of basic psychological needs, with all of these being positive and direct: the need for competence and the need for autonomy ($b = 0.536$), the need for competence and the need for relatedness ($b = 0.441$), and the need for autonomy and the need for relatedness ($b = 0.462$).

In analysing the second level of the model, the associations between the basic psychological needs and the two dimensions of emotional regulation can be seen, with statistically significant differences being obtained in all cases. The need for autonomy showed a positive relationship with cognitive reappraisal ($p < 0.005$; $b = 0.129$) and expressive suppression ($p < 0.005$; $b = 0.134$). The need for competence revealed a positive association with cognitive reappraisal ($p < 0.005$; $b = 0.155$) and a negative association with expressive suppression ($p < 0.01$; $b = -0.118$). In a similar way, the need for relatedness was positively related with cognitive reappraisal ($p < 0.005$; $b = 0.129$), and negatively and indirectly related with expressive suppression ($p < 0.005$; $b = -0.183$). Finally, both dimensions of emotional regulation were directly related ($p < 0.005$; $b = 0.146$).

The last level of the model studies the relationships between emotional regulation and academic stress, alongside the influence of the different dimensions of stress. It could be observed that expressive suppression was positively related with global academic stress ($p < 0.005$; $b = 0.211$), whilst cognitive reappraisal did not have any relationship. On the other hand, the dimension "academic obligations" was the indicator with the greatest regression weight for overall stress ($p < 0.005$; $b = 0.805$), followed by future expectations ($p < 0.005$; $b = 0.776$), the communication of ideas ($p < 0.005$; $b = 0.548$) and interpersonal difficulties ($p < 0.005$; $b = 0.512$).

Table 2. Regression weights for students of social sciences.

Relationships between variables			R.W.				S.R.W.
			Estimate	S.E.	C.R.	P	Estimate
ER-CR	←	PN-A	0.199	0.060	3.332	***	0.129
ER-CR	←	PN-C	0.282	0.070	4.052	***	0.155
ER-CR	←	PN-R	0.174	0.049	3.534	***	0.129
ER-ES	←	PN-C	-0.271	0.091	-2.959	**	-0.118
ER-ES	←	PN-R	-0.311	0.065	-4.825	***	-0.183
ER-ES	←	PN-A	0.260	0.078	3.321	***	0.134
ER-ES	←	ER-CR	0.185	0.043	4.278	***	0.146
STRESS	←	ER-CR	-0.034	0.021	-1.639	0.101	-0.060
STRESS	←	ER-ES	0.094	0.017	5.710	***	0.211
S-AO	←	STRESS	1.000	-	-	-	0.805
S-FE	←	STRESS	1.152	0.062	18.536	***	0.776
S-ID	←	STRESS	0.914	0.066	13.805	***	0.512
S-CI	←	STRESS	0.881	0.060	14.729	***	0.548
PN-C	↔	PN-A	0.217	0.015	14.255	***	0.536
PN-C	↔	PN-R	0.204	0.017	12.174	***	0.441
PN-A	↔	PN-R	0.252	0.020	12.642	***	0.462

1. R.W., Regression Weights; S.R.W., Standardized Regression Weights; S.E., Estimation of Error; C.R., Critical Ratio.

2. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relationship; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.
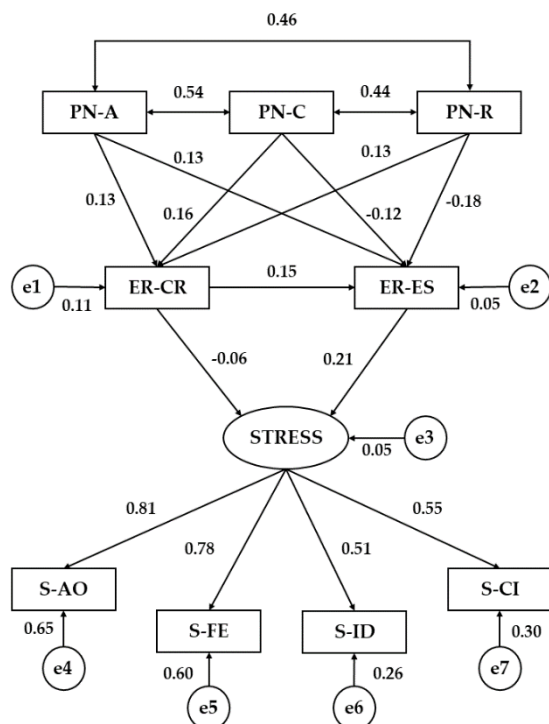
3. ***, p < 0.005.

Figure 2. Structural equation model for students of social sciences.

1. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relationship; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.

