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Abstract

Muslim students' wellbeing is said to be impacted by zikr meditation because it fosters a sense of connection between the self and nature. Consequently, this study attempts to look into how zikr meditation and being in nature might help Muslim university students' ecopsychological, spiritual, physical, and mental wellbeing. Using the random selection method, this study assigned 160 Muslim university students to either (i) engage in zikr meditation or (ii) not engage in meditation in both green outdoor and indoor settings. Blood pressure and pulse rate were then measured to assess physiological responses; Results: The level of mood disturbances, heart rate, and systolic blood pressure are all significantly reduced by the combination of nature-zikr exposure. Spirituality score and the ecopsychology value score were both significantly greater in the meditation group than in the control group. Spending time outside is an effective way to increase spirituality and eco-psychological self-value, according to differences between pre-and post-test results. Although further research is needed to replicate these effects in other populations/environments, this study implies that Muslim university students gain significantly from zikr meditation and exposure to nature.

Keywords: Muslim University Students, Nature Exposure, Ecopsychology, Spiritual Well-Being, Physiological Health, Mood State; Zikr Meditation

Introduction

Stress among university students has become a major problem in countries on a global scale (Ramachandiran & Dhanapal, 2018). Many students find university to be a stressful

experience. In addition to dealing with academic pressure, some students must deal with the stressful tasks of separation and individuation from their family of origin, while others may have multiple work and family responsibilities (Pedrelli et al., 2015). In this context, many university students experience the first onset of physical and psychological health problems as a result of increased stress (Ramon-Arbues et al., 2020). The greater the stress on university students, the more their spiritual health will be distorted (Leung & Pong, 2021). Consequently, their physical response to stress increased the production of certain hormones, which in turn causes increased heart rate, blood pressure, and respiratory rate, and other physical changes (Edgewater, 1981). Islamic countries are no exception. Many Muslim students suffer from stress during their college years (Abu-Hilal et al., 2017; Danasabe & Bell, 2017; Karmakar & Behera, 2017; Nadeem et al., 2017).

As a response, institutions of higher learning are formulating strategies to promote mental health awareness among students. Since the physical environment is often recognized as an influence on a student's mental health (Prieto-Welch, 2016), insufficient attention is appointed to studying the impact of one's immersion in a natural green environment. Nevertheless, frequent interactions with natural areas or green spaces are increasingly applied in diverse populations to assist with stress reduction (Holt et al., 2019; Sugiyama et al., 2018; Yusli et al., 2021). University students particularly enjoy generous access to green campus spaces that provide countless engagement opportunities to boost and maintain overall health and wellness (Holt et al., 2019). Moreover, previous research has shown that green spaces help to improve mood, attention and enhanced psychological stress recovery (Holt et al., 2019; Lin et al., 2019). Tyrvaenen et al (2014) have also reported that visits to urban green environments are associated with an increased feeling of restoration, vitality, and positive mood.

Furthermore, Van Gordon et al (2018) suggested that nature connectedness and the restorative qualities of natural environments could be adopted to nurture self-awareness and mindfulness. The feeling of nature connectedness is explained as an "individual's experiential sense of oneness with the natural world" (Mayer & Frantz, 2004) or "the affective, cognitive, and experiential relationship individuals have with the natural world or a subjective sense of connectedness with nature" (Nisbet et al., 2009). Recent research indicated that brief visits to green spaces or viewing green nature images could positively influence mood and attention while impacting the level of stress and mental health. Corresponding to such mood and stress level changes, it is observed that the heart rate, blood pressure, and salivary cortisol levels are reduced. Therefore, nature-inclined university students who gain a sense of meaningfulness could demonstrate improved physical health conditions and mental well-being (Howell et al., 2013).

Furthermore, the theorists of ecological self-purports have advocated for an interdependent relationship between the well-being of the human self and the natural world, and this relationship can be found in meditation (Kamitsis & Francis, 2013). Meditation, one of the aspects of the concept of tauhid (oneness), is the relationship between oneself and nature. Since nature is the evidence of God's power, being one with nature (surrounding) is akin to being one with God (Omer, 2012). Within the framework of Islamic theology, a better understanding of how nature works has a religious purpose, since it also provides knowledge of God's characteristics (Chuvieco, 2012). In addition, the current scientific literature is increasingly recognizing the efficacy of meditation. For example, spiritual meditation and mindfulness sessions are adopted to reduce stress, over-thinking, anxiety, and depression (Querstret et al., 2020). Therefore, it is not surprising that a robust research area in

psychology is the study of meditation. It is examined from the universal models of meditation led by a previous study that argues the 5-week Holy Name Meditation Program had positive effects on the spiritual well-being, depression, and anxiety of cancer patients (Kim et al., 2018). There is also evidence of the benefits of meditation to reduce stress, improve academic performance, and increase graduation rates in different school settings, such as middle school, high school, and higher education (Beauchemin et al., 2008; Diaz, 2018; Fergusson et al., 2022; Totzeck et al., 2020).

The holistic view of Islam provides principles of spirituality, which builds the foundation of meditation practice. Zikr also spelled as dhikr, meditation is practiced by Muslim mystics (Şūfis) to glorify God and achieve spiritual perfection (Arslan, 2014; Saniotis, 2018). Zikr, which translates to “remembrance”, is a devotional act in the religion of Islam in which certain short phrases or prayers are recited repeatedly (Nor, 2015). It is reported as a powerful yet simple practice to worship the Creator with many benefits and virtues resulting in tranquility and peace of heart. The psychological benefits of zikr practice also include a sense of comfort, spiritual attainment, connectedness with the Creator (Hermansen, 2008), and a moderated brainwave activity, all of which enhance one’s physiology (Soliman & Mohamed, 2013).

