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Students' online self-regulated learning and academic achievement: General effects of the COVID-19 pandemic

Abstract: The present study aimed to propose a conceptual model of the general effects of the COVID-19 pandemic on the self-regulatory behavior of students learning online. The participants of the study included 350 students of Salman Farsi University of Kazerun who answered an electronic questionnaire from November 5 to November 24, 2020. This electronic questionnaire consisted of two tools: 1. COVID-19 General Impact Survey 2. Online Self-regulated Learning Questionnaire (OSLQ). The results of the structural equation modeling (SEM) showed that the goal orientation dimension has the highest mean (M=17.58) and the time management dimension has the lowest mean (M=10.18) among students. With the increase in negative academic outcomes and the decrease in students' psychological health during the COVID-19, their online self-regulated learning behaviors have also reduced. In addition, the COVID-19 had a negative and direct effect on online self-regulated learning behaviors in students. The results also showed that the greatest effect of the COVID-19 pandemic on the self-regulatory components of online learning was related to the time management component. As for academic achievement, the three dimensions of goal setting, environmental structure, and self-evaluation showed a positive and significant relationship with the average of two semesters of students. Finally, the overall effects of the COVID-19 could explain 11% of online self-regulatory learning behaviors in students. Implicit implications of these findings for education as well as suggestions for further research are discussed.

Keywords: *online self-regulated learning; COVID-19 Pandemic; university students*

INTRODUCTION

On December 31, 2019, cases of pneumonia with unknown causes were observed in Wuhan, Hubei Province, China. On January 7, 2020, it was announced that some patients were infected, not with pneumonia, but a new type of Coronavirus. On January 30, 2020, the disease was called a "Public Health Emergency of International Concern" by the World Health Organization (WHO, 2020). The spread of the SARS-COV-2 virus worldwide happened in less than 4 months (Zangrilo, Beretta, & Silvani, 2020). Given the prevalence and transmission of the disease, on January 30, 2020, the Secretary-General of the World Health Organization recommended that countries lessen the person-to-person transmission of the disease by reducing contact with individuals and, as a result, control its global spread (WHO Statement, 2020).

Due to the pandemic status of the disease, which paralyzed almost all important economic, political, social, and even military aspects of the world (Lee et al., 2020), an increasing number of asymptomatic carriers led to lockdowns in several countries, including Iran (Alizadeh Fard & Saffarinia, 2020). With the closure of universities and training centers due to the outbreak of the COVID-19 disease, virtual education replaced face-to-face teaching and online education became especially important around the world. Concurrent with these events, universities thought of launching virtual education systems for their students and held classes via virtual education platforms. Now, an increasing number of students had to study online. This heavily influenced students' lives in several countries and different ways. However, despite all the opportunities it created in the field of education, it led to serious challenges for teachers, professors, as well as students.

Despite the importance of psychological challenges students have faced, their self-regulatory status when learning due to the prevalence of coronavirus and the need to prevent its spread by closing classes and continuing to

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teach online has not been considered thoroughly, to date. Self-regulated learning has been referred to as the desired outcome of the process of "students' self-generated thoughts and behaviors that are systematically oriented toward the attainment of their learning goals" (Zimmerman & Schunk, 2001).

Self-regulation of online learning in the current pandemic situation, as well as the effects of the pandemic on self-regulation of online learning, need to be further clarified to create potential opportunities or challenges that have not been thoroughly addressed in previous research. Given the importance of this issue, the present study aimed to propose a conceptual model of the general effects of the COVID-19 pandemic on the self-regulatory behavior of students learning online.

Education during the COVID-19 Pandemic

The closure of schools and universities was one of the first measures to prevent the global spread of the COVID-19 disease. Despite the traditional educational system which was teacher/book-oriented, due to the prevalence of the COVID-19, education welcomed new tools and communication environments. The advent of new technologies into educational centers and even homes completely transformed the simple teacher-student relationship and online education became vital (Mohammadyari, et al, 2020).

