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A comparative study of the impact of meditation and Buddhist five precepts on stress and depression between older adults and younger adults

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Older adults frequently face a myriad of physical and mental health challenges, which can contribute to feelings of stress and subsequent depression. Nevertheless, with age often comes a wealth of life experience and resilience. Perceived stress commonly predicts depression across all age groups, while meditation has been associated with lower levels of depression. Additionally, adherence to the Five Precepts is a prevalent practice among Thai individuals, particularly among older adults. However, it remains unclear how the combination of meditation and the Buddhist Five Precepts influences depression levels. This study aims to explore the predictive roles of meditation, the practice of the Five Precepts, and perceived stress on depression among older adults, with comparisons drawn to younger adults. A sample of 1472 individuals (232 were older adults and 1240 were adults) participated in the study. All completed the questionnaires for depression, perceived stress, meditation, and five precepts using the core symptom index, perceived stress scale, and inner strength-based inventory. Moderation model and mediation model analyses were employed to analyze the relationship between the perceived stress scores and the symptoms of depression for both older and younger samples. In the older adults group, 59.9% were female, with a mean age of 67.96 years (SD 6.8). In the adult group, 71.3% were male, with a mean age of 29.04 years (SD 10.5). The findings revealed that among the older adults' group, precepts, meditation, and their interaction significantly predicted a lower level of depressive symptoms (estimated coefficient = − 0.1082, 95% CI = − 0.1865, − 0.03). However, this association was not observed in the younger adults' group (estimated coefficient = -0.0199, 95% CI = − 0.0465, 0.0066). The variance explained in depressive symptoms changed from 24.9% in the linear model of perceived stress to 31.8% in the moderated moderation model, representing a 27.7% increase. Conversely, meditation and the five precepts mediated the relationship between stress and depressive symptoms in younger people but not in older adults. The indirect effect of perceived stress was significant only through the five precepts (estimated coefficient = − 0.3173, 95% CI = − 0.4787, − 0.1558; p = .0001). The variance explained in depressive symptoms changed from 42.2% in the linear model of perceived stress to 43.2% in the mediation model, representing a 2.5% increase. This study emphasizes that older adults may experience enhanced benefits from meditation and adherence to the Five Precepts compared to younger adults. Additionally, the effectiveness of meditation appears to be influenced by the extent of precept practice. Older individuals who actively engage in both high levels of precept adherence and meditation demonstrate a more significant buffering effect on the relationship between stress and depression. These findings suggest that lifestyle factors, such as religious practices like meditation and adherence to precepts, may have a differential impact on older adults compared to younger counterparts. The implications for older individuals are promising and warrant encouragement, while further research is needed to explore relevant factors contributing to reduced depression among younger populations.

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There are 13,358,751 elderly people aged over 60 years in Thailand, accounting for 19.6% of the population, according to the 2021 survey of older persons in Thailand conducted by the National Statistical Office. Within that figure, males comprise 5,974,022 (44.7%), and females comprise 7,384,729 of the total population[1]. The Thai elderly population reached 20% in 2023, signaling an aging society, especially in the northern regions. Most elderly people live alone, and around one-third work to support their families. Additionally, about one-fifth of the elderly population depends on government living expenses. They have been experiencing life crises[2].

Older Persons face many challenges during this age, physically, emotionally, and socially[3]. One of the common mental health problems is depression. A systematic review estimates the global prevalence of depression in older adults to be 28.4%[4]. Similarly, related studies report that the prevalence of depression ranges from 10 to 15% among older adults, with a higher rate of 27% observed in outpatient settings[5]. This is consistent with other studies of Thai older adults that found 23% were in long-term care[6] and 23.7% were in tertiary care settings, with 20.4% within the tertiary care setting reported to be at risk for suicide[7].

Many factors contribute to the development of depression. Apart from endogenous depression or depression derived from injury to the brain (e.g., stroke, substance, hypothyroidism), perceived stress from any source is an important psychological factor that is closely related to depression. Perceived stress can contribute to an individual's personality, coping style, or loneliness[8–10]. On the other hand, many protective factors for depression have been studied[11,12]. These factors differ depending on the culture. In Thailand, older individuals are likely to spend their time participating in religious activities that include practicing meditation[13].

While mindfulness meditation is practiced globally, its format and approach can vary significantly. Among Thai people, meditation practice, regardless of age, is often rooted in Theravada Buddhism. This tradition emphasizes the integration of meditation with acts of generosity (dana) and observance of the Five or Eight Precepts (Sila). For more devout practitioners, adherence to the 'three pillars'—Sila (ethical conduct), Samadhi (meditation), and Panya (wisdom or insight)—is paramount, with precept practice serving as a crucial component.

The five precepts involve refraining from killing or harming living beings, stealing or taking others' property without permission, engaging in sexual misconduct, speaking falsely, and consuming alcohol or intoxicants. While these precepts are primarily practiced by Buddhists, they are also embraced by many Thai people, including non-Buddhists, as part of Thai societal values[14]. The observance of the Five Precepts can be viewed as a form of behavioral control that requires the development of positive attributes. These precepts align with key aspects of the Noble Eightfold Path, particularly right speech, livelihood, and action, which are central to Buddhist teachings[15]. Adhering to the Five Precepts is not an isolated practice; it requires a combination of the right view, effort, and mindfulness for effective implementation. This suggests that individuals who practice observing the Five Precepts may experience increased levels of positive mental strength. The mechanisms underlying the observance of the Five Precepts may resemble those of equanimity, potentially fostering a calming state of mind, enhanced self-awareness, and reduced stress. One study found that Buddhist affiliation and religious participation are negatively associated with depressive symptoms[16], indicating that observing the Five Precepts could be part of such religious practices.

Compared to their younger counterparts, older individuals tend to incorporate acts of generosity into their practice, although both age groups commonly observe the Five Precepts and meditation. Older individuals typically demonstrate better adherence to the Five Precepts. Adherence to the Buddhist Five Precepts has been positively correlated with well-being[17] and negatively associated with depressive symptoms[18,19]. Phong's study identified mindfulness meditation as a potential mediator in the relationship between the Five Precepts and mental well-being. Although Phong's study lacked an in-depth explanation, it is widely recognized that mindfulness often plays a pivotal role in various positive outcomes[20].

Numerous studies provide evidence supporting the preventive effects of meditation on depression[21–23]. A recent meta-analysis by Reangsing and colleagues revealed that mindfulness meditation interventions moderately improved depression compared to control conditions, with studies conducted in Asian samples demonstrating greater effects than those in European or North American samples (g = 1.28, 0.59, and 0.32, respectively)[24]. In a review of meditation intervention studies among Korean elderly, Kwon and colleagues found similar results across various interventions, such as breath or yoga meditation. However, some studies reported non-significant results[25]. Additionally, research indicates that meditation can have beneficial effects on brain structure and function, including increased structure and function in frontal and limbic systems, which may protect against mental health issues associated with aging, including depression[26]. Older adults who regularly practice meditation also tend to exhibit lower levels of brain degeneration, such as reductions in grey matter volume, compared to non-practitioners[27].

