The psychometric properties of students' attitudes, coping strategies, and psychological symptoms

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Article Info

ABSTRACT

This study examined the psychometric elements of psychological symptoms, attitudes and coping strategies and the impact of COVID-19 on learning among the university students in Malaysia. The design employed in this study was survey method, that centered on convenience sampling method. A total of 489 students from eight undergraduate program of year 1 to year 4 participated in the study. They enrolled in various disciplines ranging from chemical and food science, medicine, engineering, psychology, communication to religious studies program. Data was analyzed using exploratory factor analysis (EFA) with all items being grouped within the study's constructs, which subsequently, were tested using the establishment of measurement model of confirmatory factor analysis. The instrumentation for this study was adapted from Weiner's Attribution Theory, Expectations and Values Theory. Comparatively, in measuring the students' coping strategic approach, items were adopted from Greenaway. Additionally, the Counseling Center Assessment of Psychological Symptoms (CCAPS-62) scale was adapted to measure the eight constructs namely anxiety, social anxiety, academic distress, eating anxiety distress, family distress, hostility, and smoking abuse. The Cronbach's alpha values for all three constructs have indicated the accepted values. Findings revealed that the loading factors for the attitude, coping strategies and psychological constructs are at the accepted values and acceptable composite reliability values. Findings also indicate that the measurement model for the construct attitude, coping strategies and psychological have loading estimates that are statistically significant.
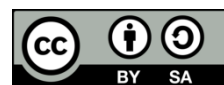
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1. INTRODUCTION

With the outbreak of COVID-19, almost 1.5 billion students from 190 countries experienced difficulties in attending their physical learning classes [1]. In particular, the traditional learning approaches were disrupted due the global COVID-19 pandemic [2] resulting in the restriction of all the social interaction that is central within the educational institutions in the attempt to curb the spread of the COVID-19 virus amongst the students. Accordingly, significant changes had to be made by many of the educational institutions by adopting digital-based learning platforms that provide opportunity for the students to remain

connected as well as engaged in their learning hence replacing the traditional face-to-face learning approaches that was extensively practiced [3]–[5].

Significantly, the COVID-19 pandemic inadvertently impacted students at various levels when continuous learning was practiced through the concept of remote learning that was actuated through the implementation of online learning over the previous offline session. This has also further led many of the educators and existing curriculum to adopt radical changes within the standard assessment and curricula to fit the immediate demand of online learning environment, encompassing mindful of technology, learning management systems, and various online learning platforms that that allows students to access learning resources from various places including their home [2]. Moreover, the drastic changes that took place also demanded many notable challenges to be faced and dealt with by many teachers during the pandemic including issues on teachers' preparedness for crisis, quality concerns for remote learning, financial and online learning process [6].

Using online learning strategies, students have the opportunities to engage in a virtual learning environment using the internet and other communication tools [7] in accessing their course materials anywhere and anytime [8]. When discussing on the advantages of online learning, researchers have argued that online learning provides greater flexibility and convenience, especially for students who are also simultaneously working or even with family commitments [9]. Secondly, online learning is perceived as being convenience and apt due to its accessibility for students to retrieve their learning materials at any time and any place. Thirdly, online learning also permits a large number of students to engage actively through interactive and creative learning environment within their hours of learning in comparison to the traditional face-to-face method which sometimes restricts the numbers of students that can participate in a class [9]. Comparatively, it is important however, to highlight that among the drawbacks identified in online learning may also include disruptions in the students learning environment such as problems in internet connections, limited internet access or even a high consumption in usage of electricity, data security problems or even additional internet services costs.

Other significant aspects pertaining to the downside of online learning include students' readiness to participate in their online learning sessions. Additionally, many of these students also experienced difficulties in connecting with their friends and teachers due to the limited exposure that they have on how to participate effectively in such online-based sessions [10]. These technical challenges were found to have psychologically affected students [11] and in turn led to empirically influencing their health condition such as reducing their immune system, or even increasing their anxiety level which subsequently, can result in imbalance physiological mechanisms [12]. More importantly, such negative psychological conditions were found to be typically experienced by students while participating in online learning mode classes amid the COVID-19 pandemic [13].

Apart from that, other negative implications related to students' online sessions comprise also the failure to adapt to the online learning environment due to the demand of long screen-time, lack of motivation and self-discipline as well as lack of focus to concentrate on what they learn online [14]. Subsequently, such previous findings have pointed out on the significant factors of the effects of online learning towards students' cognitive ability; which although is considered as an optional platform in learning during the pandemic, it can lead to serious repercussions on students' reasoning and acceptance, as well as memory processes, such as recalling pictures or even the ability to reflect on their own learning during class time [15].

