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Improving mental health, sleep, and decision-making skills through mindfulness practice

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ABSTRACT

Most of the previous studies on the efficiency of mindfulness to improve mental health states, and sleep quality, have focused on clinical samples. The present study aimed to examine the impact of mindfulness intervention training on mental health (depression, anxiety), sleep quality, life satisfaction, and decision-making skills in non-clinical sample. Using a non-equivalent comparison group design, 52 university students were recruited via convenience sampling technique and randomly distributed into two groups – treatment and comparison groups. The treatment group a 30-hour of mindfulness training over one month. Results showed that mindfulness training significantly reduced depressive symptoms and improved sleep quality and life satisfaction in treatment group, although changes in anxiety and decision-making skills were non-significant. These findings contribute to the mindfulness literature and emphasize the importance of mindfulness practice in enhancing mental health and well-being in non-clinical settings.

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1. INTRODUCTION

In our waking consciousness, we are typically aware of only a small segment of reality, often practice the daily rounds barring of true awareness. Many of us redact daily functions unconsciously, without grasping ourselves, leading to work as allegiance. However, individuals who practice mindfulness realize its absolute motive is to align with the present movement and promote mental health. Thus, mindfulness, a meditation technique, has experienced a surge in global popularity in recent years. This concept was derived from Buddhist teachings for the improvement of resilience, self-awareness, concentration, and coping abilities among individuals [1]. Both mindfulness and meditation are mirror like reflections of each other, but the difference between them is that mindfulness helps and enhances meditation, and meditation educates and facilitates mindfulness. Kabat-Zinn [2] defined mindfulness as "the awareness that emerges through paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally".

Mindfulness involves maintaining a mental state of acceptance, compassion, detachment, non-judgment, and non-reactivity toward oneself and others [3]. Diwan [4] identified positive role of four mindfulness skills including- attention (hearing, observing, or take into account what is exist in the present environment), intention (purposeful progression of awareness about one's experiences), presence (exist in the present moment, here and now), and openness (non-judgmental about experience). Studies showed that these skills, when used as nonpharmacological interventions, are safe and effective for various psychological and physical health issues. For example-mindfulness practices have reduced psychological problems such as–depression and anxiety, and also enhance the well-being and quality of life, not only in general population

[5]–[7] but also in population with psychological distress, and somatic problems [8]–[14]. These skills also help people become aware of unusual experiences, such as pain, distress, loneliness, and learn to cope with them in an appropriate manner [15]. Studies have found that mindfulness is associated with lower levels of depression and anxiety [16]. Evidence also suggested that mindfulness improves communication and relationship skills and brings sympathy toward others which are related to quality of life and satisfaction [17]–[21].

A recent narrative review study reported that mindfulness meditation, yoga, and psychoeducation increase emotion regulation and well-being, which remarkably improve sleep quality, happiness, and overall mental health in patients with insomnia [22]. Deficiency of sleep may be the reason of mental illnesses such as depression and anxiety [23]–[26]. Experimental evidence shows that mindfulness improves psychological problems and the quality of sleep [22], [27], [28]. That means mindfulness techniques can be an effective effort to treat mental illness and ensure quality sleep. Hence, sound sleep is essential for maintaining robust brain function, enhancing overall physical and mental health [29], fostering life satisfaction [30], [31], and improving decision-making abilities [32], which are our others study variables.

In case of decision-making performance, mindfulness-based interventions (MBIs) assist in developing organized thought patterns that can help them make rational judgments and decisions through awareness of their attention and emotions [33]. Mindfulness techniques can enhance positive emotions by regulating negative emotions, a crucial factor influencing decision-making abilities and satisfaction level [21]. Overall, it is clear that the significance of MBIs has been growing steadily and strengthening its impact in case of many mental and physical issues.

Based on the above literature review, the present study aimed to assess the effect of the mindfulness-based interventions to improve mental health, sleep quality, and decision-making skills. Although in previous studies, we found evidence for mindfulness-based interventions that had a relationship with the improvements of anxiety, depression [34], and quality of life [16], [35], but still additional studies are warranted by several researchers [36], [37]. There are a small number of studies about the impact of mindfulness practices on the non-clinical populations. Most of these studies were on clinical samples. Moreover, a very few studies have conducted to explore the impact of mindfulness intervention on mental illnesses like depression and anxiety, mental well-being indicators like life satisfaction, sleep quality, and decision-making skills among Bangladesh settings. In Bangladesh, the prevalence of anxiety and depression among university students has been reported to range from 47.5% [38] to 69.5% [39]. Therefore, we focused on non-clinical population from Bangladesh, mainly university students. The main objective of this study was to assess the impact of mindfulness intervention to improve mental health, sleep, and decision-making skills.

