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Self-Regulation of Motivation and Confinement by COVID-19: A Study in Spanish University Students

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Abstract: (1) Background: confinement by COVID-19 in 2020 meant that face-to-face teaching changed to virtual teaching. The goal of this study was to test how confinement affected to self-regulation of motivation (SRM); (2) Methods: a longitudinal design was used to obtain information from 75 university students in three moments: before confinement, 20 days after confinement, and 40 days after confinement. The SRM Strategies Questionnaire and the Pittsburgh Sleep Index were used to evaluate the study variables; (3) Results: the SRM decreased as confinement progressed. Moreover, those students who had higher levels of SRM before confinement, showed worse sleep quality 20 days after. There was no interaction effect between moments and gender and between moments and work situation on any of the dimensions of the SRM. There were gender differences (women scored higher) in almost all of the SRM dimensions in the three moments, but there were no differences dependent on the work situation (i.e., only study or study and work); (4) Conclusions: the change from face-to-face classes to virtual learning decreased the SRM of university students and was related to worse sleep quality. Women showed higher levels of SRM than men, but these levels were reduced to the same extent in both genders.

Keywords: confinement; self-regulation of motivation; sleep quality

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1. Introduction

In the 2019–2020 academic year, teaching in Spanish universities was strongly altered due to the health emergency situation caused by COVID-19, which led to the Spanish government's decision to declare a state of emergency on 14 March 2020 [1]. For 15 days, the entire population was quarantined, limiting freedom of movement to minimal activities [1]. This meant confinement of both students and teachers to their homes and the accelerated adaptation to a virtual teaching situation.

The first 15 days were extended through several royal decrees and it was on 21 June 2020 when the quarantine ended and the so-called new normality, characterized by less restrictive measures, began. On that date, a large part of the second semester subject evaluations were still pending, but the universities took a conservative position and decided that their evaluations would be done virtually.

These exceptional circumstances, as well as the changes made by teachers and students to adapt to the demands of confinement, were not only made in Spain, but were widespread in many countries. In fact, there is evidence that these changes, together with the feeling of a lost year, probably contributed to high levels of stress, anxiety, and depression among students [2,3]. Furthermore, although teachers and students saw some advantages to online teaching, resulting in low levels of anxiety and stress for some (7.7% of those evaluated) [4], most felt that face-to-face teaching was better [5,6].

Another effect of confinement among students from different parts of the world, who were also affected by restrictions on freedom of movement, was a worsening of sleep [7–9].

Among the most common problems were that people went to sleep later, woke up later, and also spent more time in bed [7], which did not always translate into more sleep, especially because of the reversal of daytime and night-time activities [8]. Despite this, a proportion of people reported sleeping more hours than before confinement [9], which did not result in better sleep quality. In fact, there is considerable consensus that sleep quality was reduced during confinement [10–12].

On the other hand, from the theoretical perspective of relating motivation to the value that the student assigns to tasks, the concept of self-regulation of motivation (SRM) arises [13]. SRM refers to the learner's active control over his or her own motivation towards the tasks to be performed. This idea implies two things: firstly, that the student is aware of the relationship between his or her beliefs about the tasks that he or she has to perform and the reasons why he or she decides to engage in them; and secondly, it implies that the student is able to identify how his or her level of motivation towards the tasks assigned to him or her changes. When the student is aware of both of these things, he or she is more likely to persist in the task and be able to complete it successfully [14].

There are different strategies based on the definition of SRM proposed by Wolters and Rosenthal [15–17]. One of these strategies is called self-consequating. This strategy proposes using self-rewards to reinforce those behaviors that involve making an effort to learn, such as eating something appetizing after understanding a mathematical problem [18]. Another common strategy is the so-called regulation of the value. This strategy is based on a cognitive change to increase the perceived usefulness of tasks and consequently to increase motivation to perform them. Other interesting strategies related to the environment are the so-called environmental control [19,20] or environmental structuring [21]. This strategy refers to the actions that students perform to organize their environment and therefore complete their tasks more easily and without interruptions.

Other strategies that have shown their usefulness in the SRM are the regulation of performance goals and the regulation of mastery goals. The first strategy refers to the cognitive change that students make to increase the importance of obtaining good marks and thus increase their motivation to study. The second strategy is concerned with increasing motivation through the mastery of the materials that students will use in their tasks. Finally, the regulation of situational interest is defined as the students' attempt to make their work more enjoyable and fun by trying to perceive it as a game [16].