Online education is a distant learning system in which the Internet is used to support teachers to educate students and allows the exchange of information and simultaneous interaction between teacher and student. According to Castro and Tumibay (2019), online learning has become popular because of its great potential for providing more flexible access to content and education anytime as well as anywhere. Additionally, it is believed that online learning is as effective as traditional classroom learning (Jacobs, 2013). Recently, several studies have strived to investigate the influence of the COVID-19 on education. For example, Hulei and Malkovnych (2020), in their study of the state of education in Ukrainian universities, concluded that in the era of the pandemic, the use of modern techniques for education is inevitable and students should be actively involved in online education. With online education, learners and educators can walk in the path of teaching and learning with peace of mind and without the stress of being infected. Also, using all aspects of online education makes education more attractive and useful for learners and may lead to more interaction between teachers and students.

Self-regulation and online learning

There is no doubt that online education has led to profound psychological effects on students' motivation due to time constraints, the unpreparedness of learners and professors, as well as the major design of courses that are most appropriate for face-to-face classes than online courses. In the current period, due to the rapid growth of technology, people need to take more responsibility for their education. All these factors lead to the need to pay more attention to students' ability to self-regulate their learning process. Self-regulation in learning is an active process that includes setting learning goals, determining the approaches and resources needed to achieve these goals as well as responding to feedback to enhance outcomes (Ng, 2016). According to Zimmerman model, self-regulated learning is considered as self-made thoughts, feelings, and actions that are used cyclically to achieve personal goals and has six strategies of "environmental structure". "goal setting", "time management", "help-seeking", "homework strategies" and "self-assessment" (Barnard et al., 2008). The main framework of this theory is based on how learners organize their learning cognitively, metacognitively, motivationally, and behaviorally (Zimmerman & Martinez-Ponz, 1990). Phillips et al. (2015) assert that students need to regulate their learning because they are expected to be actively involved in online learning processes.

Zhu et al. (2010) define self-regulated learning as the processes of self-motivation, self-control, and self-evaluation. Some researchers also believe that self-regulated learning is not a fixed phenomenon; rather, it is a skill that can be developed through experience and practice of applying self-regulatory strategies (e.g. Kizilcec et al., 2017). In general, self-regulated learners are identified as individuals who possess strategies and can manage their behaviors and learning purposefully (Daniel et al., 2016). Pintrich (1999) also defines self-regulated learning as a constructive and active process, in which learners set their own goals for learning and then try to monitor and control their behavior in order to achieve the desired goals. The main framework of Pintrich and De Groot's (1990) theory is grounded on how learners organize their learning using cognitive, metacognitive, and motivational beliefs.

In the 21st century, self-regulated learning has become an essential skill for education. Due to the expansion of the realms of knowledge and the unceasing increase in the bulk of information in the present time, every individual should try to learn. The online learning environment tends to provide learning with minimal guidance on how to learn while learning efficiently, with a strong emphasis on learners' ability to engage independently and actively in learning (Wang et al., 2013). Therefore, people should direct their learning in a path that requires less help from educators (Thowfeek & Abdul Salam, 2014). Nowadays, the importance and necessity of students' self-direction and self-regulation in online educational environments are more tangible compared to traditional education. Therefore, online learners must have more ability to control, manage and plan their learning compared to their peers in face-to-face classes (Broadbent & Poon, 2015). Furthermore, online learners need to be independent because the nature of online education promotes self-directed learning (Serdyukov & Hill, 2013). Besides, the effectiveness of online education is determined by identifying whether learners can engage in self-care learning in an e-learning environment (Wang, 2011).

Concerning research on self-regulation, Broadbent and Poon (2015) examined students' self-regulated learning strategies in two learning environments. 140 students enrolled in online classes were compared with 466 students enrolled in combined (face-to-face) classes. The findings showed that students in the online group were better self-regulated learners than students in the combined learning group. Likewise, Haron et al. (2015) found that students in online classes performed better when they used self-regulated learning strategies compared to those who did not use these strategies. Similarly, previous research has also shown that self-regulated learning strategies have played an important role in distinguishing high scores from low scores in assignments that focus on students' comprehension (Green et al., 2018).

In a more recent study, Sun et al. (2018) examined the relationship between academic achievement and self-regulation. The results suggest that self-regulatory strategies are positively correlated with academic achievement. These findings were consistent with the results of Kizilcec et al. (2017).

In another study, Bradley et al. (2017) also examined the effects of self-regulation and self-efficacy beliefs on students' academic achievement in an online learning environment. Findings revealed that students' self-efficacy beliefs and their self-regulatory strategies have a direct effect on their academic records.

