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Loneliness and Depressive Symptoms: Moderation and Mediation Model

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ABSTRACT

Background: Due to the impact of COVID-19, loneliness rates among university students have increased. Despite research evidence on the impact of loneliness on depression among university students, only a few studies have focused on the mediating mechanism of this relationship. The investigation of the role of self-esteem and life satisfaction in the association between loneliness and depression among university students still has many gaps.

Purpose: This study aimed to investigate whether loneliness was associated with higher depressive symptoms among university students through lower life satisfaction and whether the relationship between loneliness and depressive symptoms was moderated by self-esteem.

Methods: The sample includes 408 university students (341 female students and 67 male students) in Vietnam. Participants completed self-reported measures of loneliness, life satisfaction, self-esteem, and depression symptoms.

Results: Moderation analyses indicated that self-esteem moderated the relationship between loneliness and depression symptoms. Mediation analyses indicated that loneliness was associated with depression symptoms through life satisfaction.

Discussion: Self-esteem and life satisfaction are important mechanisms to explain why students with high levels of loneliness may be associated with more depressive symptoms.

Translation to Health Education Practice: Health educators should consider implementing measures to reduce loneliness and increase self-esteem and life satisfaction to reduce depression in students.

ARTICLE HISTORY

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Background

The COVID-19 epidemic appeared at the end of 2019, and so far it has spread to countries around the world.¹ To limit the spread of COVID-19, many countries implemented social distancing and lockdown,² including Vietnam. Starting April 27, 2020, Vietnam entered the fourth wave of the COVID-19 pandemic. Most university students are not allowed to go to school; teaching is moving from face-to-face to online. Previous studies have shown that social distancing and being out of school increase the prevalence of loneliness among students.³ Loneliness is mentioned as an unpleasant feeling for an individual when their social network is deficient in quantity and quality in some important respects.⁴ During the pandemic, an estimated 46.2% to 80.3% of university students experienced feelings of loneliness.^{5,6} Depression is a multifactorial disorder and is related to a series of specific behavior symptoms (e.g., excitement, self-aggression, negative speech and complaining, crying, poor speech, desperate and sad facial expression) as well as cognitive, social, and biological symptoms (e.g., negative self-assessment, increased

dependence on others, and avoidance of social interaction; sudden weight gain or loss; insomnia or drowsiness; fatigue; loss of energy and appetite; physical discomfort; weakness).⁷ During the COVID-19 pandemic, an estimated 40.3% to 48.1% of students experienced depressive symptoms.^{8,9} Loneliness was found to be associated with depression among college students.¹⁰⁻¹³ However, not all individuals who have experienced loneliness will become depressed or have the same level of depression. Previous studies indicated that internet addiction, coping styles, and self-disgust may be partially responsible for these differences.^{10,12,13} The aim of this study was to explore the mediating effect of life satisfaction and the moderating effect of self-esteem in the association between loneliness and depression symptoms among college students in Vietnam. Based on the findings of this study, it is possible to develop depression prevention intervention programs for at-risk students. This has important implications for limiting the development of chronic diseases because depression is a major independent

risk factor for many chronic diseases. Previous research has shown that depression increases stroke, heart disease, morbidity, and mortality in cancer, diabetes, and hypertension.^{14,15}

Self-esteem as a moderator

Self-esteem is a positive or negative attitude toward oneself and is the result of the influence of culture, society, family, and interpersonal relationships.¹⁶ Self-esteem appears to be related to loneliness and depression among students.^{12,17,18}

First, it has been shown many times that low self-esteem is associated with an increase in depressive symptoms among college students.^{17,18} For example, self-esteem was found to be negatively related to depression in samples of students in China,^{18,19} in Singapore and Malaysia.²⁰ In the context of the COVID-19 epidemic, similar results were found in a sample of college students in Peru²¹ and Saudi Arabia.²² Individuals with low self-esteem often have negative self-evaluations,²³ while negative self-evaluations are one of the symptoms of depression.⁷ Low self-esteem may increase vulnerability to the development of internalizing symptoms.¹⁷ In addition, in previous studies, relationship satisfaction may have been a factor explaining the self-esteem-depression relationship.²⁴ At the same time, positive affect can moderate the effect of self-esteem on depression among students.²⁴