The SRM is conditioned by factors such as the value students place on academic work and activities, the self-efficacy expectations they have, and the extent to which they achieve their goals [22,23]. Previous research also studied whether there were gender differences in self-regulation learning strategies, which SRM is derived from, and in general they found that women tended to show higher levels of self-regulation learning strategies than men [24,25]. In addition, women seemed to manage their effort more adequately and consistently over time than men [24], tended to score higher on their self-efficacy beliefs towards studying [26], and showed greater commitment and effort towards learning. All of this positively related to their motivation to learn [25].

Considering the changes resulting from the COVID-19 pandemic described above, it seems necessary to determine whether students' SRM was also affected and what other variables, apart from the virus, may also have had an influence. To address these questions the general aim of this study was to test which changes occurred in the SRM of Spanish university students during confinement, as well as to identify possible variables that influenced SRM, such as gender, work situation, or sleep quality. To achieve this objective, we proposed the following hypotheses:

Hypothesis 1 (H1). *There will be a positive relationship between SRM and its dimensions before confinement, and perceived sleep quality and its dimensions after 20 days of confinement;*

Hypothesis 2 (H2). *Students' SRM will worsen in each of its dimensions as confinement progresses;*

Hypothesis 3 (H3). *There will be an interaction effect between moment and gender on the levels of all dimensions of SRM;*

Hypothesis 4 (H4). *There will be an interaction effect between moment and work situation on the levels of all dimensions of SRM;*

Hypothesis 5 (H5). *There will be differences between men and women in their levels of SRM in all its dimensions in the three moments;*

Hypothesis 6 (H6). *There will be differences between those who study and work, and those who only study, in their levels of SRM in all its dimensions in the three moments.*

2. Materials and Methods

2.1. Design

This study was conducted using a quasi-experimental, longitudinal (pre-test and post-test), quantitative, within-group design. Data were collected at two different time periods: at 20 (time 1, T1) and 40 (time 2, T2) days of confinement. At T1, we assessed two different time points: in moment 1 (M1) we asked participants retrospectively, using the time prior to confinement as a referent; in moment 2 (M2) we asked questions related to their current situation at 20 days of confinement. Moment 3 (M3), therefore, corresponded to T2.

2.2. Sample

A non-probabilistic method for convenience sampling was used to obtain the sample. The sample of the study at T1 was composed of 102 participants (80.4% women) with the average age of 21.83 (SD = 2.97). At T2, there was an experimental attrition rate of 26.4%, resulting in a final sample of 75 people (74.7% women), with the average age of 21.67 (SD = 2.23). Forty percent belonged to Health Sciences, 25.3% to Social and Legal Sciences, 17.3% to Arts and Humanities, 13.3% to Engineering and Architecture, and 4% to Sciences. Fifty-three point three percent were in the fourth year of their degree, 29.3% in the third year, 13.3% in the first year, and 4% in the second year. In addition to studying, 40% also worked before confinement began.

2.3. Procedure

The authors used social networks and e-mail as a means of disseminating the online questionnaire through which the participants were evaluated. The questionnaire was created using the Google Forms platform (https://docs.google.com/forms/, accessed for the first time on 5 April 2021). At the beginning of the questionnaire, participants were asked to create a code to match the two questionnaires and to guarantee anonymity. At the end of the T1 questionnaire, an e-mail address was requested to send the questionnaire again at T2.

The first questionnaire, sent after 20 days of confinement, asked about aspects prior to the state of emergency (retrospective evaluation, M1) and about aspects of confinement (M2). The second questionnaire, completed after 40 days of confinement, asked only about the students' present situation (M3).

2.4. Instruments

Pittsburgh Sleep Quality Index [27]:

We used the Spanish validation of the questionnaire [28], which consisted of 24 questions: 19 to be answered by the person themselves and five by the roommate (when applicable). The reference period, according to which the participants had to answer the questions, was established in the last 20 days. In order to correct the questionnaire, only the first 19 were considered. The first four (for example, at bedtime) were answered in an open format according to each person's circumstances. The other 15 were answered

using a four-point ordinal scale. The questionnaire evaluated seven different components: (1) subjective sleep quality, (2) latency, (3) duration, (4) efficiency, (5) disturbance, (6) medication use, and (7) daytime dysfunction. The total score of the questionnaire was acquired by adding up the scores obtained in each component and ranged from 0 to 21. A score of less than 5 meant the person had no sleep problems, 5–7 meant they deserved medical attention, 8–14 meant they deserved medical attention and treatment, and a score of 15 or more meant they had a serious sleep problem. Therefore, the higher the score, the lower the quality of sleep [29].

