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Technology Anxiety and its Impact on E-Learning System Actual Use in Jordan Public Universities during the Coronavirus Disease Pandemic

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Abstract: During the Coronavirus disease (COVID-19) pandemic, universities were obligated to transform from traditional classroom teaching environments to virtual ones. This sudden transformation highlighted the issue of low e-learning system usage amongst instructors of humanity faculties in Jordan's public universities. This study empirically investigated the moderating impact of technology anxiety on the relationship between the instructor's self-efficacy and the e-learning system's actual use to contribute to solving the problem. A survey was distributed to 468 instructors to test the theoretical framework, which yielded 285 valid and complete instruments analyzed using Structural Equation Modeling (SEM). Results showed the positive direct effect of self-efficacy on actual use. Furthermore, the level of technology anxiety moderated the relationship. Instructors with low technology anxiety showed a higher level of e-learning system actual usage than those with a high anxiety level. To improve the use of e-learning systems, top management must understand the fundamental role of compulsory training as the Covid-19 pandemic, and the instructor's confidence must be increased by providing training and support.

Keywords: Anxiety, COVID-19, e-learning, self-efficacy.

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Introduction

Information and Communication Technology (ICT) plays a significant role in every sector and industry, including the educational sector. The implementation of ICT in education is meant to benefit this sector with the valuable characteristics and innovation that ICT can improve the quality and the efficiency of the learning and teaching process (Alkhawaja et al., 2019). One fact of ICT that has come to the forefront is e-learning. The term "e-learning" has been used in diverse contexts. For instance, mixed-method learning, distributed learning and online learning (Altawalbeh, 2018). Moreover, a diversity of tools and technologies is engaged in each learning environment, such as the internet, websites, e-learning systems, virtual classrooms, radio, or TV broadcasts. The main objective of the e-learning systems in general and higher education specifically is to shrink the obstacles of time and location by allowing better access to the desired information (Ching-Ter et al., 2017). The value of e-learning has become evident in the Coronavirus disease (COVID-19) pandemic.

On December 31, 2019, the World Health Organization declared that a virus emanating from Wuhan, China, was spreading across the globe and causing death among citizens. The U.S. Centers for Disease Control and Prevention (CDC) defined the virus as a respiratory illness caused by a new Coronavirus initially spotted in China. It has been recognised in more than 100 countries internationally. The virus is known as "SARS-CoV-2," and the illness it causes has been called "coronavirus disease 2019/COVID-19." The source of infection was a mystery; the first theory was based on the fact that many patients at the epicentre of the outbreak in Wuhan, China, had some link to abundant seafood and live animal market, proposing animal-to-person spread. Accordingly, a growing number of patients reported that they did not attend the animal markets, which indicated that there is a person-to-person infection.

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Later on, a person-to-person spread was reported outside China, which made containing the disease almost impossible. Consequently, countries started to take precautions. For instance, closing borders preventing people from infected countries from entering, suspending import and export services, and closing ports. As the situation became more severe, World Health Organization (WHO) declared COVID-19 a pandemic.

In response to the crises, the Ministry of Interior in Jordan suspended flights arriving from the infected countries to prevent COVID-19 from inside the Kingdom. On March 17, land, sea crossings and airports were closed except for cargo as a measurement to surround the spread of the coronavirus outbreak domestically; the government of the Kingdom suspended all educational institutions starting from March 12, 2020, until further notice. The decision to suspend all educational activities was an extension of the leadership's concern for its children's safety. To ensure the continuation of the education process, The Minister of Education and the Ministry of Higher Education and Research directed the activation of distance learning for schools and universities during the suspension period. Students were able to continue the semester by taking courses virtually. For school, materials were broadcast through the national TV starting from March 15, 2020, and, starting from March 22, 2020, the ministry activated a distance learning platform whereby university students could continue their classes using the university e-learning system.

With the sudden enforcement of virtual learning in Jordan, students and instructors were expected to deal with the humble infrastructure and weak internet connections to continue with a new teaching and learning environment to cope with the Ministry of Higher Education and the Ministry of Education decisions to continue the semester during the lockdown. Based on the situation and the performance, decision-makers were expected to evaluate the technical aspects and human factors. It was found that the successful employment of a web-based learning system was most affected by the instructor's readiness to use the e-learning system because some instructors preferred the traditional classroom teaching method (Almaiah & Al Mulhem, 2020). Thus, in the transition to online teaching using web-based courses, decision-makers in universities needed to motivate instructors to implement the e-learning system to become a daily teaching routine to ensure successful adoption of the e-learning system (Almaiah & Alyoussef, 2019).