According to Sufi psychology, zikr is an important means of spiritual meditation. More than just remembering or reciting Allah’s names and attributes in a certain harmonious way, zikr is a verbal expression of devotion rooted in the surrender of the heart. Therefore, all Sufis regard zikr as the keystone of applied religion (Tenik & Goktas, 2014). One example is Ash-Sha'rani, a sixteenth-century Sufi writer, who explains this seven-fold zikr in the following way (quoted in Schimmel, 1975):

“dhikr al-lisan, with the tongue; dhikr an-nafs, which is not audible but consists of inner movement and feeling; dhikr al-qalb, with the heart, when the heart contemplates God's beauty and majesty in its inner recesses; dhikr ar-ruh, when the meditating mystic perceives the lights of the attributes; dhikr as-sirr, in the innermost heart, when divine mysteries are revealed; dhikr al-khafiy, the secret recollection, which means the vision of the light of the beauty of essential unity; and, finally, the dhikr akhfa al-khafi, the most secret of secret, which is the vision of the Reality of Absolute Truth (haqq al-yaqin)”.

Moving forward, numerous studies have been conducted on the usefulness of zikr meditation, being the exact opposite to the stress responses, to potentiate stress reduction, and improve physical and psychological well-being (Safara et al., 2019; Sulistyawati & Probosuseno, 2019; Rochdiat et al., 2019). Other studies have found that mindfulness meditation is associated with nature connectedness (Unsworth et al., 2016). A previous study also displayed that spending time outside and practicing meditation are effective approaches for improving college students’ moods, particularly for students who infrequently go outside (Ibes & Forestell, 2022). Nisbet et al (2019) also found that individuals who practiced mindfulness meditation reported greater awareness of their surroundings, stronger nature connectedness, and better moods and well-being. According to Kaplan (Kaplan, 2001), meditating while in nature may amplify the restorative benefits of nature affiliation. Djernis et al (2019) stressed that the capacity acquired through meditation can support the acquisition of the potential health benefits of being in nature.

Even though there is a good deal of evidence demonstrating that both meditation and exposure to nature have positive mental and health effects, there has been little research into combining zikr meditation with restorative experiences, such as exposure to nature. Therefore, this study aimed to examine whether briefly engaging in nature or spiritual practice of zikr either indoors or outdoors affected psychological (i.e., eco-psychology, mood,

and spiritual well-being) and physiological responses (i.e., blood pressure and pulse rate) in Muslim university students.

Hypotheses

The present investigation aims to test the following hypotheses:

H_{1a,b,c}: Exposure to nature will affect Muslim university students' (a) eco-psychology, (b) mood disturbance, and (c) spiritual well-being.

H_{2a,b,c}: Zikr meditation will affect Muslim university students' (a) eco-psychology, (b) mood disturbance, and (c) spiritual well-being.

H_{3a,b,c}: A combination of exposure to nature and zikr meditation will affect (a) eco-psychology, (b) mood disturbance, and (c) spiritual well-being.

H_{4a,b,c}: Zikr meditation will affect (a) systolic blood pressure, (b) diastolic blood pressure, and (c) pulse rate.

H_{5a,b,c}: Outdoor settings will affect (a) systolic blood pressure, (b) diastolic blood pressure, and (c) pulse rate.

H_{6a,b,c,d}: Zikr meditation in outdoor settings will affect (a) systolic blood pressure, (b) diastolic blood pressure, and (c) pulse rate.

Materials and Methods

Experimental sites and subjects

For this study, the researchers selected an indoor and a green outdoor site. Specific site selection relied on the restorative environment quality by Kaplan (1992). The site was selected using elements of biophilic design by Kellert (2018). Light, air, water, plants, animals, weather, natural landscape, and ecosystem are biophilic design elements for restorative environments. Biophilic design in a green environment can provide individuals with psychological restorative experiences by releasing mental fatigue and decreasing their levels of stress (Hidalgo, 2014). This restoration process in turn improves an individual's well-being. As such, this study was conducted in Putrajaya Wetlands Park (hereafter referred to as a natural outdoor environment) in Putrajaya, Malaysia. As a popular green attraction to international and local tourists alike, this park hosts 24 wetland cells built along with the Chua and Bisa River. The park's marshes and swamps are biologically diverse, with 70 species of wetland plants and 24 species of indigenous fish among the thriving flora and fauna. Kinesiology Laboratory, Faculty of Educational Studies, Universiti Putra Malaysia (UPM) (hereafter referred to as an indoor environment) was selected as a control site. The Laboratory is an empty enclosed hall with nominal dimensions of approximately 34.5 x 20.0 x 7.5 m. The participants viewed a plain painted brick wall throughout the walk around the hall's perimeter. The noise levels inside the control site ranged from low to medium, against the background sounds of the air conditioner system and outdoor activities that were occurring concurrently. However, the noise levels of the outdoor sessions ranged from low to high.