In this line, Yeh et al. (2019) similarly examined the effectiveness of psychological characteristics such as motivation to achieve a goal to predict student learning outcomes. They developed a three-way mediation model to examine the mediating role of self-regulated learning strategies and online supportive learning behaviors with the relationship between online learners' motivation and their learning outcomes. The results showed that both self-regulated learning strategies and supportive learning behaviors play an important role in predicting students' success in the online learning environment. Several studies have also reported a positive relationship between self-regulated learning strategies and non-academic outcomes (e.g. Broadbent & Poon, 2015; Cho et al., 2017; Lee et al., 2018).

THE PRESENT STUDY

The present study seeks to propose a conceptual model of the general impact of the COVID-19 pandemic on self-regulatory behaviors of online learning in students (Figure 1) through investigating the following research hypotheses:

1. The educational consequences of the COVID-19 pandemic affect the self-regulatory dimensions of students' online learning.
   (If approved), What is the relationship between students' academic achievement and their online self-regulation during the pandemic?
2. The social consequences of the COVID-19 pandemic affect the self-regulatory dimensions of students' online learning.
3. The financial consequences of the COVID-19 pandemic affect the self-regulatory dimensions of students' online learning.
4. The resource consequences of the COVID-19 pandemic affect the self-regulatory dimensions of students' online learning.
5. The psychological health consequences of the COVID-19 pandemic affect the self-regulatory dimensions of students' online learning.

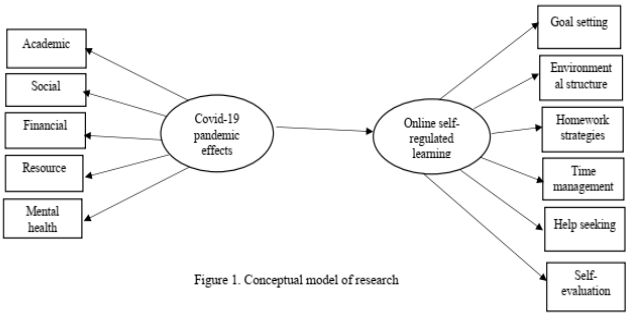

Figure 1. Conceptual model of research

METHOD

Participants

The participants of the present study included 350 (221 female and 129 male) students of Salman Farsi University of Kazerun, of which 37% were male and 63% were female. The average age of the participants was 23.10 with a standard deviation of 6.07. Overall, 84.60% were undergraduate students and 0.6% were postgraduate and doctoral students. The sample size was estimated to be 350 based on the Morgan index. According to the size of the statistical population, the number of sample was estimated to be 351. The sampling method was convenient sampling. It is worth mentioning that the face-to-face classes of Salman Farsi University of Kazerun were closed on March 2, 2020, due to the prevention of the outbreak of COVID-19 disease and the students were with their families while collecting the data for the present study.

Measures

COVID-19 General Impact Survey

This questionnaire was designed by Conway, Woodard, and Zubrod (2020) to assess the general effects of the COVID-19 on life. This tool has 18 items that evaluate the impact of the pandemic on specific aspects of life. All items are coded on a five-point Likert scale from "strongly disagree" equals 1 to "strongly agree" equals 5. This questionnaire has five subscales namely, academic subscale (questions 1 to 4), social subscale (questions 5 to 8), financial subscale (questions 9 to 11), resource subscale (questions 12 to 14) and psychological health subscale (questions 15 to 18) in which higher scores indicate greater impact (S1 $\alpha = 0.86$, $\omega = 0.86$; S2 $\alpha = 0.84$, $\omega = 0.84$) (Conway et al., 2020).

The Online Self-regulated Learning Questionnaire (OSLQ)

This questionnaire was developed by Barnard, Lan, To, Patton, and Lai (2009) to assess online learning self-regulation. It has 24 items that measure the variables of goal setting, environment building, homework strategy, time management, help-seeking, and self-evaluation. The alpha coefficient for the scale equals .97. All of these items are encoded on a 5-point Likert from "strongly agree" to "strongly disagree". Higher scores on this scale indicate better self-regulation of students' online learning. When evaluating the internal reliability of scores based on the subscale, Cronbach's alpha values ranged from 0.67 to 0.90, which indicates sufficient reliability at the subscale level.

Our data and the scores obtained in our study demonstrated adequate internal consistency of scores (α=.90). Nunnally (1978) suggests that score reliability of .70 or higher is acceptable when used in basic social science research such as the current study.