In line with patterns observed in other cultures, older individuals tend to be more involved in religious activities compared to their younger counterparts[28,29]. In Thailand, older people often participate in religious rituals such as observing the five or eight precepts and engaging in meditation on holy days, typically once a week[30]. Within the framework of Theravada Buddhism, Buddhist meditation practitioners are expected to adhere to at least the five precepts alongside their meditation practice, following the Sila-samadhi-panna (precepts-meditation-insight) principle. Hence, Thai meditation practitioners, particularly older individuals, are more inclined to integrate meditation practices with observing the five or eight precepts instead of solely focusing on meditation, as observed in non-Buddhist meditators.

Few studies have investigated the role of the Five Precepts and meditation in addressing depressive symptoms. One study among adolescents demonstrated that meditation mediated the relationship between insecure attachment and depressive symptoms, suggesting that regular meditation practice can reduce the negative emotional impact of insecure attachment[31]. Another study found that adherence to the Five Precepts combined with meditation significantly enhanced resilience, highlighting the potential of these practices to promote emotional strength and well-being[18].

Moreover, observing the Five Precepts is a positive attribute that can be cultivated. Developing the practice of the Five Precepts may influence the relationship between perceived stress and depressive symptoms, potentially offering a pathway to improved mental well-being.

The present findings offer different perspectives on the possible effects of meditation and the Five Precepts, including the moderation effect. First, meditation is well-established in its direct effects on depressive symptoms, operating through mechanisms such as emotional regulation, stress reduction, and cognitive restructuring[32]. Second, the Five Precepts contribute to mental well-being by promoting ethical living, reducing guilt and shame, and fostering positive relationships[18]. Third, the Five Precepts may act as a moderator, influencing the relationship between perceived stress and depressive symptoms by providing a moral framework that enhances resilience and emotional stability. Finally, meditation and the Five Precepts may work synergistically, addressing internal (emotional and cognitive) and external (behavioral and social) factors contributing to mental health. These perspectives highlight how meditation and the Five Precepts can promote mental well-being, particularly in culturally relevant contexts like Thailand.

This study aimed to explore the mediating and moderating role of precept-based meditation on depressive symptoms among Thai participants experiencing stress. The authors hypothesized that the combined practice of meditation and adherence to the precepts would result in a more pronounced reduction in depression scores compared to practicing meditation alone or adhering to the precepts alone. Additionally, the authors anticipated differences in the effects of precept-based meditation on depressive symptoms between older individuals and younger adults, considering the greater engagement of older people in such practices. Specifically, it was hypothesized that older individuals, who are more likely to regularly participate in religious activities such as observing the Five Precepts and engaging in meditation, would experience a more pronounced reduction in depressive symptoms due to their more profound familiarity with and commitment to these practices. In contrast, younger adults, who may have less consistent engagement with religious rituals and meditation, might show smaller or less consistent improvements. Furthermore, the synergistic effect of combining meditation with adherence to the Five Precepts was expected to be stronger among older individuals, as their lifelong exposure to Buddhist practices and cultural values may enhance the mental health benefits of these activities. Older individuals might also exhibit greater resilience and emotional stability as a result of their sustained practice of precept-based meditation, further amplifying the protective effects against depressive symptoms.

The current study also used network analysis to explore the connections between meditation, adherence to precepts, and depressive symptoms among older Thai adults experiencing stress. The researchers aimed to visualize and quantify the interactions and identify potential moderating effects. They hypothesized that meditation would be a central node in the network. They believed that combining meditation and precept adherence would lead to more significant reductions in depression compared to meditation alone. The study also looked at differences between age groups in meditation and precept adherence and their effects on depressive symptoms.

Materials and methods

The study design was a cross-sectional survey among a general population in Chiang Mai province, Thailand. A convenient sampling method was applied. The Ethics Committee of the Faculty of Medicine, Chiang Mai University, approved the study. The study code was PSY- 458/2559, and the approval date was November 23, 2017.

Procedure

The procedures used to recruit participants. As per the study's inclusion criteria, all participants aged 18 years old and older who were able to understand, read, and write the Thai language used an online questionnaire and had their own electronic devices such as smartphones, tablets, or notebooks that could access the study's online questionnaires. Individuals diagnosed with a psychiatric disorder or undergoing treatment for one that could interfere with completing the questionnaires or affect their reliability were excluded from participation. This includes conditions such as active bipolar disorder, active psychosis, or substance intoxication and withdrawal.

The survey's participants were reached from different avenues, including (1) Placing banners on websites to attract users and promote the study, (2) Posting on departmental Facebook accounts, and (3) Employing flyers for community-wide advertisement. Participants were individually invited to participate in the research project by a research assistant who provided comprehensive details to those who expressed interest. Eligible participants who adhered to inclusion and exclusion criteria received a link to provide informed consent and complete the questionnaires. Data were collected online through Google Forms, which clearly informed participants about the purpose of the data collection, how their data would be used, and any potential risks. Participants were ensured to give explicit consent before they began filling out the form. Participation was ensured that the survey was voluntary and that respondents knew they could withdraw at any time without penalty. Anonymity, confidentiality, and Data Security were informed to protect against unauthorized access. Compensation for participants amounted to 100 baht (equivalent to 2.83 US dollars based on the exchange rate as of August 15, 2023).

Participants

A sample size calculation was performed for the indirect effect (parallel mediation model). We determined a small effect size (0.2), with a power over 0.9. The minimal sample size required was 522[33,34]. However, a sample of 1472 people participated in the study. The participants' ages ranged from 18 to 90, with an average age of 35 years. The majority were female, living alone, and had an average of 15 years of education. Nearly 70% of the participants reported a low to moderate income level.

Instruments

The electronic form of the following questionnaires, as well as demographic information, was collected.

Inner-strength-based inventory (I-SBI)
This inventory measures the frequency of behaviours that follow the Buddhist ten perfections (e.g., loving-kindness, equanimity, truthfulness, perseverance, generosity, morality, mindfulness, wisdom, patience, and endurance). Each strength is measured with one multiple-choice question that describes varying degrees of the corresponding behaviour along a 5-point scale. The factor analysis revealed that the iSBI followed a three-factor model. Factor 1 included generosity, loving-kindness, equanimity, meditation, and patience; Factor 2 comprised morality, wisdom, and perseverance; and Factor 3 encompassed determination and truthfulness. However, each item can also be used independently. This study used only meditation/mindfulness and morality (the five precepts) as single variables. The mindfulness variable corresponds to a question about the frequency of meditation practice, while the morality variable assesses the frequency of adherence to the precepts. The iSBI was validated according to the Rasch measurement theory, and no misfit items were observed. The person reliability is 0.86 according to Rasch's analysis. The two-week test-retest score of the intraclass coefficient was 0.88[20].

