



## **The mediating role of perceived stress between smartphone dependency and psychological well-being among college students**

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### **Abstract**

Psychological well-being is one of the main elements in students' life, especially for successful adaptation to the college environment. Determining what factors influence students' psychological-well may provide valuable insights and ideas for the development of intervention programs. Therefore, this paper aims to examine the association between life events, smartphone dependency, perceived stress, and psychological well-being and whether perceived stress mediates the association between smartphone dependency and psychological well-being. Pearson correlations and multiple regression analyses with bootstrapped mediation were used to analyze the data in this study. The results show that life events were positively associated with perceived stress and that smartphone dependency was associated with higher perceived stress levels. Then, perceived stress was found negatively correlated with psychological well-being. However, smartphone dependency was not associated with psychological well-being. The bootstrapped analysis indicated that perceived stress fully mediated the association between smartphone dependency and psychological well-being. In summary, this study is significant for practitioners in well-being fields, such as counselors and educators, to promote students' well-being in higher education.

**Keywords:** Life events, perceived stress, psychological well-being, smartphone dependency.

### **Introduction**

Unhealthy psychological well-being can affect students' development, including poor academic performance, lack of motivation, social problems, etc. According to the National Health and Morbidity Survey, the prevalence of psychological problems among Malaysian adults increased from 10.7% in 1996 to 29.5% in 2015 (Institute for Public Health, 2015). Also, the Malaysian Health Ministry revealed that one in five students reported psychological problems in 2016 compared to one in ten students in 2011 ("Mental Health of Malaysian Students Cause of Worry: Health Ministry," 2016). A recent study found that stress is a significant predictor of students'

well-being (Rogowska et al., 2021). Lazarus & Folkman (1984) identified that stress occurs when there is an interaction between person and environment that is appraised as potentially threatening to one's well-being. The influence of various factors, including academic responsibilities, lack of social skills, financial pressures, and time demands are associated with the extent to which students perceive stress during their college years (Aherne, 2001; Tan & Yates, 2011).

As technology plays an important role in many aspects of a student's life, a smartphone is found as one way to reduce stress levels of college students. For example, a smartphone can help reducing stress by keeping on track with homework assignments, by providing easy access to learning material, by organizing a personal and academic schedule, and by helping students to complete assignments. Also, the applications of Facebook, Snapchat, Whatsapp, and Instagram, which can be accessed through a smartphone, accommodate the students to connect with their virtual friends and family members anytime and anywhere. However, despite the benefits of multi-functions of the smartphone, it can also be a disadvantage to their users. An empirical study conducted in the United States showed that high smartphone dependency was associated with poor psychological well-being (Twenge, Martin & Campbell, 2018). In this study, we define high smartphone dependency as "uncontrollable use of one's smartphone, preferring to conduct searches using one's smartphone to asking help from other people, always preparing one's charging pack, and feeling the urge to use one's smartphone again right after one stopped using it" (Kwon et al., 2013). In fact, a number of studies have reported that uncontrollable use of the smartphone has been linked to addictive behaviors (Chóliz, 2010), stress (Thomé et al., 2011), anxiety, and depression (Yang et al., 2019). All these studies indicated that higher smartphone dependency in the presence of stress may increase the risk of poor well-being. When preferring this situation, uncontrollable smartphone use could be a maladaptive way of dealing with stress and result in poor well-being. Based on Lazarus & Folkman (1980), the maladaptive strategies involve avoidance, denial, self-distraction, and detachment.

Empirical studies about the association between life events, perceived stress, smartphone dependency, and psychological well-being in the Malaysian context need further exploration. The findings in this present study could contribute to the literature in three ways. First, it examines the relationship between life events, perceived stress, smartphone dependency, and psychological well-being. Second, this study sought to examine whether perceived stress mediates the association between smartphone dependency and psychological well-being. Drawing from stress-coping theory (Lazarus & Folkman, 1984) and previous literature, we proposed to test a theoretical model that explains the direct effects of life events on perceived stress, and indirect effects of smartphone dependency on psychological well-being through perceived stress. Third, considering the rate of young Malaysians exhibiting high levels of phone dependency (Malaysian Communications and Multimedia Commission, 2017) it provides an appropriate context to examine the proposed association in this study. Besides, the use of smartphones has become a common trend among university students in Malaysia for them to do instant messaging, emailing, studying, entertainment, checking social media, and browsing the internet (Ching et al., 2015; Osman et al., 2012). Therefore, the findings will make a significant contribution to researchers and practitioners in understanding the association between life events and perceived stress, smartphone dependency and perceived stress which can also contribute to understanding the negative role that smartphone play in forming student's psychological well-being.