Procedure

To collect the data of the present study, the electronic version of the questionnaires was placed on the Instagram page of Salman Farsi University of Kazerun (student account) in the form of a link, and in the accompanying text, students were invited to participate in the research. During the period from November 5 to November 24, 2020, which was set to collect the data of this research, 402 students answered the questionnaires, and 52 incomplete forms were discarded. Inclusion criteria were willingness to participate in the study and no obvious physical/health problems at the time of the study.

Data analysis

AMOS and SPSS package (version 26) were used to analyze the data and the descriptive and inferential statistics were finally tabulated.

RESULTS

Table 1 shows the mean, standard deviation, minimum, maximum, skewness, and kurtosis of the participants' scores based on the research variables.

According to table 1, the highest effect of the COVID-19 pandemic was related to the social dimension (M=28.18) and the lowest effect was related to the resource dimension (M=16.61). Also, regarding the self-regulated learning variable, the goal orientation strategy has the highest mean (M= 17.58) and the time management strategy has the lowest (M=10.18) among students. In addition, the mean students' GPA in the two semesters of online education was 16.59. The lowest and highest GPAs of students were 9.24 and 20, respectively.

The results showed that the values of statistical skewness and kurtosis of the research variables ranged from +1 to -1. Therefore, the data had been distributed optimally in this term. Regarding multicollinearity, the variance inflation factor and tolerable rate were calculated as well. The variance inflation factor varied from 1.45 to 3.11, which was below 10. Also, the tolerable rate ranged from 0.32 to 0.69 which was higher than 0.1; thus, the multicollinearity phenomenon did not occur to the research variables.

To investigate the first and fourth research hypothesis, as table 2 shows, the educational and mental health variables of the COVID-19 pandemic showed a significant negative correlation with all dimensions of online self-regulated learning ($p \leq 0.05$). This means that with the increase in negative academic outcomes and the decrease in students' psychological health during the COVID-19, their self-regulated online learning behaviors have also reduced. However, the financial consequences and resources of the COVID-19 showed a negative and significant correlation ($p \leq 0.05$) only with the orientation dimension of the goal of online self-regulatory learning

Table 1. Means, standard deviations, minimum, maximum, skewness, kurtosis of the study variables (N=350)

Variables	M	(SD)	Min	Max	skew	kurtosis
COVID-19 pandemic effects: academic	27.10	9.50	4	40	-0.61	-0.40
COVID-19 pandemic effects: social	28.18	7.92	5	40	-0.49	-0.40
COVID-19 pandemic effects: financial	18.16	8.24	3	30	-0.22	-1.00
COVID-19 pandemic effects: resource	16.61	7.41	3	30	-0.44	-0.76
COVID-19 pandemic effects: mental health	25.61	10.04	4	40	-0.51	-0.48
Online self-regulated learning: goal setting	17.58	4.04	5	25	-0.82	1.07
Online self-regulated learning: environmental structure	15.47	3.53	4	20	-1.09	1.08
Online self-regulated learning: homework strategies	12.43	3.50	4	20	-0.21	-0.20
Online self-regulated learning: time management	10.18	2.97	3	15	-0.73	0.15
Online self-regulated learning: help-seeking	13.70	3.41	4	20	-0.66	0.72
Online self-regulated learning: self-evaluation	14.45	3.38	4	20	-0.96	1.05

Table 2. Correlation coefficients of research variables

	C19-A	C19-S	C19-F	C19-R	C19-M	OS-G	OS-E	OS-Ho	OS-T	OS-He	OS-S
C19-A	-										
C19-S	0.50**	-									
C19-F	0.33**	0.25**	-								
C19-R	0.31**	0.23**	0.51**	-							
C19-M	0.50**	0.57**	0.38**	0.34**	-						
OS-G	-0.31**	-0.25**	-0.11*	-0.12*	-0.25**	-					
OS-E	-0.25**	-0.19**	-0.07	-0.04	-0.20**	0.61**	-				
OS-Ho	-0.23**	-0.17**	-0.03	-0.02	-0.13*	0.59**	0.56**	-			
OS-T	-0.27**	-0.26	-0.09	-0.05	-0.25**	0.71**	0.58**	0.67**	-		
OS-He	-0.14**	-0.15**	0.00	-0.04	-0.12*	0.50**	0.49**	0.55**	0.57**	-	
OS-S	-0.19**	-0.17**	-0.03	-0.01	-0.14**	0.63**	0.55**	0.63**	0.67**	0.75**	-

and had a non-significant correlation with other dimensions (hypothesis 3). Also, table 2 showed a significant and negative correlation between the social effects of the COVID-19 on all subscales of online self-regulated learning (except time management) at the p ≤0.01level.

