



Regulating emotions and learning motivation in higher education students

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This study has a two-fold objective: First, to adapt and validate the Emotions and Motivation Self-Regulation Questionnaire (EMSR-Q) with university students in Colombia, and secondly, to verify whether the relationship model between emotional and motivational self-regulation and academic performance coincides with what was initially proposed by the questionnaire's authors. A total of 644 higher education students participated in the study. To test the questionnaire's structural validity and generalizability across cultures and educational levels, confirmatory factor and cross validation analyses were carried out. Besides, to test its predictive validity, a multiple linear regression analysis was carried out. Results showed that the data fit the model well, that the scales of the questionnaire have adequate reliability, and that negative self-regulation of stress and avoidance-oriented self-regulation related negatively and significantly to academic performance. The results support the emotion and motivation self-regulation model proposed by the authors.

Keywords: self-regulated learning, higher education, emotion regulation, motivation regulation

First submission 10th April 2020; Accepted for publication 25th August 2020.

Introduction

One of the challenges of higher education is to educate students who are capable of activating and maintaining thoughts, emotions, motivation and behaviours oriented toward achieving their learning goals, a process called

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learning self-regulation (Panadero, 2017). These types of strategies are desirable since students who adequately regulate their learning usually achieve more in-depth knowledge, aim at achieving learning goals and obtain higher performance.

Learning self-regulation includes several sub-processes, namely self-regulation of learning strategies, self-regulation of emotions, and self-regulation of motivation (Efklides, 2011). Of these, self-regulation of emotions and motivation are those that need more attention. Students need to deal and overcome emotional and motivational challenges when undertaking academic tasks of various types. These challenges can interfere with the learning process, negatively affecting motivation and preventing the effective use of learning strategies (Pekrun et al., 2002). To date, few studies have been devoted to understand these processes (Asikainen et al., 2018; Baez-Estradas & Alonso-Tapia, 2017; Wolters, 2003). Filling this gap could enable a more complete elaboration of factors influencing higher education students' self-regulation processes and, in addition, enhanced performance.

The study of emotions in academic contexts has focused mainly on identifying emotions arising from the social processes that take place in educational institutions. To a lesser degree, it has endeavoured to identify the emotions, both positive and negative, students experience when they are confronted with academic tasks (Asikainen et al., 2018). Though several strategies can be used to study motivational regulation such as surveys, interviews, direct observation, think aloud and trace methods (Wolters et al., 2011), there are only a few validated instruments designed to assess emotional and motivational regulatory strategies. To fill this gap, Alonso-Tapia, Panadero and Ruiz (2014) created the Emotion and Motivation Self-Regulation Questionnaire (EMSR-Q). This instrument was developed specifically to identify the processes of self-regulation of emotions and motivation that arise during academic tasks. It was created and validated to be used with Spanish high and middle school students. Due to its theoretical basis, structure and good psychometric qualities, it has also been considered potentially adequate for higher education students. As in the case of most assessment instruments, it has its limitations, particularly the short length of its scales. The reliability indexes of some of the scales could be improved by lengthening the scales. However, since it has not been used with higher education students, it may exhibit better reliability with adult subjects.

Our aim in this study was twofold. First, we aimed to adapt and validate the EMSR-Q with higher education students in the Colombian context. This entailed the need to test whether the structural model of emotion and motivation self-regulation strategies derived from the statistical results in Colombia coincides with the model proposed by the authors of the questionnaire, and whether this model generalises across various academic levels and cultures. Secondly, we were interested in studying how the emotion and motivation self-regulation strategies and styles identified related to academic performance. Fulfilling these objectives can inform and guide future research and intervention proposals in this field.

Self-Regulation of Emotions and Motivation

The emotion and motivation self-regulation process operates within the broader system of self-regulated learning. Self-regulation in learning implies the use of meta-cognitive, cognitive, behavioural, emotional and motivational strategies to deal with academic tasks during the different phases of completion. Different models have been formulated to explain this process. Most of them consider three general phases, namely preparation, performance and appraisal. Some studies, reviewed in the meta-analysis of Li, Ye, Tang, Zhou and Hu (2018), investigated the effect of each of these phases on academic performance. However, research on the effect of emotional and motivational self-regulation is scarce, even though all models recognise that emotional and motivational self-regulation is crucial for the whole self-regulation process (Panadero, 2017).

Self-regulation of emotion and motivation implies thoughts and actions through which students deliberately try to cope with emotions arising during learning. These emotions can affect achievement motivation, as the need to use a strategy for regulating motivation can be triggered when students experience learning problems (Wolters, et al. 2011). The experience of these challenges usually generates negative emotions that the student needs to overcome to continue performing the task. As students try to achieve their goals, they must activate strategies to regulate their emotions. However, not all students cope with negative emotions in the same way, but according to their volitional and motivational orientations (Alonso-Tapia et al., 2014). Besides, sometimes they have to self-regulate their motivation directly, repeatedly focusing on their goals. As a result, some authors consider emotional regulation as a strategy for regulating motivation and point to the need for further research that examines the relationship between these two processes within the learning experience (Wolters, 2003).