Table 3 and Figure 3 show the regression weights and standardised regression weights of the SEM developed for the students of social sciences. These permit us to determine the relationships between the basic psychological needs, emotional regulation and stress. In the first level of the model statistically significant associations ($p < 0.005$) are shown between the three dimensions of the basic psychological needs. All relationships were positive and direct: need for competence and need for autonomy ($b = 0.475$), need for competence and need for relatedness ($b = 0.387$), and need for autonomy and need for relatedness ($b = 0.368$).

Analysing the second level of the model associations can be observed between the basic psychological needs and the two dimensions of emotional regulation. Statistically significant differences were obtained in all cases. The need for autonomy was not statistically related with cognitive reappraisal, whilst differences were observed with expressive suppression ($p < 0.005$; $b = 0.160$). The need for competence revealed a positive association with cognitive reappraisal ($p < 0.01$; $b = 0.141$) and a negative association with expressive suppression ($p < 0.005$; $b = -0.172$). In a similar way, the need for relatedness was positively related with cognitive reappraisal ($p < 0.01$; $b = 0.159$), and negatively and indirectly related with expressive suppression ($p < 0.005$; $b = -0.290$). Finally, both dimensions of emotional regulation were directly related ($p < 0.005$; $b = 0.253$).

The final level of the model examines the relationships between emotional regulation and academic stress, considering both overall stress and the influence of the different dimensions of stress. It could be observed that expressive suppression was positively related with global academic stress ($p < 0.01$; $b = 0.156$), whilst cognitive reappraisal was negatively and indirectly related ($p < 0.005$; $b = -0.179$). On the other hand, the dimension describing "academic obligations" was the indicator with the greatest regression weight for overall stress ($p < 0.005$; $b = 0.824$), followed by expectations for the future ($p < 0.005$; $b = 0.761$), interpersonal difficulties ($p < 0.005$; $b = 0.579$) and the communication of ideas ($p < 0.005$; $b = 0.543$).

Table 3. Regression weights for students of health sciences.

Relationship between variables			R.W.				S.R.W
			Estimate	S.E.	C.R.	P	Estimate
ER-CR	←	PN-A	-0.053	0.079	-0.677	0.499	-0.036
ER-CR	←	PN-C	0.241	0.091	2.638	**	0.141
ER-CR	←	PN-R	0.224	0.072	3.138	**	0.159
ER-ES	←	PN-C	-0.358	0.107	-3.348	***	-0.172
ER-ES	←	PN-R	-0.500	0.084	-5.957	***	-0.290
ER-ES	←	PN-A	0.290	0.092	3.165	**	0.160
ER-ES	←	ER-CR	0.309	0.054	5.680	***	0.253
STRESS	←	ER-CR	-0.123	0.036	-3.442	***	-0.179
STRESS	←	ER-ES	0.087	0.029	2.995	**	0.156
S-AO	←	STRESS	1.000	-	-	-	0.824
S-FE	←	STRESS	0.969	0.071	13.737	***	0.761
S-ID	←	STRESS	0.814	0.073	11.228	***	0.579
S-CI	←	STRESS	0.751	0.071	10.551	***	0.543
PN-C	↔	PN-A	0.187	0.020	9.161	***	0.475
PN-C	↔	PN-R	0.160	0.021	7.709	***	0.387
PN-A	↔	PN-R	0.175	0.024	7.378	***	0.368

1. R.W., Regression Weights; S.R.W., Standardized Regression Weights; S.E., Estimation of Error; C.R., Critical Ratio.

2. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relationship; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.
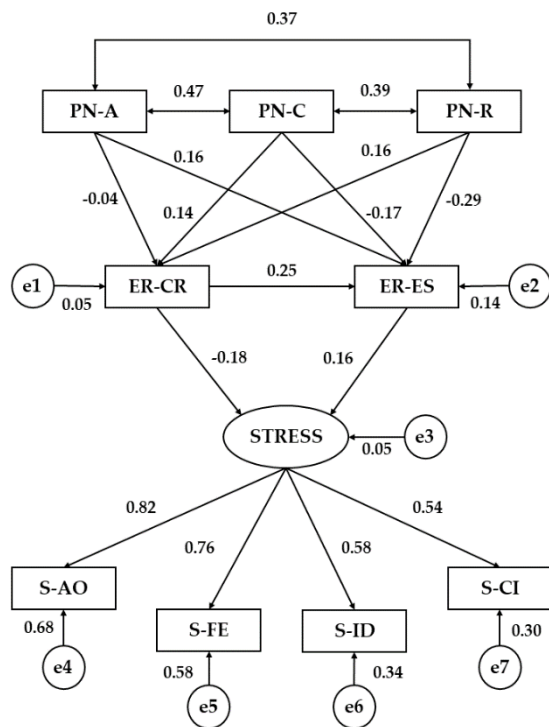
3. ***, p < 0.005.

Figure 3. Structural equation model for students of health sciences.