Second, few previous studies have confirmed the relationship between loneliness and depression among students.¹² For example, research on samples of college students in Turkey and the UK has shown that loneliness is positively correlated with depression.^{10,13} In the context of the COVID-19 epidemic, similar results were found in a sample of college students in South Africa and China.^{11,12} Students who are lonely tend to experience more depressive symptoms because they often have negative thoughts about themselves and everything around them.²⁵ In the context of COVID-19, to limit the spread of the disease, limiting social engagement is essential. However, limited social engagement can lead to a decrease in the individual's mood and increase the risk of depression.¹¹ According to Zhang et al. (2021), lonely individuals who use negative coping styles may experience more depressive symptoms.¹²

Third, in the literature, research has revealed that gender and affinity for aloneliness are mechanisms that moderate the relationship between loneliness and depression among college students in China and America.^{26,27} In a German sample, Brailovskaia et al. (2021) found that narcissism buffered this relationship.²⁸ In other cases, social support became

a moderating mechanism for the above relationship in participants from 49 to 95 years old.²⁹ There are still research gaps regarding the moderating mechanism of self-esteem in this relationship.

Life satisfaction as a mediator

Life satisfaction is an important factor that strongly influences an individual's thoughts and feelings in dangerous situations.³⁰ Life satisfaction refers to a person's cognitive and emotional evaluation of his or her life.³¹ Life satisfaction was found to be linked to loneliness^{11,32,33} and depression.^{34,35}

On the one hand, previous studies have verified the link between loneliness and life satisfaction and reported that individuals with high levels of loneliness have low life satisfaction.^{11,32,33} Other studies have focused on the mediating mechanism between loneliness and life satisfaction. For example, Padmanabhanunni and Pretorius (2021) demonstrated that high levels of loneliness were associated with high levels of hopelessness, which in turn reduced life satisfaction.¹¹ On the other hand, researchers also investigated the role of life satisfaction in the increase in depressive symptoms, with results showing that a higher level of life satisfaction was related to lower risks of depression.³⁴ According to prior studies, positive perceptions and emotions can reduce negative thoughts, thereby reducing the risk of depression.³⁶ In contrast, low life satisfaction was found to be a predictor of depression development.³⁵ More importantly, few previous studies have focused on the mediating mechanism of the loneliness-depression relationship. For example, research has shown that self-esteem and happiness mediate the loneliness-depression relationship in a sample of Turkish Facebook users.³⁷ Other research has also revealed that during the COVID-19 lockdown, coping strategies may mediate this relationship among youths.¹² However, no research has been found investigating the mediating mechanism of life satisfaction in this relationship among college students.

Purpose

Despite research evidence on the impact of loneliness on depression among university students,^{12,38,39} only a few studies have focused on the mediating mechanism of this relationship.^{12,39} The investigation of the role of self-esteem and life satisfaction in the association between loneliness and depression among university students still has many gaps. For these reasons, we examined the mediating role of life satisfaction and the moderating role of self-esteem in the

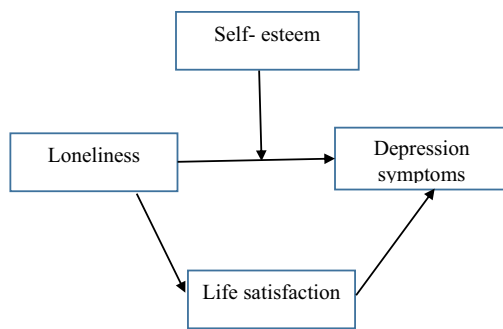


Figure 1. Theoretical model.

association between loneliness and depression among Vietnamese university students. Based on prior studies, we proposed the following three hypotheses (see Figure 1): loneliness would be positively correlated with depressive symptoms (H1), self-esteem would moderate the link between loneliness and depressive symptoms among university students (H2), and life satisfaction would mediate the link between loneliness and depressive symptoms among university students (H3).

