



Could mindfulness diminish mental health disorders? The serial mediating role of self-compassion and psychological well-being

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Abstract

The COVID-19 pandemic clearly has various detrimental psychological effects on people's mental health, emphasizing the importance of mindfulness in overcoming such repercussions. This is in line with the growing number of studies that have been conducted to assess the effects of mindfulness in diverse settings. However, the role of mindfulness in reducing mental health issues among university students has received little attention. Therefore, the current work seeks to investigate how mindfulness could reduce the anxiety, depression, and stress of university students and how self-compassion and psychological well-being could mediate the links between mindfulness and these mental health disorders. To that end, an explanatory sequential mixed-method design was adopted. Quantitative data collected, through a two-wave survey, from 560 Vietnamese students having an average age of 18.7 years were used to test the hypotheses. To measure the six variables in the research models, we opted for the Five Facet Mindfulness Questionnaire (FFMQ), Self-Compassion Scale (SCS-26), Depression Anxiety Stress Scale (DASS-21–7 items for each subscale), and World Health Organization-Five Well-Being Index (WHO-5). Additionally, qualitative data from 19 in-depth interviews were utilized to explain the quantitative findings and explore students' experiences in practicing mindfulness and self-compassion to decrease stress, depression, and anxiety. The results elucidated that self-compassion and psychological well-being serially mediated the relationships between mindfulness (as a predictor) and anxiety, stress, and depression (as outcome variables). The findings demonstrated the key role of mindfulness in increasing students' self-compassion and psychological well-being as well as reducing anxiety, depression, and stress. This research holds substantial contributions by providing universities and psychotherapists with recommendations to deal with negative psychological consequences caused by COVID-19.

Keywords Mindfulness · Anxiety · Depression · Stress · Self-compassion · Psychological Well-being

Introduction

The COVID-19 pandemic has caused several devastating consequences in many sectors around the world and in

different aspects of life, such as the economy, society, and public health in particular (Nicola et al., 2020; Pak et al., 2020; Vo-Thanh et al., 2021, 2022; Vu et al., 2022). In addition, this pandemic has destructive psychological outcomes

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on mental health symptoms, partially relying on individuals' features (Reilly et al., 2021), including university students (Sun et al., 2021).

Moreover, the COVID-19 pandemic triggers radical changes to university students' daily experiences and working life, including studying at higher education institutions and the way universities operate. Besides, this pandemic has already disrupted not only their education but also their work, thus being able to damage their finance and creating more pressure on their lives (Sun et al., 2021; Wathelet et al., 2020). In addition, such a pandemic (i.e., COVID-19) is often related to a substantial degree of stress that results from infection or death fear (Almomani et al., 2021; Vo-Thanh et al., 2021, 2022; Vu et al., 2022). In this way, the pandemic can harm students' mental health (Ma et al., 2020; Sun et al., 2021; Wathelet et al., 2020), which involves some disorders, such as depression, stress, and anxiety (Maddock & Blair, 2021; Vu et al., 2022). Consequently, university students need to receive care and support in order to overcome the COVID-19 crisis. This could be achieved by concentrating on their mindfulness.

"Mindfulness is a total clarity and presence of mind, actively passive, wherein events come and go like reflections in a mirror, nothing is reflected except what is." (Watts, 1989).

Mindfulness, which has roots in Buddhist meditation, is defined as a condition of consciousness confirmed by a neutral and intentional focus on the current moment (Kabat-Zinn, 2005). Mindfulness arises from the simultaneous cultivation of three mechanisms: (a) intention and understanding of why one is engaging in the practice of mindfulness (e.g., self-regulation, stress reduction), (b) attention to one's moment-to-moment observations and experiences without judgment or analysis, and (c) attitude of acceptance, kindness, compassion, openness, patience, non-striving, equanimity, curiosity, and non-evaluation (Bergen-Cico & Cheon, 2014; Kabat-Zinn, 2005). Furthermore, mindfulness could protect against maladaptive behaviors among university students and benefit their mental health (Fino et al., 2021; Tomlinson et al., 2018) considerably affected by the COVID-19 pandemic (Almomani et al., 2021).

Some recent studies indicated that mindfulness was positively correlated with self-compassion (Golden et al., 2021; Kristeller & Johnson, 2005; Wasson et al., 2020). In addition, self-compassion helps individuals take a balanced view of their failures and personal sufferings rather than exaggerate or suppress them. In this way, self-compassion can avoid negative emotions and promote positive feelings, which is beneficial for psychological well-being (Ge et al., 2019; Kotera & Ting, 2021; Tran et al., 2021; Zessin et al., 2015).

On the other hand, students' psychological well-being dramatically impacts their academic performance and university life and reduces anxiety and depression (Cobo-Rendón et al., 2020; Cruwys et al., 2021; Liu et al., 2009). In this vein, mindfulness and self-compassion can improve psychological well-being and quality of life as well as reduce individuals' negative feelings, including stress and symptoms in people who deal with stress-associated problems (Mugrabi et al., 2020; Tang et al., 2019). Thus, increased mindfulness leads to higher self-compassion (Golden et al., 2021; Kristeller & Johnson, 2005; Wasson et al., 2020). At the same time, mindfulness helps in reducing human stress, depression, and anxiety. However, the impact of mindfulness on students' anxiety, depression, and stress within the COVID-19 era is still not clarified. Moreover, the serial intervening role of self-compassion and psychological well-being in the associations between mindfulness and anxiety, depression, and stress has not been studied yet, especially within the setting of university students.

