

# An Analysis of the Link between Metacognitive Beliefs and Academic Health-oriented Lifestyle Preventive Behaviours Mediated by Self-efficacy during the COVID-19 Pandemic

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## Abstract

The outbreak of the coronavirus and its ramifications, including lockdown and shutting down of many learning centers magnified the necessity of turning to virtual learning, has given rise to concerns about students' learning and their reaction to the new teaching methods and the challenges they entail. The present study attempts to examine the link between metacognitive beliefs and behaviors that prevent health-oriented lifestyles through academic self-efficacy during the COVID-19 pandemic. The statistical sample consisted of 239 randomly selected undergraduate students of engineering at Azad University of Shahre-e Rey in the second semester of 1399-1400 (Solar Hijri calendar). The data were gathered using academic health-oriented lifestyle test Salehzadeh et al. (2018) Academic Self-Efficacy Beliefs Questionnaire (ASEBQ), and Wells' Metacognition Questionnaire-30 (MCQ-30). Findings of the study indicated that metacognitive beliefs are related to behaviors preventing academic health-oriented lifestyle factors, such as learned helplessness and effort withdrawal, through self-efficacy. It is suggested that, according to the positive relationship that exists between metacognitive strategies and academic achievement. As well as these strategies are scalability learners need to be trained in skills such as self-regulation self- monitoring planning and goal setting. Until they dominate decided cognitive strategies and professors can also encourage students to use orientation by designing assignments, teaching study strategies, and using new teaching methods.

**Keywords:** metacognitive beliefs, self-efficacy, behaviors preventing academic health-oriented lifestyle, learned helplessness, effort withdrawal

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## 1. Introduction

A review of empirical evidence derived from studies on prerequisites and implications of academic success indicates that cognitive processes have been largely overlooked in educational systems. Metacognition is an important factor in formulating conceptual processes of academic success. Metacognition can be defined one's awareness of the way one learns, uses available facts to achieve an aim, evaluates cognitive processes useful for a particular task, chooses strategies to realize a goal, and assess one's performance during and following an action. One's awareness of tasks, strategies one adopts to fulfil those tasks, and one's cognitive beliefs are the three metacognitive factors Flavell identifies; furthermore, he asserts that metacognition can be useful in devising and adjusting plans (Flavell & Miller, 1998). Metacognitive learning strategies are among the important components of self-regulated learning which enable the learners to monitor and regulate their cognition and emotions. students with more self-efficacy are more willing to adopt metacognitive strategies, and self-efficacy has a positive relationship with metacognitive strategies(Ozgur, 2021; Hayat & Shateri, 2019).

Most experts distinguish metacognitive knowledge from metacognitive supervision. Metacognitive knowledge consists of the information one acquires about one's cognition and one's learning strategies, and the way the latter influences the former. Cognitive supervision refers to a range of executive functions, such as paying attention to, controlling, and identifying errors (Biabangard,2003). Experts have always recognized metacognition as a factor influencing learning and educational variables (Osoli et al., 2016). Metacognition refers to psychological structures, knowledge, and processes that control, modify, and interpret thoughts and perceptions. Furthermore, metacognition can be defined as the awareness of the way one learns, uses available facts to achieve an aim, evaluates cognitive processes useful for a particular task, chooses strategies to realize a goal, and assess one's performance during and following an action (Salarifar et al., 2011).

Metacognitive beliefs are those parts of the cognitive knowledge that link a person's beliefs about cognition to cognitive and emotional experiences (Wells, 2009). Metacognitive beliefs may function in positive and negative ways. Negative metacognitive beliefs deal with the uncontrollability of cognitive thoughts and experiences, and also, the dangers they might pose. Positive metacognitive beliefs, on the other hand, interpret concerns, anxieties, threats, and similar phenomena in a positive way, identifying the advantages and benefits of engaging in cognitive activities that comprise the

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cognitive-attentional syndrome. Cognitive-attentional syndrome is a reiterating thought process that manifests as anxiety and mind rumination fixed on threats and preventative behaviors such as repression and withdrawal (Khamisabadi, Mirmehdi & Meraati, 2021; Salarifar et al., 2011). Negative metacognitive beliefs interpret cognitive phenomena such as thoughts and normal beliefs in a negative way, resulting in a disruption of thought control and negative interpretation of events (Wells, 2009). The present study is an attempt to investigate metacognition as an important effect in learning and academic success.

Health-oriented lifestyle behaviors are among the important factors that may predict and formulate academic performance of students. In the context of health studies, health-oriented lifestyle behaviors are a series of behaviors under a person's control, comprising that person's daily behavioral patterns. Developmental situations, such as learning, giving an examination, or partaking in classes may entail various demands, and positive or negative emotions (Burić et al., 2016). Facing positive or negative emotions is an inevitable consequence of teach (Pekran et al., 2007). Researchers have attempted to use process-based conceptual models of learning life effectiveness to determine the distinctions between values assigned to objective and subjective symptoms, emphasizing the crucial role played by meditating mechanisms, such as preferred methods of meeting motivational demands of learning as well as a wide range of conceptual factors facilitating cognitive resources to face the inherent challenges of learning (Amid et al., 2016).

A factor that may be helpful in predicting and assessing students' academic performance is their academic health-oriented lifestyle behaviors. The emerging idea of academic health-oriented lifestyle behaviors relies on the contemporary concepts of motivational development, such as self-efficacy theory, attribution theory (Weiner, 1994), mastery goal orientation theory (Anderman & Anderman, 2009), self-esteem theory (Covington, 1984), hope theory (Snyder et al., 2002), self-determination theory (Deci & Ryan, 2000), expectancy theory (Wigfield & Eccles, 2000), and control-value theory (Pekrun, 2006), and turns to positive learning to identify the most common behavioral indications of facing the challenges of the academic life. In educational studies, academic health-oriented behaviors are the preferred models of behaviors that may be chosen and expressed by learners. Based on their nature and functions, they can improve learners' academic wellbeing or threaten it. Some of these behaviors are expressed as facilitators and promoters of academic wellbeing, such as mastery goal orientation, while others are inhibitors of academic wellbeing and disrupt learning, such as

learned helplessness and effort withdrawal (Lajoie, Pekrun, Azevedo, & Leighton, 2020; Putwain, Wood & Pekrun, 2020; Shaowei & Chia-Ching, 2019; Salehzadeh et al., 2018).