## Literature review

### *Life events, perceived stress and psychological well-being*

Despite a large body of research reporting that negative life events are associated with poor health outcomes (Berntson et al., 2017; Cohen et al., 2019; Kendler et al., 2000; Sherrill et al., 1997), little is known about the role of life events in the stimulation of perceived stress among undergraduate students. Burris, Brechting, Salsman & Carlson (2009) mentioned that college students encounter stress due to adjustment from school and home to independent living. This condition might be due to certain life events that they may not experience during school but have to face during college years, such as academic issues, family and peer pressure, separation from family members, interpersonal conflict, and financial difficulties (Dusselier et al., 2005; Hurst et al., 2013; Nisa & Nizami, 2014). In Malaysia, an empirical study indicated that academic issues such as examinations, a large amount of content to be learned, poor grades, lack of time to review what had been learned, having difficulty understanding the content and being unable to answer the questions from teachers were among the factors that lead to stress (Yusoff et al., 2011). However, the study only focused on the medical students and not considered other clusters such as technical and social sciences students. Thus, the first aim of this study was to address how life events correlate with perceived stress.

The second aim was to investigate whether perceived stress correlates with psychological well-being. Many previous studies reported that higher perceived stress among college students linked to poor psychological well-being (Bovier et al., 2004; Denovan & Macaskill, 2017; Singh et al., 2016). An empirical study among college students in the United States indicated that perceived stress was a mediator between smartphone use and psychological well-being (Rogowska et al., 2021). Psychological well-being refers to an “individual’s degree of a sense of wellness” (Diener, 1984). The element of psychological well-being is very significant for students to overcome any difficulties and ensure their healthy development. Although research has been conducted and has confirmed the association between life events, perceived stress and psychological well-being, this topic needs further exploration from the Malaysian perspective. To our knowledge, there are limited empirical findings of students’ well-being in higher education specifically concerning the association between perceived stress and psychological well-being of college students. In light of this, the present research aimed to identify the association between perceived stress and psychological well-being among college students at a technical public university.

### *Smartphone dependency, perceived stress, and psychological well-being*

Other than for communication purposes, the features of a smartphone provide many benefits to their users, including socializing, browsing the internet, entertainment, education, and banking activities. These advantages of the smartphone have become an integral part of life and thus increased smartphone ownership. Among Malaysians, smartphone ownership rose from 68.7% in 2016 to 75.9% in 2017 (Malaysian Communications and Multimedia Commission, 2016). Malaysian students in higher education spent approximately 6 hours per day on average using their cellphones (Zulkefly & Baharudin, 2009). To our knowledge, there are few empirical studies to date about the linkage between smartphone dependency and psychological well-being, specifically among college students in Malaysia. Furthermore, research about smartphone use was more likely

to focus on the association with student's academic performance (Siew et al., 2017). One study identified that high mobile phone dependency correlated with psychological disturbance among college students at a Malaysian public university (Zulkefly & Baharudin, 2009). However, the feature of the mobile phone in that year was more focusing on communication purposes such as texting and calling.

Nowadays, mobile telephones are more up to date with more than necessary mobile phone capabilities, such as built-in internet access and consisting of multifunction of applications which can be downloaded from the Google play store or Apple app store. With abundant applications, smartphones can accommodate college students in their daily hassles. For example, the smartphone provided college students with easy access in learning activities such as logging into an academic portal, using learning management systems, such as Blackboard and CANVAS, and downloading class materials (Alfawareh & Jusoh, 2014; Mothar et al., 2013). Also, college students use the smartphone to assist them in bridging social relations with friends and family, and this kind of behavior helps them to increase their self-esteem and reduces loneliness and depression (Park & Lee, 2012). Moreover, Rochester (2014) reported that college students use the smartphone to reduce stress by listening to music, playing games, and seeking supports from their virtual friends and family members. All of these empirical studies in line with Hoffner & Lee (2015) that found smartphones can reduce stress and indirectly increase the psychological well-being of college students.