Consequently, the aforementioned discussion is reflecting the gaps that the present research seeks to cover. In doing so, this study aims to (1) examine the effect of mindfulness on students' anxiety, depression, and stress during the COVID-19 pandemic and (2) investigate the serial intervening role of self-compassion and psychological well-being in the relationships between mindfulness (as an independent construct), and anxiety, stress, and depression (as dependent constructs). In doing so, this study provides new perspectives regarding the prevention of students' mental illness. It also suggests appropriate mindfulness exercises during the COVID-19 pandemic to help students overcome potential mental health disorders.

Theoretical background and hypotheses

Relationships between mindfulness and anxiety, depression, and stress

Over the last two decades, mindfulness has become imperative and attracted attention of psychologists and researchers all over the world (Nguyen et al., 2020; Vu et al., 2022). Mindfulness has roots in Buddhist meditation, describing a condition of consciousness defined by a neutral and intentional focus on the current moment (Kabat-Zinn, 2005; Thich, 2012). Mindfulness comprises five facets: (1) observing our sensations, perceptions, thoughts, and emotions; (2) describing these experiences with words; (3) acting with awareness rather than doing something on autopilot; (4) non-judging of these experiences; and (5) non-reaction to these experiences (Baer et al., 2006). Mindfulness is also associated with lesser degree of over-identification,

avoidance strategies, and judgmental attitudes (e.g., emotions, cognition, bodily sensations, external stimuli such as sounds and smells) (Allen & Leary, 2010; Bajaj et al., 2016; Brown et al., 2015; Brown & Ryan, 2003).

Several studies have demonstrated that mindfulness effectively affects mental health. For example, mindfulness helps reduce negative emotions and rumination, depressive symptoms, anxiety, and burnout (Ge et al., 2019; Mugrabi et al., 2020; Shapiro et al., 2008; Vu et al., 2022). Moreover, mindfulness can improve health and emotional tolerance (Irum et al., 2020; Kabat-Zinn, 2005; Mekawy et al., 2021; Parto & Besharat, 2011). In the context of COVID-19, Antonova et al. (2021) have indicated that the mechanism of mindfulness had an important beneficial application in dealing with anxiety and promoting well-being. Therefore, a higher level of mindfulness brings a significant positive effect to individuals' mental health, such as reducing anxiety and stress (Antonova et al., 2021; Dillard & Meier, 2021; Vu et al., 2022).

First, the adverse effect of mindfulness on anxiety, depression, and stress can be explained by the mindfulness-to-meaning theory (Garland et al., 2015). According to Garland et al. (2015), repeated practice in focusing on physical sensation like the breath may bolster the ability of continued sensory attention, therefore reducing mind-wandering. In addition, mindfulness practices can promote attention on one's habitual patterns of responding, thereby adapting attentional habits to disengage from fixation of negative events (Garland et al., 2015; Thich, 2012). Reducing mind-wandering without focusing on negative points can decrease the ability of triggering anxiety as it is stimulated by thoughts about negative things, such as harm or danger. According to Foa et al. (2017, p. 190), "anxiety refers to multiple mental and physiological phenomena, including a person's conscious state of worry over a future unwanted event, or fear of an actual situation. Anxiety and fear are closely related. [...] anxiety is a diffuse emotion, sometimes an unreasonable or excessive reaction to current or future perceived threat." Based on the mindfulness-to-meaning theory, Garland et al. (2015, p. 298) contend that mindfulness is imperative to permit "stimulus reframing to enter into the appraisal process." The mechanism involves "decentering from thoughts, emotions, and sensations into a metacognitive state of awareness" (Garland et al., 2015, p. 298). By this way, "mindfulness disrupts default activation of schemas and scripts to allow for flexible selection of appraisals. In this capacity, mindfulness interrupts automatic conditioned reactions, allowing for conscious reflection. By interrupting scripted defensive responses to an appraised stressor, it is possible to reevaluate the context in which initial stress appraisals are made" (Garland et al.,

2015, p. 298). Therefore, mindfulness can help individuals avoid negative thoughts leading to depression and stress.

Second, there is increasing evidence that mindfulness is inversely related to indices of negative mental health like anxiety (Ostafin et al., 2014; Simone et al., 2020), depression, and stress (Hofmann et al., 2010; Khoury et al., 2013; Shankland et al., 2021; Tang et al., 2007; Williams, 2008). Previous studies have indicated that increase of mindfulness is related to decrease of anxiety as well as the improvement of psychological well-being (Jazaieri & Shapiro, 2017; Vonderlin et al., 2020). According to Shankland et al. (2021), the total mindfulness score is negatively linked to perceived anxiety, depression, and stress. In addition, several studies have also pointed out that accelerating mindfulness could effectively enhance mental health and reduce depression in individuals (Hofmann et al., 2010; Khoury et al., 2013; Maddock & Blair, 2021; Tang et al., 2007; Vu et al., 2022; Williams, 2008).

From the theory and research evidence above, we assume that mindfulness is negatively correlated with anxiety, depression, and stress in university students. Therefore, the following hypotheses are proposed:

Hypothesis 1 Mindfulness is negatively correlated with anxiety of university students.

Hypothesis 2 Mindfulness is negatively correlated with depression of university students.

Hypothesis 3 Mindfulness is negatively correlated with stress of university students.

Serial mediation model of self-compassion and psychological well-being

Self-compassion is defined as being kind towards oneself when facing difficulties and failures (Neff, 2003; Neff & Germer, 2013; Neff & Vonk, 2009). It plays a key role in improving mental health (e.g., happiness, psychological well-being, satisfaction with life) (Barnard & Curry, 2011).