This study employed an experimental design with two groups (control and experimental group) and two times of evaluation (the pretest phase applied before the intervention and the posttest phase applied after the intervention). Muslim university students from the Centre of Foundation Studies for Agricultural Science, UPM were selected. This was followed by a random assignment to a meditation condition or a meditation-free condition at both sites. The participants were first recruited through announcements posted around the campus. Next, the potential participants were subjected to a simple screening process that

required them to complete a personal profile containing basic questions (gender, age, medications, and personal medical history). The inclusion criteria were Muslim students who were aged between 18 to 23 years ($M = 18.38$, $SD = .897$), had a body mass index of 18.5-24.9, and were medication-free (including herbal medicine and supplements). The exclusion criteria included malignancy, immunodeficiency, autoimmune disorders, hepatitis, hypertension, HIV infection, or smoking. Sample size calculation was performed using G*Power 3.1.9.7 software. Based on the levels of significance ($\alpha < 0.05$ and power $> 80\%$) and consideration of a 5% dropout rate, this study targeted the recruitment of 160 participants (Table 1).

Table 1
Participant demographic characteristics.

Characteristic	Outdoor		Indoor	
	Zikr	Non- zikr	Zikr	Non- zikr
Total participants (No.)	40	40	40	40
Gender				
Male (No.)	19	19	26	21
Female (No.)	21	21	14	19
BMI (No.)				
<18.5 kg m ⁻²	5	4	2	5
18.5 to 24.9 kg m ⁻²	29	33	35	29
> 25 kg m ⁻²	6	3	3	6
Age (Years)	18-23			
Religion				
Islam (%)	100			
Currently pregnant	No			
Smoking	No			
Currently taking medication	No			
Major health problem	No			

Note. BMI = Body Mass Index.

Ethics

Ethical approval was obtained from UPM (JKEUPM: IBS-P101). Before the experiment, the participants were thoroughly briefed about the objectives and procedures involved. A description of the experiment was also provided, and the participants signed the consent documents upon agreement.

Measures

Total Mood Disturbance (TMD)

The profile of mood state measures six different dimensions of mood states: tension–anxiety, anger–hostility, depression–dejection, fatigue–inertia, vigor–activity, and confusion–bewilderment (Tenik and Gökteş 2014). A total mood disturbance (TMD) score, which is considered a global measure of mood disturbance, is calculated by subtracting the one positive mood state (vigor) from the sum of the remaining five negative mood scores. For this study, participants responded to a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). A higher TMD score indicates a more negative emotional state. In this study, Cronbach's alpha for the TMD was $\alpha = 0.94$ (pre) and 0.912 (post).

Eco-psychological self-value (ECOPSY)

This measures two fundamental assumptions: (i) the boundary between the human self and nature is flexible, and (ii) a sense of self that includes nature is beneficial to an individual's well-being [35]. In this study, Cronbach's alpha for the ECOPSY was $\alpha = 0.813$ (pre) and 0.90 (post). The group with the highest mean ECOPSY values was assumed to have a higher sense of self.

Zikr meditation

This is measured by one's remembrance of Allah in two ways: verbally (verbal zikr) or non-verbally (non-verbal zikr). The non-verbal zikr denoted remembering God in one's heart in oratory silence. Irrespective of one's zikr practices, the measurement is done within 2 minutes. Students choose to recite simple zikr that they are familiar with which are Lailahailallah, Subhanallah, Walhamdulillah, and Allahuakbar. This practice is the ultimate spiritual remedy among believers whereby they pay homage to the prophet (Quran, Surah al-Ahzab, 33, verse 56).

The spiritual well-being scale (SWB)

The closest construct to explain spirituality is the concept of spiritual well-being. Darvishi et al. (2020) suggested that spiritual well-being is important in mental relaxation and reducing stress for patients on hemodialysis. Thus, it can be interpreted that spiritual well-being has a very important role in Muslim university students' life and health. The spiritual well-being scale developed by Ellison (1983) is deemed as the most widely applied socio-psychometric instrument in the area of spirituality (Sajadi et al., 2018).

It is a 20-item scale that provides an overall measure for the perception of the spiritual quality of life. The SWB scale provides subscale scores for Religious Well-being (RWB) and Existential Well-being (EWB). The participants responded to the items on a 6-point Likert scale that ranged from strongly agree to strongly disagree. This scale also has no mid-point. In this study, Cronbach's alpha for the SWB was $\alpha = 0.849$ (pre) and 0.745 (post). The highest SWB scale score indicates greater spirituality.

Physiological Measurements

Physiological measurements including pulse rate and blood pressure were assessed using a calibrated Omron HBP-1300 Portable Blood Pressure Monitor (Omron, Japan). In line with international recommendations of 3 - 5 minutes resting time prior to blood pressure measurement, all subjects were instructed to sit down and rest for 15 min before the baseline and post-experimentation measurements. Once the subjects were ready, the cuff adapted to the arm circumference was placed at heart level on the subject's non-dominant arm. The systolic and diastolic blood pressure, as well as the pulse rate was then automatically measured. All the data were collected thrice, 60 seconds apart, during each measurement period and the average values were calculated. Participation was only allowed when participants' blood pressure values were less than 200 (systolic)/100 (diastolic). The mean values between the baseline and post-experimentation measurements for different groups were first evaluated for normality, homogeneity of variance, and independent observation before proceeding with a two-way MANOVA analysis.

Experimental Procedures

Before arriving at the study sites, the participants were assigned to either a meditation condition or a non-meditation condition in indoor and natural outdoor settings. The decision to conduct this study in September was deliberate. This time of the year is suitable for outdoor activities as the weather tends to be sunny. During the study, the average temperature was around 24.0 °C. To avoid circadian or diurnal sampling bias, the pre-and post-experimental exposure data collections were performed at approximately the same timeframe across different groups. The participants were randomly divided into four groups with an equal number of males and females. Table 1 shows the experimental plan (Figure 1).