In contrast, many studies established a strong association between perceived stress, smartphone dependency and reduced psychological well-being (Beranuy et al., 2009; Lu et al., 2011; Samaha & Hawi, 2016; Thomée et al., 2007). Although smartphones provide easy access to seek support from friends, being often connected and reachable by others is a significant contributor towards stress (Hall & Baym, 2011). A possible reason for this situation is due to uncontrolled use of social networking sites and received overload information that affects their well-being (Choi & Lim, 2016). Besides, two empirical studies reported that technology addiction decreased psychological well-being via anxiety and fatigue (Huang, 2010; Schiffrin et al., 2010). This condition might be due to the technology causing compulsive behavior and if it is unavailable, users are more likely to become anxious and depressed affecting their well-being. Even though people use the smartphone to temporarily escape from stress, they may still be unable to solve their problems affecting well-being (Wang et al., 2015). When considering Lazarus and Folkman's theory (1984), smartphone dependency can be regarded as maladaptive coping because it involves escaping from stressful events, self-distraction, and regulating negative emotions. These maladaptive strategies do not assist in dealing with stress and in turn decrease psychological well-being. Thus, the current study answers an important question regarding how smartphone dependency relates to psychological well-being with perceived stress as a mediator.

In summary, a review of the research literature on the association between perceived stress, smartphone dependency, and psychological well-being provides mixed results. Therefore, this study examined the association between perceived stress, smartphone dependency, and psychological well-being. Also, this study examined the mediating role of perceived stress between smartphone dependency and psychological well-being of college students. The present study was aimed to test two hypotheses. First, we predicted that life events would be positively associated with perceived stress. That is, those experiencing many life events would report higher levels of perceived stress. Second, we predicted that the relationship between smartphone dependency and psychological well-being would be mediated by perceived stress. That is,

smartphone dependency leads to increased perceived stress, which in turn leads to poor psychological well-being.

## Method and study area

### *Sample and procedure*

Prior to data collection, the study was approved by the university's Institutional Review Board (IRB). A total of 303 undergraduate students recruited from one public technical university located at the east coast of Malaysia. Before the participants answered the survey, researcher verbally explained the purpose of the study, confidentiality, and anonymity to them. Also, we provided our participants with an informed consent form. The participants in this study filled out the questionnaires during the class hour, and we collected the completed questionnaire on the same day. The session took between 10 and 15 minutes for the participants to complete the questionnaire.

### *Measures*

There were four measurements used in this study to measure the variable of life events, perceived stress, smartphone dependency, and psychological well-being. Also, several demographic characteristics were assessed to gather information about the participants.

*Demographic characteristics.* Information was collected on participants' demographic characteristics including age, gender, year of study, ethnicity, and school. Table 1 shows the participant's demographic background information, including age, gender, ethnicities, and school.

**Table 1.** Frequency of smartphone use (N = 303)

Variables	Frequency	Percentage (%)
Internet		
Yes	276	91.1
No	27	8.9
Social Networking Sites		
Yes	247	81.5
No	56	18.5
Games		
Yes	146	48.2
No	157	51.8
Calling		
Yes	247	81.5
No	56	18.5
Learning		
Yes	233	76.9
No	70	23.1

*Life events.* We used the Life Event Scale for Students (Linden, 1984) to measure college students' life events. The scale consisted of 29 items, with 0 indicating "no" and 1 "yes." We asked participants to check the life events they had experienced over the past six months. Sample items

included “Losing a good friend” and “Failing a Course.” Then, we computed a summary score of the scale, with a higher score on the scale indicating more life events they had experienced.

*Perceived stress.* In this study, ten items of the Perceived Stress Scale (PSS) were used to assess the participant’s perceived stress (Cohen et al., 1983). There were six positively worded items and four negatively worded items which range from 0 (*never*) to 4 (*very often*). An example of a negative item included “In the last month, how often have you been upset because of something that happened unexpectedly?” A positive item included, “In the last month, how often have you felt that things were going your way?” Then, we reversed coded for positively worded items so that a higher score indicated a higher level of perceived stress. Lastly, we computed summary scores with higher scores on this scale corresponding to more perceived stress. Cronbach’s alpha for this scale was .77.