1. PN-A, Psychological Need of Autonomy; PN-C, Psychological Need of Competence; PN-R, Psychological Need of Relationship; ER-CR, Emotion Regulation – Cognitive Reappraisal; ER-ES, Emotion Regulation – Expressive Suppression; S-AO, Stress-Academic Obligations; S-FE, Stress-Future Expectations; S-ID, Stress-Interpersonal Differences; S-CI, Stress-Communication of ideas.

Discussion

The object of study of the present work centred on the interest in promoting self-determined motivations and improving emotional regulation for the prevention of negative cognitive states, such as stress in higher education. To this end, the present work pursued as its objective to determine the existing relationships between basic psychological needs, emotional regulation and academic stress. Structural equations were applied to data collected within a sample of university students, providing an approximate view according to the branch to which the student's degree course belongs:

social sciences and health sciences. In this sense, some studies of a similar vein which have helped to form the basis of this study are those developed by Campbell (2018), Ranasinghe et al. (2017), Thomas, Cassady, & Heller (2017) and Van den Broeck et al. (2008).

Following the preliminary results, it was observed that social science students had a greater need for autonomy than health science students. Moreover, this group of students obtained higher levels of academic stress in all its dimensions. Justifying these findings, Vallejo-Martín, Aja, & Plaza (2018) obtained similar results and concluded that social science students presented higher levels of stress because they had a lower sense of usefulness whilst studying for their degree, typically received lesser job offers, developed less efficient learning and stress management strategies, and had a greater need for autonomy (Denovan, Dagnall, Dhingra, & Grogan, 2017; Gargallo, Almerich, Suárez, & García, 2012).In contrast, students of health sciences had higher levels of expressive suppression. This better capacity for emotional regulation seems logical given that psychology students also form some of the sample and they tend to have better strategies for understanding and controlling emotions (McDaniel et al., 2014). Likewise, health sciences students usually present higher scores when rating access to their degree. This generates a more pleasant and positive state of coping with the stresses faced whilst undertaking a degree in order to achieve its objectives (Vallejo-Martín et al., 2018). Another reason could be that these students have more healthy habits which, as has been established by Ali & Ali (2016), are beneficial for emotional regulation and stress management. In consideration of these findings and in order to give a closer view of reality, this study highlights the need to develop a structural model through multi-group analysis that integrates the relationships between all variables according to the branch of knowledge.

The findings obtained determined a positive relationship between all of the basic psychological needs as a function of the type of degree being undertaken, with students of social sciences acquiring stronger outcomes. Works such as those undertaken by Hancox, Quested, Ntoumanis, & Duda, (2017) and Faye & Sharpe (2008) demonstrate the direct relationship between the dimensions, thus justifying the finding that the dimensions lead to higher levels of self-determination. Hancox et al. (2017) explain that greater satisfaction of the need for competence or the feeling that one is effective when completing tasks, will lead to greater intrinsic motivation. Further, the greater regression weights observed in students of social sciences could be linked to the greater vocational component found in this type of degree, this includes being a teacher, a social educator or a counsellor (Guzanov, Tarasyuk, Bashkova, Ustakova, & Sotskova, 2016).

A positive relationship was observed between the need for autonomy and expressive suppression in all cases. This demonstrates that those university students who need to feel more effective when carrying out tasks, report a greater suppression of emotions. This might be explained by the fact that greater emotional expression could denote a lack of competence, ability or capacity for completing tasks. For this reason such individuals will feel less autonomous when engaging in tasks (Boekaerts, & Pekrun, 2015; Faye & Sharpe, 2008). On the other hand, a positive association was revealed between the need for autonomy and cognitive reappraisal, with this only being present in students of the social sciences. The positive thoughts generated through the successful completion of a specific task carried out independently (Klassen, Perry, & Frenzel, 2012) may at least partly explain this outcome. Despite it being difficult to provide an explanation for this outcome, various characteristics of the degree courses such as the level of difficulty or one's commitment towards achieving objectives, could

form the basis of an explanation (Troiano, Torrents, Sánchez-Gelabert, & Daza, 2017; Weber et al., 2018). The results may be justified by the fact that degrees related to the social sciences do not require such high marks in order to qualify for the course, are associated with a greater percentage of modules being passed every year, and lend greater attention to students through tutoring and teaching learning strategies (Respondek, Seufert, Stupnisky, & Nett, 2017).

The need for relatedness was positively associated with cognitive reappraisal and negatively associated with expressive suppression. This demonstrates that university students who seek to relate themselves with other colleagues on their course tend to regulate their emotions better. This has been shown by Chew, Zain, & Hassan (2015) and Rahkar-Farshi, Jabraeili, & Vahidi (2015) who established that processes of socialisation help in the learning of strategies for emotional regulation and in better understanding the emotions of others. In fact, the inverse relationship with expressive suppression could be explained by the greater ease with which university students who possess more social relationships, express their emotions (Doinita, 2015). Such relationships appear not to suppress emotions.