Motivation Self-Regulation Strategies Questionnaire [30]:

We used the Spanish validation of the questionnaire [31], which consisted of 30 items that were grouped into 6 different dimensions: (1) regulation of value, (2) regulation of performance goals, (3) self-consequating, (4) environmental structuring, (5) regulation of situational interest, and (6) regulation of mastery goals. The items were rated on a frequency scale from 1 to 7, with 1 being never and 7 being very frequently. An example of an item was "I tell myself that I should keep working just to learn as much as I can".

The questionnaire showed good internal consistency at the three moments because all the Cronbach's alpha values were above 0.70 [32].

2.5. Ethical Considerations

This study was approved by the bioethics committee of the University of Burgos, respecting the four Helsinki principles [33], and in accordance with Law 15/1999 of 13 December on the Protection of Personal Data [34].

In addition, the participants were informed about the legal and ethical aspects derived from the research on the first page of the questionnaire, which also included the informed consent.

2.6. Data Analyses

All analyses were conducted with the SPSS Statistical Package (Version 25, IBM Corp, Armonk, NY, USA), and the level of significance was set at $p \leq 0.05$.

First, the Pearson correlations between the dependent variables of the study in all moments were calculated. Second, repeated measures ANOVAs and ANOVAs were performed to test the research hypotheses. In all analyses the effect sizes were estimated through the partial eta squared statistic ($\eta_p{}^2$). It was considered that an $\eta_p{}^2$ around 0.01 was a low effect, an $\eta_p{}^2$ around 0.06 indicated a medium effect, and an $\eta_p{}^2$ above 0.14 was a large effect [35]

3. Results

3.1. Intercorrelations

First, Table 1 presents the intercorrelations among the dimensions of SRM. As expected, the same dimension was positively and significantly related to itself at all three points in time. Moreover, most of the dimensions were also positively related to each other, with some exceptions affecting the environmental structuring dimension.

Second, Table 2 shows intercorrelations among the dimensions of SRM in M1 and the dimensions of sleep quality in M2.

The results allow us to partially confirm H1 of the research because the expected relationship between the variables exists, but not in all cases. The general indicator of SRM in M1 was negatively and significantly related to latency, disturbance, daytime dysfunction, and the general indicator of sleep quality in M2.

With regards to the dimensions of SRM, regulation of the value in M1 was positively related to sleep disturbance in M2. Regulation of performance goals, self-consequating, environmental structuring and regulation of mastery goals in M1 were positively related to latency and disturbance in M2. Regulation of mastery goals in M1 was also positively related to daytime dysfunction and the general indicator of sleep quality in M2.