In the present study, two preventive factors of academic wellbeing, namely effort withdrawal and learned helplessness have been examined. Effort withdrawal describes the behavior of learners that refuse to extend the necessary much effort for understanding and completing their academic assignments. Researchers in the field of motivational development have presented evidence indicating that in addition to mastery and functional goal orientations, learners may also express effort withdrawal in learning contexts (Tankari, Zouhin Toboula, Ousseini, 2020; Jarvis & Seifert, 2002). Many researchers have examined effort withdrawal as an orientation and have studied its associations with other variables. Such a behavioral pattern in developmental contexts indicates a reduction in assigned values and loss of interest in academic activities. The reduction, which can be quite intense and serious in some cases, entails implications, such as indifference towards learning. The indifference will, in turn, lead to less value being assigned to learning and lack of interest in it (Harackiewicz et al., 2008).

An attitude of learned helplessness suggests a person's exposure to disrupting events and experiences of failure. Such a person will gradually realize that the results and implications of these events are formed regardless of the choices he makes. In other words, the person registers the independence of results from his choices, and concludes that what he does has no bearing on the results. In these circumstances, the person experiences mental anxiety and reduced self-efficacy. The assumption is that when the implications of a behavior are independent of choices the person makes, there is no motivation to control the outcome. The lack of control will then entail its own set of outcomes: reduced motivation to respond, debilitation of cognitive capacity to perceive success, and finally, an increase in the number of negative emotional responses (Putwain, Wood & Pekrun, 2020; Shaowei & Chia-Ching, 2019; Oyelekan, Jolayemi & Upahi, 2019; Maier & Seligman, 1979). Research findings have demonstrated that after numerous failures, one's efforts to respond to different situations slacken (Maier & Seligman, 1979). As one realizes behaviors and results are independent, one's anticipation of change diminishes. In most cases, such a person's voluntary responses to a situation grow weaker as well. People tend to extend their learned helplessness reactions to other circumstances as well; consequently, their learned helplessness turns into a helplessness as habit before long. (Abramson et al. 1978) have proposed an attributive framework for such behaviors. According to their framework, based on the nature of the rationale one employs

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to make sense of an event, and also based on the three criteria of stability (or instability), generality (or exclusivity) and internality (or externality), the resulting helplessness will be specified (Peterson & Steen, 2002) As a motivational factor, self-efficacy can boost academic performance and reduce anxiety; therefore, identifying factors influencing self-efficacy can play a major role in students' academic success and the development of educational systems. Self-efficacy is one's capacity to face challenges to realize goals and achieve success. More than the students' intelligence or their learning capabilities, personal characteristics such as trust in oneself (confidence), fighting spirit, ability to analyze reasons for failure (self-evaluation), ability to devise new arrangements and social methods to achieve goals (self-regulation), and the ability to control impacts (self-leadership) lead to academic development and success. Self-efficacy influences behavior selection, engagement and effort extension, and pursuing goals. Furthermore, it determines the way one faces obstacles and challenges. According to Bandura's theory, self-efficacy plays a critical role in a person's psychological adaptability, resistance to mental problems, physical well-being, and also self-guided behavior-altering strategies (Maddux, 2003). Many researchers have studied the link between self-efficacy and academic success. (Ozkal, 2019) studied the influence of self-efficacy and metacognition on mathematical performance of middle-school students in Turkey, concluding that there is a relationship between self-efficacy, metacognition, and mathematical performance.

Göktepe Yıldız (2020) demonstrated that teaching metacognitive concepts can improve geometrical performance of teachers who were undergoing education as part of their teaching careers. Teaching metacognitive concepts can improve teachers' awareness of learning. Tossavainen et al. (2021) studied freshman engineering students in Sweden to establish a link between self-efficacy and mathematical performance, showing that students with more self-efficacy perform better mathematically.

Nicoloff (2018) have studied self-efficacy, anxiety, and attitudes towards mathematics among students at a college in southwestern USA. Their findings indicated that as self-efficacy increases, anxiety and negative attitudes towards mathematics can be alleviated. Ozkal (2019) examined the influence of self-efficacy on learning and academic development of sixth, seventh, and eighth high-school forms in Turkey. According to their findings, the students' belief in their self-efficacy in mathematical learning and performance has a significant relationship with their educational development.

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Paying attention to the quality of education is crucial in promoting student acceptance and advancing science (Ferrándiz, Puentes, Moreno & Flores, 2016; Hoveida & Molavi, 2008; Birnbum, 1998) as centers of scientific, cultural and educational production, universities are the source of innovation necessary for solving society's current issues (Haji Khajelu & Hesampour, 2011). The ongoing and regular evaluation of students' academic performance is necessary for devising better educational plans and improving the quality of education, especially in universities, making it an indispensable asset for improving the quality of education, and ultimately, for adjusting and enhancing administrative capabilities (Hojjati et al., 2017; Sajadi, 2003). The coronavirus pandemic has affected all human activities, and its impact on students' academic life has been especially noticeable (Papapicco, 2020). Institutes of education were shut down in over 60 countries all around the world as a result of the critical conditions brought about by the pandemic, compelling educators to turn to virtual tools (Iyer et al., 2020). While virtual education was already common before the coronavirus pandemic, its adoption by most governments as the prevalent educational system during in the critical situation caused by the pandemic was a notable change, and its quality and performance remain to be fully studied and evaluated (Abasi et al., 2020). The present study is an attempt to examine the influence of metacognitive beliefs and behaviors preventing health-oriented academic lifestyle mediated by self-efficacy on students' academic development during the coronavirus pandemic. Based on these premises, the present study will try to answer the following question:

Is there a link between metacognitive beliefs through self-efficacy and health-oriented academic lifestyle preventive behaviors through learned helplessness?

### 1.1. Methodology

The present study employs a descriptive correlational research design. Most variables were examined through the path analysis method. The participants were 239 randomly selected undergraduate engineering students at Imam Khomeini Azad University. Study goals were described and engaging participants' attention, three questionnaires of metacognitive beliefs, self-efficacy, and health-oriented academic lifestyle were presented to them via an online platform. The collected data was analyzed using SPSS 26 and Amos software programs. The inclusion criterion was the students' involvement with education for at least one semester, and the exclusion criterion was their failing to answer at least 95 percent of questions.