Available evidence on such relations (Ben-Eliyahu, 2019; Pekrun et al., 2002) shows that emotions have a mediating effect on goals, beliefs and learning behaviours, and their interactions, when facing difficulties during task development or when facing failure. Students who regulate their emotions more effectively when completing a task tend to be motivationally oriented toward learning and persist in that task until they have mastered the content or skill. However, emotions are closely related to the essential components of learning self-regulation (e.g., interest, motivation and learning strategies), all of which have been found to predict academic performance (Asikainen et al., 2018).

Young people in academic contexts can experience a wide range of emotions that can fluctuate, depending on the instructional contexts and their personal development. In general, findings seem to indicate that positive-valence emotions have a positive impact on learning. On the other hand, even though negative-valence emotions tend to interfere with performance, some exceptions have been found. Negative emotions such as shame, an emotion intrinsic to an avoidance-oriented motivation, seem to be positively related to learning, an aspect that needs more in-depth research that considers other variables such as the type of task or the context (Asikainen et al., 2018). The impact of emotions seems to depend on students' goal orientations. It is therefore necessary to understand the role of goal orientation in the process of emotion and motivation

self-regulation, and which are the specific strategies and self-regulation styles that students with different goal orientations use more frequently.

Several authors (Baez-Estradas & Alonso-Tapia, 2017; Boekaerts, 2011; Efklides, 2011) have sought to address this issue. Among these, it is worth highlighting the model proposed by Boekaerts (2011), which focuses on explaining the role of goals in learning self-regulation. She proposes that students activate different self-regulation paths according to the types of goals they pursue – which, in turn, are activated by the emotions aroused by the task. Regulation paths may be aimed at achieving mastery or at preserving wellbeing. On one side, on the mastery path, goal orientation is driven by the desire to learn or improve a skill. This path is activated when the student feels positive emotions, such as when seeing congruence between his/her interests and objectives and those proposed by the task. In contrast, on the wellbeing path, goal orientation is driven by the desire to avoid damage to the ego. This path is activated when students experience negative emotions because they do not see a relationship between their personal goals and those proposed by the task – which is why they seek to avoid it.

The paths, however, are not fixed. It is possible to move between both paths during activity because of the internal and external factors relationship. A student may initially activate the path of mastery but find obstacles during performance and evaluate his/her performance as low, which generates negative emotions. In this case, a student can activate strategies of self-regulation of emotions and motivation, encourage themselves by interpreting the obstacle as a challenge, and maintain positive emotions regarding the task – and, thus, stay on the path of mastery. If the student sees the obstacles as insurmountable and perceives the task as unfavourable to learning, negative emotions are elicited; in addition, the student can redirect his/her goals in the direction of wellbeing. Students can also shift from the path of wellbeing to mastery by employing strategies of emotional and motivational regulation. This can occur as a result of internal factors, such as generation of specific learning objectives, or external ones, such as social reinforcement, task restructuring, or a new approach derived from teacher intervention (Boekaerts, 2011).

Recognising the instructional context as a moderator of how emotional self-regulation influences academic performance raises the question of whether the role emotions and motivation play at the higher education level is the same as that at lower educational levels. To date, few studies shed light on this. One exception is Pekrun et al. (2002)'s study. Their results suggest that academic-triggered emotions are significantly related to student learning and performance variables, in a similar fashion, for both higher education and high school students. However, they did not focus on strategies for self-regulating emotions. As stated earlier, the scarcity of studies may be due to the lack of instruments that allow identifying the positive and negative self-regulation strategies that students with different goal orientations use. Therefore, it is essential to determine which type of instruments are available to assess the different components of self-regulation and, especially, of emotional and motivational self-regulation.

Self-regulation of emotions and motivation assessment

Most instruments developed to assess learning self-regulation focus on learning strategies, planning strategies and time management, among others, such as the *Learning and Study Strategies Inventory* (LASSI; Weinstein, Zimmerman, & Palmer, 1988), the *Motivated Strategies for Learning Questionnaire* (MSLQ; Pintrich et al., 1991) and the *Achievement Emotions Questionnaire* (AEQ; Pekrun et al., 2011). These questionnaires differ in the weight attributed to emotion and motivation self-regulation and it is necessary to identify which characteristics should have an adequate instrument for assessing emotional and motivational self-regulation.