Table 1. Intercorrelations among the dimensions of SRM in the three different moments.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Value M1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Value M2	0.56 **	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Value M3	0.41 **	0.64 **	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. P. goals M1	0.42 **	0.35 **	0.16	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. P. goals M2	0.29 *	0.70 **	0.46 **	0.62 **	1	-	-	-	-	-	-	-	-	-	-	-	-	-
6. P. goals M3	0.15	0.34 **	0.64 **	0.40 **	0.58 **	1	-	-	-	-	-	-	-	-	-	-	-	-
7. Self-c. M1	0.50 **	0.23 *	0.17	0.48 **	0.29 *	0.22	1	-	-	-	-	-	-	-	-	-	-	-
8. Self-c. M2	0.27 *	0.42 **	0.29 *	0.48 **	0.66 **	0.38 **	0.60 **	1	-	-	-	-	-	-	-	-	-	-
9. Self-c. M3	0.21	0.36 **	0.53 **	0.33 **	0.52 **	0.68 **	0.45 **	0.65 **	1	-	-	-	-	-	-	-	-	-
10. E. structuring M1	0.25	−0.01	−0.09	0.43 **	0.23 *	0.16	0.41 **	0.31 **	0.22	1	-	-	-	-	-	-	-	-
11. E. structuring M2	0.16	0.48 **	0.29 *	0.26 *	0.55 **	0.34 **	0.13	0.53 **	0.43 **	0.41 **	1	-	-	-	-	-	-	-
12. E. structuring M3	0.09	0.23 *	0.46 **	0.18	0.41 **	0.59 **	0.19	0.44 **	0.59 **	0.36 **	0.56 **	1	-	-	-	-	-	-
13. S. interest M1	0.72 **	0.44 **	0.26 *	0.39 **	0.26 *	0.21	0.54 **	0.29 *	0.32 **	0.20	0.17	0.02	1	-	-	-	-	-
14. S. interest M2	0.54 **	0.74 **	0.50 **	0.32 **	0.60 **	0.36 **	0.37 **	0.50 **	0.42 **	0.06	0.44 **	0.19	0.64 **	1	-	-	-	-
15. S. interest M3	0.24 *	0.32 **	0.63 **	0.17	0.25 *	0.56 **	0.22	0.18	0.54 **	−0.08	0.14	0.31 **	0.39 **	0.49 **	1	-	-	-
16. M. goals M1	0.70 **	0.34 **	0.25 *	0.57 **	0.32 **	0.25 *	0.66 **	0.47 **	0.35 **	0.49 **	0.25 **	0.20	0.57 **	0.47 **	0.25 *	1	-	-
17. M. goals M2	0.40 **	0.72 **	0.50 **	0.42 **	0.71 **	0.49 **	0.38 **	0.67 **	0.53 **	0.20	0.57 **	0.39 **	0.39 **	0.68 **	0.37 **	0.54 **	1	-
18. M. goals M3	0.24 *	0.41 **	0.76 **	0.28 *	0.47 **	0.81 **	0.18	0.41 **	0.68 **	0.07	0.35 **	0.58 **	0.22	0.44 **	0.66 **	0.31 **	0.58 **	1

Note. ** $p \leq 0.01$; * $p \leq 0.05$. Value: regulation of value; P. goals: regulation of performance goals; Self-c: self-consequating; E. structuring: environmental structuring; S. interest: regulation os situational interest; M. goals: regulation of mastery goals; M1: Moment 1; M2: Moment 2; M3: Moment 3.

Table 2. Intercorrelations among the dimensions of SRM and sleep quality dimensions.

Variables	8	9	10	11	12	13	14	15
1. Self-regulation motivation M1	0.19	0.28 *	0.02	0.06	0.33 **	−0.09	0.21 *	0.20 *
2. Regulation of value M1	0.09	0.17	0.02	0.11	0.26 *	−0.14	0.15	0.15
3. Regulation of performance goals M1	0.10	0.23 *	0.03	0.03	−0.08	−0.08	0.11	0.11
4. Self-consequating M1	0.15	0.21	0.04	0.03	0.02	0.02	0.16	0.16
5. Environmental structuring M1	0.16	0.12	0.08	−0.02	−0.07	−0.07	0.16	0.09
6. Regulation of situational interest M1	0.15	0.21	−0.08	0.10	−0.24 *	−0.24 *	0.16	0.16
7. Regulation of mastery goals M1	0.23 *	0.30 **	0.01	0.07	−0.04	−0.04	0.21 *	0.23 *
8. Subjective sleep quality M2	1	0.69 **	−0.43 **	0.44 **	−0.01	−0.01	0.48 **	0.81 **
9. Latency M2	-	1	−0.39 **	0.38 **	0.14	0.14	0.36 **	0.76 **
10. Duration M3	-	-	1	−0.63 **	−0.05	−0.05	−0.08	−0.60 **
11. Efficiency M2	-	-	-	1	0.11	0.11	0.30 **	0.73 **
12. Disturbance M2	-	-	-	-	1	0.09	0.36 **	0.63 **
13. Medication use M2	-	-	-	-	-	1	0.07	0.22 *
14. Daytime dysfunction M2	-	-	-	-	-	-	1	0.63 **
15. Sleep quality level M2	-	-	-	-	-	-	-	1

Note. ** $p \leq 0.01$; * $p \leq 0.05$; M1 = Moment 1; M2 = Moment 2.

3.2. Repeated Measures ANOVA

To test H2, H3 and H4, repeated measures ANOVA were conducted with the dimensions of SRM as the dependent variables and moment and gender as the independent variables.

As can be seen in Table 3, in five of the six dimensions of SRM, there were statistically significant changes over time. The scores on these dimensions decreased as confinement progressed. In the self-consequating dimension, the differences between the three moments were tendential, i.e., they were close to significance ($p = 0.09$). Therefore, H2 is confirmed.