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Wells' Metacognition Questionnaire-30 (MCQ-30). MCQ-30 is a self-report scale developed in 1997 and revised in 2004 by Wells and Cartwright-Hatton. In its current form, it consists of 30 questions using a 4-point Likert scale (1 = do not agree, 2 = somehow agree, 3 = agree, 4 = completely agree). The scale comprises five sub-scales: 1. unruliness and danger, 2. positive beliefs about concerns, 3. confidence in memory, 4. necessity of thought management, 5. cognitive self-awareness. The psychometric attributes of the questionnaire were examined by (Shirinzadeh et al., 2009). The questionnaire's Cronbach alpha was reported as 0.91 for the entire questionnaire, and 0.87, 0.86, 0.81, 0.80, and 0.71 for unruliness, positive beliefs, cognitive self-awareness, and the necessity of thought management in Iranian samples, respectively.

Academic Self-Efficacy Beliefs Questionnaire (ASEBQ). This questionnaire was developed by (Zajacova et al., 2005). It takes account of four variables: confidence in academic performance in the classroom, confidence in academic performance outside the classroom, confidence in the ability to interact with the others in an academic context, and confidence in managing work, family, and academic lives. The questionnaire consists of 27 questions using a 10-point Likert scale (0 = complete lack of confidence to 10 = full confidence), meaning the lowest score a participant can get is 0 and the highest score a participant can get is 270. According to Zajacova, et al (2005) the reliability of the questionnaire can be between 0.72 to 0.90 (Shokri et al. 2011) have standardized the questionnaire in Iran. Their confirmatory factor analysis confirmed these variables. Furthermore, using the Cronbach alpha they calculated the reliability of these variables as 0.88 for confidence in academic performance in the classroom, 0.85 for confidence in academic performance outside the classroom, 0.83 for confidence in the ability to interact with the other in an academic context, and 0.72 for confidence in managing work, family, and academic lives.

The encouraging and preventive health-oriented academic lifestyle behaviors questionnaire. The questionnaire was developed by (Salehzadeh et al., 2018). It consists of 124 items categorized into 13 behavioral patterns. It was designed as a self-report questionnaire that can be answered either individually or as a group. 48 sections deal with behaviors promoting academic health, and 76 sections are dedicated to behaviors preventing academic health. The participants' answers are evaluated using a 5-point Likert scale from completely agree (5) to completely disagree (1). In the present study, due to the high number of questions which might cause fatigue and, in turn, reduce accuracy in answering questions of different sections of health-oriented academic lifestyle preventive behaviors, two behavioral models of effort withdrawal and learned helplessness were chosen to be

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evaluated. Base structures and the number of items in each preventive aspect of academic health were learned helplessness (10 items) and effort withdrawal (11 items). The internal consistency coefficients were calculated as 0.92 and 0.95 for learned helplessness and effort withdrawal, respectively (Salehzadeh et al., 2018).

## 1.2. Results

Table 1 demonstrates the descriptive values of mean and standard deviation of the study.

**Table 1.** Descriptive values of mean and standard deviation in the study (N = 239)

Base structures	Subscales	Mean	Standard deviation
Metacognitive beliefs	Unruliness and danger	20.33	6.816
	Positive beliefs about concerns	12.39	4.637
	Cognitive self-awareness	19.01	4.719
	Confidence in memory	9.15	4.011
	Necessity of thought management	9.36	2.951
	Total	68.26	18.223
Self-efficacy	Total	186.40	61.257
Learned helplessness	Total	24.21	12.575
Effort withdrawal	Total	29.97	13.398

Data distribution normality test: the results indicated that all variables are normal.

Correlation matrix of research variables: as demonstrated in Table 2, the relationship between total metacognitive beliefs score,  $r = 0.587$ , is negative and significant ( $p \geq 0.05$ ). Furthermore, the results indicate that the relationship between constructive communication pattern and academic health-oriented preventive behaviors (learned helplessness and effort withdrawal),  $r = 0.531$  and  $r = 0.457$ , respectively, were positive and significant.



The results also point to a negative and significant relationship between the self-efficacy score and academic health-oriented preventive behaviors (learned helplessness and effort withdrawal),  $r = -0.485$  and  $r = -0.394$ , respectively ( $p \leq 0.05$ ).

**Table 2.** Correlation matrix of metacognitive beliefs, self-efficacy, and academic health-oriented preventive behaviors

Variable	1	2	3	4	5	6	7	8	9
Unruliness and danger	1								
Positive beliefs about concerns	0.683**	1							
Cognitive self-awareness	0.579**	0.521**	1						
Confidence in memory	0.650**	0.554**	0.323**	1					
Necessity of thought management	0.693**	0.588**	0.566**	0.531**	1				
Metacognitive beliefs	0.915**	0.819**	0.748**	0.746**	0.806**	1			
Self-efficacy	-0.332**	-0.289**	-0.040	-0.437**	-0.285**	-0.337**	1		
Learned helplessness	0.553**	0.418**	0.179**	0.616**	0.346**	0.531**	-0.485**	1	
Effort withdrawal	0.426**	0.381**	0.151**	0.575**	0.330**	0.457**	-0.394**	0.771**	1