One of the best ways to assess how students regulate their positive and negative emotions is through the thinking aloud method (Wolters et al., 2011). Self-regulation process during learning involves aspects related to internal dialogue and this dialogue is key to understanding what happens during the self-regulation process. Inner speech frequently adopts the form of verbal instructions, which usually appear in challenging situations during a task and are used to regulate emotions, thinking and behaviour (Alderson-Day & Fernyhough, 2015). Through internal language, insofar as it is externalised or reported, we can identify the emotions that a task arouses and the strategies a student uses to regulate them and achieve the proposed goal. However, while the thinking-aloud method allows externalising inner speech, it is not adequate for assessing self-regulation in large groups. Hence, it is essential to identify how one can combine the advantages of externalising inner-speech and those of inventories.

A possible way is adopting the method used by Alonso-Tapia et al. (2014) to develop the Emotion and Motivation Self-Regulation Questionnaire (EMSR-Q). The model underlying this questionnaire considers that self-regulation of emotions is manifested in the internal messages that individuals generate when handling either the challenging experiences that generate positive emotional responses or the threats that produce negative ones. To capture these messages, the authors, first, identified in students' thinking aloud protocols the most frequent self-messages through which they expressed emotional states activated by the task and ways of regulating both emotions and motivation, and then used them to create the items of the questionnaire. Secondly, the authors considered that such messages, insofar as they are repeated and used more or less regularly, configure general strategies and styles of emotion and motivation self-regulation in learning contexts. On this basis, the authors considered that the self-regulation styles manifested in the messages would differ as a function of students' motivational orientations towards the different goals that arise in academic contexts. The theoretical model basis of the EMSR-Q is shown in Figure 1.

This instrument has at least two advantages over other self-regulated learning questionnaires. The first one is that it relates and organises strategies of self-regulation of emotions and motivation within the trichotomy goal orientation theory (Elliot, 2005), as well as within Boekaerts' theory (2011). This gives goals a central role in the organisation of emotions and forms of self-regulation. Its second advantage is the empirical basis of its design.

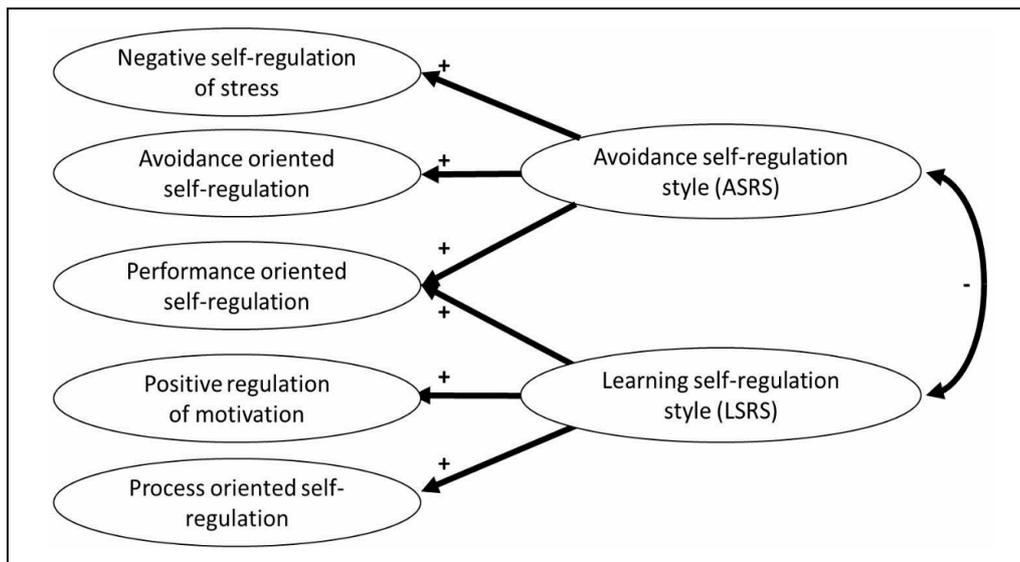


Figure 1. Motivation and emotion and motivation self-regulation model: expected relations (Alonso-Tapia et al., 2014)

However, since the EMSR-Q has been validated to be used with high school students –although it has also been used in some empirical studies with higher education participants (Panadero et al., 2013) –, it is necessary to adapt and validate it to be used in the context of higher education. This is the first objective of this study. It is also necessary to determine the relationships between ‘emotions’ and ‘motivation’ self-regulation styles and academic performance, which is the second objective of the study. In terms of our hypotheses, we expected, first, that the adapted version of the EMSR-Q would match the model proposed by Alonso-Tapia et al. (2014; Figure 1). Second, that the relationship between self-regulation and performance would also be like the relation found in the original study, namely, positive with the Learning-Oriented Self-Regulation Style and negative with the Avoidance-Oriented Self-Regulation Style.