2. METHOD

2.1. Research design

The samples for this non-equivalent comparison group design (quasi-experimental group design) were randomly assigned into two groups as: treatment group, which received mindfulness training, and comparison group, which received no training. The participants of the treatment group underwent a one-month intensive mindfulness training program. A total of 15 sessions were employed for study's duration, and two hours long each session.

2.2. Participants

The students of the University of Chittagong, Bangladesh, were targeted to enlist participants in the study. The study sample comprised 52 university students, who were selected through convenience sampling technique. Among the participants in treatment group, five discontinued the training sessions, resulting in 21 participants (42.9% male) in the treatment group (mean age 19.90 years with a standard deviation of 1.221). Among the 26 participants in comparison group, 42.3% were male, and their mean age was 20.04 years, with a standard deviation of 1.038 years.

2.3. Intervention procedure

The program was designed by the authors, drawing on an extensive literature review and prior studies. Its implementation and monitoring were carried out by the research team. Prior to the intervention, the authors held a fundamental orientation meeting and collected pre-test measurements at baseline. In the first session of the intervention, all the participants of the treatment group were invited to the Computer Lab Room in the Department of Psychology at the University of Chittagong, Bangladesh. A briefing on mindfulness exercises, and their benefits in our everyday life was delivered using picture charts, slide presentation, and videos. Participants were also informed about the study objectives, potential risk, and the confidentiality of their data. They then signed a consent form to participate in the present study. The training program included seven mindfulness exercises: mindful observation, mindful listening, body scan, mindful

eating, mindfulness gratitude, 3-step mindfulness exercise, 5-senses mindfulness, and exercise. Furthermore, free-hand exercise and 5-minute breathing exercise were appurtenant as relaxation techniques. Participants were also given informal home assignments to be carried out during daily activities as part of the training. After completion, participants were requested to fill up the questionnaires again to examine the changes. The comparison group received no training. After one month, they completed the questionnaire again. No rewards or compensations were provided for participation in this study.

2.4. Measurement tool

The questionnaire survey were conducted during pre-test and post-test with the following measures along with demographic information including participant's age, gender, family type, socio-economic status, residence, and number of family member. Other's instrument's specifications are as follows:

Depression was assessed by using Uddin and Rahaman depression scale [40] which is a 30-item measure for assessing depression for Bangladeshi population. It has acceptable reliability (Guttman split-half r = .76, and test-retest reliability = .59) and validity. In this scale, participants responded to each item using a five-point scale (ranging from 'not at all applicable' [1] to 'fully applicable' [5]) after thinking about how they have felt in last seven days. Total scores would range from 30 to 150. The following severity norm was utilized in the present study-minimal (30-100), mild (101-114), moderate (115-123), and severe (123-150).

The anxiety scale [41] is a 36-item measure for assessing anxiety symptoms only for Bangladeshi population. This scale has good reliability (split-half reliability r = 0.91, test-retest reliability = .68 and Cronbach's alpha reliability = .94) and validity. Participants responded in this scale using a five-point scale, ranging between '0' (never occurs) to '4' (profoundly occurs). Total scores ranged from 0 to 144. The following severity norm was used in the present study - mild (27-54), moderate (55-66), severe (67-77), and profound (78-above).

The Pittsburgh Sleep Quality Index (PSQI) [42] (Bangla version [43]) was used for assessing sleep quality. The PSQI has seven components that included 19 items for assessing sleep quality. This scale assesses seven components of sleep. Scores in each ranged from 0 to 3. Total scores for PSQI ranged from 0 to 21. A global score of 5 or more indicates poor sleep quality.

The satisfaction with life scale (SWLS) [44] (Bangla version [45]) is a 5-item for assessing perceived life satisfaction. This is the most widely used scale for assessing life satisfaction. Participants responded in this scale using a seven-point scale, ranging between 'strongly agree' (1) to 'strongly disagree' (7), yielding total scores from 5 to 35. The following norm was used in the present study-extremely satisfied (31-25), satisfied (26-30), slightly satisfied (21-25), neutral (20), slightly dissatisfied (15-19), dissatisfied (10-14), extremely dissatisfied (5-9).