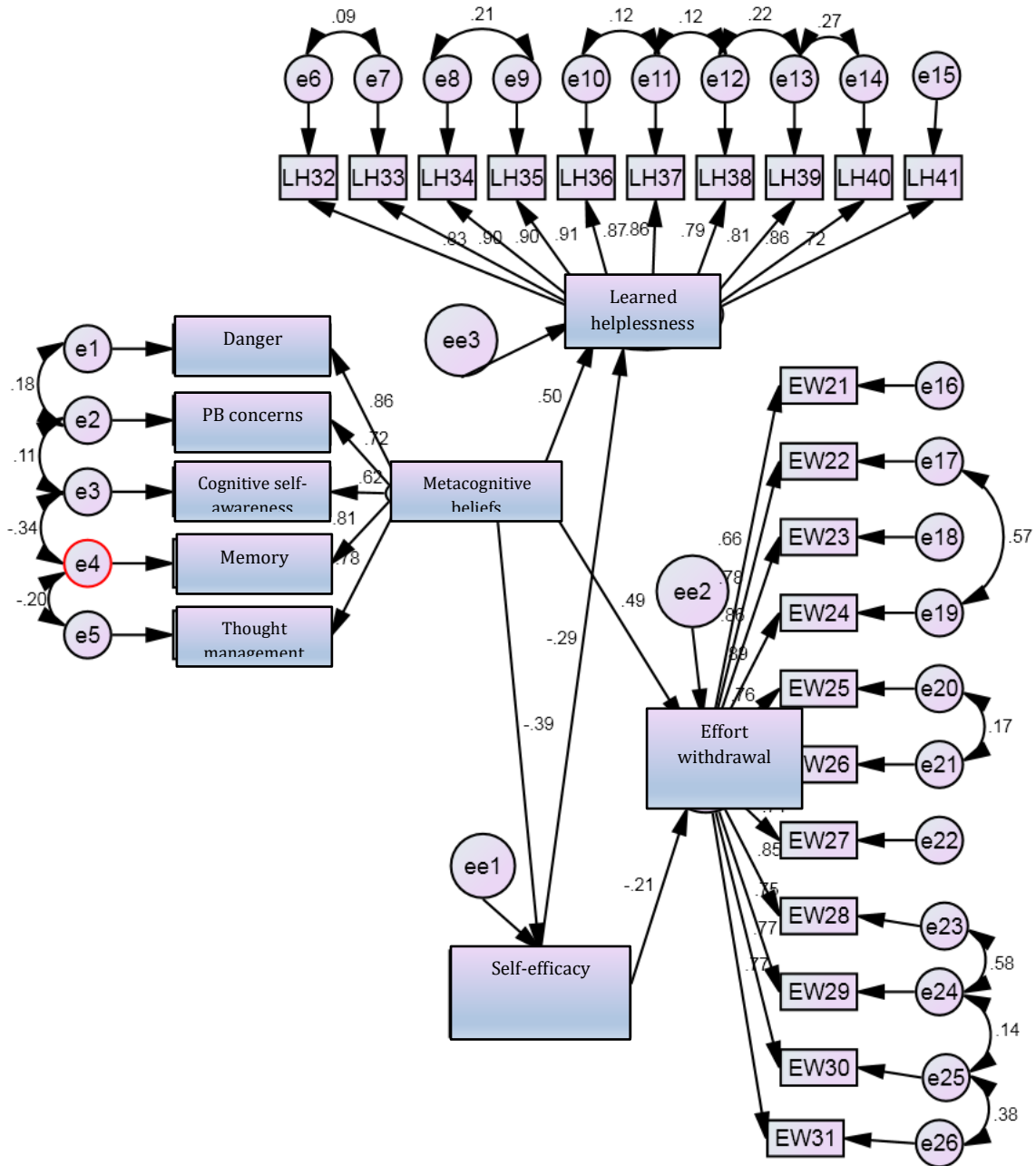
\*  $p < 0.05$ , \*\*  $p < 0.01$

Hypothesis under study: Metacognition beliefs mediated by self-efficacy influence academic health-oriented lifestyle behaviors.

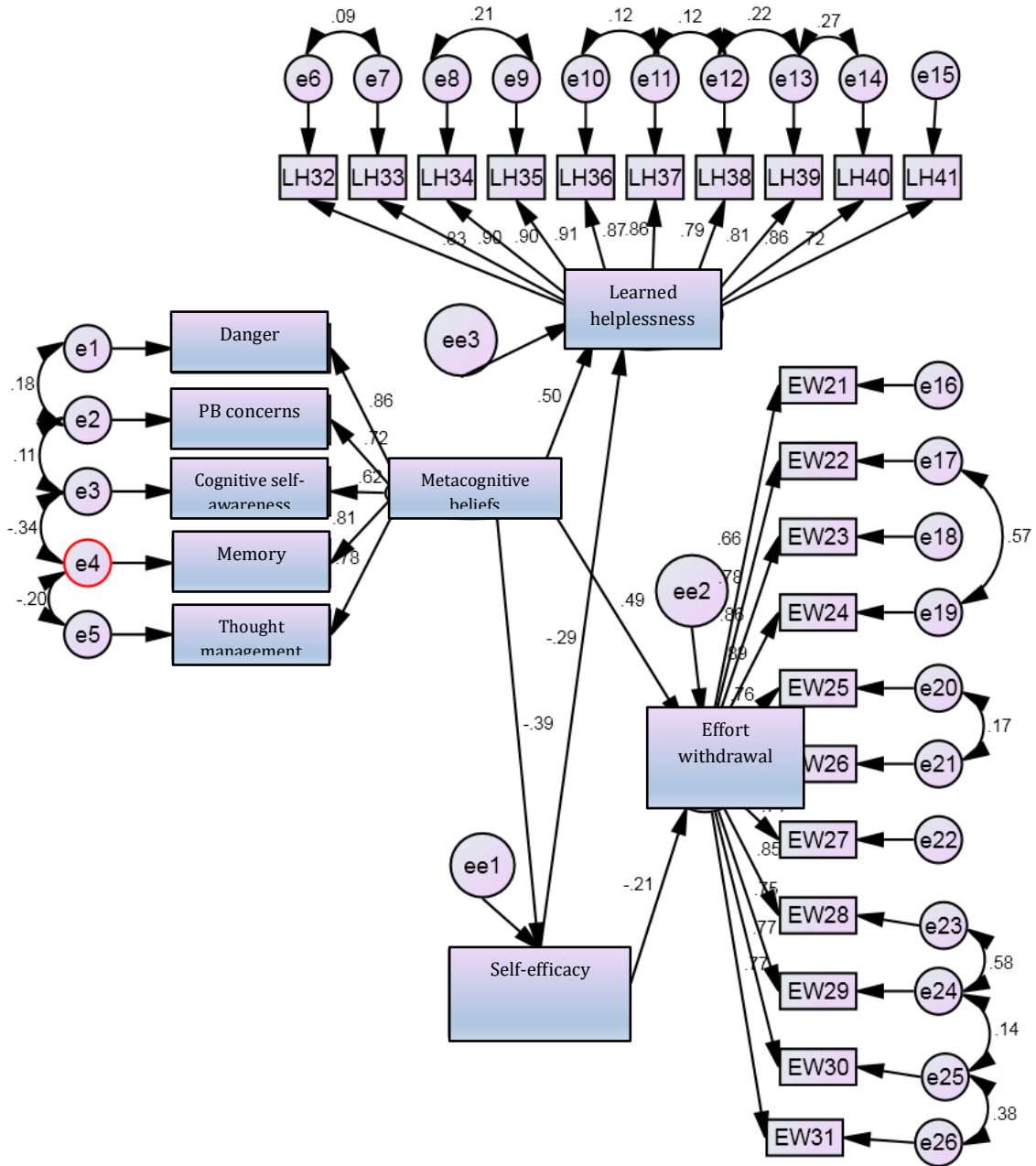
In order to formulate a distribution model for academic health-oriented lifestyle preventive behaviors mediated by self-efficacy, the path analysis method was adopted (Figures 1 & 2). As demonstrated in Table 3, chi-squared ( $X^2$ ) was calculated as 857.89, chi-squared divided by degrees of freedom ( $X^2/df$ ) was calculated as 2.813, the comparative fit index (CFI) was calculated as 0.91, the goodness of fit index (GFI) was calculated as 0.91, and the root mean square error of approximation (RMSEA) was calculated as 0.077. According to Hu and Bentler (1999) values greater than 0.90 for CFI and GFI, and values less than 0.08 for RMSEA indicate the proposed model's goodness of fit with the data.