Testing the model

To test the research hypothesis and evaluate the fitting of the proposed model, the structural model's fit indices were estimated and evaluated. After initial implementation of the assumed model, it was found that the model was slightly different from the optimum fit. Therefore, considering the modification indices, a covariance was established between some errors of both latent variables.

These modifications led to promotion of the model's fit indices. Although, all paths were significant, according to the final model's fit indices shown in Table 4, the normed Chi-squared ($\chi^2/_{df}$) was lower than 2, and the CFI, IFI, and NFI indices were over 0.95. Besides, RMSEA was equal to 0.02, and they all showed a good fitness of the structural model with the data (Table 3).

of the COVID-19 pandemic on the components of online self-regulated learning was related to time management (β= -0.28).

Furthermore, the least impact of the COVID-19 pandemic on the environmental structure dimension (β = 0.23) was online self-regulated learning. Overall, the results showed that the COVID-19 pandemic generally affects online self-regulated learning behaviors by -0.33. In addition, the results showed that the variable of COVID-19 could explain 11% of the students' online self-regulated learning. This means that the COVID-19 pandemic has led to 11 percent change in the variance of online self-regulated learning behaviors in students.

According to table 5, the average of the students' two semesters during online education showed a positive and significant correlation (p≤0.01) with three online self-regulated learning strategies called goal orientation (r: 0.11), environmental structure (r: 0.14), and self-assessment (r: 0.12). This means that the more students used these three strategies during e-learning, the greater their academic achievement. However, the three strategies of doing homework (r: 0.04), time management (r: 0.08),

Table 3. Model Fit Indices

Fit Indices	CFI	IFI	NFI	RMSEA	$\chi^2/_{df}$
Final model	0.99	0.99	0.97	0.02	1.17

As shown in table 4, all coefficients of the total effects of the variable of COVID-19 pandemic on online self-regulated learning are significant (p≤0.05). Also, the results indicate that the greatest effect related to the effect of the COVID-19 pandemic on the components of online self-regulated learning was related to time management (β= -0.28).

As shown in table 4, all coefficients of the total effects of the variable of COVID-19 pandemic on online self-regulated learning are significant (p≤0.05). Also, the results indicate that the greatest effect related to the effect

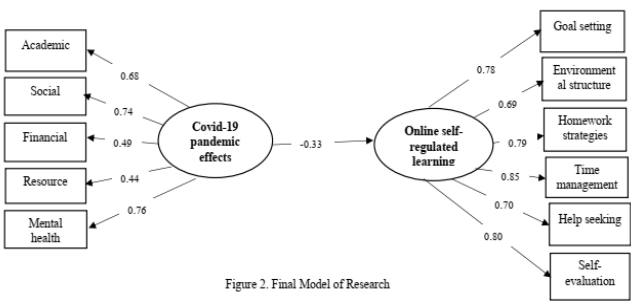

Figure 2. Final Model of Research

Table 4. Impact Analysis: Standard Total Effects of the Model

Causal variables	Online self-regulated learning	C19-A	C19-S	C19-F	C19-R	C19-M	OS-G	OS-E	OS-H	OS-T	OS-H	OS-S
COVID-19 pandemic	-0.33**	0.68**	0.74**	0.49**	0.44**	0.76**	-0.26**	-0.23**	-0.26**	-0.28**	-0.23**	-0.27**
Online self-regulated learning	-	-	-	-	-	-	0.80**	0.69**	0.78**	0.85**	0.70**	0.80**

** p≤ 0.01

Table 5. Correlation coefficients of students' self-reregulated strategies and their GPA

	OS-G	OS-E	OS-Ho	OS-T	OS-He	OS-S	Average
OS-G	-						
OS-E	0.61**	-					
OS-Ho	0.59**	0.56**	-				
OS-T	0.71**	0.58**	0.67**	-			
OS-He	0.50**	0.49**	0.55**	0.57**	-		
OS-S	0.63**	0.55**	0.63*	0.66*	0.75**	-	
Average	0.11**	0.14**	0.04	0.08	0.09	0.12**	-

and help-seeking (r: 0.09) did not show a significant relationship with the students' average of two semesters in the period of virtual education.