During the lockdown, instructors were directed to use the e-learning system to upload subject materials and interact with their students, which can be a big challenge for some instructors. For instance, according to Alassaf (2014), not all Jordan university instructors could properly utilise the e-learning system because instructors from humanity faculties showed a lower usage rate of the e-learning system than instructors from science faculties who tended to use the system more. Among the reasons was that instructors lacked confidence in their ability and skills to use the e-learning system, which makes the instructors feel disappointed and disabled, which prevents them from using the e-learning system because of their anxiety or shame if they used it incorrectly (Mirzajani et al., 2015).

Many prior studies have revealed associations between self-efficacy determinants like past success with technology, technology abilities, the period of ICT use, and utilisation of e-learning or training systems among instructors (Mirzajani et al., 2015). According to Fabry and Higgs (1997), self-confidence is a category of users' attitudes towards technology, depending on a user's personality and successful experience with technology. To examine this issue, this research explored the moderating impact of technology anxiety on the relationship between self-efficacy and actual e-learning system use in humanity faculties as a mandatory procedure during the shutdown in Jordan.

Literature Review

In 1975, Fishbein and Ajzen developed the Theory of Reasoned Action, which was the base for several later theories. In 1989 Davis developed the Technology Acceptance Model (TAM) to investigate human behaviour towards new technologies. Venkatesh and Bala (2008) established an advanced acceptance model based on TAM and called it TAM3. In this version, the authors included computer self-efficacy, computer anxiety, observations of computer playfulness, external control perceived enjoyment and objective usability as determinants of perceived ease of use to understand an individual's adoption and usage of information systems. However, Self-efficacy originally is a fundamental perception in social learning theory where self-efficacy reflects an individual's beliefs regarding his/her capability in performing specific technology tasks successfully (Bandura, 1977). The literature based on TAM suggested that self-efficacy is one of the greatest frequently used external constructs of TAM to understand individuals' skills, knowledge and capabilities in adopting information systems (Rezaei et al., 2020).

Self-Efficacy

In an e-learning system, self-efficacy is a crucial predictor of a user's performance during the actual user experience. Self-efficacy is defined as user's self-confidence in his/her capability to accomplish specific tasks using the e-learning system where users that have low skills to use the e-learning system have more probability of being unable to handle obstacles that face them, which will affect their use of the system (Al-Azawei et al., 2017). Furthermore, Awofala et al. (2019) defined self-efficacy in using technologies as the user's perceptions and beliefs about their competencies to perform performance levels. Self-efficacy has been shown to be a predictor of the instructor's future computer technology use. In other words, instructors with a high level of confidence in their computer skills will tend to develop a positive behaviour towards using the e-learning system, increasing their actual use of a system (Liu et al., 2017).

According to Awofala et al. (2019), more studies should be conducted to fill the literature gap relating to the effect of instructor's self-efficacy on their behaviour. Moreover, Lee et al. (2020) confirmed the direct effect of self-efficacy on actual use. Thus, this current study investigates the effect of instructor's self-efficacy toward using the e-learning system in Jordan universities.

H1. Self-efficacy has a significant direct effect on the e-learning system actual use.

Technology Anxiety

Celik (2016) defined anxiety as the degree to which an individual temporally experiences fear, apprehension, and aggression when using a virtual system or even considering using it. The concept of technology anxiety is a developed version of computer anxiety. Computer anxiety is defined as the extent to which a user expresses fear or difficulties when using computer devices (Adenuga et al., 2019) or as an adverse reaction based on previous experiences in using computers (Lee & Xiong, 2018). According to Fernando and Dinesha (2019), computer anxiety is anxiety related to personal computers. However, this concept can be extended to anxiety related to all kinds of technological tools in general. Thus, technology anxiety can be defined as the user's feeling of inability or lack of self-confidence in managing the technology effectively. Accordingly, it can be said that instructors who express anxiety in using the e-learning system have technology anxiety.