Core symptom index (CSI-15)
The Core Symptom Index (CSI) is designed to measure anxiety, depression, and somatization symptoms. The CSI items comprised five items representing depression, four items for anxiety, and six items for somatization symptoms. The CSI instructions directed respondents to answer the items based on their feelings over the past week. The instrument was based on a 5-point Likert scale, i.e., values of 0 (never), 1 (rarely), 2 (sometimes), 3 (frequently) and 4 (almost always). Total scores are interpreted as the higher the score, the higher the level of psychopathology. The bifactor model provided the best fit to the data. Comparative Fit Index (CFI) = 0.983; Standardized Root Mean Square Residual (SRMR) = 0.034; Non-Normed Fit Index (NNFI) = 0.977, Root Mean Square Error of Approximation (RMSEA) = 0.042[35]. The study used only the depression subscale, with a Cronbach's alpha of 0.84.

Perceived stress scale (PSS-10)
This ten-item, 5-point Likert scale instrument records how frequently people feel stressed[36]. The Thai version of the perceived stress scale (PSS) has demonstrated good reliability and validity[37]. It has two dimensions: "stress" and "control". The item loadings ranged from 0.547 to 0.881. Investigation of the fit indices associated with Maximum Likelihood (ML) estimation revealed that the two-factor solution was adequate ($\chi^2 = 35.035$ ($df = 26$, $N = 368$, $p < .111$)); Goodness-of-Fit Index (GFI) = 0.981; Root Mean Square Residual (RMR) = 0.022; Standardized Root Mean square Residual (SRMR) = 0.037, Comparative Fit Index (CFI) = 0.989; Normed Fit Index (NFI) = 0.96, Non-Normed Fit Index (NNFI) = 0.981, Root Mean Square Error of Approximation (RMSEA) = 0.031. It was found that the T-PSS-10 had a significant positive correlation with the STAI ($r = .60$, $p < .0001$), and the TDI ($r = .55$, $p < .0001$); and was significantly negatively correlated with the RSES ($r = -.46$, $p < .0001$, $N = 368$)[37]. The Cronbach's alpha for this subscale in this study was 0.86.

Statistical analysis

In the initial phase of analysis, descriptive statistics, independent t-tests, and Chi-square tests were performed to provide insights into the sociodemographic characteristics and to compare the distribution of depressive symptoms across different groups. Following this, the relationships between the study variables (perceived stress, meditation, five precepts, and depressive symptoms) were explored using Pearson/ Spearman correlation analyses. This step aimed to ascertain whether there were significant associations between these variables.

Subsequently, upon confirmation that meditation and adherence to the five precepts showed significant associations with perceived stress and depressive symptoms, mediation analysis was used for its explanatory role of these variables. Conversely, if no significant associations were found, moderation analysis was pursued, particularly if interaction plot analysis suggested such an approach. Finally, a moderated moderation model (PROCESS Model 3 based on Hayes, 2018) was utilized to determine whether adherence to the five precepts moderated the impact of meditation[38].

To further elucidate the relationships among the variables, mediation, and moderated mediation models were analyzed by using the PROCESS macro for SPSS[38]. This involved calculating bias-corrected 95% confidence intervals (CIs) with 5000 bootstrapping re-samples to assess the significance of indirect effects. For instance, with PROCESS Model 4 (as illustrated in Fig. 1), we investigated whether the association between perceived stress and depressive symptoms was mediated by adherence to the five precepts and meditation. A significant mediating effect was indicated if the 95% CI of the indirect effect (path a*b) did not contain 0.

Furthermore, PROCESS Model 3 was employed to explore the moderated moderation effect, assessing whether adherence to the five precepts moderated the moderation effect of meditation on perceived stress and depressive symptoms (as depicted in Fig. 2). A significant moderated mediation effect could be established if the 95% CI of the interaction did not contain 0.
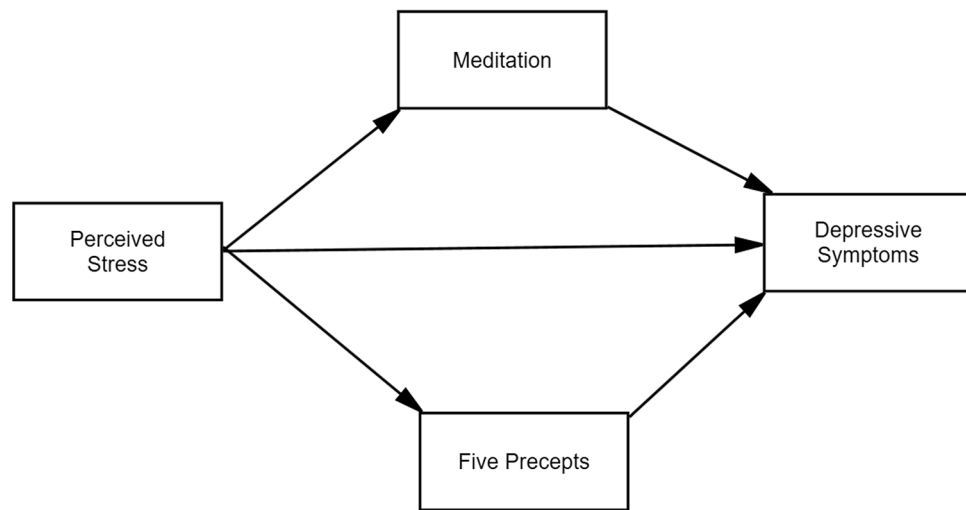
Fig. 1. Parallel Mediation Model (Model 4). Rectangular (Observed Variables): Perceived Stress: The independent variable, located on the left side. Meditation: The first mediator variable, positioned in the middle on the upper side. Five Precepts: The second mediator variable, positioned in the middle on the lower side. Depression: The dependent variable, located on the right side. Arrows and Paths: 1. Direct Path from Perceived Stress to Depression: A straight arrow from Perceived Stress to Depression indicates the direct effect of perceived stress on depression. 2. Indirect Path through Meditation: An arrow from Perceived Stress to Meditation and another arrow from Meditation to Depression represent the mediation effect of meditation on the relationship between perceived stress and depression. 3. Indirect Path through Five Precepts: An arrow from Perceived Stress to Five Precepts and another arrow from Five Precepts to Depression illustrates the five precepts' mediating effect on the relationship between perceived stress and depression.
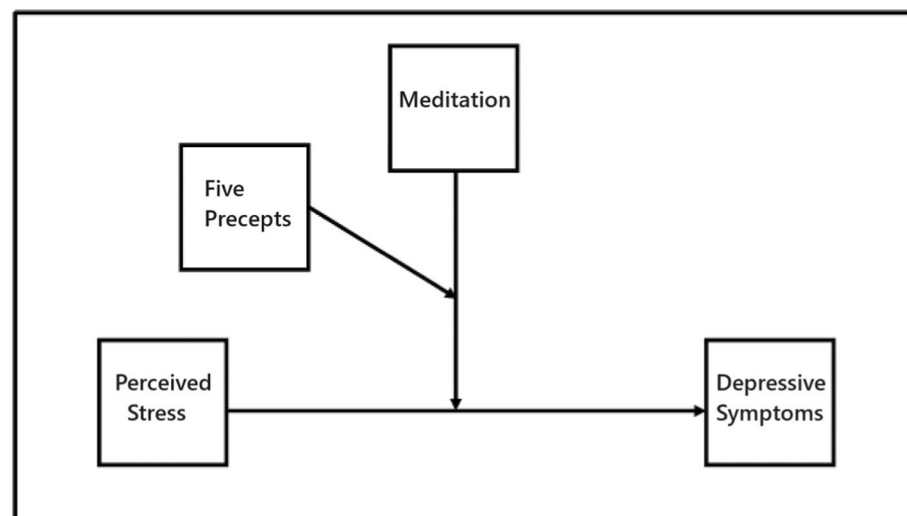