DISCUSSION

The present study aimed to investigate the overall effects of the COVID-19 outbreak on students' online self-regulated learning behaviors. According to the first research hypothesis, the effect of students' academic outcomes of the COVID-19 pandemic on the dimensions of self-regulatory dimensions of students' online learning was investigated. The results showed that the negative academic outcomes of the COVID-19 pandemic have a significant negative correlation with all dimensions of students' online self-regulated learning. This means that with the increase in negative academic outcomes during the COVID-19, students' online self-regulated learning behaviors have also decreased. This finding is consistent with the research findings by Bradley et al. (2017) that emphasized the direct relationship between self-regulation and student academic outcomes. In this study, the three dimensions of goal setting, environmental structure, and self-evaluation showed a positive and significant relationship with the average of two semesters of students. This means that the more students use these three strategies during e-learning, the greater their academic achievement. These findings are consistent with the results of studies such as Cazan (2014). In Cazan's study, a positive and significant relationship – albeit weak – was achieved between the dimensions of goal setting and environmental structure. Goal setting is one of the most important dimensions of online learning self-regulation and provides standards for regulating individual activities and is effective in achieving academic success. Moreover, the environmental structure can improve students' performance in online learning. On the other hand, self-assessment plays an important role in examining the weaknesses in the field of learning and doing homework and trying to eliminate these shortcomings for the learner (Zimmerman & Schunk, 2001). In other words, the findings of this study imply that students who have a higher grade point average in the two semesters and at the same time have self-regulatory skills of online learning, choose more effective learning objectives, more effective environmental factors involved in learning, and manage and evaluate themselves more effectively in the performance of online tasks.

The findings regarding the second hypothesis of this study on the social consequences of the COVID-19 pandemic and on the self-regulatory dimensions of students' online learning also showed a significant negative relationship of COVID-19 social consequences with all subscales of online self-regulated learning (except time management). To interpret this finding, it can be stated that when schools and universities are closed, students do not have the motivation and structured feeling that is usually provided by the school and university environment and have less opportunity to interact with friends, classmates as well as to gain social support from their professors and friends. In addition, as mentioned before, online self-regulated learning is a skill that is acquired through experience and practice of self-regulation strategies (Kizilcec et al., 2017), it can be said that the urgency created by the COVID-19 pandemic in the mandatory holding of online education and lack of practice and

acquisition of skills to create these strategies without receiving support and motivation from friends and the community in students is one of the factors that have led to the negative social effects of the COVID-19 on online self-regulated learning.

As for the third research hypothesis, the financial implications of the COVID-19 pandemic had a significant negative effect on the goal dimension in online self-regulated learning. This is understandable as limitations imposed by the COVID-19 on the use of educational facilities such as laboratories, libraries, in-service courses, etc. have placed an excessive financial burden on students and their families to provide the facilities needed for online education. This consequence may have jeopardized the students' vision and planning for short-term and long-term academic goals.

The fourth research hypothesis, i.e. the effect of consequences of COVID-19 pandemic resources on the self-regulatory dimensions of online learning was not confirmed and this variable was not significantly related to any of the dimensions of online self-regulated learning.

Finally, the fifth hypothesis regarding the effect of the COVID-19 mental health implications on the dimensions of online self-regulated learning was also confirmed as this variable had a negative and significant relationship with all dimensions of online self-regulated learning. This means that with the increase in negative effects on students' mental health, the use of self-regulatory strategies for online learning also decreases. This finding is consistent with the research of Yeh et al. (2019) who found a positive effect of psychological and mental health interventions on improving the dimensions of online self-regulated learning.