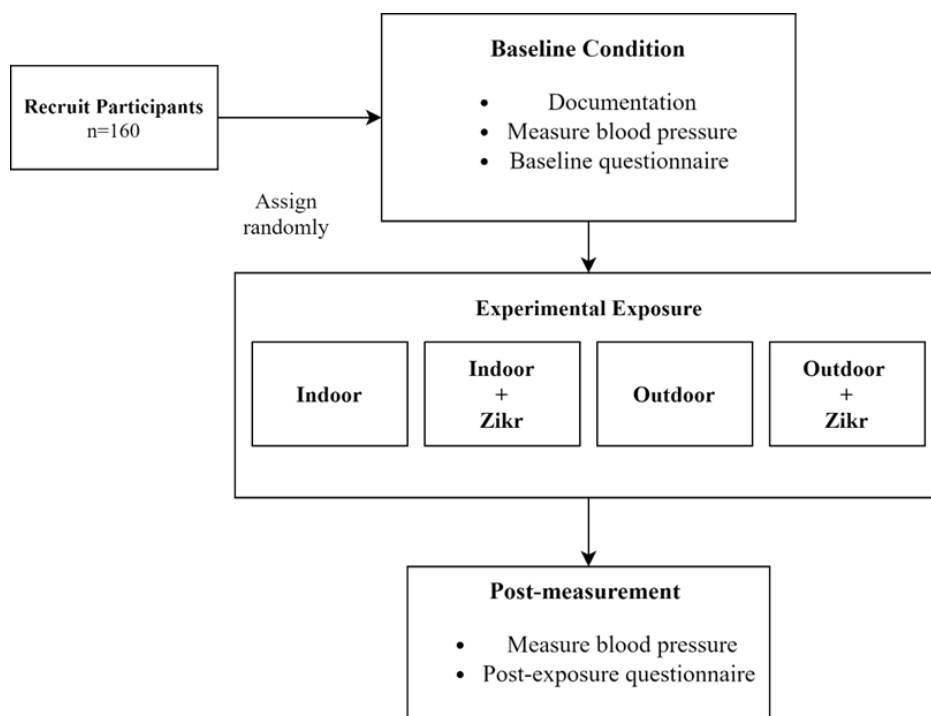


Figure 1. The experimental plan of this study.

The participants received an online message reminder a day before the experiment. On an experimental day, the participants gathered at 7 A.M. and they were all provided with the same standard breakfast before being transported to the experimental sites. Upon reaching the experimental sites, the participants were asked to sit down for at least 15 minutes to rest after walking. Pulse rate and blood pressure were subsequently measured. The participants completed a questionnaire upon reaching the sites before they walked and did zikr at the same time. For the outdoor natural setting, the participants were subjected to follow a pre-defined route that took approximately 45 minutes to complete at a normal walking pace. The outdoor walking terrain was predominantly flat to mimic the indoor laboratory condition, thus ensuring the same amount of physical activity being performed across the different groups. To ensure the safety of the participants, the researchers covertly observed the participants from afar (at a distance of approximately 30 meters or more), without revealing themselves to the participants. Alternatively, the participants from the indoor groups were also asked to walk for 45 minutes in an empty laboratory.

Upon their return, the participants sat quietly for 15 minutes. In both environmental settings, zikr meditation was also performed with the participants. The participants were then further assigned to either a group involved in zikr meditation or a group doing walking routines. In

these meditation conditions, zikr meditation occurred for 15 minutes. The research team was trained by the first and second authors to practice and lead zikr meditation, and they were provided with opportunities to practice zikr meditation as part of a formal meditation group before leading the outdoor and indoor zikr program. Zikr recitation was played through loudspeakers and the sound volume was adjusted to a comfortable listening level.

After the post-experiment data collection, the participants' pulse rate and blood pressure were again taken. The participants completed the questionnaire on TMD, eco-psychology, and spiritual well-being. The entire experimental session took approximately 3 hours. When the experiment was completed, the participants were provided with light refreshments. Upon completion of the session, the participants were debriefed and given credit for their participation. A group of panel experts was also included to only fill in the pre-and post-intervention questionnaires. By comparing the outcomes of this group to the control group's outcomes, the content validity can be established and testing effects can be ruled out.

Data Analysis

Analyses were performed using SPSS version 26.0 and GraphPad Prism 8.4.3. Multivariate analysis of variance (MANOVA) is a powerful statistical analysis method that combines two or more dependent variables in a single analysis (McMillan & Schumacher, 2010). To test hypotheses 1, 2, and 3, two-way MANOVA was used to examine pretest-posttest changes in zikr meditation and indoor/outdoor environment on mood state profiles, eco-psychology, and spiritual well-being variables simultaneously. MANOVA is a more robust test than ANOVA since it takes into account the relationships between the dependent variables (Field, 2009). According to Meyers et al (2006b), utilizing MANOVA rather than numerous separate ANOVAs helps in reducing the Type 1 error rate. As a result, we do a Pearson correlation test to make sure the accuracy of our MANOVA results.

A significant multivariate effect for interaction between indoor/outdoor environments and zikr meditation (Wilks' Lambda =0.85, F=3.867, p=.001, partial $\eta^2 = .155$) was also observed. Since the interaction displayed statistical significance, the univariate F tests for each variable were further examined to explain the meaning of every single effect.

To test hypothesis 4, two-way MANOVA was also used to examine the effects of zikr meditation and the indoor/outdoor setting on physiological health (blood pressure and heart rate). A p-value of less than 0.05 was considered statistically significant. Before proceeding with MANOVAs, initial checks were carried out for normality, homogeneity of variance, and independent observation.