The Melbourne decision making questionnaire (MDMQ) [46], (Bangla version [47]) Bangla version contains 20 items in four subscales (Vigilance, Buck-passing, Procrastination, and Hyper-vigilance). The Bangla version of this scale has acceptable reliability and validity. Participants rated each item using a three-point scale, ranging between 'not true for me' (0) to 'true for me' (2). A higher score in each subscale indicates that the respondent uses the respective decision-making skill more.

2.5. Data analysis

The IBM SPSS version 25.0 was used to process and analyze the collected data. Descriptive statistics (e.g., frequency distribution, percentages) were used to assess demographic characteristics of the participants, and independent sample *t*-test were performed to assess the group differences concerning pre-test and post-test of the treatment group and also comparison group. Mean differences are reported with 95% confidence intervals.

3. RESULTS AND DISCUSSION

Mindfulness training is thought to function as a mediator in ameliorating mental health and daily life functioning. The present study aimed to assess the mindfulness intervention training on mental health (depression and anxiety), sleep quality, life satisfaction, and decision-making skills of non-clinical sample. In this study, a total of 52 participants took part in which 21 in the treatment group and 26 in the comparison group. Post-test test were assessed at the one-month follow-up. After a one-month long intervention training, this study elucidated improvement in various areas. Table 1 demonstrates the frequencies and percentages of participants in both the treatment and comparison groups in depression, anxiety, sleep quality, life satisfaction, and the mean and standard deviation of decision-making skills.

Table 1. Descriptive statistics of depression, anxiety, sleep quality, life satisfaction, and decision making in pre-test and post-test conditions

Psychological variables	Treatment		Comparison	
	Pre-test	Post-test	Pre-test	Post-test
Depression				
Minimal	20 (95.2%)	21 (100%)	24 (92.3%)	25 (96.1%)
Mild	-	-	1 (3.8%)	-
Moderate	-	-	-	-
Severe	1 (4.8%)	-	1(3.8%)	1 (3.8%)
Anxiety				
Mild	16 (76.2%)	16 (76.2%)	18 (69.2%)	19 (73.1%)
Moderate	4 (19.00%)	2 (9.5%)	1 (3.8%)	3 (11.5%)
Severe	-	2 (9.5%)	4 (15.4%)	2 (7.7%)
Profound	1 (4.8%)	1 (4.8%)	3 (11.5%)	2 (7.7%)
Sleep quality				
Better	10 (47.6%)	12 (57.1%)	12 (46.2%)	10 (38.5%)
Poor	11 (52.4%)	9 (42.9)	14 (53.8%)	16 (61.5%)
Life satisfaction				
Extremely dissatisfied	-	-	1 (3.8%)	2 (7.7%)
Dissatisfied	1 (4.8%)		1 (3.8%)	-
Slightly dissatisfied	6 (28.6%)	5 (23.8%)	5 (19.2%)	4 (15.4%)
Not satisfied or dissatisfied	1 (4.8%)	-	1 (3.8%)	1 (3.8%)
Slightly satisfied	7 (33.3%)	6 (28.6%)	6 (23.1%)	10 (38.5%)
Satisfied	4 (19.0%)	9 (42.9%)	8 (30.8%)	4 (15.4%)
Extremely satisfied	2 (9.5%)	1 (4.8%)	4 (15.4%)	5 (19.2%)
Decision making				
Vigilance	*M*=9.714 (*SD*=3.243)	*M*=9.429 (*SD*=2.399)	*M*=8.654 (*SD*=2.842)	*M*=8.654 (*SD*=3.046)
Buck-passing	*M*=3.619 (*SD*=2.692)	*M*=4.00 (*SD*=2.345)	*M*=4.308 (*SD*=2.223)	*M*=3.654 (*SD*=2.828)
Procrastination	*M*=3.714 (*SD*=3.133)	*M*=2.667 (*SD*=2.033)	*M*=3.385 (*SD*=2.499)	*M*=3.182 (*SD*=2.367)
Hyper-vigilance	*M*=4.667 (*SD*=2.708)	*M*=4.524 (*SD*=2.522)	*M*=4.962 (*SD*=2.849)	*M*=4.308 (*SD*=2.429)

In the treatment group, a participant exhibited a severe depressive symptoms score (4.8%) during the pre-test, which improved in the post-test, with no individuals showing moderate to severe depressive symptoms. Conversely, in the comparison group, the proportion of severe depression remained unchanged (3.8%). Previous studies reported consistent findings in their study indicating significant improvement in the level of depression after MBI [6], [48]–[52]. Kuyken *et al.* [53] suggested similar conclusion that mindfulness intervention training not only decreasing depressive symptoms but also increasing the quality of life.