Accordingly, there is a crucial need to examine students' psychological implications amid the COVID-19 pandemic due to the gap that existed in the literature pertaining to the investigation on students' feelings, such as anxiety or stress that they experience during the pandemic. At the moment, only a small number of studies have been conducted locally [16]–[18] in measuring the psychological implications of students in the midst of COVID-19. More importantly, these studies were found to only focus from the perspective of mental health, psychiatry and anxiety. Consequently, there is a need for the researcher to embark in exploring the psychological implications of COVID-19 by employing three variables (attitude, coping strategies, and psychological symptoms) to gain in-depth insights and provide alternative perspectives and solutions to the issue in question. In addition, the strength of this study also lies in the sampling involved, in which, it consists of all first-degree level of students of different years and fields of study.

In order to ensure in-depth insight were obtained regarding students' feelings and psychological implications during the movement control order (MCO) of COVID-19, it is important that relevant items were constructed to measure students' attitudes, coping strategies, and psychological symptoms. In doing so, the level of students' mental states as well as their wellbeing during the COVID-19 situation will be effectively measured in the attempt to understand how the different variables affect their psychological wellbeing. Thus, the aims of the study are: i) To assess the construct validity of attitude, coping strategies and psychological symptoms through exploratory factor analysis (EFA) procedure; ii) To assess the construct reliability of attitude, coping strategies and psychological symptoms among the students; and iii) To assess

the construct validity of attitude, coping strategies and psychological symptoms through confirmatory factor analysis (CFA) procedure.

Over the recent years, the implementation of online learning in education has been proven to be effective in students' learning process of the students. Online learning is perceived as an alternative method to motivate the students to focus on their learning in classroom. For instance, in a study conducted by Henry and Mamat [19] pertaining to students' attitudes towards learning in a Malay language course using digital technology indicate that the relationship between student attitudes and digital learning applications in schools is at a moderate level. Among the reasons identified was due to the fact that the application of digital technology was not being fully implemented in the teaching and learning process. Besides that, the attitude and the role of educators in the achievement of online learning play a crucial role in the successful implementation of online learning. Such notion is supported by a study conducted by Makhtar et al. [20] that concur the importance of innovative and creative teaching methods to be deployed by teachers in class, as it can increase the interest and attitude of students to continue to be consistent and ultimately show good performance in class. This is in line with Rusli et al. [21] who also reported that effective teacher teaching strategies such as student-centered teaching methods in the form of small group learning has a significant correlation with the students' achievement due to its capability to shape the students' thinking process.

In the context of online learning, Thomas [22] disclosed that 56 students studied have positive attitudes towards technology, self-regulated learning and online learning behavior using the massive open online course (MOOC) approach in India. Thus, students' attitudes towards technology have improved according to their personal affective level. In other words, students who have a high level of affective control were able to use their experience in learning and hence demonstrate a positive attitude towards the use of the technology during the course of their learning. The results also recorded a favorable impact towards students' self-learning behavior from the MOOC program particularly in students controlled of their learning in the online learning environment. Similarly, the positive attitude towards online learning was also recorded by study [23]. The attitude of Iranian students towards online learning during the COVID-19 pandemic was very positive and has the potential to improve the students' understanding towards the subject learnt. Moreover, this also corroborates with the findings revealed in a study conducted by Muzammil et al. [24] which reported that interaction among students and online learning methods have a positive effect on students as it allows active engagement in their learning. Specifically, the findings showed the students enjoyed and showed a high level of satisfaction with their learning experience in their online class.

Additionally, in response to the requirement of physical distancing in the COVID-19 situations, many of the institutions of higher learning had to shift to an emergency online learning format. Subsequently, such shift has been deemed to exacerbate academic stress for students. According to Grubic et al. [25], there are further needs for in-depth research to investigate how the impacts of academic disruptions lead to the decrease in motivation towards learning, increased pressure to study independently, forced daily routine to be abandoned, or even the possible higher dropout rate in colleges. Such move is crucial as it is evident that the effects of stress and depression have long-lasting psychological effects on students' ability to face issues, challenges and adapt to new environments. This is because students' ability from the aspect of coping strategies is important when they study in a different learning environment [26]. In essence, the relationship of students' coping strategies with the pandemic is related to emotional management, self-learning management, time management, and adaptation of learning places and effective communication skills. This notion is supported by the results gained from previous study which revealed that students who use a person-centered approach can effectively manage coping strategies and the environment, usually get better results than students who are less successful in managing coping strategies [27]. Subsequently, such outcome demonstrates that in addition to good cognitive ability, students need to manage coping strategies well to ensure good learning results when facing stress in life. The positive findings reported in this study showed that the person-centered approach has advantages of providing good coping strategies, increasing the social connections amongst students and improve the ability of students' cognitive. These results suggested that encouraging flexibility in coping strategies would help to improve university students' self-efficacy.

The next factor involved pertaining to students' psychological symptoms is the anxiety and stress faced during online learning even after the pandemic ends. This is crucial to be looked into as the changing of learning method from traditional learning mode to digital learning has had an impact on the acceptance of their own learning capabilities. According to Sahu [28], the challenge of switching to an online format raises concerns for students not only regarding the variation and application of equipment to the adaptation but also their own ability to use the sophisticated tool. Students not only face increased stress related to educational access, isolation, but also anxiety related to mental health [28], [29], hence affecting their daily lives as students. Known as the effect of psychological stress that disturbs the cognitive and emotional state of the students, this factor is closely related to their adaptation at home or campus, expenses to be spent, and daily survival as well as provision of learning materials and better health needs during the pandemic period [30].