Fig. 2. Moderated moderation model (Model 3). Perceived Stress: This is the independent variable located on the left side of the figure. Depression is the dependent variable situated on the right side of the figure. Meditation with the one-headed arrow to the line between Perceived Stress and Depressive symptoms, indicating that Meditation interacts with Perceived Stress to influence Depressive symptoms (Moderator). Precepts with the one-headed arrow to the line between Meditation and the line between Perceived Stress and Depressive symptoms indicate that precepts interact with meditation to influence the relationship between Perceived Stress and Depressive symptoms (Moderated Moderator).

Importantly, the analyses were conducted separately for older adults and adults to account for potential age-related differences. All statistical procedures were performed using SPSS 27.0, with statistical significance defined as a two-tailed p-value of less than 0.05. Additionally, all models were adjusted for covariates (age, sex, marital status, education), and the study variables were standardized to facilitate comparison and interpretation.

At last, we ran Network modeling in JASP (2023) to examine the complex network of variables based on partial correlations between variables. The network model was selected based on the Extended Bayesian

	All (*n* = 1472)	Elderly	Adult	Test difference
Sociodemographic				
Sex (female), n (%)	986(71.3)	139(59.9)	889(71.7)	12.874, *p* < .001
Age, Mean ± SD	35.15(17.38)	67.96(6.84)	29.01(10.52)	72.736, *p* < .001
Years of education, Mean ± SD	15.05(4.74)	9.05(6.59)	14.98(4.80)	12.897, *p* < .001
Living status, n (%)				127.284, *p* < .001
lived with partner	313 (22.7)	137 (59.1)	281 (22.7)	
not with partner	1096 (77.3)	95 (40.9)	959 (77.3)	
Income (monthly), n (%)				4.377, *p* = .497
≤ 20,000 Baht*	964 (69.8)	172 (74.8)	878 (70.8)	
20,001–40,000 Baht	262 (19.0)	41 (17.8)	223 (18.0)	
40,001–60,000 Baht	85 (6.2)	12 (5.2)	76 (6.1)	
60,001–80,000 Baht	34 (2.5)	2 (0.9)	32 (2.6)	
80,001–100,000 Baht	12 (0.9)	1(0.4)	12(1.0)	
≥ 100,000 Baht	25 (1.8)	2 (0.9)	19 (1.5)	

Table 1. Sociodemographic data of the participants according to age *1 baht = 0.028 US dollars (at the exchange rate on 9 March 2024)

Variables	Older adults	Adults	Test difference
Five Precepts, n (%)			
1 never thought to follow	4 (1.8)	88 (7.1)	36.536, *p* < .001
2 difficult to follow	27(11.9)	204(16.5)	
3 intended but cannot sometimes	81 (35.7)	445 (35.9)	
4 can follow, rarely break it	66 (29.1)	386 (31.1)	
5 always follow, never break it	49 (21.6)	117 (9.4)	
Five Precepts, mean (SD)	3.57 (1.0)	3.19 (1.05)	4.974, *p* < .0001
Meditation, n (%)			
1 rarely meditate	43 (18.9)	441 (35.6)	38.833, *p* < .001
2 do it on some occasions	85(37.4)	484(39.0)	
3 often meditate	65 (28.6)	205 (16.5)	
4 do it every day at a certain time	24 (10.6)	80 (6.5)	
5 do it every day, at a certain time, including some other time available	10 (4.4)	30 (2.4)	
Meditation, mean (SD)	2.44(1.0)	2.01(1.0)	5.904, *p* < .001
Core symptom index- depression score, mean (SD)	2.30 (2.64)	3.58 (3.53)	5.195, *p* < .001
Perceived stress scale score, mean (SD)	13.68 (5.36)	16.37 (5.83)	6.476, *p* < .001

Table 2. Mean and standard deviation of the clinical variables. SD = standard deviation

Information Criterion[39] and estimated by Graphical Gaussian Models (GGM) combined with a graphical least absolute shrinkage and selection operator (LASSO) method[40].

Results

When comparing the sociodemographic data between the two age groups, it was found that females were more prevalent among adults than older adults. As expected, older adults had lower levels of education and were more likely to live with a partner compared to the younger group. However, the two groups had no significant difference in monthly income (Table 1).

Table 2 Indicates that older participants demonstrated higher levels of adherence to the five precepts and engagement in meditation practice while reporting lower levels of depression and perceived stress compared to younger participants.

Table 3 displays the correlation coefficients among variables. The values in the upper triangle represent the correlation matrix among variables in the younger group. In comparison, the values in the lower triangle represent the correlation matrix among variables in the older group. Depression is significantly associated with precepts and meditation among younger participants but not among older participants.

Mediation effect

Table 4 shows that meditation and precepts do not mediate the relationship between perceived stress and depression in the older group, as the indirect effect was nonsignificant. This contrasts with the younger group, where the indirect effect was significant and observed through precepts rather than meditation (Table 5).