According to the literature, technology anxiety can rise not only because of lack of confidence but also because of unpleasant previous experience in using a particular technology (Lee & Xiong, 2018), an instructor's use of the e-learning system in this case. Moreover, Achim and Al Kassim (2015) illustrated that technology anxiety could be developed due to the technology's continuous change. Accordingly, technology anxiety may increase users' negative feelings towards their ability to follow up with the dramatic pace of technology, consequently affecting users' technology implementation in their work.

With the suspension of students' attendance at their educational institutes, instructors will continue teaching students via e-learning systems like MOODLE and Blackboard. This change in the teaching environment can pressure instructors who have not developed a high level of e-learning system acceptance and do not have enough confidence in his/her computer abilities and skills (Awofala et al., 2019). Adopting the e-learning system in higher education is essential because of its advantages on organisational and individual levels. However, the adoption of the e-learning system in higher education might not be accomplished when instructors do not have the required confidence in using ICT technology in teaching despite being digital natives (Awofala et al., 2019). Moreover, an instructor's lack of knowledge and computer technology skills may negatively impact students' learning process by transferring the opposing tendency to use the e-learning system to their students.

Self-efficacy and anxiety were found to play an essential role in determining an individual's behaviour. According to Alahakoon (2016), a person with high computer anxiety would have a more negative perception of using the technology (Alahakoon, 2016), which means that anxiety negatively affects users of the e-learning system. In other words, users' level of anxiety increases when they lack self-confidence and self-efficacy (Adenuga et al., 2019). This study investigated the moderating effect of technology anxiety on the relationship between instructors' self-efficacy and e-learning system use in Jordan Universities to examine this relationship. Thus, the following hypothesis is posited. H2. Technology anxiety moderates the relationship between self-efficacy and the e-learning system actual use.

Methodology

Measurement

A questionnaire was designed to survey respondents. The questionnaire used a 5-point Likert scale with responses ranging from 1 = strongly disagree to 5 = strongly agree for three constructs with 13 items that were altered from earlier research to ensure content validity. Self-efficacy items were adapted from Fathema et al. (2015), Najmul Islam and Azad (2018), and Wang and Wang (2009). Technology anxiety items were adapted from Celik (2016), whereas actual use items were adapted from Bastola et al. (2019) and Mohammadi (2015).

The instrument was translated into the Arabic language as all respondents were expected to be native Arabs. The first part contained demographic information such as gender, age and frequency of e-learning system usage before the pandemic. Then, items that measure the three constructs were briefly introduced, including a definition of each construct, allowing the participants to have a suitable understanding of the nature of the items to fill the survey. To verify the content validity and face validity, three experts in education systems refined the questionnaire. Then, 100 respondents were selected randomly to carry out a pilot study, as Bahkia et al. (2019) and Awang et al. (2015) suggested. Construct validity was examined using exploratory factor analysis (EFA). The result of the Exploratory Factor Analysis (EFA) procedure showed that the Cronbach's alpha to evaluate construct validity for self-efficacy is 0.891, for technology anxiety is 0.933 and for actual use is 0.880, which indicate that three constructs are reliable with Cronbach's alpha value above 0.7 (Bland & Altman, 1997). Moreover, as the survey includes items to measure more than one construct, Harman's one-factor test was performed to avoid the common method bias. Harman's one-factor

test suggests that common method bias exists if the variance of all constructs of the study is more than 50% (Podsakoff & Organ, 1986). For this study, Harman’s one-factor test showed a result of 36%.

Confirmatory factor analysis (CFA) was undertaken, while structural equation modelling (SEM) was performed to investigate the model’s causal effects. A multi-group CFA procedure was performed to check the moderating effect of technology anxiety on the relationship of self-efficacy on actual use. IBM-AMOS 24.0 was utilised to examine the construct reliability and validity.

Sample and Data Collection

The targeted population in this study were instructors of humanity faculties in public universities of Jordan. From April 2020 to July 2020, 468 questionnaires were distributed online to instructors of different humanity faculties in 6 public universities in Jordan. The questionnaires were accompanied by a cover letter discussing the survey, and all potential respondents were assured of their anonymity. Of those distributed, 285 surveys were completed resulting in a 60% response rate. Of these, 63% of the respondents were female, and 37% were male. Of the respondents, 3% were in the age range of 25-35, 32% were in the age range of 36-45, 41% were in the age range of 46-55, and 24% were 56 and above.