Results

According to Meyers et al (2006a), a moderate correlation between the dependent variables is required for MANOVAs to generate appropriate results. Pre- and post-results showed moderate and significant associations between the profile of mood disturbance, ecopsychology, and spiritual well-being, indicating that these correlations are accurate enough to proceed with MANOVAs (Table 2).

Table 2

The correlations among profile of mood state, ecopsychology, and spiritual well-being.

No.	Dependent Variables	1	2	3	4	5	6
1	Mood disturbance (pre-test)	1					
2	Ecopsychology (pre-test)	-	1				
		0.532**					
3	Mood disturbance (post-test)	0.592**	-	1			
			0.626**				
4	Ecopsychology (post-test)	-	0.417**	-	1		
		0.516**		0.541**			
5	Spiritual well-being(pre-test)	-	0.473**	-	0.937**	1	
		0.557**		0.533**			
6	Spiritual well-being (post-test)	-	0.405**	-	0.942**	0.794**	1
		0.548**		0.629**			

**p < .01.

Based on the analysis of the assumptions, the data met the criteria of multivariate normality. In addition, two-way MANOVA revealed a significant multivariate effect for indoor/outdoor environment (Wilks' Lambda = .91, F=2.249, p=.042, partial $\eta^2 = .088$) and a significant multivariate effect for zikr meditation (Wilks' Lambda = .84, F=4.111, p<0.001, partial $\eta^2 = .15$). A two-way (group by trial) MANOVA was calculated to test for differences in mood disturbance, eco-psychology, and spiritual well-being over trials between the four groups (H₁, H₂, and H₃).

Table 3

Mean and Standard Deviation (Mean ±SD) for Mood Disturbance, Ecopsychology, and Spiritual Well-being

			Pre	Post	Mean (SD)	α	
			Mean ±SD	Mean±SD	Delta	Pre	Post
Mood disturbance	ON	ZK	4.83±.50	4.63±.51	-0.20(.01)	0.94	0.91
		NZK	4.63±.51	4.59±.28	-0.04(.23)		
	IH	ZK	4.88±.64	4.61±.14	-0.27(.5)		
		NZK	4.59±.51	4.44±.36	-0.15(.15)		
Ecopsychology	ON	ZK	4.43±.35	4.59±.47	0.16 (.12)	0.81	0.90
		NZK	4.07±.52	4.21±.51	0.14 (.01)		
	IH	ZK	4.01±.48	3.97±.62	-0.04 (.16)		
		NZK	4.22±.48	4.05±.67	0.17(.19)		
Spiritual Well-being	ON	ZK	4.49±.31	4.60±.40	0.11(.09)	0.88	0.91
		NZK	3.91±.61	4.20±.50	0.29(.11)		
	IH	ZK	4.23±.50	4.25±.48	0.03(.02)		
		NZK	4.20±.57	4.07±.63	-0.13(-.06)		

Note. SD=standard deviation, ON = Outdoor-Nature, IH = Indoor-Hall, ZK = Zikr, NZK = Non-Zikr.

Table 4
 Summary Table of Multivariate Analyses of Variance.

		Indoor/outdoor environment effect		Zikr meditation effect		Indoor/outdoor environment × zikr meditation interaction	
		F	η ²	F	η ²	F	η ²
Mood disturbance	Pre	0.01	0.00	5.81**	0.04	0.11	0.00
	Post	0.43	0.00	0.04	0.00	5.63**	0.03
Ecopsychology	Pre	9.30**	0.06	5.71**	0.03	2.54	0.02
	Post	7.97**	0.05	9.67**	0.06	1.19	0.00
Spiritual well-being	Pre	0.00	0.00	8.46**	0.05	12.93**	0.08
	Post	7.62**	0.05	10.82**	0.07	1.56	0.01

Note. *p<.05, **p<.01, ***p<.001.

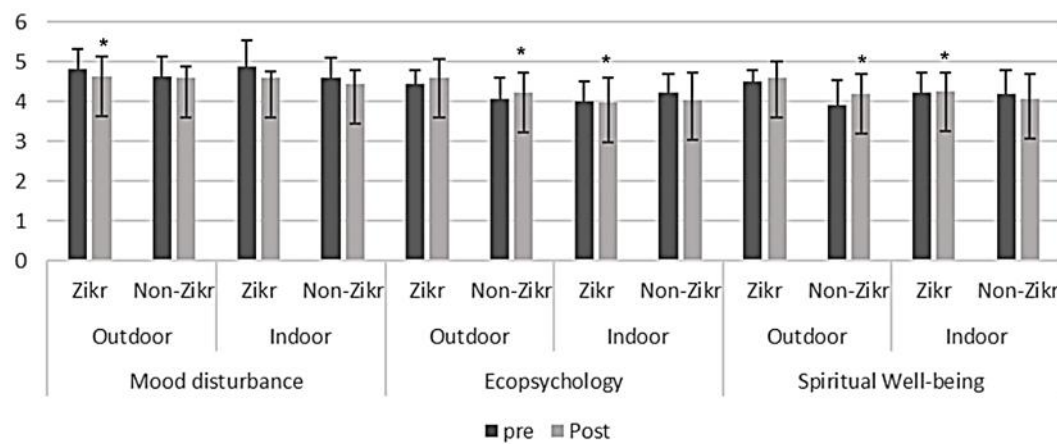


Figure 2. Mean and standard deviation of pre-post test for mood disturbance, ecopsychology, and spiritual well-being, Asterisk (*) represents statistical significance.