Issues on the effects of depression and anxiety in learning during COVID-19 were also documented on a group of Brazilian students [31]. Based on a sample of 152 students who undergoing online learning from various academic disciplines such as medicine, psychology, law, engineering, physiotherapy, and business students, majority of these students showed negative emotional, learning experience, financial, social and technological effects along with a significant difference in the presence of depressive symptoms. However, the students were also found to present moderate anxiety levels, with no significant differences between genders and mild levels of depressive symptoms with significant differences between genders. This finding is, however, contrary to Morishima *et al.* [32] which reported that students who attend online classes have low level of mental health symptoms. According to the conservation of resources theory (COR) individuals usually depend on resources that provide complete learning facilities and opportunities for social interaction when participating in face-to-face classes. However, during the pandemic period, many resources were inaccessible. Hence, rather than being left in despair, gradually led the students to accept the reality of having lack of resources during such particular period. Accordingly, as documented in the results of this study, many of the students who participated in such online classes inadvertently accept the absence of resources during school closures, thus reducing the stress level that might have existed amongst them.

2. RESEARCH METHOD

2.1. Subject

A convenience sampling technique was used to select the sample of this study. This technique was chosen in gathering the relevant information from the study's sample as it is easy to obtain due to the more favorable responses gained in relation to participants' willingness to participate and conveniently conducted as part of the research [33]. The total sample for this study is 489 students involving the age range of 21 to 24 years old. 53% (N=260) were female, and 46% (N=229) were male students. Based on the age group, a total of 291 (59.5%) students were 20 years old, 124 students (25.4%) were 21 years old, 51 students (10.4%) were 22 years old, and 23 students (4.7%) were 23 years old. A total of 240 students were from the urban districts while 235 students were from the suburban districts. Additionally, a total of 14% of students (N=70) were first year students, 21% (N=107) were second year students, 38% (N=140) were third year students while 45% (N=172) were final year students. All students participating in the study were full-time students.

The samples involved five major faculties from eight programs namely, the chemical science, medicine, engineering, psychology, communication, and religious studies. Moreover, due to the limited numbers of sampling, it was decided that the convenient sampling technique was to be implemented as it is considered suitable in selecting students who were currently studying at their universities. Other reasons or criteria in selecting students were typically based on students who were able to fulfill the following: i) students who have experienced a period of COVID-19 during the learning process at universities in Malaysia; ii) students who were following learning at different faculties such as psychology, social sciences, religious, medicine, science and engineering; and iii) students who are still studying from year 1 to year 4 at the campus during the period of the data collection stage. Those who were excluded were those who had completed their studies or alumni as well as students who were studying part time and currently working in the public and private sectors.

2.2. Instrument

The survey method is deemed as being the appropriate technique for obtaining the parametric test data with the purpose to infer the population [34]. In this study, three major instruments were employed. The instruments include students' attitude, students' coping strategies and The Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62). In addition, the items that represent the students' attitude was adapted by integrating Weiner's Attribution Theory and Expectations and Values Theory. Items were adapted from previous studies [35], [36] that were initially conducted their studies based on Weiner's Attribution Theory in relation to the need to work hard in studies in order to obtain good results were also employed in this particular study.

More specifically, for the purpose of the aims of this study, 25 items that measure students' attitudes during online learning were adapted and used in gaining insights to the issues in question. Following the EFA that was performed on the attitude construct, 13 items were dropped, and 12 new items were formed. Items that underwent such modifications include attitude and relation to online learning challenges, expectations and personal values of students. The items were measured with a good reliability ranging from 0.89 [32], and 0.74 [33] and finally at 0.92 [37]. The scale for the items is based on a 5-Likert scale between 1 (strongly disagree), 2 (disagree), 3 (neutral), and 4 (agree) and 5 (strongly agree) containing 12 items that were translated and modified based on context culture, social and locality. Specifically, the reliability for this attitude is 0.76 for Cronbach alpha.

On the other hand, the coping strategies instrument used for this study explained that the occurrence of the coping behavior of an individual is the result of the emerging feeling that he/she felt in the attempt to obtain something constructive when being encountered in a situation which is perceived as negative [38]. These also include problem-focused coping strategies such: i) planned problem solving that encompasses responding in the attempt to make certain efforts made with the aim at changing the situation, followed by an analytical approach in problem solving; ii) confrontational resilience that entails responding to changing circumstances that can reflect the level of risk that needs to be taken; iii) seeking social support or referred to as responding by seeking support from outside parties, whether in the form of information, actual help, and emotional support and finally; and iv) emotion-focused coping strategies which involve efforts aimed at modifying emotional functioning without attempting to change the stressor directly. It is worthy to highlight that emotion-centered coping behavior tends to occur when an individual feel that he/she is unable to change a stressful situation and instead willingly accept the situation at hand due to the restricted resources available in dealing with the situation at the particular moment.