Measurement Model

Constructs should be validated regarding reliability (composite reliability and construct reliability) and validity (construct validity, convergent validity, and discriminant validity) to establish a measurement model (Alkhawaja et al., 2019). Individual CFA results in Table 1 show that the demonstrated fitness index values reached the required level.

Table 1: Fitness Indices for Measurement Model

Fit Indices	Measurement Model			
	Self-Efficacy	Computer Anxiety	Actual Use	Cut off Value
p value	000	000	001	
χ ² /df	2.221	1.988	2.034	< 3
GFI	.920	.910	.921	≥ .80
TLI	.954	.944	.955	≥ .90
CFI	.972	.937	.972	≥ .90
IFI	.972	.937	.973	≥ .90
RMSEA	.054	.063	.052	≤ .08

Composite reliability (CR) and average variance extracted (AVE) were computed. The results in Table 1 show that the value of CR and AVE for research was in an acceptable range and exceeded the required 0.50 (Dalila et al., 2020)). The CR for self-efficacy and Actual use were 0.920 and 0.917, respectively, while AVE were 0.698 and 0.735, respectively

Moreover, Fornell and Larcker’s (1981) approach was followed to test discriminant validity by comparing each square root of AVE with all construct correlations in a model. The discriminant validity obtained in Table 2 for self-efficacy and actual use were 0.835 and 0.852, respectively whereas, the square root of AVE for self-Efficacy and actual use was 0.83 and 0.85. Hence, AVE's square root was more than the correlations between variables, indicating that the discriminant validity was acceptable. In addition, the value of construct correlation was also below the threshold value of 0.85 (Nasir et al., 2020).

Findings

Structural Model and Hypotheses Testing

The SEM was used for analysing the relationship between self-efficacy and actual use. The measurement model in Figure 3 was created to check whether the first hypothesis was supported. The estimate carried out for results was a standardised estimate.

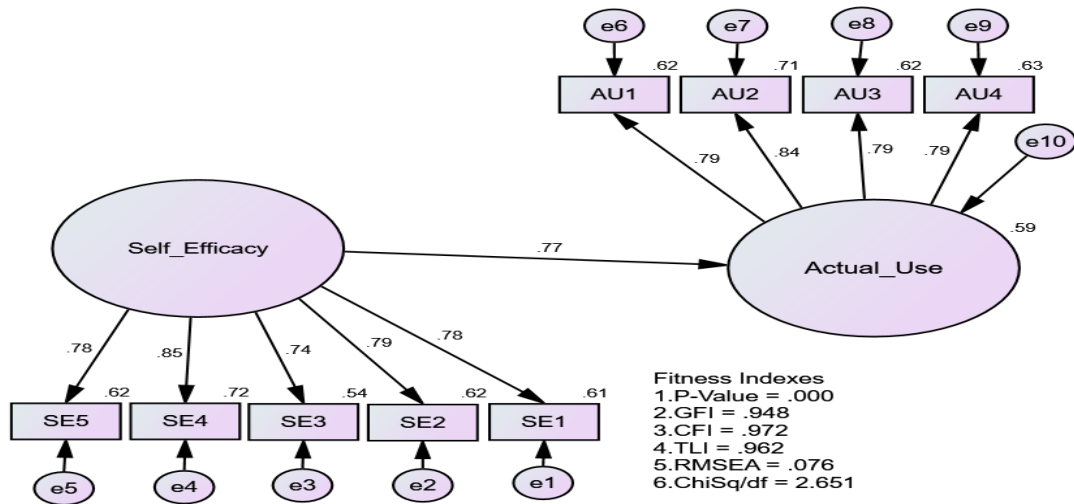


Figure 3: The Regression Path Coefficient among the Constructs

The results in Figure 3 shows that the structural model is fit with GFI=.948 (≥ 0.80), CFI=.972 (≥ 0.90), TLI=.962 (≥ 0.90), RMSE= .076 ($\leq .08$). In addition, self-efficacy had a significant impact on actual use with a P value of .000, 0.77 regression coefficient and 0.59 (R^2), which means that self-efficacy explains 59% of the population's actual use. Thus, the effect size for this research was moderate (Afthanorhan et al., 2019).