Method

Sample

A sample of university students from different academic levels was collected at the Faculty of Education of *Universidad Pedagógica Nacional de Colombia*. A total of 644 students participated, of which 94.7% were female and 5.3% male, a proportion that reflects the composition of the Faculty. The age of participants ranged from 18 to 23 years (Mean= 22.5, *SD* = 3.6). Approximately, 96.3% of students came from low- and middle-income socioeconomic backgrounds, which is representative of the university population.

To validate the Colombian results, a Spanish sample of 544 students from five universities was also collected (53.2% females and 46.2% males). The age of participants ranged from 17 to 53 years (Mean= 20.5, *SD* = 3.7). Finally, the original sample from the first validation of the questionnaire with Spanish high school students was also used (see Alonso-Tapia et al., 2014).

Instruments

Emotion and Motivation Self-Regulation Questionnaire (EMSR-Q) (Alonso-Tapia et al., 2014): consists of 20 items corresponding to different types of messages students can give themselves when facing difficulties during tasks requiring self-regulation of emotions and motivation. The questionnaire’s initial validation was conducted with high and middle school students from Madrid (Spain); table I describes each of the original scales and subscales that comprise the instrument with their corresponding levels of reliability. Since there are differences in the Spanish language used in Spain and Colombia, the instrument was adapted to Colombian language peculiarities. The adjustment process was carried out based on the procedures described by Beaton, Bombardier, Guillemin and Ferraz (2000).

Academic Achievement. As a performance measure, we used the University’s grade point average for the participants.

Table I. *EMSR-Q* Scales

Self-regulation Style	Scale	Alpha
Avoidance-oriented: Frequently employs motivational strategies linked to performance or avoidance goals, perceives the task as an obstacle to be overcome, and the process as stressful ($\alpha = .77$).	<i>Negative self-regulation of stress.</i> The task generates stress in the person, who reacts with negative thoughts about their performance and its outcome.	.79
	<i>Avoidance-oriented self-regulation.</i> The focus is on the task itself and its difficulties, motivating oneself to complete it promptly. The task is perceived as an undesired event an individual wants to complete to avoid it.	.69
	<i>Performance-oriented self-regulation.</i> A task is an undesired event; the person seeks the motivation to complete it. Emphasis is placed on performance and the consequences that may ensue due to quitting the task or failing at it.	.72
Learning-oriented: Tends to frequently use motivational strategies linked to learning goals, perceive the task as a challenge and part of the learning process ($\alpha = .84$).	<i>Positive self-regulation of motivation.</i> The task is perceived as a challenge; motivation arises from a positive perspective of efficiency and outcome.	.84
	<i>Process-oriented self-regulation.</i> The task is perceived as a challenge that is part of a larger process. Motivation arises from improving their performance throughout the process and not just from succeeding in the task.	.70

Data Analysis

To explore the questionnaire's *structural validity*, we conducted a confirmatory factor analysis of the proposed model, a cross-validation analysis, a multi-group analysis per academic level –basic (1st to 3rd year) and advanced (4th and 5th year) -, and another two multi-group analyses to compare data from the Colombian sample with those of the original Spanish sample (high school students) and a sample of Spanish higher education students. To conduct these analyses, data were divided randomly into two groups. The confirmatory factor analysis of the proposed model was conducted with the first subsample, using the second one to conduct the cross-validation. For the estimations, the maximum likelihood method was used. To evaluate model fit, absolute fit indices (χ^2 , χ^2/df , SRMR) and non-central fit indices (CFI, RMSEA) were used, as well as the acceptance or rejection criteria proposed by Hair, Black, Babin and Anderson (2010) ($\chi^2/df < 5$; and CFI $> .90$; RMSEA $< .08$; SRMR < 0.08). To determine the instrument's reliability, we used McDonald's ω . Finally, to establish the relationships between the EMSR-Q scales and academic performance, correlation and multiple regression analyses were conducted. In this case, the direct method was used, since it minimises the effects due to biases in the sample.

Results

EMSR-Q Initial confirmatory factor analysis (CFA1): University Colombian Students

Figure 2 shows the standardised estimates of the confirmatory model. All estimated weights (λ) were significant ($p < .001$). Additionally, Table II shows the fit statistics obtained for the proposed model (CFA1). As shown, the statistic χ^2 was significant (probably due to the sample size), but the ratio χ^2/df was acceptable (< 3), as were the remaining fit indices (except TLI and CFI, both of which fell short of the standard limits of significance). Because of these results, we opted to conduct a cross-validation analysis (CFA2).