As such, there are several sub-constructs that represent the items, which in this case include problem solving (item 1 to item 5), cognitive structure (item 7 to item 11), expression of emotion (item 12 to item 17), avoiding problems (item 18 to item 23), wish and hope (item 24 to item 29), self-criticism (item 30 to item 33) and the last construct is the social support (item 34 to item 38). Specifically, the coping strategies questionnaires were adapted from Greenaway *et al.* study [39] which is based on a 5-Likert scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), and 4 (agree) and 5 (strongly agree). It contains 38 items translated and modified accordingly to the 7 sub-contracts that are appropriate for local context of the study. After performing the EFA on the coping strategies construct, 15 items were dropped. The three constructs remained are the problem-solving construct (7 items), the wish and hope (5 items) and the self-critic construct (3 items). The total new items selected and employed are 15 items for the coping strategy construct. The reliability for these coping strategies is 0.87 for Cronbach alpha.

The third group of items developed for this study is based on the CCAPS-62 instrument which was constructed by the Counseling and Psychological Services at the University of Michigan in 2001 to fulfill the clinical, research, and administrative needs of counselling centers. The CCAPS-62 instrument is also intended to contribute valuable information to the science of mental health in college students. Accordingly, eight CCAPS-62 constructs have been developed which consist of the following constructs-anxiety, social anxiety, academic distress, eating anxiety distress, family distress, hostility, and drug/cigarette/substance use. It is significant to point out that all existing constructs are maintained except for the construct of alcohol and drug use, which in this case was replaced with cigarette use.

More specifically, a total of six items related to substance abuse were replaced by cigarette abuse in this study. Changes to these constructs were made in view that the students who are studying in Malaysia are not commonly alcoholics. Rather it has been a norm that most of the offenses committed by the students are typically due to the misuse of cigarettes on campus. The questionnaires were adapted from Pau *et al.* [40] with 0.94 validity value. The CCAPS-62 was based on a 5-Likert scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree) translated and modified accordingly to the 8 CCAPS-62 sub constructs based on local context of the study. Following the EFA being performed on the eight sub-constructs, 50 items were dropped, and 12 new items were formed and added. Examples of such items include the constant feeling of sadness experienced, and sleeping difficulty. More importantly the new CCAPS-62 for the 12 items involved in the construct obtained at an alpha value of 0.89 and according to Kerlinger [41] it shows a high reliability of value.

2.3. Reliability and data analysis

In order to analyze the measurement of the structural equation model, the first step that needed to be done is to perform the CFA where the proposed construct was tested from the aspect of compatibility pertaining to the data collected. The matching measure was based on the goodness of fit. If the matching index was not achieved, then the weak items needed to be discarded or correlated based on modification indices (M.I). This was aimed to determine the reliability of the structural equation model that is based on the reliability of the indicators being represented by the concept of latent variables in the measurement model [42]. This analysis was also used for the purpose of convergent validity and construct reliability.

2.4. Ethics in research

All student's participation in this study was truly based on the voluntary basis; thus, before participating, students were asked to provide their consents. Students who are reluctant to participate were not being selected as participants for this study. All students received the questionnaires in early 2022 which asking them to provide their responses on the challenges in the informal mentoring within their place context. In order to protect the students' identities, pseudonyms are employed in this study; their identities are replaced with 'S1' to 'S489'.

3. RESULTS AND DISCUSSION

3.1. Exploratory factor analysis

To examine the items' validity and internal consistency, EFA using varimax rotation procedure was employed. Before proceeding with the EFA analysis, the Kaiser-Meyer-Olkin (KMO) test was required in determining the measurement of sample adequacy. Based on the KMO result, the values for both coping items and attitude's item were found to have exceeded the accepted values which is more than 0.6.

Table 1 shows the findings of EFA analysis using the principal component extraction method with varimax rotation (variation maximization) approach. The 25 items of students' attitude were tested together with 38 items on students' coping patterns. In addition, 12 items on students' psychological symptoms were also being tested alongside with other two constructs. Results in Table 1 show that the value of Bartlett's test of sphericity is noted with significant value (p<0.05) for all three major constructs together with the results of the measurement of sample accuracy (MSA) test using KMO. Based on the KMO results, all three constructs reported on values that exceeded the value of 0.6 Finch, 2019 in Hair *et al*. [42], coping strategies - 0.84; students' attitudes - 0.87 and 0.89 for psychological symptoms. As for the Bartlett's test of sphericity, results indicated that all three constructs reported on significant values: coping strategies (χ^2=11173.69; df=703' Sig=0.000), students' attitudes (χ^2=6349.62; df=300; Sig=0.000) and lastly for psychological symptoms (χ^2=3250.50; df=280; Sig=0.000). Based on these results, it is accurate to state that the data is suitable to continue with the subsequent data reduction procedure [42].