The results of structural equation modeling showed that the pandemic had a negative and direct effect on online self-regulated learning. These findings are consistent with other studies (for example, Broadbent & Poon, 2015; Serdyukov & Hill, 2013, Wang, 2011). Staying at home can put some students at bigger risk as evidence shows that students are less physically active when they are out of school and on campus (for example, weekends and summer vacations). During the lockdown, people have longer TV time, they have irregular sleep patterns, and poor diet, which can lead to weight gain and decreased cardiorespiratory fitness. Such health effects are likely to be worse when students are confined at home during an outbreak without outside activity and interaction with friends. Moreover, prolonged lockdown, fear of illness, fatigue and boredom, insufficient information, lack of communication with classmates, friends, teachers, and professors, lack of personal space at home, and family's financial problems can have negative and lasting effects on students as well.

To further interpret the findings, when information about academic subjects is transmitted through distance education, this creates a constructive relationship between students and faculty, and even a student can access all educational resources, including faculty, books, and workshops in the shortest matter of time. Therefore, when students feel that despite the limitations, they have the resources and facilities that can be accessed in absentia from libraries, universities, and higher education centers and download their favorite books, this not only provides the ground for planning, organizing, and expanding information in absentia but also provides the ground for continuing education and a sense of self-control and self-regulation of learning through time management and access to resources. As such, although during the pandemic, people faced the greatest limitations of the century due to the direct negative effects of the pandemic, including educational, social, economic, medical, and health dimensions, they were able to transform these limitations into a new opportunity to enhance human knowledge with access to resources and information. Also, self-regulated learners who have the ingenuity to design, master, and guide their learning process typically tend to learn, evaluate and think about the whole learning process, and actively participate in the learning process and based on their perceptions of their ability, set goals for learning the temperament and finally, based on the goals and environmental characteristics, use appropriate strategies. During this process, they also review, regulate and control their cognition, motivation, and behavior. This process of students' control during learning is effective on how to form their commitments to academic values and ideals, as well as how to form a framework to interpret personal experiences and talk about the meaning, purpose, and direction of academic life (Yousefi, Zainuddin Meymand, Razavi Nematollahi and Soltani, 2019).

The present study has limitations such as using a questionnaire as the only data collection tool, geographical constraints, not examining affective variables related to online self-regulatory learning behaviors as well as lack of access to more representative samples from all students due to COVID-19-time constraints.

Tziner (2002) believes that what we have learned from natural disasters is the continuing importance of social protection (cited in Sijia et al., 2020). This support can be provided in several ways. Teachers' social, educational, and psychological support of students can be provided through the Internet, phone calls, text messages, and video chats, during physical distancing when people are away from their loved ones in their homes. Social media can use one of the self-regulatory learning strategies, such as resource management strategies, which include strategies for controlling and managing non-cognitive learning factors such as time, effort, and environment. In other words, despite the environmental constraints, students should make the best use of their time and try to achieve the desired goals, and provide the basis for increasing cognitive, metacognitive, and self-regulated learning behaviors. The use of self-regulated learning strategies creates an effective adjustment in controlling an individual's learning to achieve personal goals (Nietfeld, Shores & Hoffmann, 2014).

Based on the results obtained in this study, instructors and educators must try to encourage students to use online self-regulated learning behaviors. In order to achieve the mentioned goal and to guide all students in this direction, it is suggested that students be encouraged to use the online

content and the opportunity for deep and meaningful learning be provided by using concentration and using appropriate online teaching methods and mastering the subjects. The class should also be continuously organized in such a way that instead of cooperation and emphasis on the performance scores or superiority of others, emphasize meaningful online learning and mastery of lesson concepts. It is also suggested that after the COVID-19 pandemic, stakeholders continue to make the most use of online education alongside face-to-face training as well as combining the two approaches.

CONCLUSION

The results of this study added to the literature on the factors involved in the success of students in online courses and highlighted the important points that counselors, professors, and policymakers in the field of teaching and planning for education should focus on. The interaction between lifestyle changes and socio-psychological stress caused by lockdown can not only intensify the harmful effects on students' physical and mental health, but also affect the social, psychological, and educational dimensions of students. Therefore, when students face these limitations, they need degrees of self-regulation to have the necessary performance at the emotional and educational levels. As such, students with self-regulatory learning behaviors in all stages of learning consider themselves to be efficient and competent individuals. Then, they can overcome these limitations imposed by the disease through acquiring adapted self-regulated learning strategies to develop motivational patterns when doing homework (such as, striving for success, enjoying activity challenges, making appropriate use of strategic learning behaviors, setting specific goals, and demonstrating a high level of efficiency).

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval: Procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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DATA AVAILABILITY

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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