First, the relationship between mindfulness and self-compassion can be explained by the concept of self-compassion proposed by the study by Neff (2003) in which self-compassion includes three components, including self-kindness, common humanity, and mindfulness. Self-kindness means to treat oneself with kindness, care and understanding rather than criticize or ignore what one is suffering. Common humanity is understood to acknowledge that suffering or personal inadequacy is a part of human beings and it does not happen to an individual alone. Mindfulness is to be aware of an individual's both physical and mental status in

each moment of the present (Neff, 2003). It can be seen that mindfulness is a component of self-compassion, therefore a higher degree of mindfulness can lead to a higher level of self-compassion and vice versa. Self-compassion is a construct that can also be thought of as a complement to mindfulness when faced with a difficult situation (Wisener & Khoury, 2020). Moreover, research has provided evidence that mindfulness is positively connected with self-compassion; to be specific, mindfulness increases self-compassion for others and oneself (Golden et al., 2021; Kristeller & Johnson, 2005; Wasson et al., 2020).

Second, there is a connection between self-compassion and psychological well-being, which not only can be explained by theories but also has been pointed out with scientific evidence. Psychological well-being is an individual's cognitive and emotional evaluation of one's life (Ryff, 2014). Psychological well-being not only refers to happiness but also mental stability and social ability. It can be measured by six components: autonomy, environmental mastery, personal growth, positive relations with others, purpose of life, and self-acceptance (Ryff, 1989). According to Neff & Germer (2013), self-compassion helps individuals take a balanced view of their failures and personal sufferings rather than exaggerate or suppress them; and by this way self-compassion can avoid negative emotions and promote positive feelings, which is beneficial for psychological well-being. Furthermore, self-compassion has been empirically proved to be positively associated with psychological well-being (Ge et al., 2019; Kotera & Ting, 2021; Zessin et al., 2015).

Third, on the one hand, psychological well-being has been found to be associated with mindfulness through mediating variables (Parto & Besharat, 2011). For instance, the relationship between mindfulness and psychological well-being is mediated by self-regulation and autonomy (Parto & Besharat, 2011). On the other hand, psychological well-being has been proved to be negatively associated with anxiety, depression, and stress (Liu et al., 2009; Malik et al., 2020; Suleman et al., 2018). Liu et al. (2009) reported that psychological well-being is negatively correlated with anxiety and depression. Malik et al. (2020) demonstrated a negative relationship between psychological well-being and stress among Malaysian university students. Similarly, Suleman et al. (2018) found a negative connection between perceived occupational stress and psychological well-being.

Fourth, the connection between mindfulness and anxiety, stress, and depression through mediating variables has been highlighted by some empirical studies (e.g., Crego et al., 2021; Pérez-Aranda et al., 2021). Crego et al. (2021) found that the relationship between mindfulness and each of the outcome variables, including anxiety and depression is partially mediated by behavioral activation and purpose in life.

Pérez-Aranda et al. (2021) reported that resilience partially mediates the influence of mindfulness and self-compassion on depression. Up to now, there have not been many studies dealing with the serial mediation role of self-compassion and psychological well-being in the relationships between mindfulness and anxiety, depression, and stress, which is the gap that this study aims to address.

From the aforementioned theories and research evidence, we propose that the relationship between mindfulness and each of the mental health disorders, including anxiety, depression, and stress is serially mediated by both self-compassion and psychological well-being.

Hypothesis 4 The relationship between mindfulness and anxiety is sequentially mediated by self-compassion and psychological well-being.

Hypothesis 5 The relationship between mindfulness and depression is sequentially mediated by self-compassion and psychological well-being.

Hypothesis 6 The relationship between mindfulness and stress is sequentially mediated by self-compassion and psychological well-being.

The research models in Fig. 1 summarize the hypotheses.

Methodology

The present article employed a sequential explanatory mixed-method design through using both quantitative and qualitative methods. This design was adopted to have an insight into the findings of the quantitative phase.

Quantitative part

Respondents and procedure

The quantitative part was conducted using an online questionnaire sent to Vietnamese university students in February and March 2021. The questionnaire was translated into Vietnamese and then back into English to ensure the consistency. The Vietnamese version was tested on six Vietnamese university students and amended, based on their comments, to guarantee the readability. A cover letter was written to describe the study's aims, ensure data confidentiality, and select the right respondents (i.e., Vietnamese university students). Moreover, respondents voluntarily participated in the survey without receiving any fees or gifts from the researchers.