	Sex	Age	Education	Live together	Precepts	Meditation	PSS	Depression
Sex		0.009	0.069*	− 0.066*	0.128**	− 0.011	− 0.004	0.064*
Age	0.070		0.097**	0.581**	0.209**	0.055	− 0.073*	− 0.198**
Education	− 0.068	− 0.131*		0.006	0.090**	− 0.042	− 0.044	− 0.072*
Live together	− 0.359**	− 0.088	− 0.004		0.110**	0.011	− 0.036	− 0.172**
Precepts	0.220**	0.020	0.092	− 0.092		0.306**	− 0.210**	− 0.240**
Meditation	0.111	− 0.011	− 0.010	− 0.093	0.242**		− 0.159**	− 0.130**
PSS	0.136*	0.011	− 0.243**	0.005	− 0.230**	− 0.082		0.625**
Depression	0.141*	0.009	− 0.162*	0.015	− 0.128	− 0.073	0.505**	

Table 3. Correlation matrix among variables. Lower = older adults, upper = younger adults, PSS = perceived stress

	B Coefficient	SE	t	p-value	LLCI	ULCI
Multiple regression model						
Constant	-1.471	1.771	− 0.831	0.407	-4.963	2.020
Perceived stress	0.241	0.030	7.999	< 0.001	0.182	0.301
Sex	0.514	0.340	1.511	0.132	− 0.156	1.185
Age	− 0.005	0.023	− 0.234	0.815	− 0.050	0.040
Education (year)	− 0.016	0.025	− 0.644	0.520	− 0.064	0.033
Living status: Together	0.286	0.339	0.844	0.399	− 0.381	0.953
R^2	0.249 (F = 15.687, Df1 = 5, Df2 = 221, P < .0001)					
Mediation model (Model 4)						
Constant	-0.8949	1.8794	-0.4762	0.6344	-4.5999	2.8100
Perceived stress	0.2277	0.031	7.3522	< 0.001	0.1666	0.2887
Meditation	-0.1386	0.1534	-0.9036	0.3672	-0.4411	0.1638
Five Precepts	-0.0887	0.1673	-0.5305	0.5963	-0.4184	0.2410
Sex	0.5597	0.3471	1.6126	0.1083	-0.1245	1.2440
Age	-0.0034	0.0229	-0.1497	0.8811	-0.0486	0.0417
Education (year)	-0.0189	0.0245	-0.7726	0.4406	-0.0672	0.0293
Living status: Together	0.3621	0.3383	1.0705	0.2856	-0.3047	1.0289
R^2	0.1136 (F = 5.431, Df1 = 5, Df2 = 212, P = .0001)					

Table 4. Mediation effect of five precepts and meditation on depressive symptoms among older group. β = standardized coefficient, SE = standard error, LLCI = Lower-level confidence interval, ULCI = Upper-level confidence interval, DF = degree of freedom.

The indirect effect of perceived stress on depressive symptoms through meditation was 0.0002 (bootSE = 0.0024, 95% BootCI − 0.0047, 0.0049). The indirect effect of perceived stress on depressive symptoms through the five precepts was 0.011 (bootSE = 0.0033, 95% BootCI 0.005, 0.0179).

Moderation effect
To demonstrate the interaction effect of perceived stress and meditation on depression, In the older group, low-practice level of meditation, the slope coefficient was 0.278 (p < .001), whereas, in the high-level practice population, the slope coefficient was 0.200 (p < .001). No significant difference between the two slopes was noted (t = −1.391, p = .165).

In the younger group, the low-practice level of meditation, the slope coefficient was 0.391 (p < .001), whereas, in the high-level practice population, the slope coefficient was 0.352 (p < .001). No significant difference between the two slopes was noted (t = − 1.362, p = .173).

The moderation effect of the five precepts practice was examined along the same line. The slope of the regression line, along with the observation of perceived stress and depression in the older group, was also examined. In the low practice level of the Five Precepts, the slope coefficient was 0.316 (p < .001), whereas in the high-level practice population, the slope coefficient was 0.210 (p < .001). No significant difference between the two slopes was noted (t = − 1.550, p = .122).

Figure 3 displays the slope of the regression line along with the observation between perceived stress and depression in the younger group. In the low practice level of the Five Precepts, the slope coefficient was 0.403 (p < .001), whereas in the high-level practice population, the slope coefficient was 0.313 (p < .001). A significant difference between the two slopes was noted (t = -3.440, p < .001).

Since there was no significant correlation between the five precepts, meditation, and depression among older participants, no mediation model was tested for this group. However, moderated moderation analysis was

	B Coefficient	SE	t	p-value	LLCI	ULCI
Multiple regression model						
Constant	-1.787	0.484	-3.694	< 0.001	− 2.736	− 0.838
Perceived stress	0.371	0.013	28.287	< 0.0001	0.345	0.397
Sex	0.502	0.170	2.951	0.003	0.168	0.836
Age	− 0.033	0.009	-3.692	< 0.001	− 0.051	− 0.016
Education (year)	− 0.029	0.016	-1.832	0.067	− 0.061	0.002
Living status: Together	− 0.740	0.225	-3.286	0.001	− 1.181	− 0.298
R²	0.422 (F = 182.0980, Df1 = 5, Df2 = 1239, P < .0001)					
Mediation model (Model 4)						
Constant	− 0.9602	0.494	-1.9438	0.0521	− 1.9294	0.0089
Perceived stress	0.3598	0.0128	28.0084	< 0.0001	0.3346	0.385
Meditation	− 0.0067	0.089	− 0.075	0.9403	− 0.1812	0.1679
Five Precepts	− 0.3173	0.0823	− 3.8549	0.0001	− 0.4787	− 0.1558
Sex	0.5921	0.1687	3.5102	0.0005	0.2612	0.9231
Age	− 0.0273	0.0084	− 3.2587	0.0011	− 0.0437	− 0.0108
Education (year)	− 0.0257	0.0125	− 2.0608	0.0395	− 0.0501	− 0.0012
Living status: Together	− 0.739	0.2099	− 3.5216	0.0004	− 1.1508	− 0.3273
R²	0.4327 (F = 150.692, Df1 = 7.00, Df2 = 1232, P < .0001)					

Table 5. Mediation effect of five precepts and meditation on depressive symptoms among younger group. β = standardized coefficient, SE = standard error, LLCI = Lower-level confidence interval, ULCI = Upper-level confidence interval, DF = degree of freedom
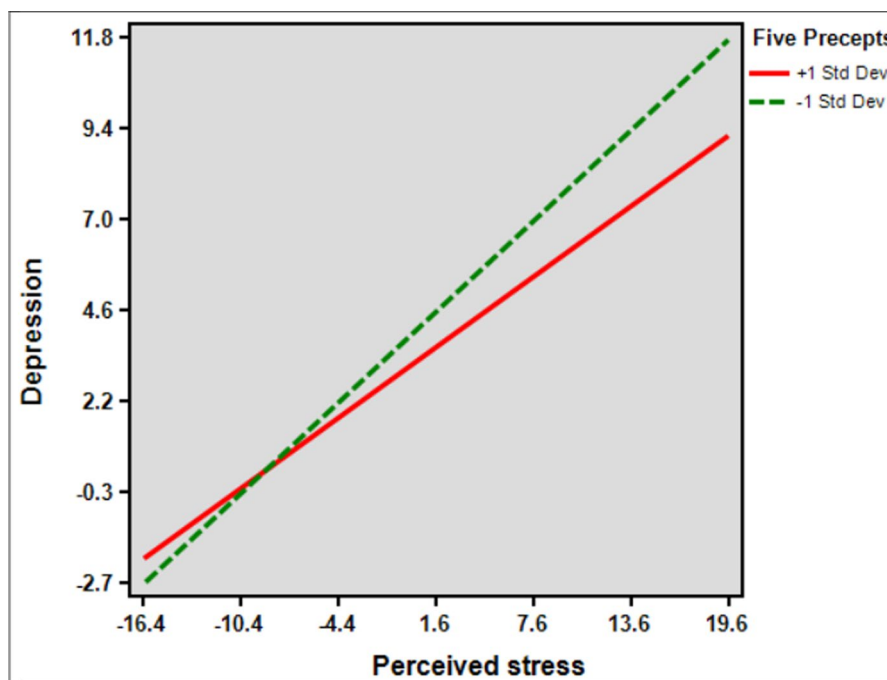