The results also showed (see Table 3) that there was no interaction effect between moment and gender on any of the dimensions of SRM. Similarly, no interaction effects were found between moment and work situation on any of the dimensions. H3 and H4 were, therefore, rejected.

Table 3. Multivariate tests of the moment effect and interaction of moment x gender, and moment x work situation in the dimensions of the SRM strategies.

Dimensions	Effect	Value (Pillai's Trace)	F	Hypothesis df	Error df	*p*	η_p^2
(1) Regulation of value	Moment	0.275	13.673	2	72	**0.000**	0.275
	Moment-Gender	0.042	1.559	2	72	0.217	0.042
	Moment-Work	0.004	0.129	2	72	0.879	0.004
(2) Regulation of performance goals	Moment	0.236	11.108	2	72	**0.000**	0.236
	Moment-Gender	0.056	2.122	2	72	0.127	0.056
	Moment-Work	0.041	1.536	2	72	0.222	0.041
(3) Self-consequating	Moment	0.063	2.441	2	72	*0.094*	0.063
	Moment-Gender	0.031	1.167	2	72	0.317	0.031
	Moment-Work	0.040	1.517	2	72	0.226	0.040

Table 3. *Cont.*

Dimensions	Effect	Value (Pillai's Trace)	F	Hypothesis df	Error df	*p*	η_p^2
(4) Environmental structuring	Moment	0.122	4.991	2	72	**0.009**	0.122
	Moment-Gender	0.025	0.921	2	72	0.403	0.025
	Moment-Work	0.033	1.245	2	72	0.294	0.033
(5) Regulation of situational interest	Moment	0.167	7.208	2	72	**0.001**	0.167
	Moment-Gender	0.030	1.102	2	72	0.338	0.030
	Moment-Work	0.009	0.334	2	72	0.717	0.009
(6) Regulation of mastery goals	Moment	0.154	6.556	2	72	**0.002**	0.154
	Moment-Gender	0.036	1.357	2	72	0.264	0.036
	Moment-Work	0.028	1.041	2	72	0.358	0.028

Note. df = degrees of freedom; η_p^2 = the partial eta squared statistic.

3.3. ANOVA

Finally, to test H5 and H6, different ANOVAs were conducted with the dimensions of SRM as the dependent variables and gender and work situation as the independent variables. Specifically, an ANOVA was performed at each of the three moments.

With regard to the gender analyses (see Table 4), in the regulation of value, regulation of performance goals, and self-consequating dimensions, there were statistically significant differences between men and women at all three moments (women scored higher than men in all cases). In the other dimensions, differences were also detected, but only in one of the moments. For example, in environmental structuring, the differences existed in M3 (women scored higher than men), in regulation of situational interest the differences were detected in M1 (women also scored higher), and in regulation of mastery goals the differences appeared in M2 (women again scored higher than men). Therefore, H5 was partially confirmed.

Table 4. Descriptive statistics and ANOVAs of the dimensions of the SRM strategies depending gender.

Dimensions	Gender	M	SD	F (gl)	*p*
(1) Regulation of value M1	Men	4.833	1.287	4.333 (1, 73)	**0.041**
	Women	5.357	0.806		
	Total	5.224	0.968		
(1) Regulation of value M2	Men	3.824	1.474	8.955 (1, 73)	**0.004**
	Women	4.839	1.205		
	Total	4.582	1.344		
(1) Regulation of value M3	Men	4.149	1.424	4.247 (1, 73)	**0.043**
	Women	4.794	1.087		
	Total	4.631	1.205		
(2) Regulation of performance goals M1	Men	4.463	1.331	15.569 (1, 73)	**0.000**
	Women	5.503	0.853		
	Total	5.240	1.086		
(2) Regulation of performance goals M2	Men	3.515	1.439	20.541 (1, 73)	**0.000**
	Women	5.032	1.195		
	Total	4.648	1.416		
(2) Regulation of performance goals M3	Men	4.105	1.468	7.010 (1, 73)	**0.010**
	Women	5.021	1.244		
	Total	4.789	1.355		