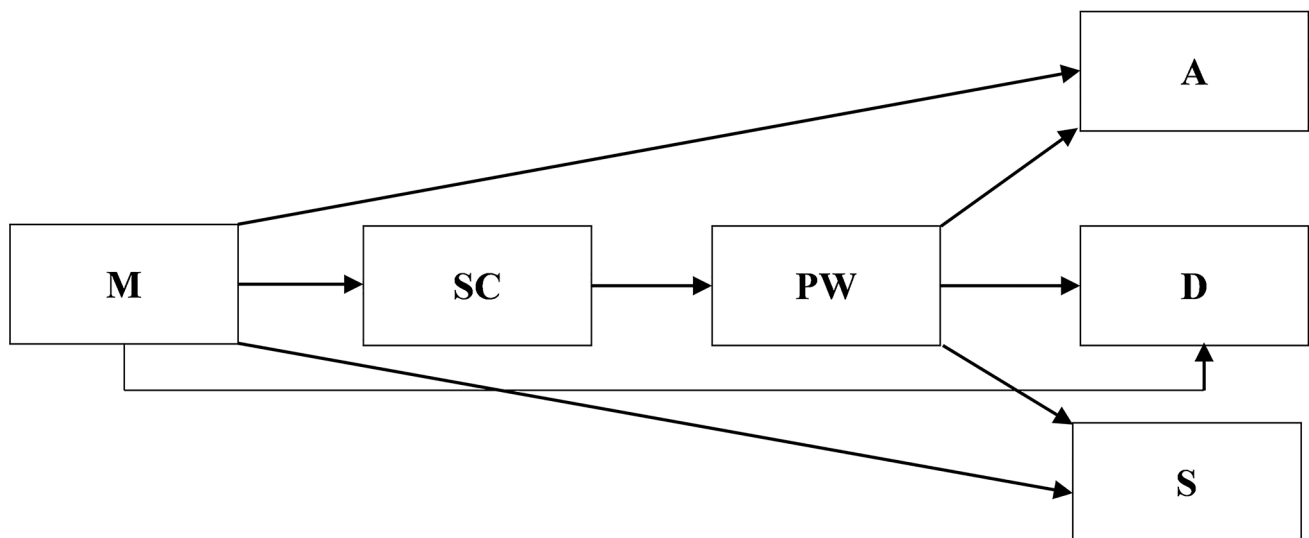


Fig. 1 Research models. M = Mindfulness; SC = Self-compassion; PW = Psychological well-being; A = Anxiety; D = Depression; S = Stress. Model 1: M→SC→PW→A; Model 2: M→SC→PW→D; Model 3: M→SC→PW→S.

A two-phase survey was adopted to reduce the effects of common method bias in relation to one-time data collection (Podsakoff et al., 2003). We matched the two-phase data through a code assigned to each respondent. The multiple-phase data collection approach through a longitudinal study during COVID-19 has been mobilized by prior studies (e.g., Vo-Thanh et al., 2021, 2022; Vu et al., 2022). In the first phase, Vietnamese university students were invited to provide their demographic information, emails, university year, independent (i.e., mindfulness) and outcome (i.e., anxiety, depression, and stress) variables scores. We received 637 complete responses after the first-phase survey. After fifteen days, we contacted the respondents from the first phase via email and asked them to participate in the second phase survey, which sought to assess their self-compassion and psychological well-being (i.e., mediators) during COVID-19. We obtained 560 valid responses after the second-phase survey. The average age of participants was 18.7 years ($SD = 1.12$, range 18–21). There were 354 (63.2%) females and 206 (36.8%) males; among 560 respondents, 349 were first-year students, 70 second-year students, 61 third-year students, and 80 fourth-year students. The Research Ethics Committee of the first author's university approved this research project.

Measurement scales

Mindfulness

A 39-item questionnaire on the Five Facet Mindfulness Questionnaire (FFMQ) developed by Baer et al. (2006) was used in this study. Items were classified into 5 levels

(1 = “Never or very rarely true”; 5 = “Very often or always true”) and assessed by students. One of the items includes “I’m good at finding words to describe my feelings”. We have divided the total in each category by the number of items in that category to get an average score of a student’s mindfulness. Cronbach’s alpha coefficient for mindfulness was good (0.71). CFA demonstrated that the measurement model is adequate (Table 1).

Self-compassion

Self-compassion was used through the 26-item self-compassion scale (SCS-26) (Neff, 2003). The highest score on the SCS-26 indicates the strongest self-compassion. Each item is rated on a 5-point scale (from 1 = almost never to 5 = almost always). The SCS-26 has been shown to have high reliability and validity in the Vietnamese university environment (Nguyen et al., 2020; Tran et al., 2021). One of the items includes “I try to be understanding and patient towards the aspects of my personality I don’t like. Cronbach’s alpha coefficient for self-compassion was good (0.72). CFA showed that the measurement model is adequate (Table 1).

Anxiety

The anxiety variable was measured using the 7-item anxiety subscale of the Depression Anxiety Stress Scale-21 (DASS-21), which refers to anxiety properties during its development and was validated in the Vietnamese students context by Tran et al. (2013) and used by recent studies (e.g., Tran et al., 2021). One of the items includes “I was aware of the

Table 1 Goodness-of-fit indices for the measurement models

Model	χ^2	GFI	CFI	TLI	RMSEA	90%CI	Cronbach's alpha
M	4.11***	0.94	0.95	0.93	0.05	[0.04;0.05]	0.71
SC	3.75***	0.93	0.94	0.94	0.08	[0.05;0.06]	0.72
A	3.51**	0.98	0.94	0.92	0.07	[0.07;0.09]	0.91
S	4.22**	0.97	0.94	0.91	0.08	[0.06;0.10]	0.72
D	2.40**	0.98	0.99	0.98	0.05	[0.03;0.07]	0.91
PW	4.12***	0.99	0.99	0.98	0.08	[0.04;0.11]	0.90

$p < 0.001$, ** $p < 0.01$

Note: M= Mindfulness; SC= Self-compassion; A= Anxiety; S= Stress; D= Depression; PW= Psychological well-being

action of my heart in the absence of physical exertion". Items are scored on a 4-point scale from 0 "Did not apply to me at all" to 3 "Applied to me very much, or most of the time", with the highest score reflecting the greatest anxiety. Cronbach's alpha coefficient for anxiety was excellent (0.91). CFA showed that the measurement model is adequate (Table 1).

Stress

The stress subscale extracted from the DASS-21 was translated in Vietnamese and validated by Tran et al. (2013) in the Vietnamese students context. This subscale includes 7 items. One of the items is "I felt that I was using a lot of nervous energy". Each item comprises a statement and four short response options to reflect the severity, scoring from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). Cronbach's alpha coefficient for the stress subscale was good (0.72). CFA showed that the measurement model is adequate (Table 1).