Regarding anxiety, the participants in the treatment group showed that one participant had profound anxiety (4.8%) before mindfulness training, with this ratio remaining constant, even two participants also developed severe anxiety symptoms (9.5%). In spite of mindfulness training, participants had developed severe anxiety. In the comparison group, three participants initially had profound anxiety scores (11.5%), and four had severe scores (15.4%). Without mindfulness training only two participants experiencing profound (7.7%) and two severe symptoms (7.7%) of anxiety in the post-test test which contradicts our research objectives.

Comparing the post-test condition with pre-test, mindfulness training improved sleep quality in the treatment group participants. Ten participants had better scores (47.4%) in the pre-test, which improved after mindfulness training, with twelve participants (57.1%) showing better sleep quality, which indicates the impact of mindfulness training on sleep quality. These findings are consistent with previous studies [22], [27], [28]. Chen *et al.* [22] emphasized the impact of mindfulness-based stress reduction (MBSR) training on enhancing sleep quality. In the comparison group, twelve participants had better sleep quality scores (46.2%) in the pre-test, but this number decreased in the post-test to ten participants (38.5%).

Results concerning the satisfaction with life in the treatment group turn up with significant improvement. One participant expressed dissatisfaction (4.8%) in the pre-test, which improved in the post-test such that no participant exhibited dissatisfaction with their life. Additionally, the number of satisfied participants increased in the post-test (42.9%) compared to the pre-test (19.0%). However, the ratio of extremely satisfied participants decreased in the post-test (4.8%) compare to the pre-test (9.5%). In the comparison group, two participants displayed extremely dissatisfaction in post-test, whereas only one participant did so in pre-test. Compared to the pre-test (30.8%), the proportion of satisfied participants also decreased in post-test (15.4%). Previous studies revealed similar findings in their studies that mindfulness training had great impact in the improvement of sleep quality [54]–[57].

Table 2, about the mean differences of treatment group participants between pre-test and post-test conditions, which shows significant improvement in depression (t-value = 3.08, p<.01, 95% CI [3.85, 20.06], Cohen d = .32), sleep quality (t-value = 2.31, p<.05, 95% CI [.16, 3.08] Cohen d = .21), and life satisfaction

(*t*-value =-2.62, p<.01, 95% CI [-5.22, -.59], Cohen *d* =.26). There is no significant impact on anxiety, and decision making styles after one month mindfulness training among the treatment group participants.

The mean differences showed in Table 3 that the comparison group's participants had no significant differences in depression, anxiety, sleep quality, life satisfaction, and decision-making skills between pre-test and post-test conditions. However, the findings presented in this study reveal significant improvements in mental health (depression), sleep quality, and life satisfaction among participants who go through one month intense mindfulness intervention training. The treatment group findings showed noteworthy reductions in symptoms of depression and significantly elevated the quality of sleep, and life satisfaction, aligning with the previous findings [16], [22], [48]–[51], [53]. Parallelly, the comparison group showed non-significant changes in any one of the study variables between pre-test and post-test. These results also supported the positive impact of the mindfulness practice on depressive symptoms, anxiety symptoms, poor sleep quality, life satisfaction, and decision-making skills. Some previous studies employed similar design found non-significant changes in mental health [58], [59] and sleep quality [59], [60] in non-treatment groups.

Despite the mindfulness training, the study also observed an increase in severe anxiety, lower decision-making styles in the treatment group, which contrast with the previous research findings. A study by Takahashi *et al*. [61], after 8-weeks of mindfulness intervention training, results revealed that depression, as well as anxiety, significantly decreased, and Tang *et al*. [7] found a significant improvement in decision making after mindfulness training. Our present study giving a hint the necessity for further research into the shade of mindfulness training's impact on anxiety and decision-making styles. The probable reasons for the non-significant impact on anxiety and decision-making skills might be due to the shorter duration of the training and dependence on self-reported measures, which may inseminate bias.