Methods

Sample and procedure

Data collection starts from May 20, 2021, to June 4, 2021, shortly after Vietnam entered the 4th wave of the COVID-19 pandemic (April 27, 2021), using a convenience sampling method. All participants were from a local university. Ethical permission was obtained from the Department of Psychology and Education, University of Education, Hue University. Informed consent was obtained from participants. The number of samples was determined according to Slovin's formula with $N = 40,000$ and $e = 0.05$. Data collection proceeds in the following order: Step 1: The researcher contacted the teachers and asked for their support; Step 2: The researcher and teacher schedule an online meeting with students; Step 3: The researcher meets online (via Google Form) with students, informs them of the purpose of the research, how to participate in the research, and asks for their help; Step 4: Students who do not agree to participate in the study can leave the online meeting rooms, and students who agree to participate in the study are sent a link to participate in the survey and answer the questionnaire; Step 5: Students receive gifts from researchers (free book download link). A total of 450 students agreed to participate in the survey and were sent questionnaires. The total number of

Table 1. Demographic characteristics of the study sample.

	n	%
Gender		
Female	341	83.6
Male	67	16.4
Age, Mean \pm SD	19.95 \pm 1.636	
Grade		
First year students	203	49.8
Second year students	85	20.8
Third year students	54	13.2
Fourth year students	66	16.2

questionnaires recovered was 408 (accounting for 90.67%). Table 1 indicated a mean age of 19.95 (SD = 1.636), with most of the participants being females ($n = 341$, 83.6%). The majority of the participants were first-year students ($n = 203$, 49.8%).

Instruments

Depression symptoms

The Depression Anxiety Stress Scales – Short Form (DASS-21)⁴⁰ is a 21-item measure of stress, anxiety, and depression symptoms with three subscales. However, we only used the depression subscale (7 items) to assess students' depression symptoms. A sample item includes "I felt that I had nothing to look forward to". Each item was designed to respond to the frequency of experiencing symptoms of depression on a four-point scale from 0 (never) to 3 (always). For each subscale, the highest score is 42, the lowest score is 0, and higher scores indicate more depression symptoms. In this study, the Cronbach's alpha value for the depression subscale was 0.87.

Loneliness

The UCLA loneliness scale version 3⁴¹ is a 20-item measure of feelings of loneliness. A sample item includes "How often do you feel left out?." All items are rated using a four-point scale, ranging from 1 = never to 4 = often. The highest loneliness score was 80, and the lowest score was 20. In this study, the Cronbach's alpha value was 0.88.

Life satisfaction

The Life Satisfaction Scale (SWLS)⁴² is a five-item measure of life satisfaction. A sample item includes "I am satisfied with my life." Questions are rated on a 7-point scale ranging from "strongly disagree" to "strongly agree." The total score ranges from 5 to 35, and the total score is directly proportional to the level of life satisfaction. Internal consistency for our study was 0.79.

Self-esteem

The Rosenberg's Self-Esteem Scale¹⁶ is a 10-item measure of global self-esteem. Items are phrased as self-statements (e.g., "I am able to do things as well as most other people"), and respondents use a 4-point scale to indicate their degree of agreement with each item related to them. The total score ranges from 0 to 30, and the total score is directly proportional to the level of self-esteem. Internal consistency for our study was 0.70.

Data analysis

Statistical analyses used SPSS version 20.0, including PROCESS macro 3.5.⁴³ To evaluate moderation and mediation effects, we use Process Macro 3.5 (Model 1 and Model 4). In the models, loneliness is entered as X, depression is entered as Y, self-esteem is entered as W, life satisfaction is entered as M, and gender is entered as a control variable. The moderation effect or mediation effect is significant when the 95% confidence interval of the X*W interaction terms or the indirect effect does not include zero.

Results

Descriptive and correlational analyses

Bivariate correlations between loneliness, life satisfaction, self-esteem, and depression symptoms were examined (see Table 2). The results indicated that loneliness was negatively associated with life satisfaction ($r = -0.233$, $p < .01$) and self-esteem ($r = -0.563$, $p < .01$); however, loneliness was positively associated with depression ($r = 0.559$,

$p < .01$). Life satisfaction was positively associated with self-esteem ($r = 0.263$, $p < .01$) and negatively associated with depression ($r = -0.286$, $p < .01$). Self-esteem was negatively associated with depression symptoms ($r = -0.467$, $p < .01$).

Moderation analyses

Table 3 indicated that self-esteem significantly moderated the link between loneliness and depression symptoms ($B = -0.028^{***}$, $SE = 0.008$, 95% CI = $[-0.044, -0.013]$). Table 3 and Figure 2 showed that the effect of loneliness on depression symptoms was powerful among students with low self-esteem ($B = 0.460^{***}$, $SE = 0.049$, 95% CI = $[0.364, 0.556]$); however, this association was weaker among students with high self-esteem ($B = 0.237^{***}$, $SE = 0.053$, 95% CI = $[0.133, 0.340]$). In other words, high self-esteem reduces the effect of loneliness on depression symptoms among Vietnamese students.