**Table 3.** Goodness of fit indices for the proposed model after adjustment

	$X^2$	Df	$X^2/df$	GFI	CFI	RMSEA
Before adjustment	1143/044	320	3.57	0.863	0.862	0.104
After adjustment	857.89	305	2.813	0.91	0.91	0.077



**Figure 1.** Proposed model's distribution of scores for academic health-oriented lifestyle preventive behaviors through metacognitive beliefs mediated by self-efficacy, before adjustment.



**Figure 2.** Proposed model's distribution of scores for academic health-oriented lifestyle preventive behaviors through metacognitive beliefs mediated by self-efficacy, after adjustment

As demonstrated in Table 4, before analyzing the results and presenting data derived from the base equations' output model through Amos software, research variables' indices and markers, as well as path indicators were developed.

**Table 4.** The relationship between variables based on the proposed model.

Predictor	Criterion	Path type	Standard coefficient	Value of t	Significance
Metacognitive beliefs	Learned helplessness	Direct	0.503	7.268	0.001
Metacognitive beliefs	Effort withdrawal	Direct	0.492	6.255	0.001
Metacognitive beliefs	Self-efficacy	Direct	-0.395	5.858	0.001
Self-efficacy	Learned helplessness	Direct	-0.288	-5.024	0.001
Self-efficacy	Effort withdrawal	Direct	-0.210	-3.369	0.001
Metacognitive beliefs	Learned helplessness	Indirect	0.114	Sobel test 2.908	<0.05
Metacognitive beliefs	Effort withdrawal	Indirect	0.083	Sobel test 2.31	<0.05

Based on the findings, following a model adjustment, removing insignificant paths, and decreasing freedom degrees by establishing connections between predictor factors (Figure 2 and Table 4), metacognitive beliefs directly determined academic health-oriented lifestyle preventive behaviors through learned helpness, effort withdrawal, and self-efficacy with calculated distributions of  $\beta = 0.503$ ,  $\beta = 0.492$ , and  $\beta = -0.395$ , respectively.

Furthermore, based on the findings (Figure 2 and Table 4), self-efficacy directly determined academic health-oriented lifestyle preventive behaviors through learned helplessness and effort withdrawal with calculated distributions of  $\beta = -0.288$  and  $\beta = -0.210$ , respectively.

The indirect influence of metacognitive beliefs through self-efficacy on determining the variance of academic health-oriented lifestyle preventive behaviors in learned helplessness factor was calculated as 0.114, pointing to a significant mediatory effect.

The findings of the present study, therefore, establish a link between metacognitive beliefs mediated by self-efficacy and academic health-oriented lifestyle preventive behaviors of the learned helplessness factor. In other words, metacognitive beliefs mediated by self-efficacy influence academic health-oriented lifestyle preventive behaviors of learned helplessness.

Furthermore, the indirect influence of metacognitive beliefs mediated by self-efficacy in determining the variance of academic health-oriented lifestyle preventive behaviors of the effort withdrawal factor were calculated as 0.083, pointing to the significant influence of the mediator in this relationship.

Based on these findings, it can be surmised that metacognitive beliefs mediated by self-efficacy are linked to academic health-oriented lifestyle preventive behaviors of the effort withdrawal factor. In other words, metacognitive beliefs mediated by self-efficacy influence academic health-oriented lifestyle preventive behaviors of the effort withdrawal factor.

## Discussion and Conclusion

Many researchers believe that the tools adopted for conducting research, especially in academic contexts, should be built on a strong theoretical foundation (Nadi & Sajjadian, 2011). Among the crucial goals of an educational system are knowledge promotion, and identifying and removing the obstacles against learning to prevent academic failure among students (Abasi et al., 2020; Putwain, Wood & Pekrun, 2020; Oyelekan, Jolayemi & Upahi, 2019). During the coronavirus pandemic, education inevitably moved towards virtual learning, and given the fact that each person's potential capacity for learning is different, and people in similar circumstances learn at different rates and in different shapes, virtual learning entails advantages as well as challenges (Khamisabadi, Mirmehdi & Meraati, 2021; Papapicco, 2020). A review of literature indicates that self-efficacy and metacognitive beliefs are among the factors that may influence learning (Salarifar et al., 2011, Özcan, 2019; Gümüş, 2019; Nicoloff, 2018). The present study was an attempt to analyze the relationship between metacognitive beliefs and academic health-oriented lifestyle preventive behaviors through academic self-efficacy among students during the coronavirus pandemic.