Fig. 3. Regression lines between Depression and Perceived stress based on the level of the Five Precepts in the younger group. Std Dev = standard deviation

performed. Table 6 displays the results of the moderated moderation model, where all four interaction effects were observed after controlling for the covariates.

In contrast to the moderated moderation model among the younger participants, no interaction effect was observed (Table 7).

Network analysis
Network modeling was done separately on younger ones (Fig. 4) and the elderly (Fig. 5). Meditation (M) and Precepts (W) were linked in both samples, as well as perceived stress (X) and depression. Among younger ones,

	β Coefficient	SE	t	p-value	LLCI	ULCI
Multiple regression model						
constant	-1.471	1.771	− 0.831	0.407	-4.963	2.020
Perceived stress	0.241	0.030	7.999	<0.001	0.182	0.301
Sex	0.514	0.340	1.511	0.132	− 0.156	1.185
Age	− 0.005	0.023	− 0.234	0.815	− 0.050	0.040
Education (year)	− 0.016	0.025	− 0.644	0.520	− 0.064	0.033
Living status: Together	0.286	0.339	0.844	0.399	− 0.381	0.953
R^2	0.249					
Moderated moderation model (Model 3)						
constant	6.8721	4.4369	1.5489	0.1229	-1.8754	15.6197
Perceived stress	-0.466	0.334	-1.3949	0.1645	-1.1245	0.1926
Meditation	-4.3554	2.0325	-2.1429	0.0333	-8.3627	-0.3482
Int_1	0.3888	0.1651	2.3553	0.0194	0.0633	0.7142
Precepts	-2.0616	1.0039	-2.0537	0.0413	-4.0408	-0.0824
Int_2	0.2066	0.0868	2.3805	0.0182	0.0355	0.3777
Int_3	1.1642	0.4789	2.4311	0.0159	0.2201	2.1084
Int_4	-0.1082	0.0397	-2.7268	0.0069	-0.1865	-0.03
Sex	0.6025	0.336	1.7931	0.0744	-0.0599	1.2649
Age	-0.0219	0.0251	-0.8717	0.3844	-0.0714	0.0276
Education (year)	-0.0185	0.0239	-0.7739	0.4399	-0.0656	0.0286
Living status: Together	0.3105	0.3233	0.9603	0.3380	-0.327	0.948
R^2	0.318	F = 6.975	Df1 = 11	Df2 = 206		
Test(s) of highest order unconditional interaction(s)						
R^2 change	0.0225	7.435	Df = 1	Df2 = 206	P = .0069	
Sex	0.6025	0.336	1.7931	0.0744	-0.0599	1.2649
Age	-0.0219	0.0251	-0.8717	0.3844	-0.0714	0.0276
Education (year)	-0.0185	0.0239	-0.7739	0.4399	-0.0656	0.0286
Living status: Together	0.3105	0.3233	0.9603	0.3380	-0.327	0.948

Table 6. Moderated mediation effect of the five precepts and meditation on depressive symptoms among older group. Int_1: Perceived stress x Meditation Int_2: Perceived stress x Precepts Int_3: Meditation x Precepts Int_4: Perceived stress x Meditation x Precepts β = standardized coefficient, SE = standard error, LLCI = Lower-level confidence interval, ULCI = Upper-level confidence interval, DF = degree of freedom

meditation (M) and precepts were (W) negatively but indirectly linked to stress levels through the interaction of meditation, perceived stress, and precepts. Precepts were also linked negatively to depression. In this way, among younger individuals, meditation, five precepts, and their interaction with stress formed an indirect relation between stress and depression.

Among the elderly (Fig. 5), meditation was linked to engagement in precept adherence, which was directly negatively linked to stress levels. Interaction of stress, meditation, and precepts was linked to stress levels as well. There was no direct link between depression and meditation nor depression and precepts. Instead, meditation, through practicing precepts and through the interaction of stress and the five Precepts, and meditation, has a buffering effect on the levels of stress and indirectly on depression. In comparing the two age groups, the connections between the younger adults were less pronounced. The network's weights matrix can be found in Table 8.

Discussion

This study aimed to examine the associations between perceived stress, depressive symptoms, and meditation and precept practice levels. We tested the mediation and moderation model wherein the path from perceived stress to depression varied at different levels of precept practice. Second, we explored a moderated moderation model to evaluate the moderating role of meditation practice in the conditional influence of precepts on the relationship between perceived stress and depressive symptoms. Thirdly, we compared the effects of the five precepts and meditation on the relationship between perceived stress and depressive symptoms between adults and older adults.

The overall results supported our hypothesis that older Thai adults had a higher prevalence of practicing the five precepts and meditation than younger people. The mediation model was supported only in younger adults but not older ones. Interestingly, the moderation effect of the five precepts and meditation practices was observed only among older people. While both meditation and precepts were shown to have effects in older individuals, only precept effects were observed among younger adults. In addition, the effects were different between the two age groups. The moderating effect was observed in an older sample, whereas a mediating effect