Table II. Fit Indices for *EMSR-Q* Confirmatory (CFA) and Multi-Group (MG) Factor Analyses

	χ^2	<i>df</i>	<i>p</i>	χ^2/df	TLI	CFI	RMSEA	SRMR
CFA1-Col ($N_{G1} = 318$)	465.79	166	$<.001$	2.80	.82	.84	.075	.078
CFA2-Col CV ($N_{G1} = 318, N_{G2} 326$)	1009.90	376	$<.001$	2.68	.85	.85	.051	.080
MG1- Col ($N_B: 453; N_A: 191$) ¹	927.58	356	$<.001$	2.60	.85	.85	.050	.078
CFA3-SP ($N_{G1} = 277$)	344.09	163	.000	2.23	.86	.88	.067	.070
CFA4-SP CV ($N_{G1} = 277, N_{G2} = 277$)	776.64	341	.000	2.28	.85	.86	.048	.072
MG2 ($N_C: 644; N_{SSS}: 664$)	1315.26	332	$<.001$	3.96	.85	.87	.048	.077
MG3 ($N_C: 644; N_{SUS}: 554$)	1055.31	235	.000	3.23	.87	.89	.049	.066

¹ Note: Col: Colombia; SP: Spain; NB: N basic level; NA: N advanced level; NC: N Colombia; Nsss: N Spanish Secondary Students; Nsus: N Spanish University Students;

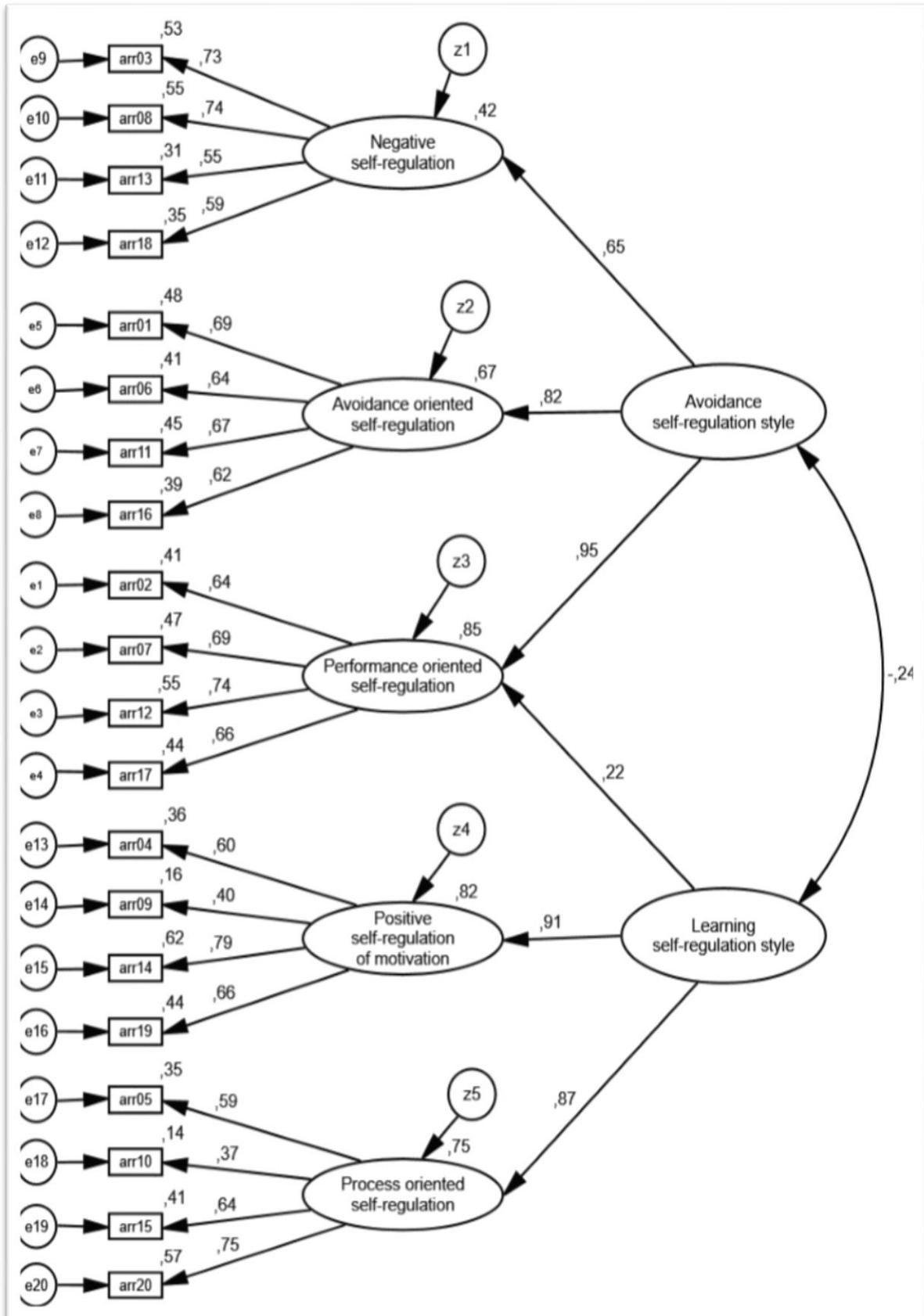


Figure 2. EMSR-Q original model: Standardised measurements and structural weights

EMSR-Q Cross-validation factor analysis (CFA2): University Colombian Students.