Mediation analyses

Table 4 indicated that the direct effect of loneliness on life satisfaction ($B = -0.133$, $SE = 0.028$, 95% CI = $[-0.187, -0.079]$), the direct effect of life satisfaction on depression symptoms ($B = -0.239$, $SE = 0.060$, 95% CI = $[-0.357, -0.121]$), and the direct effect of loneliness on depression symptoms ($B = 0.430$, $SE = 0.034$, 95% CI = $[0.362, 0.497]$) were all statistically significant. The indirect effect of loneliness on depression symptoms through life satisfaction was also statistically significant ($B = 0.032$, $SE = 0.012$, 95% CI = $[0.011, 0.059]$). Therefore, life satisfaction

Table 2. Pearson correlations, mean, and standard deviations among study variables.

	Mean	SD	Loneliness	Life satisfaction	Self-esteem
Loneliness	46.039	10.218	–		
Life satisfaction	20.831	5.835	–0.233**	–	
Self-esteem	17.814	3.967	–0.563**	0.263**	–
Depression	9.275	8.448	0.559**	–0.286**	–0.467**

** $p < .01$.

Table 3. Regressions testing self-esteem as a moderator in the link between **loneliness** and depression symptoms.

Regression Models	B	SE	95% CI	
Loneliness	0.851***	0.143	[0.569, 1.132]	
Self-esteem	0.789*	0.367	[0.068, 1.510]	
Loneliness * Self-esteem	–0.028***	0.008	[–0.044, –0.013]	
Gender	0.454	0.914	[–1.344, 2.251]	
Conditional effects	Self-esteem value	Effect	SE	95% CI
	Low Self-esteem	0.460***	0.049	[0.364, 0.556]
	Moderate Self-esteem	0.349***	0.040	[0.270, 0.427]
	High Self-esteem	0.237***	0.053	[0.133, 0.340]

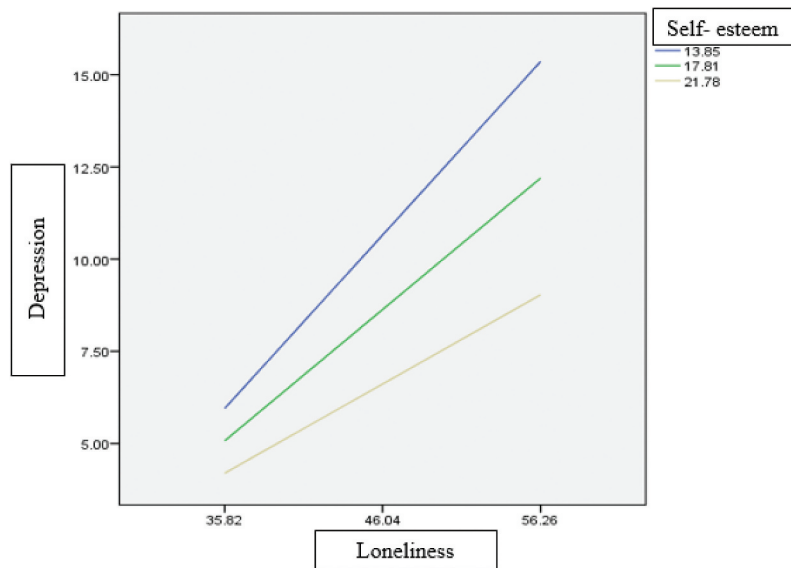


Figure 2. Self-esteem as a moderator of the link between loneliness and depression symptoms.

Table 4. The direct and indirect effects of loneliness on depression symptoms.

	B	SE	95% CI
<i>Direct effect</i>			
Loneliness → Life satisfaction	-0.133***	0.028	[-0.187, -0.079]
Life satisfaction → Depression	-0.239***	0.060	[-0.357, -0.121]
Loneliness → Depression	0.430***	0.034	[0.362, 0.497]
Gender → Life satisfaction	0.063	0.760	[-1.431, 1.557]
Gender → Depression	1.034	0.920	[-0.776, 2.843]
<i>Indirect effect</i>			
Loneliness → Life satisfaction → Depression	0.032	0.012	[0.011, 0.059]

****p* < .001, CI: Confidence interval; Male = 1; Female = 2.

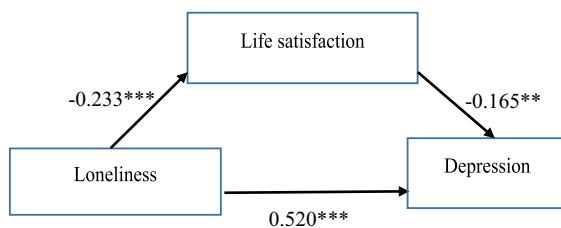


Figure 3. Life satisfaction as a mediator in the association between loneliness and depression.

mediated the association between loneliness and depression symptoms among Vietnamese students (see Figure 3).