Table 4. *Cont.*

Dimensions	Gender	M	SD	F (gl)	*p*
(3) Self-consequating M1	Men	3.936	1.811	1.839 (1, 73)	0.179
	Women	4.471	1.360		
	Total	4.336	1.493		
(3) Self-consequating M2	Men	3.210	1.653	6.285 (1, 73)	**0.014**
	Women	4.339	1.709		
	Total	4.053	1.755		
(3) Self-consequating M3	Men	3.452	1.530	4.717 (1, 73)	**0.033**
	Women	4.350	1.564		
	Total	4.122	1.594		
(4) Environmental structuring M1	Men	4.618	1.119	0.396 (1, 73)	0.531
	Women	4.776	0.885		
	Total	4.736	0.944		
(4) Environmental structuring M2	Men	4.118	1.173	1.757 (1, 73)	0.189
	Women	4.544	1.222		
	Total	4.436	1.217		
(4) Environmental structuring M3	Men	3.921	1.238	4.003 (1, 73)	**0.049**
	Women	4.504	1.048		
	Total	4.356	1.120		
(5) Regulation of situational interest M1	Men	3.842	1.155	4.528 (1, 73)	**0.037**
	Women	4.371	0.85317		
	Total	4.237	0.95899		
(5) Regulation of situational interest M2	Men	3.452	1.326	1.915 (1, 73)	0.171
	Women	3.935	1.311		
	Total	3.813	1.323		
(5) Regulation of situational interest M3	Men	3.557	1.255	0.063 (1, 73)	0.802
	Women	3.635	1.133		
	Total	3.616	1.157		
(6) Regulation of mastery goals M1	Men	4.094	1.510	3.111 (1, 73)	*0.082*
	Women	4.617	0.953		
	Total	4.485	1.132		
(6) Regulation of mastery goals M2	Men	3.347	1.197	7.838 (1, 73)	**0.007**
	Women	4.253	1.226		
	Total	4.024	1.274		
(6) Regulation of mastery goals M3	Men	3.642	1.264	2.673 (1, 73)	0.106
	Women	4.132	1.080		
	Total	4.008	1.141		

Note. M = Mean; SD = Standard Deviation; M1 = Moment 1; M2 = Moment 2; M3 = Moment 3.

The case of the work situation was different. As can be seen in Table 5, the differences obtained were much less common. People who only studied scored higher on regulation of performance goals than those who studied and worked in M2. Moreover, those who only studied score higher on self-consequating in M2. Finally, there were tendential differences in regulation of the mastery goals dimension in M1. H6 was, therefore, rejected.

Table 5. Descriptive statistics and ANOVAs of the dimensions of the SRM strategies depending work situation.

Dimensions	Work Situation	M	SD	F (gl)	*p*
(1) Regulation of value M1	Study and work	5.216	0.947	0.003 (1, 73)	0.955
	Only study	5.229	0.993		
	Total	5.224	0.968		
(1) Regulation of value M2	Study and work	4.550	1.379	0.028 (1, 73)	0.867
	Only study	4.603	1.335		
	Total	4.582	1.344		
(1) Regulation of value M3	Study and work	4.677	1.288	0.074 (1, 73)	0.786
	Only study	4.600	1.160		
	Total	4.631	1.205		
(2) Regulation of performance goals M1	Study and work	4.886	1.097	5.618 (1, 73)	**0.020**
	Only study	5.475	1.024		
	Total	5.240	1.086		
(2) Regulation of performance goals M2	Study and work	4.306	1.547	2.980 (1, 73)	*0.089*
	Only study	4.875	1.290		
	Total	4.648	1.416		
(2) Regulation of performance goals M3	Study and work	4.733	1.381	0.084 (1, 73)	0.772
	Only study	4.826	1.351		
	Total	4.789	1.355		
(3) Self-consequating M1	Study and work	3.973	1.601	3.031 (1, 73)	*0.086*
	Only study	4.577	1.381		
	Total	4.336	1.493		
(3) Self-consequating M2	Study and work	3.453	1.745	6.256 (1, 73)	**0.015**
	Only study	4.453	1.662		
	Total	4.053	1.755		
(3) Self-consequating M3	Study and work	3.846	1.760	1.508 (1, 73)	0.223
	Only study	4.306	1.465		
	Total	4.122	1.594		
(4) Environmental structuring M1	Study and work	4.625	1.054	0.696 (1, 73)	0.407
	Only study	4.811	.867		
	Total	4.736	.944		
(4) Environmental structuring M2	Study and work	4.258	1.028	1.074 (1, 73)	0.303
	Only study	4.555	1.325		
	Total	4.436	1.217		
(4) Environmental structuring M3	Study and work	4.416	1.202	0.142 (1, 73)	0.708
	Only study	4.316	1.074		
	Total	4.356	1.120		
(5) Regulation of situational interest M1	Study and work	4.280	0.90455	0.098 (1, 73)	0.755
	Only study	4.208	1.002		
	Total	4.237	0.958		
(5) Regulation of situational interest M2	Study and work	3.740	1.110	0.152 (1, 73)	0.698
	Only study	3.862	1.457		
	Total	3.813	1.323		
(5) Regulation of situational interest M3	Study and work	3.640	1.215	0.021 (1, 73)	0.885
	Only study	3.600	1.130		
	Total	3.616	1.157		