Table 1. KMO and Bartlett's test

	KMO measure of sampling adequacy	Bartlett's test of sphericity		
		Approx. Chi-square	df	Sig.
Attitude	0.87	6349.62	300	0.000
Coping strategies	0.84	11173.69	703	0.000
Psychological symptoms	0.89	3250.50	280	0.000

As shown in Table 2, factor loadings of the measurement indicators of students' attitudes item ranged from 0.601 to 0.738. The total variance explained is indicated at 34.45%. Based on EFA analysis, there is only one construct that represented the student's attitudes which taken from the rotated component table. The indicators of each construct also show good efficacy to measure the constructs, with average variance extracted (AVE) values equal to or exceeding 0.50 and the reliability, achieving acceptable values, above 0.70 [41]. All indicators are found to be statistically significant.

Table 2. Standard coefficient of students' attitude constructs

	Attitude constructs		
	1	2	3
BAT2	0.601		
BAT3	0.640		
BAT5	0.620		
BAT9	0.738		
BAT10	0.741		
BAT11	0.623		
BAT14	0.715		
BAT15	0.605		
BAT16	0.634		
BAT18	0.673		
BAT21	0.678		
BAT22	0.686		

The following analysis reports on findings obtained from EFA analysis indicated significant factor loadings of the measurement indicators of coping strategies ranged from 0.601 to 0.851 as shown in Table 3. Based on the EFA analysis, three sub-constructs were identified namely the construct of problem solving, wish and hope and self-critic. Constructs 1 contributed 9.12%, construct 2 presents 5.44% and construct 3 contributed 2.33% based on the eigen value. The total variance explained for the coping strategy construct is 23.99%. The indicators of each construct also show good efficacy to measure the constructs, with AVE values equal to or exceeding 0.50 value.

Table 4 illustrates the factor loadings of the measurement indicators of students' psychological symptoms item which in this case, ranged from 0.46 to 0.89. The total variance explained is indicated at 62.51%. Based on EFA analysis, there is only one construct that represents the students' psychological

symptoms. The indicators of each construct also show good efficacy to measure the constructs, with AVE values equal to or exceeding 0.50 and the reliability, hence achieving acceptable values, above 0.70 [38]. All indicators are also found to be statistically significant. In essence, the findings in relation to all three constructs are presented in Table 5 and which reported based on the items' numbers, KMO results, loading items values and the AVE results for all items. The total variance explained is at 62.51%.

Table 3. Standard coefficient of coping strategies construct

		Coping strategies constructs				
	1		2		3	
BCS1	0.646					
BSS3	0.655					
BCS4	0.701					
BCS5	0.626					
BCS10	0.685					
BCS11	0.648					
BCS26	0.601					
		BCS22	0.612			
		BCS23	0.832			
		BCS24	0.851			
		BCS25	0.731			
		BCS32	0.778			
				BCS16	0.692	
				BCS30	0.718	
				BCS33	0.625	
Eigen value: 9.12		5.44		2.33		

Table 4. Standard coefficient of CCAP construct

	CCAP constructs		
	1	2	3
CD12	0.67		
CA8	0.89		
CA9	0.89		
CSA1	0.57		
CSA2	0.58		
CSA4	0.86		
CSA6	0.88		
CSA7	0.75		
CAD1	0.76		
CAD2	0.67		
CAD3	0.74		
CAD4	0.62		
CAD5	0.80		
CS2	0.46		

Table 5 depicts all three items obtained from the EFA analysis. The total number for students' attitude construct is 12 items, while items for students' coping strategies are 15 items and 14 items for psychological symptoms. The loading values for students' attitudes range from 0.620 to 0.741, while coping strategies construct range from 0.601 to 0.851 and 0.46 to 0.890. The loading items for psychological symptoms is between 0.461 to 0.892. Next, findings from the EFA analysis are based on the respective construct: students' coping strategies, attitudes and their psychological symptoms during the COVID-19 pandemic situation. As shown in Table 2, factor loadings of the measurement indicators of coping strategies that were obtained, range from 0.601 to 0.851. The indicators of each construct also show good efficacy to measure the constructs, with AVE values equal to or exceeding 0.50 and the reliability, hence achieving the acceptable values of above 0.70 [38]. All indicators are also reported to be statistically significant.

Table 5. Items' numbers, loading value, AVE, and reliability

Constructs	Number of items	KMO results	Item's loading values	CR reliability (>0.70)	AVE results (>0.50)
Students' attitudes	12	0.87	0.620-0.741	0.93	0.53
Coping strategies	15	0.84	0.601-0.851	0.88	0.51
Psychological symptoms	14	0.89	0.461-0.892	0.94	0.69

In addition, results also indicated the AVE and composite reliability (CR) values. Based on analysis, the AVE for construct attitude shows the value of 0.53, with coping strategies resulted in 0.51 and CCAP resulted in 0.69 value respectively. The AVE value of the construct is above 0.5 and thus, this shows that the AVE value is acceptable. In comparison, while on one hand, the CR for this construct is above more than 0.7, and the construct for attitude is at 0.93, but on the other, the coping strategies is found to be at 0.88 while CCAP has a CR value of 0.94. A value more than 0.7 indicates a good and acceptable value in the study.