	B Coefficient	SE	t	p-value	LLCI	ULCI
Multiple regression model						
constant	-1.787	0.484	-3.694	< 0.001	-2.736	− 0.838
PSS: Stress	0.371	0.013	28.287	< 0.0001	0.345	0.397
Sex	0.502	0.170	2.951	0.003	0.168	0.836
Age	− 0.033	0.009	-3.692	< 0.001	− 0.051	− 0.016
Education (year)	− 0.029	0.016	-1.832	0.067	− 0.061	0.002
Living status: Together	− 0.740	0.225	-3.286	0.001	-1.181	− 0.298
R^2	0.422 (F = 182.0980, Df1 = 5, Df2 = 1239, P < .001)					
Moderated moderation model (Model 3)						
constant	− 1.8624	1.6554	− 1.125	0.2608	− 5.1103	1.3854
PSS: Stress	0.3848	0.0852	4.5181	< 0.0001	0.2177	0.5519
Meditation	− 0.9721	0.9401	− 1.0341	0.3013	− 2.8164	0.8722
Int_1	0.0794	0.0509	1.5586	0.1193	− 0.0205	0.1793
Precepts	0.1325	0.4527	0.2927	0.7698	− 0.7557	1.0207
Int_2	− 0.0161	0.0259	− 0.6221	0.5340	− 0.067	0.0347
Int_3	0.2289	0.2363	0.9686	0.3330	− 0.2348	0.6925
Int_4	− 0.0199	0.0135	− 1.4722	0.1412	− 0.0465	0.0066
Sex	0.5415	0.1677	3.2291	0.0013	0.2125	0.8705
Age	− 0.0296	0.0083	− 3.5466	0.0004	− 0.0459	− 0.0132
Education (year)	− 0.0265	0.0123	− 2.1665	0.0305	− 0.0506	− 0.0025
Living status: Together	− 0.7341	0.2072	− 3.5429	0.0004	− 1.1407	− 0.3276
R^2	0.441 (F = 109.9877, Df1 = 11, Df2 = 1228, P < .001)					
Test(s) of highest order unconditional interaction(s)						
R^2 change	0.0011	F = 2.167	Df1 = 1	Df2 = 1228	P = .1412	
Sex	0.5415	0.1677	3.2291	0.0013	0.2125	0.8705
Age	− 0.0296	0.0083	− 3.5466	0.0004	− 0.0459	− 0.0132
Education (year)	− 0.0265	0.0123	− 2.1665	0.0305	− 0.0506	− 0.0025
Living status: Together	− 0.7341	0.2072	− 3.5429	0.0004	− 1.1407	− 0.3276

Table 7. Moderated moderation (Model3) effect of the five precepts and meditation on depressive symptoms among younger group. Int_1: Perceived stress x Meditation Int_2: Perceived stress x Precepts Int_3: Meditation x Precepts Int_4: Perceived stress x Meditation x Precepts β = standardized coefficient, SE = standard error, LLCI = Lower− level confidence interval, ULCI = Upper-level confidence interval, DF = degree of freedom
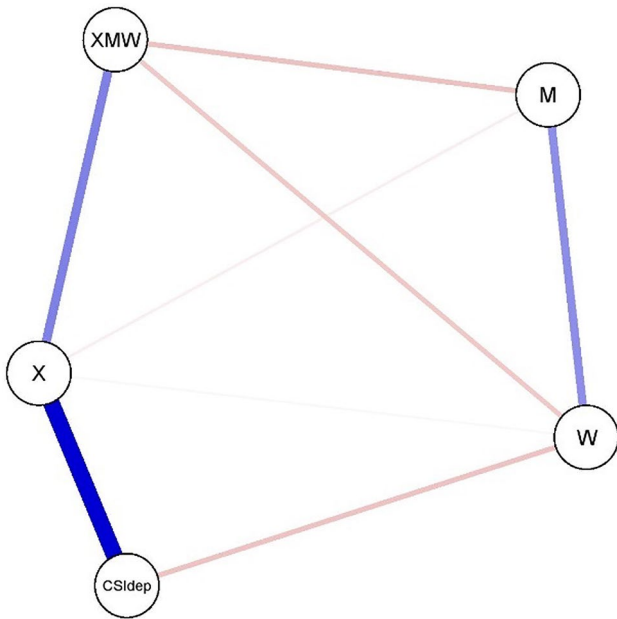

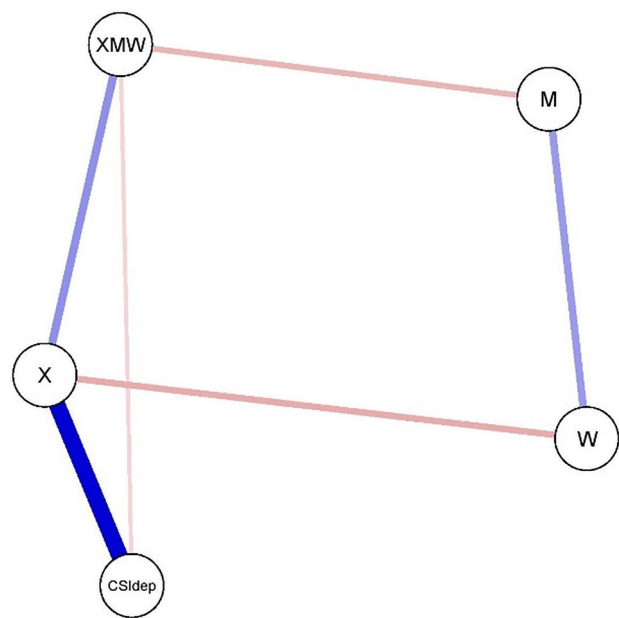**Fig. 4**. Network modeling on younger participants.

Fig. 5. Network modeling on older participants.

Variable	Younger					Older				
	W	M	X	CSI-dep	XMW	W	M	X	CSI-dep	XMW
Five Precepts (W)	0.000	0.255	−0.017	−0.133	−0.119	0.000	0.177	−0.146	0.000	0.000
Meditation (M)	0.255	0.000	−0.036	0.000	−0.136	0.177	0.000	0.000	0.000	−0.128
perceived stress (X)	−0.017	−0.036	0.000	0.573	0.283	−0.146	0.000	0.000	0.447	0.194
CSI-dep	−0.133	0.000	0.573	0.000	0.000	0.000	0.000	0.447	0.000	−0.073
XMW	−0.119	−0.136	0.283	0.000	0.000	0.000	−0.128	0.194	−0.073	0.000

Table 8. Network model's weights matrix.

was found in the younger population. This indicates that precepts may serve as a protective factor, buffering the negative impact of stress on depression in older individuals. In contrast, precepts serve as a mechanism through which stress influences depression outcomes in younger people.

The current study unveils the moderating influence of precepts on meditation, validating a longstanding tradition among Thai practitioners. These practitioners base their meditation on three fundamental pillars: the observance of the five precepts (Sila), meditation (Samadhi), and wisdom (Panya)[41]. Our findings underscore the significance of integrating the five precepts into meditation practices. Although adherence to the five precepts is integral to meditation practitioners following Buddhist teachings in Theravada Buddhism, which predominates in Thailand and other Southeast Asian countries, these principles also embody universally accepted and socially desirable behaviors. In Christianity, the five precepts resemble the commandments within the Ten Commandments.

It is noteworthy that while meditation has gained traction in Western cultures, particularly in scientific circles, it is often practiced in isolation from the five precepts. Our results corroborate the notion that a heightened adherence to precepts moderates the effects of meditation, with more significant reductions in depression observed among those who rigorously practice the precepts.