In this analysis, all weights (λ) were also significant ($p < .001$). With regards to the fit indices (Table II, CFA2), the statistic χ^2 was significant, probably due to the sample size. Further, the ratio χ^2/df was acceptable (< 3), as were the remaining fit indices (except TLI and CFI, both of which fell short of the standard limits of significance). However, results of the group comparison show that the fit does not decrease even if restrictions of equality between parameters are imposed for measurement weights ($\chi^2 = 21.81, p = .11$), structural weights ($\chi^2 = 23.58, p = .21$), structural covariances ($\chi^2 = 27.69, p = .18$), structural residuals ($\chi^2 = 30.59, p = .16$) and measurement residuals ($\chi^2 = 53.03, p = .16$). Therefore, the model is well estimated and can be accepted.

EMSR-Q Multi-Group Analysis per Year Level (MG1): University Colombian Students

A multi-group analysis (MG1) was conducted to identify whether there were differences between students in the basic cycle (1st to 3rd year; $N=453$), where students receive all the theoretical foundations of the discipline, and those in the advance cycle (4th and 5th year; $N = 191$), where formal internship processes take place and students have made choices between career paths. In this analysis, all weights (λ) are also significant ($p < .001$). As for fit indices (Table II, MG), results were parallel to those of the cross-validation analysis. The ratio χ^2/df is acceptable (< 3), as well as the remaining fit indices except for TLI and CFI that fell short of the standard limits of significance. Again, however, results of the group comparison show that the fit does not decrease even if restrictions of equality between parameters are imposed for measurement weights ($\chi^2 = 7.31, p = .95$), structural weights ($\chi^2 = 24.05, p = .19$), structural covariances ($\chi^2 = 26.72, p = .22$) and structural residuals ($\chi^2 = 28.01, p = .26$). Therefore, the model is well estimated; implying that emotion and motivation self-regulations styles are organised similarly throughout the academic levels.

EMSR-Q Initial confirmatory factor analysis (CFA3): Spanish University Students

Table II shows the fit statistics obtained for the proposed model (CFA3). The statistic χ^2 was significant (probably due to the sample size), but the ratio χ^2/df was acceptable (< 3), as were the remaining fit indexes (except TLI and CFI, both of which fell short of the standard limits of significance). Because of these results, we opted to conduct a cross-validation analysis (CFA4).

EMSR-Q Cross-validation factor analysis (CFA4): University Spanish Students.

In this analysis, all weights (λ) were also significant ($p < .001$). As for fit indices (Table II, CFA4), the statistic χ^2 was significant, probably due to the sample size. In addition, the ratio χ^2/df was acceptable (< 3), as were the remaining fit indices (except TLI and CFI, both of which fell short of the standard limits of significance). However, the results of the group comparison show that fit does not decrease even if restrictions of equality

between parameters are imposed for measurement weights ($\chi^2 = 24.01, p = .07$). Therefore, the model is well estimated and can be accepted.

EMSR-Q Multi-Group Analyses per country (MG2): Colombian University and High School Spanish Students
Although the results fit the basic model adequately both in the original Spanish sample (high school students) and the Colombian sample (higher education students), a first multi-group analysis per country was carried out to test whether differences existed in the degree of relationship between the scores in basic scales and styles, since the values of some structural weights suggested this possibility. Table II shows that all weights (λ) are significant ($p < 0.001$) and fit indices are very similar to those in the previous analyses. However, the fit is reduced if restrictions of equality between parameters are imposed. In order to identify which variables are responsible for the loading differences found between the two countries, it was decided to calculate the statistic θ of Clogg, Petkova and Haritou (1995). The results showed that, even though the model is similar for the two countries, Performance-Oriented SR relates to Avoidance SR Style to a greater degree in Colombia than in Spain ($Z = 2.75$) whereas, with Learning SR style, it occurs the opposite way (as the relationship is greater in Spain; $Z = -7.80$). The weight of Negative SR of stress on Avoidance SR style is again greater in Spain ($Z = -4.91$), whereas the weight of Positive SR of motivation in Learning SR style is greater in Colombia ($Z = 2.26$).

EMSR-Q Multi-Group Analysis per country: Colombian and Spanish University Students (MG3)

As in the previous analysis, a second multi-group analysis per country was carried using higher education students in both samples. All weights (λ) are significant ($p < 0.001$). Fit indices are very similar to those in the previous analyses (Table II). However, the fit is reduced if restrictions of equality between parameters are imposed. To identify which variables are responsible for the loading differences found between the two countries, we decided to calculate the statistic θ of Clogg, Petkova and Haritou (1995). The results showed that, even though the model is similar for the two countries, Performance-Oriented SR relates to Avoidance SR Style to a greater degree in Colombia than in Spain ($Z = 3.63$) whereas, with Learning SR style, it goes the opposite direction (as the relationship is greater in Spain; $Z = -6.29$).