Table 2. Mean differences between pre-test and post-test of the treatment group in depression, anxiety, sleep quality, life satisfaction, and decision making

Variables	Groups	*N*	*M*	*SD*	*t*-value	95% CI of MD		Effect size (*d*)
						Lower	Upper	
Depression	Pre-test	21	72.000	18.229	3.076**	3.846	20.05	.321
	Post-test	21	60.048	17.104			9	
Anxiety	Pre-test	21	41.809	25.759	.783	-5.625	12.38	.029
	Post-test	21	38.429	23.062			7	
Sleep quality	Pre-test	21	6.524	2.960	2.306*	.155	3.083	.210
	Post-test	21	4.905	2.300				
Life satisfaction	Pre-test	21	21.905	5.847	-2.616**	-5.220	-.589	.255
	Post-test	21	24.809	5.144				
				Decision making				
Vigilance	Pre-test	21	9.714	3.243	.410	-1.169	1.741	.008
	Post-test	21	9.429	2.399				
Buck-passing	Pre-test	21	3.619	2.692	-.594	-1.719	.958	.017
	Post-test	21	4.000	2.345				
Procrastination	Pre-test	21	3.714	3.133	1.471	-.438	2.533	.098
	Post-test	21	2.667	2.033				
Hyper-vigilance	Pre-test	21	4.667	2.708	.232	-1.139	1.425	.003
	Post-test	21	4.524	2.522				

*p<.05, p<.01

Table 3. Mean differences between pre-test and post-test of the comparison group in depression, anxiety, sleep quality, life satisfaction, and decision making

Variables	Groups	*N*	*M*	*SD*	*t*- value	95% of CI of MD		Effect size (*d*)
						Upper	Lower	
Depression	Pre-test	26	71.115	24.979	0.127	-9.256	8.179	.001
	Post-test	26	71.654	22.859				
Anxiety	Pre-test	26	43.000	29.308	1.376	-2.237	11.237	.070
	Post-test	26	38.500	25.696				
Sleep quality	Pre-test	26	5.731	2.822	1.013	-.358	1.049	.039
	Post-test	26	5.385	2.079				
Life satisfaction	Pre-test	26	23.347	6.758	.350	-2.257	3.180	.005
	Post-test	26	22.885	7.437				
				Decision making				
Vigilance	Pre-test	26	8.654	2.842	.000	-1.154	1.154	.051
	Post-test	26	8.654	3.046				
Buck-passing	Pre-test	26	4.308	2.223	1.522	-.232	1.538	
	Post-test	26	3.654	2.828				
Procrastination	Pre-test	26	3.385	2.499	.644	-.423	.808	.007
	Post-test	26	3.192	2.367				
Hypervigilance	Pre-test	26	4.962	2.849	1.720	-.129	1.437	.001
	Post-test	26	4.308	2.429				

Notwithstanding the present study successfully assessed the impact of mindfulness training on depressive symptoms, life satisfaction, and sleep quality, this study has some limitations. Firstly, the participants were exclusively selected from a single department at the University of Chittagong, Bangladesh. Secondly, the sample sizes were relatively small which would be subjected to low statistical power. Additionally, the lower sample size would limit the generalizability of the findings. Thirdly, the training setting was very noisy as the extended construction of the building was ongoing at that time, which was un-controllable. Noise would have an impact during the training sessions. For recommendations on further research, it is recommended that the future study would include a relatively representative sample recruited from various settings, a compatible duration of the training program, more diverse sample, conducted in a well-controlled environment, and form an objective measures to validate these findings. This study would offer more generalizability of the findings.

4. CONCLUSION

In conclusion, depressive symptoms gradually rarefy, sleep quality, and life satisfaction ameliorate bit by bit after an intense one-month mindfulness intervention training among non-clinical student sample. Thus, these findings would be helpful for education experts to enhance their student's emotional well-being, alleviate stress, and flourish academic performance and attention, for mental health professionals it can be serve as a preventive measure to minimize the mental health issues inspiring into clinical disorder, for workplace by reducing employee stress, promote job satisfaction, and enhance productivity and workplace coherence. These findings can also be helpful for further research for doing the longitudinal studies. The effectuation of mindfulness intervention training can direct to more mindful, sound, and more zestful population.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Moslima Akter	✓	✓	✓		✓	✓	✓	✓	✓					
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

This study approved by the Ethical Review Committee of the Department of Psychology, University of Chittagong, Bangladesh (ERB-PSY-CU-24-2021).

DATA AVAILABILITY

The data that supports the findings of this study are available on request from the corresponding author, [MA]. The data which contain information that could compromise the privacy of research participants, is not publicly available due to certain restriction.

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