The discovery that the precepts moderated the relationship between the moderator "meditation" is considered a novel finding. Previously, it was challenging to envision how the precepts would interact with meditation. The significance of the second moderator (precepts) in a moderated moderation model indicates that the relationship between perceived stress and depressive symptoms is not solely influenced by meditation practice but is additionally impacted by adherence to the precepts. In summary, the interactions between these factors emerge as a powerful protective mechanism against depression among older individuals experiencing stress. The buffering effect of precepts linked to meditation on the levels of stress and indirectly on depression was confirmed by network modeling among the elderly.

The differing effects of meditation and precepts on stress and depression in older people compared to younger people can be attributed to several factors, including lifestyle differences and adherence to religious practice.

In older individuals, meditation and precepts may act as a moderator of stress and depression. People often accumulate coping strategies and resilience to manage stressors as they age. Meditation in older age may serve as a tool to enhance these coping mechanisms, allowing individuals to regulate their stress responses more efficiently.

Additionally, older adults may have more established meditation practices, leading to more excellent proficiency in utilizing meditation and precepts as stress management tools. By moderating stress levels, meditation and precepts can indirectly mitigate the risk of depression in older individuals.

Conversely, in younger people, precept may function as a mediator of the relationship between stress and depression. The network model also confirmed that meditation, precepts, and their interaction with stress provide an indirect relation between stress and depression. Younger individuals may be less experienced in managing stress and may rely more heavily on maladaptive coping strategies. Precepts practice in this population may directly target stress reduction, thereby interrupting the cascade of negative thoughts and emotions that can contribute to depression. By mediating the relationship between stress and depression, precepts can directly alleviate depressive symptoms in younger people. Although the mediating effect of precepts was found to be small in comparison to older individuals, this suggests that there may be additional variables influencing the relationship between stress and symptoms of depression beyond meditation and precepts.

Implications for older adults

Meditation and precepts act as moderators between stress and depression in older adults, making these practices particularly beneficial for stress management and depression prevention. Programs should emphasize the role of meditation, reinforcing established coping mechanisms to enhance stress regulation and reduce depression risk. Integrating meditation and precepts into long-term mental health strategies through community programs and healthcare services can help maintain well-being in older adults.

Implications for younger individuals

Practicing precepts can help younger people manage stress and reduce depression risk by developing healthier coping strategies. Mental health programs should incorporate precept-based practices and education on meditation to build resilience and prevent more severe mental health issues. Since the mediating effect of precepts is small, it's important to recognize that other factors also contribute to stress and depression in younger people. Mental health interventions should be holistic, addressing multiple areas of a young person's life, including social support, lifestyle habits, and access to mental health resources.

Limitations of the study and future research

This study has certain limitations when interpreting the results and planning future research. Firstly, there was a sampling bias as convenience sampling was used. Most respondents were young adults and females, which may not represent the broader Thai population. This demographic imbalance could limit the generalizability of our findings to other age groups and genders. Future research should use more diverse sampling methods to ensure a more representative population sample, including a balanced representation of different age groups, genders, and socio-economic backgrounds.

Secondly, the study was conducted in a specific cultural and religious context to make the findings more applicable to individuals in Southeast Asia's similar cultural and religious settings. These cultural and religious factors influencing meditation practices and perceptions could differ significantly in other regions. Future research should explore these dynamics in various cultural and geographical contexts to determine whether the findings hold across different populations. Thirdly, the study utilized an ordinal scale to measure meditation practice, treating it as continuous in the analysis. While this approach facilitates interpretation, it may not capture the nuances of meditation practice, such as the specific duration or intensity of practice. Future research should incorporate more detailed measures of meditation practice, including the time spent meditating and the specific meditation techniques used, to understand better how these factors influence the outcomes. Fourthly, while this study offers valuable insights into the relationship between meditation and psychological consequences, it is cross-sectional, limiting our ability to draw causal inferences. Longitudinal studies and intervention research are needed to establish causal relationships and assess the impact of meditation practices, specifically Five Precept-based meditation, on long-term psychological and behavioral outcomes.

Lastly, as with any research study, the potential for confirmation bias must be acknowledged. Given that our study was designed to explore the effects of Meditation and Five Precepts on stress and depression, it is possible that our expectations regarding the benefits of this practice may have influenced certain aspects of the research process. To mitigate this risk, we implemented several strategies during the study design and analysis phases. First, we employed objective, validated measures for data collection, such as the Perceived Stress Scale or the Core Symptom Index-depression, to ensure that outcomes were assessed rigorously and independently of researchers' expectations. Second, we maintained transparency in our methodology by applying different analysis, which helped reduce the likelihood of selectively reporting favorable results. Third, the involvement of multiple researchers both in Thailand and abroad (Hungary) in data analysis and interpretation provided a system of checks and balances, minimizing the influence of individual biases. Despite these precautions, the possibility of confirmation bias cannot be entirely ruled out. For example, participants' awareness of the study's goals or their own expectations about the intervention may have influenced their responses. Additionally, researchers' enthusiasm for the intervention may have inadvertently affected the interpretation of qualitative data or the framing of results. We view this as a significant limitation of our study and recommend that future research adopt additional safeguards, such as blinded assessments or the inclusion of active control groups, to further reduce the risk of bias. Nonetheless, the consistency of our findings with prior literature and the use of robust methodological controls strengthen our confidence in the validity of the results.

Conclusion

This study highlights that meditation and adherence to the Five Precepts may have differing effects on older adults compared to younger individuals. The research suggests that older adults may experience enhanced benefits from these practices in terms of reducing stress and depression. The effectiveness of meditation appears to be influenced by the extent of precept practice, with older individuals who actively engage in both high levels of precept adherence and meditation showing a more significant buffering effect on the relationship between stress and depression. The study also indicates that lifestyle factors, such as religious practices, may have a differential impact on older adults compared to younger individuals. The findings suggest that these practices have more significant implications for the mental well-being of older adults than younger counterparts. Therefore, encouraging these practices among older individuals could impact their mental health. However, while the results are promising for the older population, further research is necessary to identify the contributing factors to reduced depression among younger populations. Nevertheless, this study's findings highlight the importance of incorporating meditation and adherence to precepts into daily routines, especially among older adults, to promote mental well-being.

Data availability

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Author contributions

NK and TW initiated the study. All designed the concept and methodology. TW, NW, and ZK made all data analyses. SK, PC, NT, and CP prepared tables and figures. JD interpreted the data. All prepared first draft and took part in writing and editing the manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of the Faculty of Medicine, Chiang Mai University (study code, PSY- 2562–06395 and date of approval, 6 July 2019).

Competing interests

The authors declare no competing interests.

Institutional review board statement

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Additional information

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