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To summarize the results of the present study, it may be asserted that students who take advantage of high-level metacognitive strategies learn in more meaningful ways. In other words, these students form connections between the information they acquire during their studies and their preexisting knowledge, providing them with an opportunity to learn coherently (as opposed to fragmented learning). Therefore, they can achieve a more comprehensive understanding of what they learn, retain their acquired knowledge for more extended periods, perform better in their exams—especially in a subject like mathematics—, and form a more detailed image of their capabilities and self-efficacy . The findings indicated that metacognitive beliefs have a direct as well as an indirect link with learned helplessness as one of academic health-oriented lifestyle preventive behaviors through self-efficacy. To expound on these findings, and following (Nicoloff, 2018; Özcan & Eren Gümüş, 2019). It should be noted that students with lower levels of learned helplessness are more self-efficient, as they can perform better academically. Their better performance, in turn, influences their metacognitive beliefs and leads to a better awareness of learning strategies, and ultimately, their superior academic development. In other words, mental disruptions and lack of control are rarer in these students; therefore, their academic motivation is higher and their performance in subjects such as mathematics is better. Experiential evidence confirms these findings (Ozkal, 2019).

Learners who achieve higher levels of metacognitive abilities pay attention to what they learn, and form connections between the new information and their preexisting knowledge. In other words, these learners are aware of their learning process. As such, they can decide on superior learning strategies fitting their subject of study. As the number of metacognitive strategies students employ increases, during their learning process—either in the classroom or when they are studying on their own—they try to make sense of the information as they learn, create a learning environment ripe for academic success, and improve their academic performance, and as a result of their efficacy, they leave their sense of learning inability and mismanagement behind (Khamisabadi, Mirmehdi & Meraati, 2021; Hayat & Shateri, 2019; Ozkal, 2019). Similar to the study conducted by Shoawei & Chia-Ching (2019), the present study's findings indicate a significant relationship between learned helplessness/effort withdrawal and academic performance/belief in self-efficacy. Students suffering from learned helplessness believe that they have no control over the events influencing them. Cognitive and metacognitive strategies can help these students build up academic self-efficacy and enthusiasm. Furthermore, metacognitive beliefs can influence their self-confidence and improve their performance in carrying out their academic assignments.

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Furthermore, the results of the present study indicated that metacognitive beliefs can have a direct, as well as an indirect, relationship with effort withdrawal as an academic health-oriented lifestyle preventive behavior through academic self-efficacy viz. the higher the self-efficacy among the students, the lower the possibility of effort withdrawal in them. In other words, it can be surmised that as (Lajoie, Pekrun, Azevedo, & Leighton, 2020 ;Ozgur, 2021; Hayat & Shateri, 2019; Salarifar et al. 2016; and Flavell & Miller, 1998) have proposed, metacognitive beliefs are influential factors in processes of repression, denial, and avoidance. As one's metacognitive beliefs develop and evolve, one's image of one's abilities to face academic challenges improves. Our findings demonstrated that mediated by self-efficacy, metacognitive beliefs can have both direct and indirect influences on effort withdrawal as a preventive behavior in health-oriented academic lifestyles. In other words, metacognitive beliefs can influence a student's effort withdrawal via self-efficacy. Additionally, in line with the studies mentioned in the introduction, regarding the relationship between self-efficacy and metacognitive beliefs and health-oriented academic lifestyle preventive behaviors, the present study surmised that an organized and coherent understanding of concepts, and refraining from disjointed learning can orient students towards better learning (Göktepe Yıldız, 2020; Oyelekan, Jolayemi & Upahi, 2019). This approach alleviates a student's learned helplessness and sense of inability. In addition, determined and purposeful learning tendencies lead to self-evaluation, academic behavior management, and ultimately, to academic enthusiasm, and effort withdrawal reduction and eventual cessation as results of self-efficacy and apt metacognitive beliefs (Lajoie, Pekrun, Azevedo, & Leighton, 2020; Tankari, Zouhin Toboula, Ousseini, 2020; Shaowei & Chia-Ching, 2019; Nicoloff, 2018; Salehzadeh et al., 2018). Such a person will not try to avoid challenging situations, and will not withdraw his efforts in such situations. Some researchers have demonstrated that as academic health-oriented lifestyle promoting behaviors in students increase, their preventive behaviors diminish, leading to their academic development and success (Putwain, Wood & Pekrun, 2020; Shaowei & Chia-Ching, 2019; Salehzadeh et al., 2018).

Several shortcomings afflicted the present study. The research sample was limited to the students studying in a specific field in a single university; therefore, the findings may not be applicable in other contexts. More extensive studies using samples from different universities and study fields are recommended. Furthermore, researchers in the present study did not consider social favorability and participants' biases. The studied factors should be analyzed in other environments to determine the



influence of culture and gender on the proposed model, and to gauge the impact of natural disasters and situations like COVID-19.

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## References

- Abasi, F., Hejazi, E. and Hakimzadeh, R. (2020). Lived experience of primary school teachers of teaching opportunities and challenges in the educational network Students (Shad): a phenomenological study. *Journal of Research in Teaching*, 3(8), 1-24. [https://journals.uok.ac.ir/article\\_61636.html](https://journals.uok.ac.ir/article_61636.html)
- Abramson, L. Y., Seligman, M. E. P. and Teasdale, J. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, 87, 49-74. <https://doi.org/10.4324/9780203884089>
- Anderman, L. H., & Anderman, E. M. (2009). Oriented Towards Mastery, In R. Gilman, E. Scott Huebner, M. J. Furlong (Eds.), *Handbook of Positive Psychology in Schools* (pp. 161-173). New York: Oxford University Press. <https://doi.org/10.4324/9780203884089>
- Amid, M., Shokri, O. and Zarani, F. (2016). Casual relations model of antecedents and consequences of health behaviors in university students. *RPH*, 10(3), 70-88. <http://rph.khu.ac.ir/article-1-2521-en.html>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.
- Birnbum, R. (1988). *How colleges work: the cybernetics of academic organization and leadership*. California: Jossey-Bass Inc.
- Biabangard, E. (2003). An Analysis of Metacognition and Cognitive Therapy. *Advances in Cognitive Sciences*, 4(4), 32-39. <https://icssjournal.ir/article-1-562-en.html>
- Burić, I., Sorić, I. and Penezić, Z. (2016). Emotion regulation in academic Domain: Development and validation of the academic emotion regulation Questionnaire (AERQ). *Personality and Individual Differences*, 96, 138-147. <https://doi.org/10.1016/j.paid.2016.02.074>
- Covington, M.V. (1984). The self-worth theory of achievement motivation Findings and implications. *The Elementary School Journal*, 85(1), 5-20. <https://doi.org/10.1086/461388>
- Deci, E. L. and Ryan, R. M. (2000). The "what" and "why" of goal pursuits Human needs and the self-determination of behavior. *Psychological inquiry*, 11(4), 227-268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)