3.2. Confirmatory factor analysis

Besides the EFA findings, data was further analyzed using the CFA to ascertain the factor loadings based on the establishment of the measurement models in relation to the three major constructs identified: students' attitudes, coping strategies and psychological symptoms amid the pandemic COVID-19 situation. All measurement models related to the three constructs are presented in proceeding the Figures 1-3. Final version of measurement tool is shown in Table 6.

Table 6 shows the measurement tool of items after validation for attitudes, coping strategies, and psychological symptoms among students. After CFA, the construct for attitude consists 9 items, coping strategies consist 10 items and psychological symptoms were 8 items. The attitude construct has a value factor loading between 0.53 to 0.69, the coping strategies construct has a value factor loading between 0.59 to 0.77 and the psychological symptoms construct has a value factor loading between 0.37 to 0.96. In this validation constructs, researcher only accepted item values exceeding 0.50 from all item constructs.

Table 6. Psychometric of students' attitudes, coping strategies, and psychological symptoms

Attitude construct items	Coping strategies construct items	Psychological symptoms construct items
I plan every learning in every semester	I am focused on what I should do next	I find that I cry a lot
I am interested to only pass the course	I easily sympathize with others.	I'm easily scared of surprises
I do not have interest in thinking about academic matters	I constantly hope I don't get into any trouble	I am aware that I am surrounded by other people
I use positive words to shape good behavior	I fight for what I want.	I have difficulties to do my schoolwork
I possess interest in certain subjects only	I face and deal with the problem directly	I have a happy family
I interested to ask questions to lecturers in lectures	I avoid talking to anyone	I easily get angry
I choose friends with positive attitudes	I always hope for a miracle to happen in my life	I have thoughts to badly treat other people
I pray for blessings in life	I find ways to release my emotional stress	I regret for being a smoker
I Have a clear goal in learning	I have a desire for things to change	
	I realize that I am accountable for the difficulties that occur	

Figure 1 shows that all item factor loadings are between 0.53 to 0.69. In addition, the fit statistic index shows good values such as the goodness-of-fit index (GFI) value is 0.835, normed fit index (NFI)=0.766, comparative fit index (CFI)=0.785. Meanwhile, the root mean square error of approximation (RMSEA) value is 0.132, which is a relatively low value and proves that the items and model constructed have good consistency. Factor loadings obtained from the CFA model for the attitude construct show an acceptable result. This shows that this attitude item is appropriate and positive towards online learning on campus. This finding was supported by several researchers [43]–[45]. Most studies found that students' attitudes during online learning showed a positive development. This is because students' attitudes are driven by positive emotions and they consider online writing during the pandemic to be a challenge in their lives. Accordingly, findings showed that students' attitudes in online learning was linked to factors of interest, learning environment, and critical thinking. The findings also found that students with high self-esteem are usually able to adapt to a different learning environment even if the place of study has basic facilities. In addition, students who have a high attitude and self-esteem also have a positive relationship with critical thinking during online learning. This shows that they accept online learning because it is faster, easy to obtain digital materials and communicate visually with teachers and students more effectively.

In contrast to Rucsanda *et al.* [46] that reported students' attitudes towards learning music at the Faculty of Music, Romania during the COVID-19 pandemic. Descriptive analysis shows that students have a moderate level of satisfaction (34%) towards e-learning platforms and online education. The findings show that the e-learning method of music education for individuals is better than for groups. This is because individuals who follow the e-learning method of music are easier to understand, more focused, and can perform compared students learn in groups. Nevertheless, the findings also show that there is no significant difference in the e-learning method of music for theory subjects between individual groups and groups because it is easier for students to understand when learning online.
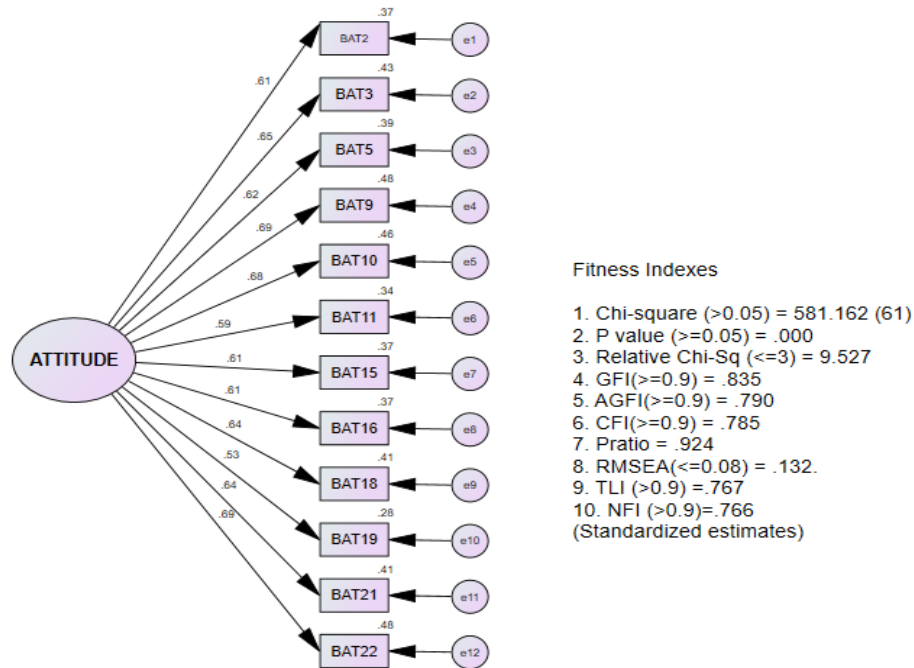
Figure 1. Measurement model for attitude