Reliability

Table III shows the results of the reliability analyses. All indices are adequate, especially in the case of the self-regulation styles, although for *Process-oriented self-regulation*, they are on the limit for acceptance ($\geq .70$).

Predictive Validity

Correlation analysis. We conducted two correlation analyses to identify the relationship between how students self-regulate their emotions and thoughts when completing a task and their academic performance

(Colombia) and self-estimated mean grade (SEMG) (Spain). In the first analysis with the Colombian sample, the only significant correlations found were between performance and avoidance-oriented self-regulation style ($r = -.150$; $p < .007$), and with both Negative Self-regulation of Stress ($r = -.206$; $p < .001$) and Performance-oriented Self-regulation ($r = -.192$; $p = .001$). In the analysis of the Spanish Sample, the relationships of both SR styles and their scales -except performance-SR- with SEMG -, were significant but had opposite directions: A) Performance and avoidance SR style: $r = -.214$; $p < .0001$; Negative SR of Stress: $r = -.275$; $p < .0001$; Avoidance SR: $r = -.131$; $p = .004$; B). B) Learning SR style: $r = .171$; $p < .0001$; Positive oriented SR: $r = .256$, $p < .0001$; Process oriented SR: $r = .221$, $p < .0001$).

Table III. Reliability Indices of the *EMSR-Q* with University Students

	Colombia	Spain
Scales	Omega	Omega
<i>Strategies</i>		
Negative self-regulation of stress	.75	.79
Avoidance-oriented self-regulation	.75	.74
Performance-oriented self-regulation	.78	.76
Positive self-regulation of motivation	.71	.74
Process-oriented self-regulation	.69	.66
<i>Styles</i>		
Avoidance-oriented self-regulation style	.78	.77
Learning-oriented self-regulation style	.72	.90

Regression analysis. To determine to what extent the different components of the questionnaire, when used jointly, contribute to predicting performance, real or self-estimated, two multiple regression analyses were conducted for each university sample, one using the first-order self-regulation scales as predictors and the other using self-regulation styles. In the Colombian case, the course's final grade was used as the dependent variable, whilst in the Spanish sample, the self-estimated mean grade was used. In the Colombian sample, the results corresponded to self-regulation styles, $R = .21$. Additionally, only the Avoidance-oriented self-regulation style contributed significantly to predict performance (Standardised Beta = $-.157$; $p < .01$): The higher this self-regulation style, the lower the performance. The analysis of the predictive power of the strategy scales shows that only the scales 'Negative Self-regulation of Stress' and 'Performance-oriented Self-regulation' have a significant weight in the prediction of performance mean-grade (Table IV). The greater the scores in each one of these factors, the lower the performance.

Table IV. Regression Analysis. Standardised Regression Weights. Predictors: Self-Regulation Strategies (SR). Criterion: Colombia: Mean Grade, Spain: Self-estimated mean grade.

Sample	R	p	Negative SR of stress	Avoidance oriented SR	Performance -oriented SR	Positive SR of motivation	Process-oriented SR
Colombia	.26	<.0001	-.17**	.08	-.16**	-.08	.04
Spain	.34	<.0001	-.21***	.04	-.05	.14**	.11

Note: *** $p < .001$; ** $p < .02$.

In the Spanish sample, the results corresponded to self-regulation styles, $R = .31$. Additionally, both SR styles contributed significantly to predict SEMG. In Avoidance Self-regulation style, the standardised Beta is $-.260$; $p < .0001$: the higher this self-regulation style, the lower one's estimated performance. In Learning SR style, the standardised Beta is $-.224$; $p < .0001$: the higher this self-regulation style, the higher one's estimated performance. The analysis of the predictive power of strategy scales shows that only the scales 'Negative Self-regulation of Stress' and Positive Self-regulation of motivation have a significant weight in the prediction of self-estimated performance (Table V).

Discussion and Conclusions

The goal of this study was to adapt and validate the EMSR-Q with higher education students in Colombia. Our results present evidence that the EMSR-Q scales can reliably identify higher education students' patterns of self-regulation of emotions and motivation and, as well as the way these patterns are organised. Their structural organisation coincides with the model initially proposed by the authors of the questionnaire, and shows that the model generalises across both academic levels and both cultures (compared to minor differences in this latter case). This makes the questionnaire suitable for use in research and intervention programmes based on the use of self-instruction to modify emotions, thinking and behaviour as a means of dealing with difficulties that arise and persist in the task, and, ultimately, achieve the proposed goal. The second goal was to study the predictive validity of the questionnaire concerning performance. The results were significant but rather low. However, concerning both objectives, our results show several significant findings that deserve to be commented on.