Depression

The 7-item depression subscale of the DASS-21 from Tran et al. (2013) was used to assess depression. It showed a good fit in students (Tran et al., 2013), and one of the items is "I felt that I was using a lot of nervous energy". Each item was scored on a 4-point scale from 0 "Did not apply to me at all" to 3 "Applied to me very much, or most of the time". Cronbach's alpha coefficient for the depression was excellent (0.91). CFA showed that the measurement model is adequate (Table 1).

Psychological well-being

The World Health Organization-Five Well-Being Index (WHO-5) (Topp et al., 2015) was employed to measure psychological well-being. The scale consists of 5 items (e.g., I woke up feeling fresh and rested). Respondents were asked to answer using a six-point rating scale from 0 (at no time) to 5 (all of the time), with the highest score indicating the greatest psychological well-being. This scale is appropriate

for Vietnamese students, and the reliability of the whole scale is good (Nguyen & Le, 2021). Cronbach's alpha coefficient for psychological well-being was excellent (0.90). CFA showed that the measurement model is adequate (Table 1).

Quantitative data analysis

In serial mediator models (Model 6) (Hayes, 2018), there are three types of variables: (1) an independent variable that is mindfulness (M); (2) three dependent variables that are anxiety (A), depression (D), and stress (S); and (3) two serial mediator variables that are self-compassion (SC) and psychological well-being (PW). SPSS 22.0 and AMOS 24.0 were utilized to test the proposed research models. First, the multivariable normality test was done. Second, descriptive analysis was conducted to calculate the mean and standard deviation for each variable. Third, correlational analyses were performed to examine whether M was associated with SC, PW, A, S, and D. Fourth, the measurement model's goodness of fit was evaluated. Finally, we evaluated the model fit. In this regard, we found that the Root Mean Square Error of Approximation ($RMSEA$) < 0.08, Standardized Root Mean Squared Residual ($SRMR$) < 0.08, Comparative Fit Index (CFI) > 0.90, Tucker-Lewis Index (TLI) > 0.90, and Goodness of Fit Index (GFI) > 0.09 were satisfactory (Kline, 2015).

Quantitative results

Common method bias and multicollinearity issues

Although some procedural remedies (i.e., the two-wave survey, use of closed-ended questions, questionnaire's construction and validation, cover letter) were opted for, the common method bias cannot radically be eliminated. Since the data in this study were collected from a single source, Harman's single-factor test proposed by Podsakoff et al. (2003) was performed to check for common method bias. The results indicated that the first factor only accounted for 30.14% of the total explained variance, common method bias was not a serious concern. Moreover, following Kock

Table 2 Descriptive statistics and correlation evaluation

Variables	M	SD	1	2	3	4	5	6
1. S	8.93	4.05	1					
2. A	7.53	3.92	0.72**	1				
3. SC	82.04	9.92	-0.51**	-0.41**	1			
4. M	120.00	12.39	-0.37**	-0.29**	0.53**	1		
5. PW	13.76	5.55	-0.47**	-0.38**	0.48**	0.35**	1	
6. D	5.06	3.56	0.74**	0.70**	-0.52**	-0.43**	-0.44**	1

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

(2015), a full collinearity evaluation test, an additional statistical remedy for common method bias, was conducted. We found that all the variance inflation factor values ranging from 1.40 to 1.53 were much less than 3.33, suggesting that multicollinearity concern did not exist in this study.

Descriptive statistics and correlation analysis

Table 2 shows the correlations between SC, M, A, D, S, and PW and mean and standard deviation values. The results indicated that SC was positively correlated with M and PW, that M was positively associated with PW, and that D was positively correlated with S and A. However, A, D, S were negatively correlated with PW, M, and SC (Table 2).

Structural models

The structural models fit the data well: Model 1: $\chi^2 = 8.71$, $df = 1$, $p = 0.03$, $GFI = 0.99$, $CFI = 0.98$, $TLI = 0.90$, $RMSEA = 0.12$, $90\%CI = [0.06; 0.19]$, $SRMR = 0.03$. Model 2: $\chi^2 = 8.71$, $df = 1$, $p = 0.003$, $GFI = 0.99$, $CFI = 0.98$, $TLI = 0.92$, $RMSEA = 0.12$, $90\%CI = [0.06; 0.19]$, $SRMR = 0.03$. Model 3: $\chi^2 = 8.71$, $df = 1$, $p = 0.002$, $GFI = 0.99$, $CFI = 0.99$, $TLI = 0.92$, $RMSEA = 0.12$, $90\%CI = [0.06; 0.19]$, $SRMR = 0.073$. Thus, all the models were acceptable. The standardized path coefficients among the variables are presented in Table 3. First, the path coefficients between M and A ($\beta = -0.21$; $p < 0.001$; $95\%CI = [-0.21; -0.14]$), M and

D ($\beta = -0.36$; $p < 0.001$; $95\%CI = [-0.43; -0.30]$), and M and S ($\beta = -0.27$; $p < 0.001$; $95\%CI = [-0.35; -0.219]$) were significant, supporting **Hypotheses 1, 2, and 3**. Second, the tests of indirect effects indicated that SC and PW significantly serially mediated the relationships between M and A ($\beta = -0.06$; $p < 0.001$; $95\%CI = [-0.09; -0.03]$), M and D ($\beta = -0.06$, $p < 0.001$, $95\%CI = [-0.08; -0.04]$), and M and S ($\beta = -0.07$; $p < 0.001$, $95\%CI = [-0.10; -0.04]$) (Table 3). Thus, **Hypothesis 4** (self-compassion and psychological well-being would serially mediate the relationship between mindfulness and anxiety), **Hypothesis 5** (self-compassion and psychological well-being would serially mediate the relationship between mindfulness and depression), and **Hypothesis 6** (self-compassion and psychological well-being would serially mediate the relationship between mindfulness and stress) were supported. Besides, M was positively associated with SC, which, in turn, was positively related to PW. Finally, PW was negatively related to A, D, and S (Table 3).