*Smartphone dependency.* In this study, we used 33 items of a Malay version of the Smartphone Addiction Scale (Ching et al., 2015) rated on a 6 point-Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The original Smartphone Addiction Scale (SAS) was developed by Kwon et al. (2013). The scale consisted of 6 dimensions which were life disturbance ( $\alpha = .84$ ), positive anticipation ( $\alpha = .87$ ), withdrawal ( $\alpha = .87$ ), cyberspace-oriented relationship ( $\alpha = .88$ ), overuse ( $\alpha = .84$ ), and primary ( $\alpha = .86$ ). Sample items included, “Missing planned work due to smartphone use” (daily life disturbance), “Feeling calm and cozy while using smartphone” (positive anticipation), “Won’t be able to stand not having a smartphone” (withdrawal), “Feeling great meeting more people via smartphone” (cyberspace-oriented relationship), “My fully charged battery does not last for one whole day” (overuse), “Always thinking that I should shorten my smartphone use time” (primary). Overall, the SAS showed good reliability ( $\alpha = .87$ ). Higher scores indicated a higher level of smartphone dependency.

*Psychological well-being.* We measured participant’s psychological well-being with five items from the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The participants rated the five items on a 7 point-Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Sample items included: “In most ways, my life is close to my ideal” and “I am satisfied with my life.” Scores were averaged, and higher scores on the SWLS indicated a higher level of psychological well-being. Cronbach’s alpha for this scale was .83.

### *Data analyses*

Data analyses were computed in the three phases. First, descriptive statistics was used to describe age, gender, ethnicity, and year of study. Second, Pearson correlations analysis was computed to identify the association between life events, perceived stress, smartphone dependency, and psychological well-being. Third, mediation analysis with the bootstrap method using the Hayes Process Macro was performed to identify the mediation effect of perceived stress between smartphone dependency and psychological well-being.

## **Results and discussion**

The survey sample consisted of 303 of undergraduate students, including 183 females (60.4%) and 120 males (39.6%). The average age of the participants was 21 years, with a range age of 19 to 28 years. Demographically, the sample comprised of 226 Malay (74.6%), 48 Chinese (15.8%), 21 Indian (6.9%), and 8 other ethnics (2.6%). Besides, most of the participants were 130 first year

(42.9%), followed by 82 second year (27.1%), 75 fourth year (24.8%), and 16 third year (5.3%). Results of hypothesis 1 indicated that there was a significant association between life events and perceived stress,  $r = .16$ , and  $p < .05$ . That is, students who had experienced a higher level of life events reported a higher level of perceived stress.

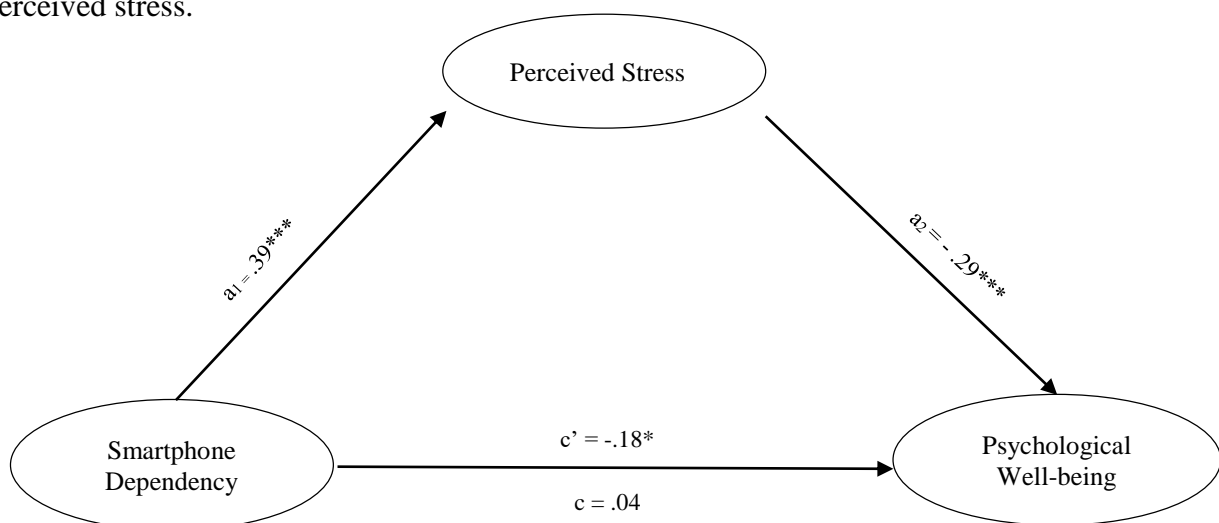
Before testing the second hypothesis, we computed the correlation between smartphone dependency, perceived stress, and psychological well-being. Results indicated that smartphone dependency was significantly associated with perceived stress ( $r = .39$  and  $p < 0.01$ ) but not with psychological well-being ( $r = -.08$ ,  $r = p > 0.5$ ). Furthermore, perceived stress was significantly correlated with psychological well-being ( $r = -.28$ ,  $p < 0.01$ ). Then, we computed mediation analysis with 10,000 bootstraps sampling to test hypothesis 2. Table 2 displays the result of the direct and indirect effects of study variables.