Table 5. *Cont.*

Dimensions	Work Situation	M	SD	F (gl)	*p*
(6) Regulation of mastery goals M1	Study and work	4.206	1.128	3.112 (1, 73)	*0.082*
	Only study	4.671	1.109		
	Total	4.485	1.132		
(6) Regulation of mastery goals M2	Study and work	3.840	1.315	1.043 (1, 73)	0.310
	Only study	4.146	1.245		
	Total	4.024	1.274		
(6) Regulation of mastery goals M3	Study and work	3.993	1.223	0.008 (1, 73)	0.928
	Only study	4.017	1.097		
	Total	4.008	1.141		

Note. M = Mean; SD = Standard Deviation; M1 = Moment 1; M2 = Moment 2; M3 = Moment 3.

4. Discussion

The main objective of this study was to test how SRM evolved in university students during confinement as well as to explore some variables that could have influenced it, such as sleep quality, gender, and work situation.

The results related to H1 showed that those students who had higher levels of SRM before confinement, had worse sleep 20 days after it began. Lerey, Adams and Tate [36], noted that people with higher levels of self-control tended to sleep worse than those who did not orient their thoughts. It is possible that higher levels of SRM are associated with higher levels of self-control, which would explain why students who were more able to self-regulate their motivation showed poorer levels of sleep quality during confinement.

Regarding the results related to H2, we found that SRM worsened in general and in all dimensions within the group of university students as confinement progressed. The reasons for this decline may lie precisely in the change in teaching: classes were no longer face-to-face, reducing interactions among classmates and between students and teachers, and relegating virtual classrooms in universities, videoconferencing applications and e-mail as the only spaces for telematic interaction. In this sense, several studies have addressed how increased peer interaction, teacher-student interaction, and a positive and safe climate [37–40] improved levels of SRM.

The online media used were considered as safe spaces against COVID-19, but they did not guarantee quality of learning, mainly because there was not enough time for teachers and students to have the necessary skills to use them successfully. In fact, the study by Langergard et al. [6] reported that students perceived that there was a deterioration in the quality of online versus face-to-face teaching. In addition, the decrease in motivation may have been influenced by the value they placed on the homework. Smith [22] stated that the greater the value students placed on their academic tasks, the greater the self-regulation of their motivation. Thus, after a drastic change in the type of tasks, it is reasonable to expect that motivation will worsen significantly, especially at the beginning of confinement.

Other factors that could explain the results obtained are students' self-efficacy expectations and their attention span. Paulino et al. [23] mentioned the positive relationship between motivation and self-efficacy expectations. Therefore, a decrease in self-efficacy expectations could be interpreted as contributing to a decrease in SRM. On the other hand, Quintiliani et al. [41] reported that students' attention span decreased by 54.4% during confinement, which could also have had an impact on their motivation.

Regarding the results of H3 and H4, they also showed that there were no interaction effects between assessment moments and gender, nor between moments and work situation. These results provide evidence that confinement had a similar impact on students' SRM, irrespective of their personal characteristics or work circumstances. It is a fact that the restriction of freedoms that confinement entailed negatively affected the population in a multitude of contexts [42–44] and, although some studies suggest that students' motiva-

tion [45] or performance [46] were not impaired, our study provides evidence that other variables, such as SRM, were affected.

Finally, the results related to H5 showed the existence of significant differences between men and women in practically all the dimensions of SRM in the three moments evaluated. Women showed higher levels than men, but the reduction of these levels was similar in both genders as evidenced by the non-existence of an interaction effect between moments and gender. This result is consistent with previous studies that also found that women showed better strategies for regulating their motivation for learning than men [47,48].