Qualitative part

Qualitative data collection

To explain the findings found from the quantitative part, the qualitative part was then performed. Based on Teddlie & Tashakkori (2009) and Vo-Thanh et al. (2022), to help us select the right interviewees for the qualitative phase, while

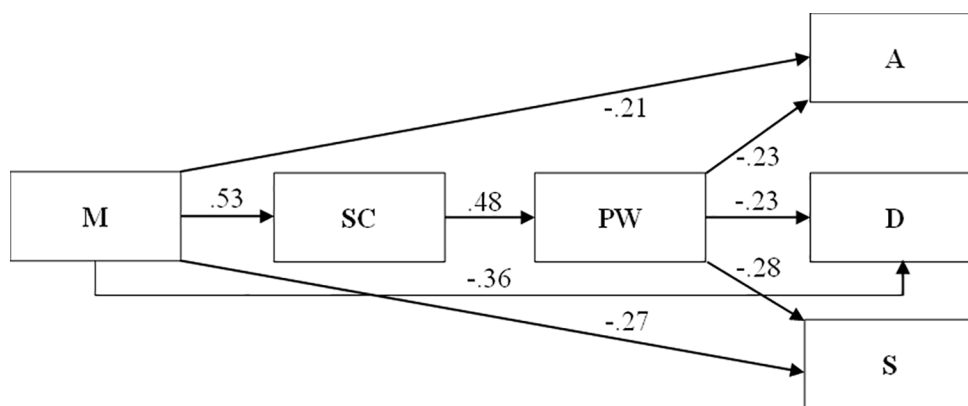


Fig. 2 Research models with results of direct effects. Note: Model 1: M→SC→PW→A; Model 2: M→SC→PW→D; Model 3: M→SC→PW→S.

Table 3 Results of direct and indirect effects tests

Model pathways	Estimates	95%CI		<i>p</i>
		Lower	Upper	
Direct effect				
M→SC	0.53	0.43	0.59	0.000
SC→PW	0.48	0.41	0.53	0.000
M→A	-0.21	-0.28	-0.14	0.000
M→S	-0.27	-0.35	-0.19	0.000
M→D	-0.36	-0.43	-0.30	0.000
PW→A	-0.23	-0.32	-0.16	0.000
PW→S	-0.28	-0.36	-0.18	0.000
PW→D	-0.23	-0.32	-0.16	0.000
Indirect effect				
M→SC→PW→A	-0.06	-0.09	-0.03	0.000
M→SC→PW→S	-0.07	-0.10	-0.04	0.000
M→SC→PW→D	-0.06	-0.08	-0.04	0.000
SC→PW→A	-0.11	-0.16	-0.07	0.000
SC→PW→S	-0.13	-0.18	-0.09	0.000
SC→PW→D	-0.11	-0.15	-0.07	0.000

Table 4 Interviewees' characteristics

No.	ID	Gender	Age	University year
1	M1	Female	21	Fourth year
2	M2	Male	18	First year
3	M3	Male	20	Third year
4	M4	Female	21	Fourth year
5	M5	Female	19	Second year
6	M6	Male	18	First year
7	M7	Female	18	First year
8	M8	Female	18	First year
9	M9	Male	19	First year
10	M10	Female	18	First year
11	M11	Male	18	First year
12	M12	Female	18	First year
13	M13	Female	19	Second year
14	M14	Female	20	Third year
15	M15	Male	18	First year
16	M16	Female	18	First year
17	M17	Female	19	First year

filling in the questionnaire, the respondents were asked to indicate if they already practiced mindfulness and would participate in the qualitative phase. Those who already practiced mindfulness and agreed to participate were invited to provide us with their accord. Following Teddlie & Tashakkori (2009) and Vo-Thanh et al. (2022), based on the quantitative sample, the quota sampling was employed to select interviewees among those who agreed to participate in the qualitative phase, using three criteria, including age, gender, and university year.

Moreover, we only selected those who have indicated that they have been practicing mindfulness during COVID-19. In addition, following Braun & Clarke (2021), the semantic saturation criterion was used to determine the qualitative sample size (Table 4). Each interview, from 45

to 60 min, was consistent with Vo-Thanh et al. (2022). At the same time, we ensured the reliability, validity, credibility, confirmability, meaning in context, recurrent patterning, saturation, and transferability of the qualitative results using Leininger's (1994) six criteria.

Some of the key questions involve "How does COVID-19 affect your daily life?", "How does anxiety (or depression or stress) caused by COVID-19 affect your daily life (e.g., learning at the university, the relationship among friends)?", "How can mindfulness help reduce anxiety (or depression or stress) caused by COVID-19 (e.g., study, family, communication with friends, emotional management)?", "Can you share any mindfulness practices to overcome mental health problems?"

Qualitative data analysis

Based on the quantitative study's findings, a thematic content analysis was performed by two of the researchers who analyzed the qualitative data using the QSR NVivo software. To guarantee reliability and validity, each researcher coded together the first two interviews to be consistent in terms of procedure and then worked independently on the remaining corpus, strictly respecting the multiple encoding procedure (Miles et al., 2020; Vo-Thanh & Kirova, 2018). The results were then compared using the coding comparison query function (Vo-Thanh & Kirova, 2018). Finally, the inconsistencies were discussed by the two researchers to reach unanimity.