In the third level of the model the relationship between emotional regulation and academic stress was determined. Expressive suppression was related directly with stress, with this relationship being stronger amongst students of social sciences. This might be due to the higher academic stress scores reported by these students, which result from the greater competition from classmates and lower job availability that are characteristic of this degree program (Vallejo-Martín et al. 2018). In fact, these findings determine that those university students who present higher levels of academic stress tend to suppress to a greater extent the emotions they feel. Gökdag, Sorias, Kiran, & Ger (2019) propose that states of stress are normally linked to negative emotions and

behaviours such as sadness, irritability, depression and social withdrawal. These states are not socially accepted. As a result, it is common that those university students who experience more stress go through an emotional suppression of these emotions and behaviours with the purpose of feeling more competent and accepted by the social group (Chew et al., 2015; Ranasinghe et al., 2017).

Likewise, it was highlighted that cognitive reappraisal was not associated with stress in students of social sciences, whilst a negative relationship did exist for students of health sciences. An explanation of these outcomes might be provided by the increased training in emotional regulation techniques received by health sciences students, which would help reduce levels of academic stress. Another explanation might be found in the reasons given by this group for experiencing academic stress. These include greater degree difficulty -for example, pharmacy or psychology have a higher dropout rate than teaching- (Rodríguez-Gómez, Feixas, Gairín, & Muñoz, 2015) or lower pedagogical degree content -education science degrees' train individuals to form learning strategies, which should translate to less academic stress thanks to a better understanding of the academic content- (Diseth, 2011). In addition, Prakash, Hussain, & Schirda (2015) and Puertas-Molero et al. (2018) propose that better emotional regulation is linked to lower stress levels. This enables students to better judge challenges and more appropriately manage resources to overcome them , offering an explanation for these findings.

In reviewing the indicators that exert the greatest influence on academic stress and framing this according to the area of study, academic obligations and expectations for the future stand out in both branches as the indicators with the greatest regression weight. It is logical that these two dimensions are those that assume greatest relevance regardless of the degree of study. Specifically, Bedewy & Gabriel (2015) state that

students' perceptions of the quantity and difficulty of academic work demands in a given faculty represent the main indicator of academic stress, this being even more relevant than academic expectations or competition amongst peers. On the other hand, Rothwell, Herbert, & Rothwell (2008) indicate that one of the main motives for completing a university degree is the prospect of finding a stable job to ensure a source of economic income. This positions is as another dimension that is highly relevant.

Moreover, the communication of ideas acquired a greater weight in students of social sciences, whilst interpersonal difficulties were more influential in courses relating to health sciences. This seems logical given that the degree courses of social sciences are typically associated with a greater number of academic activities linked to the expression of one's own ideas, debate and the construction of group knowledge (Fullana, Pallisera, Colomer, Fernández Peña, & Pérez-Burriel, 2016; Weber et al., 2018). In contrast, degree courses of health sciences are characterised by a more direct relationship between professional and patient besides also demonstrating higher competitiveness between students. This explains the greater relevance of inter-personal difficulties (Rahkar-Farshi et al., 2015).

Finally, it is of interest to indicate the main limitations of the present study. Firstly, the descriptive cross-sectional study design should be highlighted, which does not allow causal relationships to be established. The study sample must also be emphasised, although the sample was large, it is not representative of all of Spain nor of all of the types of academic degree. Further, the sample was chosen according to convenience. Finally, all of the branches of study in the university context were not included and the analysis was only carried out with students of social sciences or health sciences. In order to address these limitations, various future perspectives are developed. These include extending the study sample to the national context and

including other degree courses. This should involve carrying out experimental research studies in order to develop emotional regulation strategies and intrinsic motivations in university students with the aim of decreasing academic stress.

Conclusions

Based on the findings obtained, the present study presents as main conclusions the identification of a positive relationship between the need for autonomy and the two dimensions of emotional regulation, and the lack of a relationship with cognitive reappraisal amongst students of social sciences. Further, the needs of autonomy and competence were positively related with cognitive reappraisal and negatively related with expressive suppression, revealing a stronger relationship amongst students of health sciences. Finally, and in relation to the link between emotional regulation and academic stress, expressive suppression was directly related to stress. In the case of cognitive reappraisal, no association with stress was found in students of social sciences, whilst a negative relationship was found in students of health sciences. In conclusion, better emotional regulation was positively linked with development of the basic psychological needs in the relevant degree, as were lower levels of stress. This reveals the need to promote strategies that allow the development of emotional regulation in university students, as this will improve their levels of self-determined motivation and help to control their states of academic stress.

Disclosure statement

No potential conflict of interest was reported by the authors.

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