In addition, Figure 2 shows that all item factor loadings exceed the value of 0.50 values between 0.59 to 0.77. Furthermore, the fit statistic index shows good values such as the GFI value is 0.674, NFI=0.564, CFI=0.581. Meanwhile, the RMSEA value is 0.166, which is a relatively low value and proves that the items and model constructed have good consistency. In relation to that, some psychometric elements were also tested which consisted of discriminant validity. The findings revealed that the students' coping strategies item is appropriate and positive towards online learning on campus. As mentioned through findings of previous studies by Li and Che [47], there are several coping strategies employed by students to reduce stress during the COVID-19 period. A flexible plan to increase exercise time and improve physical fitness can be designed because it can improve the human immune system [47]. The reason is that introducing exercises to relax the cervical spine can provide relief to students during online learning.

In addition, appropriate reduction of class time and flexible learning with students' abilities can reduce student stress in a class. This study was supported by Logel et al. [48] revealed that students deal with the pandemic with creative methods that depend on the situation. The report also shows that there are three types of coping strategies which are related to hobbies such as students dealing with stress through music, exercise, cooking, and meditation. The second coping strategy is related to social activities such as making friends, finding new friends, visiting friends' rooms and partying as a therapy to deal with stress. Finally, students use technology such as cell phones to exchange text messages, talk on the phone, and use software that facilitates face-to-face communication (e.g., FaceTime) with friends. This method helps students in online learning and reduces stress when being able to share problems during the pandemic period on campus or at home.

In further, Rahmat et al. [49] conducted a study involving 353 students at a multimedia university in Malacca, Malaysia reported that 8 out of 14 coping strategies had a moderate correlation with students' attitudes towards online learning. This shows that students who have a positive attitude towards online learning are likely to use positive coping strategies which are active coping, positive reframing, planning, and acceptance. Similarly, students seem to have a good attitude towards online learning. This shows that students who study at multimedia universities have more positive attitudes and coping strategies because they have been exposed to online teaching tools and facilitate their learning on campus. In contrast, Okyere et al. [50] has different findings with previous studies. A study involving respondents in Fiji reported that they had many problems during the pandemic period due to the limited financial resources to buy computers and fast internet lines for learning purposes. Thus, they also need more time to adapt to the challenges of technology, financial resources and psychological pressure during the pandemic period.
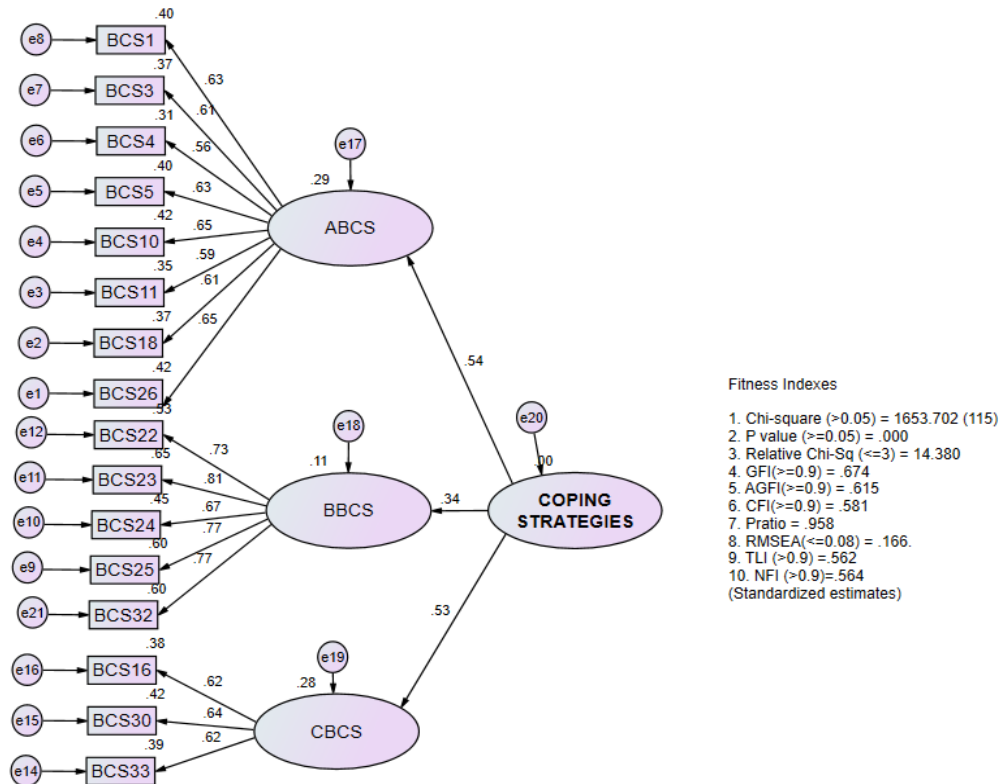
Figure 2. Measurement model for coping strategies