Qualitative results

Mindfulness and mental health disorders

The qualitative results showed that all the participants did have stress, anxiety, and depression during the COVID-19 pandemic. The conscious reflexion helps oneself disrupt his/her own usual responses to a factor causing stress, thereby decreasing the possibility of being stressed, depressed, and anxious. The empirical evidence contended that mindfulness was reducing stress, anxiety, and depression. As said by some students interviewed:

The COVID-19 pandemic has disrupted many aspects of our lives. However, thanks to mindfulness practice, I do not feel it could lead to the feeling of burnout or reduce my ability to study or work. (M1)

Really, I felt stressed, had trouble sleeping at night, and stagnated during a few days in all activities of daily living. However, helped by a friend, I practiced mindfulness which allowed me to be more reasonable and focus much less on COVID-19. I feel much better now. (M3)

Moreover, practicing mindfulness helped me feel less stressed, able to focus on my studies, and improve my expected quality of life. (M2)

Self-compassion and psychological well-being as serial mediators

The finding regarding the serial mediation role of self-compassion and psychological well-being in the relationships between mindfulness and mental health disorders (i.e., anxiety, depression, and stress) adds to the current body of psychology literature. It highlights the crucial role mindfulness, self-compassion, and psychological well-being play in understanding and reducing individuals' stress, anxiety, and depression, and thus broadens their applicability. This finding is supported by the following *verbatim*:

Practicing mindfulness helps me take time to be compassionate towards myself, start focusing on myself, be open with others, and improve my psychological health. (M15)

Since I practice mindfulness, I can achieve tasks more effectively. I also feel much better psychologically and reach out to others more easily. (M6)

I think practicing mindfulness has brought me a more harmonious life and increased my feeling of happiness and optimism. (M7)

Last year, I got into the small town mentality because negative things happen. So I started practicing mindfulness to overcome that psychological difficulty. Practicing mindfulness helps me relax, reduce anxiety due to the effects of COVID-19, and more compassionate towards myself and others. I think practicing mindfulness can help everyone boost their mental health. (M16)

During the early stages of the COVID-19 pandemic, I became angry at myself and aggressive towards others. However, since practicing mindfulness every morning (for example, deep breathing and meditation), I could control my emotions better. For example, I felt less aggressive, anxious, and more serene. (M10)

Discussion

The present research examined the relationships between mindfulness and psychology-related variables, namely anxiety, depression, and stress, considering the serial mediating role of two constructs, i.e., self-compassion and psychological well-being. The study employed a mixed-method approach, integrating quantitative and qualitative data to make robust the findings (Teddlie & Tashakkori, 2009; Vo-Thanh et al., 2022). Our study showed that mindfulness was significantly and negatively related to anxiety, depression, and stress (i.e., **Hypotheses 1, 2, and 3** were all accepted).

Furthermore, the association between mindfulness and each of the outcome variables, including anxiety, depression, and stress was sequentially mediated by self-compassion and psychological well-being (i.e., **Hypotheses 4, 5, and 6** were all supported).

Direct effect of mindfulness on anxiety, depression, and stress

The empirical findings of our paper revealed that mindfulness has significant and negative connections with anxiety, depression, and stress of university students. These findings indicate that a higher level of mindfulness among university students may play an important role in reducing the factors linked to their mental health issues. These symptoms include anxiety, depression, and stress, all of which are brought on by the COVID-19 epidemic. In other words, the higher students' mindfulness level is, the lower their anxiety, depression, and stress are. Thus, mindfulness can be regarded as a healthy way to deal with hardships of life such as anxiety, depression, and stress (Vu et al., 2022). These results are in line with the findings of previous studies (e.g., Choo et al., 2019; Khoury et al., 2013; Verplanken & Fisher, 2014), which showed that mindfulness is an effective tool in reducing physiological symptoms related to anxiety and levels of self-perceived stress. These results also support the findings of some prior studies (e.g., Irum et al., 2020; Mekawy et al., 2021) indicating that a low level of mindfulness can increase depression and anxiety, resulting in a high level of emotional exhaustion. To be more specific, through the practice of mindfulness, cortical plasticity is enhanced (Yang et al., 2019), resulting in reduced anxiety and stress (Choo et al., 2019). Our results can also be explained by the mindfulness-to-meaning theory (Garland et al., 2015). The key point of this theory is that mindfulness helps oneself observe his/her own thinking and put it into "a metacognitive state of awareness" (Garland et al., 2015, p. 298); therefore, it allows conscious reflexion, going much further than only focusing on sensation.

Serial mediating role of self-compassion and psychological well-being

The results indicated that the associations between mindfulness as a predictor variable and anxiety, stress, and depression as outcome variables were serially mediated by self-compassion and psychological well-being. According to our empirical findings, it is evident that psychological well-being does play a substantial intervening role in the direct path between mindfulness of university students and their mental health disorders, namely anxiety, stress, and depression. This means that the effect of university students'

mindfulness on their anxiety, stress and depression could be substantially mediated by their psychological well-being. In a similar way, self-compassion was found to have a crucial mediating role in the direct associations between mindfulness and anxiety, stress, and depression among university students. These results corroborate some recent studies (e.g., Liu et al., 2009; Malik et al., 2020; Suleman et al., 2018) which pointed out that the connections between such latent variables were affected by mediator variables. Interestingly, the direct associations between mindfulness and mental health disorders (i.e., anxiety, stress, and depression) could serially be mediated by self-compassion and psychological well-being.