Moderating Effect of Technology Anxiety

To investigate the moderating impact of technology anxiety on the relationship between self-efficacy and actual e-learning system use Figure 4, the respondents were divided into two sets based on their technology anxiety level (i.e., low and high level of technology anxiety). Using AMOS 24.0, the constrained and unconstrained model's heterogeneity was achieved. According to Awang (2012) and Afthanorhan et al. (2020), the outcomes are significant if the Chi-square difference is above 3.84.

In this research, Table 4 shows that the difference in Chi-square value for both groups is group one (20.6), and group two (8.5) was higher than 3.84. Hence, the moderator technology anxiety significantly affected the relationship between self-efficacy and actual use of the e-learning system.

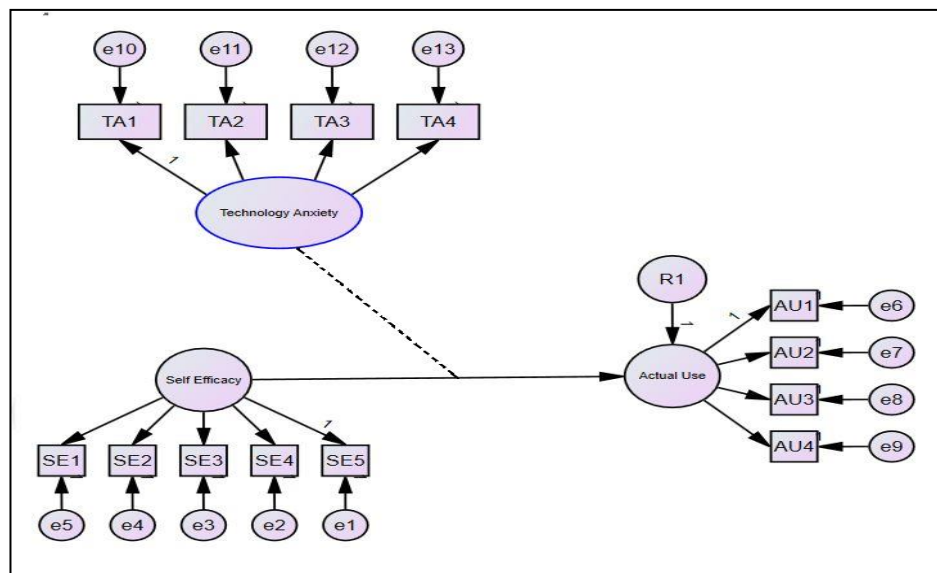


Figure 4: Model for Moderator Effect of Technology Anxiety

Table 4: Results Showing the Moderator Effect of Technology Anxiety

Independent Variable	Dependent Variable	Moderator Variable			
		Low Technology Anxiety (N=196)		High Technology Anxiety (N=89)	
		Unconstrained Model	Constrained Model	Unconstrained Model	Constrained Model
Self-Efficacy	Actual Use	47.2	67.8	36.2	44.7
		Chi-Square Difference = 20.6		Chi-Square Difference = 8.5	

Discussion

This study contributes to understanding the critical factors that influence the adoption of the e-learning system in Jordanian universities from the instructor's perspective. The factors that were examined have never been tested in Jordan universities. This study's findings represent novel contributions for the higher education decision-makers in Jordan to review and implement to enhance the e-learning system implementation.

The empirical findings from this study discovered a significant direct effect of instructor's self-efficacy and their behaviour towards using the e-learning system. In other words, instructors with a higher level of self-efficacy are expected to use the e-learning system more frequently. Therefore, instructors who are confident of their skills and knowledge will develop positive behaviour, use the e-learning system more frequently, and find it easy to encounter technology obstacles (Rezaei et al., 2020). This outcome is consistent with prior literature (Aldholay et al., 2018; Awofala et al., 2019; Liu et al., 2017). In some cases, instructors with low technology self-efficacy will consider using an e-learning system as unnecessary. Alternatively, they will use classic teaching methods as long as the system's usage is not compulsory, which will affect students' behaviour towards the usage of the e-learning system (Alomari et al., 2020) and their educational performance (Vo et al., 2017).

Moreover, this investigation results proved that the level of technology anxiety amongst instructors of humanity faculties affects their behaviour. Instructors with high anxiety levels towards using the technology will develop a negative attitude that can pass by to their students and affect the teaching process. According to Venkatesh and Bala (2008), the effect of technology anxiety on an individual's behaviour is assumed to decrease with more technology experience.