**Table 2.** Direct and indirect effects between study variables

Variables	Direct			Indirect				
	B	SE	$\beta$	B	BootSE	$\beta$	LLCI	ULCI
PS								
SD	.29***	.04	.39***					
PW								
SD	.06	.10	.04					
PS	-.63***	.13	-.29***	-.18	.03	-.11	-.17	-.06

Note.  $p^{***} < .001$ ; PS = Perceived Stress; SD = Smartphone Dependency; PW = Psychological Well-being; LLCI = lower level of confidence interval; ULCI = upper level of confidence interval

All direct effects were significant except for smartphone dependency on psychological well-being ( $\beta = .04$ ,  $p > .05$ ). Standardized regression coefficients are shown in Figure 1. After perceived stress was included as a mediator, the indirect effect from smartphone dependency to psychological well-being did not include zero (-.17 to -.06) or was significant. This result demonstrated that perceived stress fully mediated the association between smartphone dependency and psychological well-being. Thus, an increase of one standard deviation in smartphone dependency produced a decrease of .18 standard deviations on psychological well-being through perceived stress.



**Figure 1.** Standardized regression coefficients for the mediation model of the effect of smartphone dependency on psychological well-being through perceived stress among college students

## Discussion

This article evaluated two hypotheses. The results of hypothesis 1 suggest that a higher level of life events is associated with a higher level of perceived stress. In line with Lazarus and Folkman's theory (1984) and past studies (Dusselier et al., 2005; Hurst et al., 2013; Nisa & Nizami, 2014), life events experienced by college students such as academic problems, financial difficulties, and family issues would increase students' stress. To understand students' development in more detail, we computed descriptive tests on the LES to identify what were the most common life events experienced among the students. The results indicate that the ten most common life events were a family get-together, getting an unjustified low mark on a test, vacation with parents, minor financial problems, vacation alone/with friends, minor violation of the law, finding a part-time job, seriously thinking about dropping school, and failing a few courses. If we look at these ten items, the students faced a new phase or developmental transition in their life, such as family expectations, searching for a part-time job opportunity, financial issues, and academic difficulties. These conditions might not have happened before they enrolled in the college environment. Family get-togethers and vacations with parents are seen as something pleasurable. However, in this situation, college students might experience time constraints in balancing responsibilities as a student and being a family member. Therefore, the pressure of time and family expectations might give an indication how they perceived their stress. Also, during this period, young adults face new challenges, which is finding a close relationship with other peoples as a process towards intimacy (Arnett, 2000; Erikson, 1950). If young adults are unable to adjust to these new challenges, they tend to experience a conflict known as isolation, which might contribute to stress. In this study, we found that 21.5% of the participants experienced losing a good friend and 14.9% participants experienced a breakup with boy/girlfriend. Therefore, it is vital for college students to effectively cope with all the developmental challenges during the transition to promote their well-being.

Before discussing the mediation effect, it is essential to discuss the significant direct effect of smartphone dependency on perceived stress and perceived stress on psychological well-being. First, we found a positive direct effect of smartphone dependency on perceived stress. This result indicated that a higher level of smartphone dependency increased stress levels among the participants. Nowadays, the smartphone has become necessary for college students, for their education and for social purposes. Besides, many universities have implemented an online learning platform for students to meet the demands of a learning style among the new generation. Even though smartphones offer convenience with multiple applications, this might be a challenge for college students. Available evidence indicates that young adults are more prone to experience problematic smartphone use due to uncontrolled use in term of time and frequency (Alhazmi et al., 2018). The use of social media might contribute to psychological problems such as stress and anxiety (Mauri et al., 2011). Social media such as Facebook may create negative effects because their users may actively seek validation about their posts such as hoping to receive many "likes" and positive comments from their virtual friends (Clerkin et al., 2013) as well as fear of missing out (Traş & Öztemel, 2019). In this study, we found that college students are actively checking Twitter or Facebook through the smartphone as not to miss conversation with their virtual friends thereby perceiving a higher level of stress.