The results of the current study can be explained by the concepts of self-compassion, psychological well-being, and mindfulness. According to Jazaieri and Shapiro (2017), mindfulness contains three core elements, including intention, attention, and attitude that involve acceptance and love. Based on the concept of self-compassion (Neff, 2003) consisting of self-kindness, common humanity, and mindfulness, it can be seen that mindfulness is made up of self-compassion. In addition, acceptance and love shaped by mindfulness (Jazaieri & Shapiro, 2017) could contribute to self-kindness, a component of self-compassion. Therefore, mindfulness and self-compassion have a positive relationship, suggesting that the increase of the former will lead to the increase of the latter and vice versa.

Self-compassion can help university students deal with their mental health disorders while also helping them increase their psychological well-being. This finding is consistent with previous research investigating the relationships of self-compassion and psychological well-being as protective factors in terms of mental health (Blasco-Belled et al., 2022; Neff & McGehee, 2010) with psychological distress (Fong & Loi, 2016; Hatun & Kurtça, 2022; Jiménez et al., 2020) or symptoms (Blasco-Belled et al., 2022), and also with sleep quality, emotional distress, and mental well-being (Rakhimov et al., 2022). In the existing literature, it is noted that there is, regardless of age, a positive association between self-compassion and psychological well-being (Fong & Loi, 2016; Hatun & Kurtça, 2022; Neff & McGehee, 2010) between self-compassion and sleep quality, which in turn helps reduce anxiety and depression (Rakhimov et al., 2022). The extant literature also indicates a negative relationship between self-compassion and distress (Fong & Loi, 2016) and between psychological well-being and psychological symptoms (Blasco-Belled et al., 2022). Therefore, in line with previous studies, this research demonstrates that individuals with high levels of self-compassion experience higher levels of psychological well-being, which in turn decrease mental health disorders.

Regarding the serial mediation of self-compassion and psychological well-being, being kind towards oneself and treating one's failures and pain with acceptance and love instead of ignoring or over self-criticizing – the main concept of self-compassion – can help promote positive emotions and at the same time reduce negative feelings, hence improving psychological well-being. When negative emotions reduce and positive ones accelerate, psychological well-being increases and disorders (i.e., anxiety, depression, and stress) decrease because these disorders contain extremely negative emotions (Grant & Nozyce, 2013). Therefore, self-compassion and psychological well-being can serially mediate the relationships between mindfulness and the three dependent variables, which are anxiety, depression, and stress.

Contributions, limitations, and future research

Our study has significant and remarkable theoretical and practical implications for several reasons. First, while previous studies in psychology have investigated how individuals' psychological disorders (i.e., anxiety, depression, and stress) could be improved by mindfulness, this study stands out by examining not only the direct effect, but also the indirect one of mindfulness through the serial mediating role of self-compassion and psychological well-being on individuals' mental health disorders. In other words, the present study has the merit of shedding light on the serial mediating mechanism in the relationships between mindfulness and mental health disorders by highlighting the vital roles of self-compassion and psychological well-being as mediators. This research is one of the first exploring this mediating mechanism. Therefore, the current study underscored the protective role of mindfulness on Vietnamese university students' mental health disorders caused by COVID-19 and the mediating roles of both self-compassion and psychological well-being. Theoretically, our research extends the knowledge about the crucial role of mindfulness in a particular health and social context (i.e., COVID-19). Second, this study adopted the scales with good psychometric properties and a mixed-method approach, which is recommended by scholars. Therefore, it contributes to enriching the research methodology when conducting future studies on psychology. Third, mindfulness serves as a significant predictor of anxiety, depression, and stress. Thus, universities and psychotherapists could use it as a crucial tool to help students in combatting their potential anxiety, depression or stress during the COVID-19 pandemic. Universities can incorporate mindfulness courses into their mental health education program during this global health crisis. For example,

the mindfulness-based stress reduction (see Khoury et al., 2015) or the mindful self-compassion program (see Neff & Germer 2013) could be beneficial for students. Fourth, according to our findings, mindfulness practice helps boost students' self-compassion, which, in turn, increases their psychological well-being. Therefore, psychotherapists can broaden their interventions to improve individuals' psychological well-being during the COVID-19 pandemic. This could be achieved by offering courses and counseling activities helping enhance individuals' compassion or by constructing exercises for cultivating various forms of mindfulness (Jalón et al., 2020; Vu et al., 2022). Fifth, according to the findings of the serial mediating role of self-compassion and psychological well-being between mindfulness and anxiety, stress, and depression, once again we should guide and facilitate students' mindfulness practice in their daily life to prevent them from mental health disorders.

The present study has some limitations that need to be highlighted for caution and guide in future research. First, it focused on a specific population group (i.e., university students) and the sample size of 560 is hardly representative of the Vietnamese university students. Thus, further research should examine the issues raised in the present study by relying on a representative sample to make the findings more generalizable. Second, although we adopted a mixed-method approach and a two-wave survey, by exploring the relationships between variables in the research models we may not exclude the possibility that the observed cause-effect relationships were explained by unmeasured confounding variables (Hill et al., 2021). It would, therefore, be important to appeal to experiments in order to solve this potential problem. Third, as the COVID-19 pandemic is a worldwide health crisis, future research may need to opt for a cross-cultural approach to discover the phenomena in other cultures, helping us seize the possible differences across multiple cultural contexts. Fourth, in the current study, we assessed students' stress, anxiety, and depression using the DASS-21 scale (Tran et al., 2013). Other scales or measures related to these variables, such as the Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960) and/or the Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001) could be adapted and used in future research. Finally, the data were gathered from respondents' self-reported assessment. Future research should resort to other data collection methods to smooth over this limitation.

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Data Availability Data are available on request due to privacy or other restrictions.

Declarations

Conflict of Interest The authors have no competing interests to declare that are relevant to the content of this article.

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