Computer anxiety is a personal characteristic related to the external environment (Cidral et al., 2018). Instructors experience with the e-learning system might be a reason for the existence of anxiety. Instructors who have unpleasant experiences while interacting with the e-learning system could feel less comfortable and more concerned with failing while using the e-learning system. This feeling can be related to the instructor age where older instructors face difficulties to cope with the technology acceleration, especially with the unexpected shifting that happened during the pandemic that forced universities to become totally dependent on the e-learning system to deliver the education for their students (Al-Hunaiyyan et al., 2017). However, 65% of the respondents were in the age range of 46 and above, which might explain the results.

Although adopting the e-learning system during the pandemic is crucial, instructors' skills and knowledge about using the system are important factors for implementation success. Instructors with low computer skills are most resistant to adopting the e-learning system in their teaching process (Khaloufi & Laabidi, 2017). The literature highlighted that most universities in Jordan had neglected the essential role of training the instructor to enhance their computer skills to emphasise their self-efficacy to use the e-learning system (Alsmadi et al., 2017), which resulted in failure of information delivery during the pandemic. If universities gradually engage the instructors through systematic training, instructors would not feel stressed by the sudden transfer during the pandemic.

Also, instructor's behaviour is vital for e-learning success. An instructor's effective usage of an e-learning system will ensure students active involvement in using the e-learning system, which will affect the success of the e-learning project in the universities as students are the prime stockholders of the project. Thus, it is vital to invest in improving instructors' skills and enhance their self-efficacy to ensure remote learning success during the lockdown.

Conclusion

The results shed light on an important issue to be considered in public universities in Jordan. Based on the study results, the following recommendations are proposed. First, to intensify e-learning system usage amongst instructors of humanity faculties, it is essential to inform the instructors about the adopted system's features and technical issues to gain a complete understanding of the e-learning system's usefulness and feel confident using it. Moreover, top management must understand the fundamental role of compulsory training as the Covid-19 pandemic has changed the educational environment. The e-learning system became the base of the education process in Jordan universities. Thus, the instructor's confidence must be increased by providing training and support from the top management (Costa et al.,

2016). Additionally, mandatory training will enforce productivity, positive attitude and encourage users to overcome the attitudinal barrier of using the e-learning system in universities (Safsouf et al., 2020). With the enforcement of instructor's confidence and skills, the sufficiency of usage will increase and the project of the e-learning system will expand its success.

Furthermore, according to "Jordan's Vision 2020," universities were to have enhanced the usage rate of the e-learning system to 100% by the end of 2020. However, university management cannot reach this adoption level of an e-learning system at any point as long as a considerable number of the instructors resist this transformation and show a low level of self-efficacy in using the e-learning system. This investigation was performed to encourage decision-makers in higher education to pay attention to the human factor and find solutions to increase instructor's use of the e-learning system and keep them motivated and confident.

Recommendations

This study targeted six public universities in Jordan. However, future work can expand targeted universities to reach ten public universities. The instrument in this work was distributed online. Future work can use the self-administrated distribution method to ensure a higher response rate. Replication of this study in other situations, locations and sample groups would help understand the individual's behavior and factors that affect their resistance to using the Information system. Lastly, a qualitative study using semi-structured interviews could provide deeper insights. It is recommended for future studies to investigate the role of training on instructor's behavior towards the e-learning system.

Limitations

Like other studies, this study is not without limitations. First, this investigation was limited to one exogenous construct, which is self-efficacy. Its usefulness may as not great as previous studies that used several factors to enhance the impact of the specific research project. Second, some papers mentioned that Actual Use should be treated as a second-order construct when applying the structural equation modelling method, which is not highlighted in the current study. Nonetheless, second-order constructs may not be useful if the items used for assessing the construct are not meaningful. Third, this research specifically focuses on public universities in Jordan. Thus, this research may not be relevant to other countries, which have different cultures. Last, the current study is based on a cross-sectional design that constrains causality inferences. Future work is encouraged to apply longitudinal designs to confirm the causal relationships between the variables.

Authorship Contribution Statement

Afthanorhan: editing/reviewing, and analysis. Alkhawaja: Conceptualization, design, and writing. Sobihah: Editing/reviewing, and supervision.

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