Second, we indicated that a higher level of perceived stress is related to a lower level of psychological well-being among college students. This finding was consistent with other studies that showed stress associated with poor psychological well-being (Bovier et al., 2004; Denovan & Macaskill, 2017; Hamarat et al., 2001; Singh et al., 2016). Finally, because the finding suggested



that smartphone dependency associated with perceived stress and perceived stress is associated with psychological well-being, we examined whether perceived stress mediates the relationship between smartphone dependency and psychological well-being. The results of hypothesis 2 was consistent with the hypothesis that increases in perceived stress would completely mediate the relationship between smartphone dependency and psychological well-being. Smartphone use can indirectly affect psychological well-being if the use is perceived as stressful, then it exerts an indirect influence on well-being. Therefore, the increase of stress that appears to be the result of the high level of smartphone dependency is related to low levels of psychological well-being among the participants. The development of variety of application in the smartphone makes an individual use their smartphone when having stress. Thus, this finding supports another finding reporting that perceived stress mediated the association between smartphone dependency and psychological well-being of college students (Samaha & Hawi, 2016).

## **Limitations**

Smartphones have become a new tool that accommodates college students in their daily life. Nevertheless, there are many studies documenting the disadvantages of excessive smartphone use on well-being. To the best of our knowledge, few researchers investigated the association between smartphone dependency, perceived stress, and psychological well-being in the Malaysian context. Therefore, we hope that this article provides an initial step in understanding the current issue of students' development, specifically in higher education.

As is true for all research, our study has several limitations. First, the cross-sectional design revealed associations between life events, perceived stress, smartphone dependency, and psychological well-being. Nevertheless, we should not conclude that the finding of this cross-sectional study provides a cause and effect of the relationship between the study variables. Therefore, we suggest future researchers conduct longitudinal research so that we can assess the changes over time. Longitudinal sequences might suggest that smartphone use (particularly over time) can influence perceptions of additional stress which could in turn affect lower levels of well-being over time. Second, this study used surveys or self-report data. Self-reports have disadvantages, such as the questionnaires may only provide preconceptions of the researchers concerning the study variables. We suggest future studies to add other methods, such as open-ended questionnaire and interviews, which might give a broader perspective of the study variables and enrich future findings. Third, this study was conducted at a Malaysian technical university which limits generalization. The participants in this study were all engineering students. Therefore, future research should expand this study representing each cluster in Malaysia, such as including social science and science students so that the results can be generalized to the whole student population in Malaysia. In spite of these limitations, this research highlights the importance of studying the effect of smartphone dependency on perceptions of stress and psychological well-being. If there is a direct and indirect effect of this dependency on well-being, then individuals, family members and practitioners may need to adjust the amount of time and the content of smartphone use.

## Implications and Recommendations

The finding of this study confirmed the mediation effects of perceived stress between smartphone dependency and psychological well-being. In the future, we suggest expanding the psychological well-being variable by including other domains, such as anxiety and depression. In addition, we suggest that future researchers continue to examine the association of smartphone dependency with well-being, but in more detail. Technology is evolving constantly, and the effect on well-being is unclear. We found many studies on the association between social media apps and well-being. However, few studies focus on the association between learning apps with students' well-being. As smartphone use has become an essential tool among students, future researchers can expand this study by specifically examining the effect of learning application on students' well-being. Therefore, the positive effects of learning apps on well-being may outweigh the adverse effects. We believe that this topic is essential for the next generation to sustain their well-being mentally and physically.

Finally, we found that the results of this study are meaningful because it provides initial support for the notion that smartphone dependency exacerbates stress levels among participants, which in turn leads to poor psychological well-being of college students. The findings provide some ideas for practitioners and educators in this field about the issue of students' development in the Malaysian context, thereby enriching the cross-culture literature. Nowadays, the smartphone can practically help students in learning activities, such as keeping track of their assignments and accessing learning materials. However, it is important to note that the smartphone plays an essential role in determining the college students' well-being. Practitioners such as counselors and educators in this field can highlight this issue through a variety of university channels such as Facebook, website, Twitter, and classroom. For example, highlighting the awareness of adverse effects of excessive smartphone use and educating college students about the appropriate ways of using a smartphone in terms of frequency, duration, and activity may be necessary. Also, practitioners can provide guidelines of smartphone use for students' benefit. We reported that more life events experienced by students are associated with higher stress levels. A stress management program at the university can consider significant issues such as academic problems, financial difficulties, family expectations, and relationship issues in their program. This effort can help students to adapt or adjust effectively with stressful life events that have occurred during their developmental period and can consequently promote positive well-being.

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