However, there were no differences according to work situation (H6), i.e., the levels of SRM were similar regardless of whether students were only studying or whether they were also working. Although working takes time away from studying, which could have a negative impact on students' motivation, it may also have the advantage of protecting them from information about the progress of COVID-19, keeping their self-regulation at similar levels to those who only studied. The protective effect of studying and working has previously been observed in other studies in relation to other variables such as sleep quality [12].

SRM is a key factor in ensuring that the necessary stimuli are available to maintain motivation towards a task and to ensure that people persist in performing the task. The change in the conditions under which university classes were taught when COVID-19 confinement began had a negative impact on students' self-regulation, jeopardizing their learning and, consequently, their academic success. Although other studies showed that student performance was not adversely affected in these exceptional circumstances [46], our results support the need for a gradual transition to online teaching. Consequently, both students and teachers will be more likely to have the necessary competences to complete their studies with maximum guarantees.

In the event that this gradual transition cannot be achieved for major reasons such as those experienced with COVID-19, there are different types of strategies that can be promoted by universities or other educational centers to ensure SRM. For example, as it is widely known that students learn by observing models like themselves [49], peer modelling could be used to allow students to compare their tasks with those done by their peers and give feedback on them. Online platforms based on Moodle have an activity called Workshop which makes it possible to program this type of activity in a relatively simple way. In addition, if an educational institution does not have such platforms, they can propose activities involving the use of blogs or Wikis to achieve similar effects. Such joint tasks can also create a sense of community, which promotes intrinsic motivation [50].

Another strategy that could be implemented would be to sequence the tasks appropriately. Many of the tasks that students had to do before the confinement were planned to be done face-to-face. The change of the classes to online mode did not, in many cases, involve a real adaptation of the tasks. Only the way in which they were submitted was changed. In order to facilitate the self-regulation of student motivation, the programs of subjects should have been redesigned, adapting them correctly to the online mode, eliminating unfeasible tasks, and including new tasks that are more feasible to carry out. It would also have been useful to alternate difficult and easy tasks, as current effort can be affected by the effort exerted in the task immediately preceding it [51].

Finally, to avoid mental overload and time pressure, the number of deliverable tasks should be adjusted, giving limited and realistic options. The more deliverables and the more delivery possibilities learners have, the more likely they are to be distracted and procrastinate [52], reducing their self-regulation of motivation. In addition, deliverable tasks should be planned to ensure that learners perceive that by doing them they are developing a competence consistent with the subject they are taking. Consequently, they would perceive a better balance between effort and outcome, and would be more motivated [53].

Limitations and Future Research

The results of this study should be interpreted in light of some limitations. Firstly, only 75 students participated in the two evaluations. There was, therefore, a rather large experimental mortality (28 people did not respond to the second assessment). Future studies should increase the sample to verify the results obtained in our research and to be able to generalize the data to other universities. Moreover, the sample was largely composed of women, so the results should be explored in samples with a greater representation of men.

Another limitation of our study can be considered the fact that we did not assess factors such as students' self-efficacy expectations, attention span, and academic performance. Having this information could help to better understand the results obtained on SRM, so future studies should take them into account. We also did not obtain information on social class or ethnicity, variables that in previous studies [38] have been related to SRM, and that would be interesting to include in future research with larger samples.

Finally, although the retrospective evaluation of the participants was the only alternative for obtaining information prior to confinement, the answers given by them were probably less accurate than when they answered with the present moment in mind. Nevertheless, since the retrospective evaluation did not ask about events that occurred a long time ago (only 20 days earlier), we ensured greater accuracy than in other types of research where the time referents are more distant.

5. Conclusions

The main contribution of this research is to provide evidence of the negative effect that COVID-19 confinement has had on SRM, decreasing its levels in both men and women. In addition, we also found evidence that the higher the levels of self-regulation before the start of confinement, the worse the students' perception of sleep quality was 20 days after the start of the restrictions. Given the importance of both variables in the daily routine of university students, who require adequate rest and sufficient levels of motivation to be able to integrate knowledge and acquire new skills, it is essential that in possible future confinements students are provided with the necessary resources to ensure adequate self-regulation of their motivation.

To achieve this, universities and other educational centers should adapt teaching methodologies to the online modality, encouraging peer modelling, and redesigning subjects to ensure, for example, an appropriate sequencing of tasks or the adequacy of the number of deliverable tasks, as we have explained above. Implementing all these changes at a time of crisis can be very complicated, therefore it would be advisable to train teachers in advance in order to be able to better adapt to the changes imposed by unexpected future confinements.

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