Moradi et al. (2022)

Mult. J. Edu. Soc & Tec. Sci. (2022), 9(1), 39-58. <https://doi.org/10.4995/muse.2022.16879>

- Ferrándiz, E., Puentes, C., Moreno, P. J. and Flores, E. (2016). Engaging and Assessing Students through Their Electronic Devices and Real time Quizzes. *Multidisciplinary Journal for Education*, 3(2), 173-184. <http://dx.doi.org/10.4995/muse.2016.6375>
- Flavell, J. H., & Miller, P. (1998). Social cognition. In W. Doman (Series.Ed) & D. Kuhn & R. Siegler (Vol. Eds.), *Handbook of child psychology: Cognition. Perception and language* (5th ed., pp. 951-898). New York: Wiley
- Göktepe Yıldız, S. (2020). Geometrical problem-solving performance of preservice teachers: exploring the effectiveness of metacognitive strategies. *Malaysian online journal of educational sciences*, 8(4), 34-47. <https://eric.ed.gov/?id=EJ1271740>
- Haji Khawjelu, S. R and Hesampour, A. (2011). Towards a New Paradigm of Science: Some Reflections on the Trans-Scientific Nature of Second Model of Production of Science. *Journal of Culture Strategy*, 15(14), 165-161.
- Harackiewicz, J. M., Durik, A. M., Barron, K. E., Linnenbrink-Garcia, L. and Tauer, J. M. (2008). The role of achievement goals in the development of interest: Reciprocal relations between achievement goals, interest, and performance. *Journal of Educational Psychology*, 100, 105–122. <https://doi.org/10.1037/0022-0663.100.1.105>
- Hayat, A. A. and Shateri, K. (2019). The role of academic self-efficacy in improving students' metacognitive learning strategies. *J Adv Med Educ Prof*, 7(4), 205-212. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6820011/>
- Hojjati, A., Yarmohammadian, M. and Keshtiarai, N. (2017). Design an appropriate model for studying development evaluation of technical and engineering based on the lived experiences of teachers and students. *Journal of New Approaches in Educational Administration*. 8(2), 131-151. [http://jedu.miau.ac.ir/m/article\\_2410.html?lang=en](http://jedu.miau.ac.ir/m/article_2410.html?lang=en)
- Hoveida. R. and Molavi, H. (2008). Academic Quality Improvement Process from the Viewpoints of Faculty Members of Universities in Isfahan Province: A Comparison Based on Academic Quality Improvement Program (AQIP). *Iranian Journal of Medical Education*, 8 (1), 132-141. <http://ijme.mui.ac.ir/article-1-784-en.html>
- Hu, L. and Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6 (1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Iyer, P., Aziz, K. and Ojcius, D. M. (2020). Impact of COVID-19 on dental education in the United States. *J Dent Educ*, 84, 718-722. <https://doi.org/10.1002/jdd.12163>
- Jarvis, S. and Seifert, T. (2002). Work Avoidance as a Manifestation of Hostility, Helplessness, and Boredom. *The Alberta Journal of Educational Research*, 48(2), 174-187. <https://psycnet.apa.org/record/2002-18284-002>

Moradi et al. (2022)

Mult. J. Edu. Soc & Tec. Sci. (2022), 9(1), 39-58. <https://doi.org/10.4995/muse.2022.16879>

- Khamisabadi, M., Mirmehdi, S. R. and Meraati, A. R. (2021) Relationship of Academic Vitality, Academic Self-efficacy, and Meta- cognitive Skills With Lifelong Learning Concerning Mediating Role of Study Approaches. *Journal of Health Research*. 11(1), 1-10. <http://dx.doi.org/10.32598/JRH.11.1.1202.4>
- Lajoie, P., Pekrun, R., Azevedo, R., and Leighton, P. (2020). Understanding and measuring emotions in technology-rich learning environments. *Learning and Instruction*. 70, 101272. <https://doi.org/10.1016/j.learninstruc.2019.101272>
- Maddux, J. E. (2003). *The power of believing you can Handbook of positive psychology*. New York: Oxford university press.
- Maier, S. F. and Seligman, M. E. P. (1976). Learned helplessness: Theory and evidence. *Journal of Experimental Psychology: General*, 105(1), 3-46. <https://doi.org/10.1037/0096-3445.105.1.3>
- Nadi, M. A. and Sajjadian, I. (2011). A Study on Factor construction, validity, reliability and normalization of organizational learning capability scale middle school teachers in the city of Isfahan. *Quarterly Journal of Educational Innovations*, 40, 105-130. [http://noavaryedu.oerp.ir/article\\_78962.html?lang=en](http://noavaryedu.oerp.ir/article_78962.html?lang=en)
- Nicoloff, A. E. (2018). *Mathematics Anxiety and Attitudes as Predictors of Mathematics Self-Efficacy in Developmental Mathematics Courses*. ProQuest LLC, Ph.D. Dissertation, Grand Canyon University.
- Osoli, A., Shariarmadar, A. and Kalantarhormozi, A. (2016). Investigating the relationship between metacognitive beliefs and academic self-regulation and conflict between students and parents. *Counseling Culture and Psychotherapy*, 22(7), 83-104. <https://www.sid.ir/fa/Journal/ViewPaper.aspx?ID=355298>
- Özcan, Z. C. and Eren Gümüş, A. (2019). A Modeling Study to Explain Mathematical Problem-Solving Performance through Metacognition, Self-Efficacy, Motivation, and Anxiety. *Australian Journal of Education*, 63(1), 116-134. <https://doi.org/10.1177/0004944119840073>
- Ozkal, N. (2019). Relationships between self-efficacy beliefs, engagement and: academic performance in math lessons. *Cypriot Journal of Educational Sciences*, 14(2), 190-200. <https://doi.org/10.18844/cjes.v14i2.3766>
- Ozgur, S. D. (2021). Chemistry self-efficacy beliefs as predictors of students' metacognitive skills when solving chemistry problems. *International Online Journal of Education and Teaching (IOJET)*, 8(1). 132-147.
- Oyelekan, O. S., Jolayemi, S. S. and Upahi, J. E. (2019). Relationships among senior school students' self-efficacy, metacognition and their achievement in Chemistry. *Cypriot Journal of Educational Sciences*, 14(2), 208-221. <https://doi.org/10.18844/cjes.v14i2.2564>.
- Papapicco, C. (2020). Informative Contagion: The Coronavirus (COVID-19) in Italian journalism. *Online Journal of Communication and Media Technologies*, 10(3), e202014. <https://doi.org/10.29333/ojcm/7938>

- Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, 18, 315–341. <https://doi.org/10.1007/s10648-006-9029-9>
- Pekrun, R., Frenzel, A. Goetz, T., & Perry, R. (2007). *The control- value of achievement emotions: An integrative approach to emotions in education*. In P.A. Shutz, & R. Pekrun, Emotion in Education, (pp.13-36). San Diego, CA: Academic Press.
- Peterson, C. (2000). The future of optimism. *American Psychologist*, 55, 44–55. <https://doi.org/10.1037/0003-066X.55.1.44>
- Peterson, C., Steen, & T. A. (2002). Optimistic Explanatory Style, In C. R. Snyder, S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 244-256). New York: Oxford University Press.
- Putwain, D. W., Wood, P. and Pekrun, R. (2020). Achievement emotions and academic achievement: Reciprocal relations and the moderating influence of academic buoyancy. *Journal of Educational Psychology*. Advance online publication. <https://doi.org/10.1037/edu0000637>
- Rakoczy, K., Pinger, P., Hochweber, J., Klieme, E., Schütz, B. and Besser, M. (2018). Formative assessment in mathematics: Mediated by feedback's perceived Usefulness and students' self-efficacy. *Learning and Instruction*, 60,154-165. <https://doi.org/10.1016/j.learninstruc.2018.01.004>
- Salarifar, M., Pouretamad, H., Heydari, M. and Asgharnejad Farid Ali, A. (2011). Believes and meta-cognitive state, Inhibitor or Facilitator of Academic Self-Regulation. *Counseling Culture and Psychotherapy*, 7(2), 32-49. <https://www.sid.ir/en/journal/ViewPaper.aspx?id=251458>
- Salehzadeh, P., Shokri, O. and Fathabadi, J. (2018). Health-Oriented Academic Lifestyle: The Newly Emerging Idea in the Field of Academic Health Psychology. *Educational psychology*, 13(46), 1-30. [10.22054/JEP.2018.8474](https://doi.org/10.22054/JEP.2018.8474)
- Salehzadeh, P., Shokri, O. and Fathabadi, J. (2018). Development and Validation of the Promoting and Preventing Educational Health Academic Lifestyle Behaviors Questionnaire: Perspectives on contemporary theories of achievement motivation. *Quarterly of Educational Measurement*, 8(30), 61-105. <https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=606423>
- Shaowei, W. and Chia-Ching, T. (2019). The Impact of Learning Self-efficacy on Social Support towards Learned Helplessness in China. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(10). <https://doi.org/10.29333/ejmste/115457>
- Shirinzadeh, S., Goodarzi, M., Rahimi, C. and Naziri, G. (2009). Study of Factor Structures, Validity and Reliability of Metacognition Questionnaire-30. *Journal of Psychology*, 12, 445-461.
- Snyder, C. R., Shorey, H. S., Cheavens, J., Pulvers, K. M., Adams, V. H. and Wiklund, C. (2002). Hope and Academic Success in College. *Journal of Educational Psychology*, 94, 820-826. <https://doi.org/10.1037/0022-0663.94.4.820>

Moradi et al. (2022)

Mult. J. Edu. Soc & Tec. Sci. (2022), 9(1), 39-58. <https://doi.org/10.4995/muse.2022.16879>

- Snyder, C. R., Rand, K. L., & Sigmon, D. R. (2002). Hope theory: A member of the positive psychology family. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 257-276). New York, NY: Oxford University Press.
- Snyder, C., Lopez, S., Shorey, H. R., Rand, K. L. and Feldman, D. (2003). Hope theory, measurements, and applications to school psychology. *School Psychology Quarterly*, 18, 122–139. <https://doi.org/10.1521/scpq.18.2.122.21854>
- Tankari, M., Zounhin Toboula, M. and Ousseini, H. (2020). Implications of Uncertainty Avoidance and Procrastination on Some West African EFL Learners' Academic Behavior. *International Journal on Studies in English Language and Literature (IJSELL)*, 8(11), 1-19. <https://doi.org/10.20431/2347-3134.0811001>
- Tossavainen, T., Rensaa, R. J. and Johansson, M. (2021). Swedish First-Year Engineering Students' Views of Mathematics, Self-Efficacy and Motivation and Their Effect on Task Performance. *International Journal of Mathematical Education in Science and Technology*, 52(1), 23-38. <https://doi.org/10.1080/0020739X.2019.1656827>
- Weiner, B. (1994). Integrating social and personal theories of achievement striving. *Review of Educational research*, 64(4), 557-573. <https://doi.org/10.3102/00346543064004557>
- Wells, A. (2009). *Emotional Disorders and Meta cognition: Innovative Cognitive Therapy*. Wiley.
- Wigfield, A. and Eccles, J. S. (2000). Expectancy–value theory of achievement Motivation. *Contemporary educational psychology*, 25(1), 68-81. [doi:10.1006/ceps.1999.1015](https://doi.org/10.1006/ceps.1999.1015)
- Zajacova, A., Lynch, S. M. and Espenshade, T. J. (2005). Self-efficacy, stress, and academic success in college. *Research in Higher Education*, 46, 677-706. <https://doi.org/10.1007/s11162-004-4139-z>
- Zeidner, M. and Matthews, G. (2017). Emotional intelligence in gifted students. *Gifted Education International*, 33(2) 163–182. <https://doi.org/10.1177/0261429417708879>