Effects on Mood Disturbance

The mean and standard deviation for the mood disturbance were calculated before and after exposure to outdoor conditions and zikr meditation (Table 1 and Figure 2). The results indicated that the combined exposure to nature-zikr significantly decreases the level of mood disturbances after analyzing the change in the mood disturbance score ($F(1, 148) = 5.63, p = 0.000, \eta^2 = 0.03$). The post-test results, however, did not reveal any significantly different main effects of zikr meditation on the participants' moods ($F(1, 148) = 0.04, p = 0.34, \eta^2 = 0.00$). Insignificant decrease of scores by an outdoor setting was also found in mood disturbances ($F(1, 148) = 0.43, p = 0.26, \eta^2 = 0.00$).

Effects on Eco-Psychology

The results showed a main effect of location on eco-psychology, $F(1, 148) = 9.30, p = 0.000$, and $\eta^2 = 0.06$. The value of eco-psychology was found to have a significant increase in scores due to an outdoor setting, with an absolute change of 0.14 (.01%). Although the control group's post-test score was somewhat lower than its pre-test score, there was a main effect of zikr meditation on eco-psychology ($F(1, 148) = 9.67, p = 0.0001$, and $\eta^2 = 0.06$). Furthermore, the results showed that the main effects for the value of eco-psychology were not significant

by indoor/outdoor environment × zikr meditation interaction ($F(1, 148) = 1.19, p = 0.054, \eta^2 = 0.00$).

Effects on Spiritual Well-Being

The results indicated a main effect of location on the spiritual well-being score, $F(1, 148) = 7.62, p=0.0014, \eta^2=0.05$. An outdoor setting significantly increased scores in spiritual well-being, with an absolute change of 0.29(.11%). There was also the main effect of zikr meditation, $F(1, 148) = 10.82, p= 0.0018, \eta^2=0.07$, in which spiritual well-being improved for those who meditated. Furthermore, for those who meditate, the spiritual well-being score improved slightly (.02 %). For post-test results, the interaction of indoor/outdoor environment × zikr meditation had no significant improvement on spiritual well-being, $F(1, 148) = 1.56, p= 0.067, \eta^2=0.01$.

Effects on Physiological Health

As shown in Table 4, for those who were inside during the experiment, there was a significant main effect of zikr meditation on systolic blood pressure ($F = 4.64, p = 0.031, \eta^2 = 0.33$) and diastolic blood pressure ($F = 29.27, p = 0.001, \eta^2 = 0.176$) respectively. Furthermore, both outdoor activities and zikr meditation practice have a main effect on the participants' pulse rate ($F = 4.236, p = 0.041, \eta^2 = 0.030$) and their systolic blood pressure ($F = 6.899, p = 0.010, \eta^2 = 0.048$). The results of pre-post displayed there was a small reduction in systolic (3.57%), diastolic blood pressure (1.86%), and pulse rate (.86%) for those who meditate. The results also showed that the combined exposure to nature-zikr reduced systolic blood pressure (1.5 %) and pulse rate (.95 %).

Table 5

Mean and Standard Deviation (Mean ±SD) for Blood Pressure and Pulse Rate.

				Pre	Post	Mean (SD)
				Mean ±SD	Mean ±SD	Delta
Systolic Pressure (mmHg)	Blood	ON	ZK	115.36±12.56	114.75±11.06	-0.61 (1.5)
			NZK	109.03±13.11	102.86±7.75	-6.17 (5.36)
	IH	Zikr	116.63±15.18	114.56±11.61	-2.07(3.57)	
		NZK	112.75±10.72	108.95±8.81	-3.8(1.91)	
Diastolic Pressure (mmHg)	Blood	ON	ZK	69.62±7.50	67.81±6.27	-1.81(1.23)
			NZK	79.70±15.00	64.18±6.470	-15.52(8.53)
	IH	ZK	69.62±8.13	68.37±6.27	-1.25 (1.86)	
		Non-Zikr	68.90±7.63	63.58±7.40	-5.32(.23)	
Pulse Rate (beats per minute)	ON		ZK	73.12±10.07	72.87±9.12	-0.25(.95)
			NZK	79.44 ±15.00	79.03±11.19	-0.41(3.81)
	IH	ZK	74.64±9.22	75.01±10.08	0.37(.86)	
		NZK	73.40±10.11	71.62±11.34	-1.78(1.23)	

Note. SD= standard deviation, ON = Outdoor-Nature, IH = Indoor-Hall, ZK = Zikr, NZK = Non-Zikr.

Table 6
 Summary Table of Multivariate Analyses of Variance

		Indoor/outdoor environment effect		Zikr meditation effect		Indoor/outdoor environment × zikr meditation interaction	
		F	η ²	F	η ²	F	η ²
Systolic Blood Pressure (mmHg)	Pre	1.606	.012	4.72*	0.033	0.17	.001
	Post	2.507	.018	4.64*	0.033	4.2*	.030
Diastolic Blood Pressure (mmHg)	Pre	1.607	.012	1.77	0.013	0.55	.004
	Post	.000	.000	29.27**	0.176	0.22	.002
Pulse Rate (beats per minute)	Pre	1.396	.010	11.31**	0.076	3.92	.028
	Post	2.111	.015	.579	0.004	6.89**	.048

Note. *p<.05, **p<.01, ***p<.001.