Discussion

Using a sample of 408 university students in Vietnam, this study investigated the relationship between loneliness and depression and the mediating and moderating mechanisms of this relationship. To the best of our knowledge, this is the first study in Vietnam to

investigate this relationship. Furthermore, the measurement tools used in this study had satisfactory internal reliability. This study has the following important findings:

In line with our expectations, this study found that loneliness predicted an increase in depressive symptoms among university students in Vietnam. This finding is consistent with previous findings in Turkey,¹⁰ UK,¹³ South Africa,¹¹ and China.¹² According to previous studies, potential factors that explain why individuals with high levels of loneliness are at risk of experiencing depressive symptoms include low self-esteem,³⁷ low happiness,³⁷ and coping strategies.¹² Factors that buffer this relationship include narcissism,²⁸ gender,^{26,27} and an affinity²⁶ for aloneliness. Unlike previous studies, this study has found new mechanisms that may affect the relationship between loneliness and depression in a sample of university students in Vietnam.

In line with our expectations, self-esteem was found to moderate the association between loneliness and depression symptoms. Simple slope analysis indicated that when self-esteem was low, the effect of loneliness on depression symptoms was powerful; conversely, when self-esteem was high, the effect of loneliness on depression symptoms was weaker. According to the vulnerability model, low self-esteem may lead to socially avoidant behavior in some individuals,⁴⁴ and social avoidance can increase the risk of depression.⁴⁵ In contrast, individuals with high self-esteem tend to use positive coping strategies, which may reduce the risk of depression.¹² Furthermore, loneliness was found to be associated with an increase in depressive symptoms among university students. A previous study had similar

findings⁴⁶ and suggested that individuals with high levels of loneliness may have negative thoughts and are more prone to depression.²⁵ From the above analysis, the results of this study suggest that students with both high loneliness and low self-esteem exhibited the highest levels of depression, whereas students with both low loneliness and high self-esteem exhibited the lowest levels of depression. Therefore, high self-esteem may be a protective factor for students with high levels of loneliness against the risk of depression.

In line with our expectations, life satisfaction partially mediated the link between loneliness and symptoms of depression. In this study, loneliness increased depressive symptoms among students. In terms of indirect effects, loneliness levels have reduced life satisfaction, thereby increasing depressive symptoms in students. On the one hand, similar to previous findings,^{11,32,33} university students with high levels of loneliness may relate to low levels of life satisfaction. On the other hand, similar to previous studies,^{34,35} we found that university students with low life satisfaction may develop depressive symptoms. Therefore, life satisfaction may be a factor explaining the link between loneliness and depression among students. Enhancing life satisfaction may be a useful measure in preventing depression for at-risk students.

Previous studies have shown that the link between loneliness and depression is moderated by narcissism,²⁸ social support²⁹ and gender,⁴⁷ and this association is mediated by coping styles,¹² rumination,³⁹ resilience,⁴⁷ social network use, Internet gaming disorder and generalized pathological internet use.⁴⁸ Unlike previous studies, we have found that the link between loneliness and depression was moderated by self-esteem and mediated by life satisfaction. Therefore, this finding could expand understanding of the mediating and moderating mechanisms of the link between loneliness and depression. These are all our new findings, which previous studies have not found. These findings add new insights to the research literature on the relationships between loneliness, self-esteem, and symptoms of depression as well as between loneliness, life satisfaction and symptoms of depression that have not been examined before.