Avoidance self-regulation style. The results of this study show that the emotion and motivation self-regulation messages in which this style manifests to a greater degree are, first, those focused on obtaining good grades (performance), a manifestation greater in university students from Colombia than in non-university and University students from Spain. In Colombia, the finding that avoidance self-regulation predicts performance in a significant and negative way, implies the need to help university students to focus not on grades, but rather on learning –to self-regulate adequately their emotions and motivation. However, we need to know how to do it and under what conditions training would be most effective. Various studies and meta-analyses are showing the possibility and efficacy of interventions focusing on motivation training from various theoretical

perspectives and self-regulation training (Lazowski & Hulleman, 2016; Li et al., 2018). There are no studies, however, on how to change avoidance self-regulation by focusing students' attention on learning instead of grades.

Learning self-regulation style. Learning self-regulation does not correlate with performance in the Colombian university sample but it does so positively in the Spanish university sample. This result is parallel with that in the review by Senko, Hulleman and Harackiewicz (2011), which shows that the learning motivation correlation with performance, although being positive, in general, is quite low. These authors suggest that mastery-focused students are guided by their interests related to the topics they are studying. As a result, they devote less attention to the learning objectives suggested by their teachers (objectives whose achievement is tested on exams). If this assumption is correct – and there is some evidence supporting it (Senko & Miles, 2008) – the same can occur with emotional and motivational self-regulation. It may be focused on the learning process aimed at achieving the objectives that satisfy students' interests, but not the objectives proposed by teachers. This however, fails to imply that process-oriented self-regulation does not need to be stimulated by teachers. Perhaps teachers should revise the quality of content assessed or, at least, the degree in which they help their students to perceive the relevance and usefulness of what they intend to teach. Alternatively, the instructional paradigm could be altered to be more learner-centred than teacher-centred.

Potential changes in emotion and motivation self-regulation training through the career. A third finding is related with the hypothesis that there are differences in how students regulate their emotions and motivation throughout their careers. This hypothesis was based on studies showing that students develop better strategies to regulate their emotions and behaviour over time, and thus have the best tools to satisfactorily face the educational process (Alderson-Day & Fernyhough, 2015). However, no such differences were found in the present study, posing the question as to which conditions are necessary for the improvement of emotional and motivational self-regulation.

Cross-cultural differences. These differences appeared only when restrictions between parameters were imposed, indicating that the model is correct. However, in both analyses, the samples did not only differ by country of origin: in the first one, it also differs by educational level and, in the second, in the proportion of males and females. Therefore, disparities have to be attributed to the combination of such factors. The findings do show however, that in the case of the Colombian students, the target population of this study, performance emotion and motivational self-regulation do not relate to emotion and motivational self-regulation based on learning. This difference must be considered in designing self-regulation interventions for Colombian higher education students.

Limitations and additional lines for future work. Despite the interesting results obtained, this study has several limitations. First, it was carried out in a faculty of education, where most of the students are female. Before generalising the results to the male student population, it is thus necessary to test them in institutions with more male students. Secondly, to test predictive validity, we used final grades, an index of learning that often does not assess the type of learning that implies real understanding. Future research should consider

using different ways of measuring performance such as external objective achievement tests. Using this type of procedure would make it possible to clarify whether, and to what degree, process-focused self-regulation relates positively to learning and performance.

Thirdly, to validate the EMSR-Q, we evaluated the relationship between emotion and motivational self-regulation with performance, but not with motivation. Wolters (2003) hypothesises that the two variables have a reciprocal and curvilinear relation. It is reciprocal because students' motivation is affected by their use of motivational regulatory strategies whereas, at the same time, the initial motivation can influence the emotion and motivation self-regulation strategies used. It is curvilinear because of the higher level of regulation evidenced when a student has a moderate level of motivation. Further research employing the EMSR-Q will help test this hypothesis empirically. Finally, the design of the study did not allow to investigate whether, and to what degree, the characteristics of the instructional context influence how students self-regulate their emotions and motivation. It is important to identify the strategies students use in self-regulation, but only if, once identified, we can favour adaptive self-regulation styles through how we organised our teaching. Such an organisation implies the creation of a classroom motivational climate that is learning-oriented (Alonso-Tapia et al., 2020). This is one of the most important areas for the research agenda on emotional and motivational self-regulation.

Conclusion

Our study shows that EMSR-Q can be used with university students to measure their self-regulation of emotions and motivation. In this work, the original structure of the tool, initially validated with high school students, is shown to be valid also in higher education, both, in Colombia and Spain. Additionally, the measurement tool was found to be effective in evaluating these types of regulation with Colombian students; and also showed predictive power in academic performance. It is therefore one of the few international tools that can be used to measure emotional and motivational regulation, and the only one, to our knowledge, available in both English and Spanish.

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