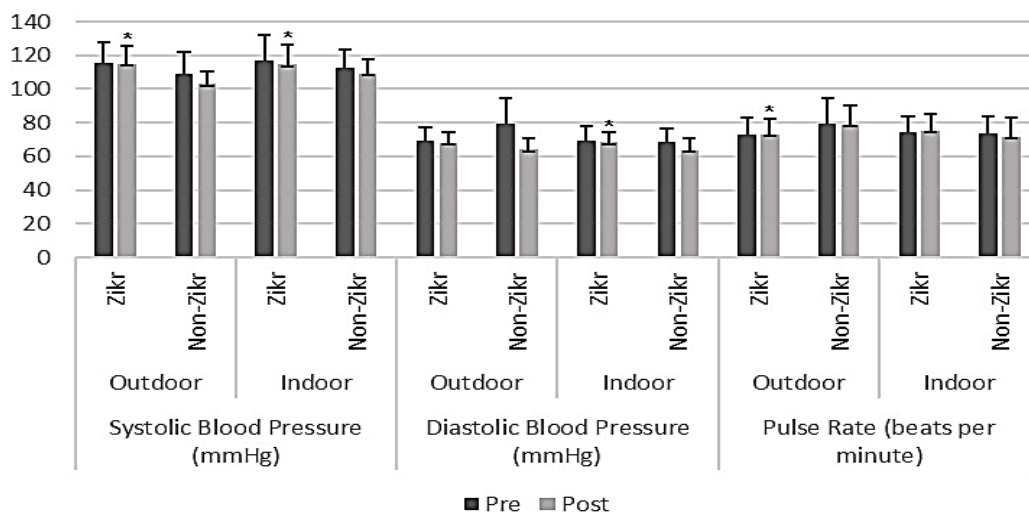


Figure 3. The mean and standard deviation of pre-posttest for physiological health, Asterix (*) represents statistical significance.

Discussion and Implications

The current study focused on Muslim university students and sought to investigate the beneficial effects of exposure to nature and zikr meditation on mood disturbance, ecopsychology, spiritual well-being, blood pressure, and plus rate. In this study, ecopsychology self-value and spiritual well-being were significantly increased after students spent time outdoors (H_{1a} and H_{1c} were accepted). These findings reveal that association with nature can be an important component of Muslim university students' spiritual orientation and their self-value. The results were consistent with a previous study which revealed that positive feelings in nature all influenced interviews' reports of spirituality in nature (Sweatman & Heintzman, 2004). Similar to Hegarty's (2010); Eshleman and Perez's (2021) findings, the majority of the participants in this study described natural settings as therapeutic, with a conscious, occasionally habitual use of nature to enhance their spiritual health.

Additionally, Kaplan and Kaplan (1989) point out that spiritual experiences frequently happen in the final stage of attention restoration theory and that nature environments are particularly well suited for restoring diminished psychological resources. Individuals frequently describe

spiritual feelings like awe, wonder, relatedness, and oneness during this final stage. Furthermore, according to ecopsychology theory, the emergence of a person's "ecological self" results from their wide physiological responses to the environment (Bragg, 1996; Wilson, 1996). This change in behaviour represents a transformation in one's concept of self and results in an "expansive or field like the sense of self, which ultimately encompasses all life forms, ecosystems, and the earth itself" (Bragg, 1996, p. 95) and it supports our findings. Results also indicated that zikr mediation produced a significant increase in spirituality score levels (H_{2c} was accepted). The findings are in line with earlier research showing that young people's spirituality can be enhanced by practicing mindfulness and meditation (Cobb et al., 2015; Cobb et al., 2016; Grabbe et al., 2012). In addition, another study reported that Muslim ritual prayer (salat) and zikr meditation have the potential to enhance the spiritual and physical well-being of Muslims (Saniotis, 2018). This is because zikr meditation helps Muslim university students produce happy emotions. Positive emotions, according to Fredrickson and Levenson's (2005) constructive theory of positive emotion extension, can broaden Muslim university students' attention spans and improve cognitive flexibility (Kearney et al., 2013). In particular, it can dissolve resentment, which causes significant harm to the body and mind, relieve physical and mental stress, and steadily build up positive emotional power. Meditation is an effective way to break the inertial connection between negative emotions and strengthen the positive emotional power. With more practice, sensitivity grows, making it easier to approach and evoke this joyful emotion at college and in daily life. Moreover, once the participants were exposed to the zikr meditation practice, there were significant differences in ecopsychology scores between the pre-test and the post-test (H_{2a} was accepted). This result, which is inconsistent with a prior study, indicated that practicing meditation can assist expand our understanding of the self (Albrecht, 2020). Baillie (2003) recognizes the role meditations can play in facilitating human–nature connectedness and recommend the practices as one way to develop the ecological self.

The results of our study also confirmed H_{3b} that mood disturbance is reduced when zikr meditation is combined with exposure to natural environments. Therefore, there is an unrealized value in encouraging Muslim university students to practice zikr meditation in a natural setting as a method to achieve mental wellness. As purported by previous research, immersing in outdoor meditation may be an effective approach for university students to address their mental health concerns while reducing total mood disturbance for those who frequently recreate outside (Ibes & Forestell, 2022). Choe et al. (2020) offer valuable insights into the benefits of combining a mindfulness intervention with exposure to nature. Additionally, Nisbet et al (2019) discovered that people who practiced mindfulness had higher levels of environmental awareness, a closer connection to nature, and better moods than people who did not.