Limitations

Limitations of this study include an unbalanced sample by gender and grade level, convenience sampling method, cross-sectional study design, and not assessing the impact of COVID-19 on students' mental health. First, the research sample is not balanced between male and female students, which may affect the research

results. In the literature, psychologists have found gender differences in loneliness,^{49,50} self-esteem,^{51–53} life satisfaction^{54–56} and depression^{53,57} among students. Studies have reported that female students have higher levels of loneliness,^{49,50} life satisfaction^{54,55} and depression^{53,57} and lower levels of self-esteem^{51–53} than male students. In our study, the majority of the sample was female (83.6%), and this may affect the level of correlation and impact between factors. Second, this research sample did not have a balance in the number of students by grade level. Usually, older students have higher grades. Previous studies have shown that there are age differences in loneliness,⁵⁸ self-esteem,⁵⁹ life satisfaction,⁶⁰ and depression.⁶¹ In our study, the proportion of first-year students is the majority (49.8%), showing an imbalance in the number of students by grade level. Therefore, the determination of control variables and research results may be affected. Future studies should consider recruiting a balanced sample by gender and grade level. Third, this study used a cross-sectional study design. Therefore, this study does not allow for inferring a causal relationship between loneliness, self-esteem, life satisfaction, and depression. Therefore, it is necessary to have longitudinal design studies to further analyze the relationship between the above variables. Four, this study has limitations of convenience sampling such as non-representative results, researcher bias in selecting participants, providing biased data, etc. Therefore, future research should use other sampling techniques (such as purposeful sampling and quota sampling) to overcome the disadvantages of convenience sampling methods. Finally, this study did not investigate the impact of COVID-19 on the mental health of university students in Vietnam. This study was conducted in the context of the fourth wave of the COVID-19 epidemic; however, we did not assess the impact of the epidemic on loneliness, self-esteem, life satisfaction, and depression in participants. Therefore, the study results may be biased because previous studies have shown that the COVID-19 epidemic may increase mental health-related problems.^{5,6,8,9} Future studies should evaluate the impact of social factors (such as epidemics) on the mental health of participants.

Translation to Health Education Practice

This study has shown that reducing loneliness levels can be effective in reducing depression among students. It also proposes an interesting approach to improving depressive symptoms for lonely individuals by focusing on measures aimed at improving students' levels of self-esteem and life satisfaction. It appears that reducing loneliness, improving self-

esteem levels, and increasing life satisfaction may help at-risk students benefit from reduced depression. In previous studies, some intervention programs to reduce loneliness and improve self-esteem and life satisfaction have been effective. First, interventions that effectively address loneliness among college students include reflection exercises and increased social interactions; interventions based on social support groups; and interventions based on psychoeducation.⁶² Second, interventions to improve self-esteem levels include fostering relationship resilience,⁶³ mindfulness-based interventions,⁶⁴ life-skills promotion program,⁶⁵ and laughing programs.⁶⁶ Interventions to enhance life satisfaction levels include social belonging interventions, life review interventions,⁶⁷ positive psychology group-based intervention programs that incorporate elements of hope and gratitude that can increase life satisfaction and reduce depression in students,⁶⁸ expressed gratitude interventions.⁶⁹ These are intervention measures for at-risk groups. In addition, mental health education activities in schools can be useful for students. These measures should be implemented at a school-wide level not only for the purpose of preventing depression but also mental health problems in general (loneliness, stress, anxiety, low self-esteem, etc.). Mental health education activities that schools can carry out include (1) organizing seminars on related topics to raise students' awareness of mental health issues (signs, consequences, effective coping strategies, and the relationship between them) and (2) organizing training sessions to improve coping skills for mental health issues for students.

Approaches to reducing depression in at-risk university students may be implemented by health educators or Certified Health Education Specialists (CHES). Certified Health Education Specialists can identify groups of students at risk for depression who need health education (Area I Competency 1.1.2),⁷⁰ determine health status (Area I Competency 1.3.1),⁷⁰ and determine the knowledge, attitudes, beliefs, skills, and behaviors that affect their health and health literacy (Area I Competency 1.3.2).⁷⁰ The above work is important in providing information to develop a health education plan (Area II Competency).⁷⁰ In particular, they assist in establishing the theoretical basis of the intervention (Area II Competency 2.1.3)⁷⁰ and determining the desired outcomes (Area II Competency 2.2.1).⁷⁰ Finally, the needs assessment and planning tasks drive implementation of interventions (Area III) and monitoring of implementation (Area II Competency 3.3).⁷⁰

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Data availability statement

Research data are not shared.

Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee. Ethical permission was obtained from the Department of Psychology and Education, University of Education, Hue University.

Consent to participate

Informed consent was obtained from participants.

Authors' contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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