Lastly, Figure 3 shows that all item factor loadings are between 0.37 to 0.96. In addition, the fit statistic index shows a good value such as the GFI value is 0.999, NFI=0.999, CFI=1. Meanwhile, the RMSEA value is 0.038 which is a relatively low value and proves that the items and the model built and the model which is built has a good consistency. This finding is parallel with Uyar [51] look from a different perspective with other researchers. They found that digital learning allows students to think outside the box. Through online learning, students can hone ideas by thinking critically and creatively. It will also increase their participation by getting involved in all the activities carried out by their teachers. As such, previous studies [52], [53] revealed that implementing online learning resources can contribute to an increase in critical thinking, maximizing student learning, and the quality of student participation.

On the other hand, Hasan and Bao [54] study shows that students' psychological anxiety is high due to the disruption of e-Learning during the COVID-19 pandemic. The findings of this research confirm that psychological stress is associated with students not being able to finish learning in the semester. They face high psychological pressure during the pandemic when many uses online systems that disturb their minds. Among them are dealing with online class registration procedures, a small performance evaluation system, one-way instructor support, and spending a lot of time downloading e-learning content.

Meanwhile, Zhang *et al.* [29] found that students who study online at a Chinese University have a high level of psychological well-being. Findings show that Chinese students experience high symptoms of depression (29.95%), anxiety symptom (25.13%), and insomnia symptom (75.89%) compared to students who follow traditional face-to-face learning methods. In addition, the findings also found that smartphone use is also associated with symptoms of depression, anxiety and insomnia. Online learning using laptops and smart phones worsens the situation when many students suffer from mental health problems. Lastly, Wilczewski *et al.* [55] also found differences in findings with other researchers. Students who study online experience stress when they have to spend a lot of time alone, social isolation and lack of communication at home or on campus.
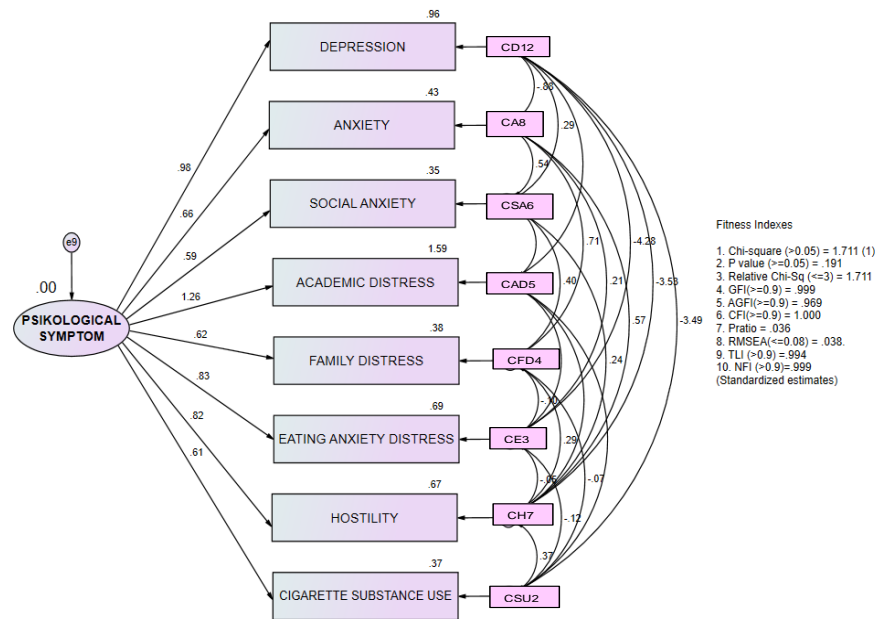
Figure 3. Measurement model for psychological symptoms

4. CONCLUSION

There are many studies that have proven the psychological impact on students due to COVID-19 and the change of traditional classrooms to an online environment. A good finding in this study is to combine attitudes, coping strategies and psychological among higher education students. This is because many online learning studies are focused on school settings rather than higher education institution. The findings of simple attitude, coping strategies, and psychological constructs show that the items are suitable and can be applied in the setting of higher education centers involving different programs. This may be because online learning seems to be the best option for teaching and learning in the COVID-19 pandemic, especially for students with good internet access. Thus, learning practices can be easily implemented by students anywhere because they are not constrained by time and space. It is suggested that the government sector must take steps to help students who have poor internet connections and gadgets which are the main prerequisites to be eligible to enroll in online courses. Although these findings are limited to the context of public universities in Malaysia, they can be a reference for public and private universities in preparing strategic plans involving students' mental health issues when faced with social isolation and online learning during the pandemic in the future.

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