Furthermore, the present study showed a significant reduction in systolic and diastolic blood pressures after practicing zikr meditation (H_{4a} and H_{4b}). In line with earlier research showing that meditation practice reduces peripheral physiological arousal (Chen et al., 2013; Coelho et al., 2018; Heckenberg et al., 2018; Nardi et al., 2020). These studies found a significant post-intervention decrease systolic blood pressure (by 2.2 mm Hg) and significant reductions in heart rate (by 3.4 bpm) and diastolic blood pressure (by 1.0 mm Hg) in the meditation group. The combined meditative practice of zikr and exposure to nature reduced systolic blood pressure and pulse rate levels in the current study, suggesting that their combined effects may be cumulative (H_{6a} and H_{6c}). From an Islamic perspective, zikr is advocated in relaxing environments because its benefits are derived more easily during times of serenity, as evident

in the present findings. This is consistent with the findings of a Japanese study which reported that people who visited non-urban green spaces, rather than urban ones, experienced a significant reduction in salivary cortisol concentration (Thompson et al., 2012).

In this regard, this is the first empirical evidence, to our knowledge, that integrates nature and zikr meditation along with evidence-based interventions for Muslim university students. The results provide important implications for health promotion and wellness programs in that zikr in natural settings increases daily spiritual experiences regardless of religious affiliation. Exposure to nature and zikr meditation provide Muslim university students with tools to manage stress, regulate their mood, and improve physiological health and spiritual well-being in daily life. It can be practiced at any time, and in any location preferred by the participant. Based on the study results, it seems that just providing resources for stress management at the university is not enough, but rather providing a course that incorporates spirituality and teaches skills as well as the opportunity to practice and develop these skills, will not only reduce perceived stress, but also regulate their mood and improve eco-psychological self-value, physiological health, and spiritual well-being in daily life. Although the participants in our study were Muslim university students, they had been deeply influenced by Islam and accepted the zikr meditation program in which Islamic concepts were integrated. Our findings suggest that zikr meditation practice could play a promising role in improving university students' eco-psychological value, spiritual well-being, physiological health, and mood, regardless of religious beliefs.

Study Limitations and directions for future research

There are a few limitations of this study that should be considered for future studies in this research area. First, this paper suggests that longitudinal studies can further assess the long-term effects of nature-mental health interactions. This is because, mental health is a state that undergoes constant change; thus, the outcomes may not be reasonably assessed in the short term. Notably, the extant literature can benefit from longitudinal studies that support the effect analyses of nature dosages, and the potential persistence of effects. As for the samples used in this study, volunteer participants were utilized, and there might be differences between individuals who were willing to participate in the study or those who were in the classes that were sampled versus those who were not.

All things considered, the relationship between nature connectedness and zikr meditation is complex. Therefore, a qualitative approach is a viable research method because it allows researchers to learn about pertinent factors, such as the duration, the types of activities, or the types of natural settings that facilitate the practice of zikr meditation. To reduce information gaps, future research should consider a mixed-method approach of both quantitative and qualitative methods. Another limitation was that this study was not designed to conduct any intercultural comparison. As a consequence, the results could be constrained in their generalizability. Additional research in different countries would be needed to generalize the findings. Most importantly, university students were not representative of the wider Malaysian population or Muslims in general. Different results might be obtained with a more diverse sample from different subpopulations within Malaysia.

Currently, the university community – faculty, staff, students, and parents – are facing challenges of remote learning as a result of the COVID-19 pandemic. As meditation is a proven stress-reliever technique, it has grown in importance not only as a method to address stress levels during the present situation but also as a means to boost academic performance. This is verifiable because meditation is also proven to sharpen one's focus, increase memory

retention, and heighten learning. Therefore, future research should investigate the effectiveness of meditation among school students as a coping technique in this COVID-19 era. This study only seeks to comprehend the role of nature and zikr meditation in eliciting psychological and physiological responses in Muslim university students. As a result, future research could dive into how other non-faith-based meditative techniques could serve the same purpose. Finally, zikr meditation is an extensive component of religion and cannot be limited to just religious belief, so this study does not use any measure of religious beliefs to measure zikr meditation. Zikr meditation is not just for Muslim people; those without a religious belief can also practice it.

Conclusions

The current study sought to determine whether participating in nature or the spiritual practice of zikr either indoors or outdoors had an impact on Muslim university students' ecopsychology, mood, and spiritual well-being as well as their blood pressure and pulse rate. The combination of nature-zikr exposure considerably lowers heart rate, systolic blood pressure, and the degree of mood disturbances. The variations between pre-and post-test findings suggest that spending time outdoors is a good strategy to boost spirituality and ecopsychological self-value. The spirituality score and the ecopsychology value score in the meditation group were both significantly higher than in the control group. In summary, the results of this study underscored the importance of providing the necessary support and resources to enable university students to immerse themselves in the outdoors and to be in a zikr-meditative state, which can be embedded in interrelated campus initiatives. Campus programs that prescribe doses of nature and park exposures are effective approaches to increase the duration of nature immersion within the university's green campus grounds. Furthermore, it is recommended to conduct training programs for faculty members in the green outdoors occasionally. Ideally, these programs should incorporate zikr meditation sessions in relevant courses or development of strategies for greening the classrooms using natural features. The findings in this study are applicable and pertinent at the policymaking and program coordination level to advocate for the inclusion of religious-based spiritual meditations or activities to achieve psychological and physiological health in university studies.

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Institutional Review Board Statement

The study was conducted in accordance with the Ethics Committee Universiti Putra Malaysia (JKEUPM: IBS-P101-2014).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest

The authors declare no conflict of interest.

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