



Research article

The impact of mindfulness training on alleviating COVID-19 fear among international students in China: A quasi-experimental study

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ARTICLE INFO

Keywords:

Mindfulness
COVID-19
Epidemic
Fear of COVID-19
International students)

ABSTRACT

This study investigated the effects of mindfulness training on alleviating fear of the COVID-19 epidemic among international students in China during the academic year 2020. The training group participants (N = 41) and the control group participants (N = 44) were surveyed pre-and post-training with the two English questionnaires: The Five-Facet Mindfulness Questionnaire (FFMQ) and the fear of the COVID-19 scale (FCV-19S). The results showed that, regarding the relationship between the two main variables in the study, mindfulness is related negatively to the COVID-19 epidemic. Moreover, compared to the control group, results showed that individuals in the training group demonstrated significant improvements in mindfulness levels and decreased Fear of COVID-19. Thus, findings suggest that a short online mindfulness meditation training may reduce fear of the COVID-19 epidemic.

1. Introduction

The emergence of the coronavirus disease 2019 (COVID-19) has led to panic worldwide, especially with the high number of infected cases and the increase in the number of deaths, which soon became a global emergency. The prolonged restrictions on movement and the economic downturn in the pandemic have also led to changes in psychological levels, stress, anxiety, and depression [1,2]. COVID-19 impacts all aspects of life, and its risk factors are different from those of past epidemics in that they are distinct, numerous, and diverse. As a result, anxiety may spread beyond illness or death due to the virus's transmission, boosting additional concerns such as the economic crisis [3].

Several studies have demonstrated research evidence of beneficial outcomes for mindfulness interventions [4]. For example, Mace [5] referred to mindfulness-based interventions that have many applications, including moods (anxiety and depression), hallucinations, and behaviors (bulimia nervosa, addiction, self-harm, violence), attachment problems (attitudes, empathy), and self-problems (self-awareness, hate self). Mindfulness also has psychological benefits and reduces stress, symptoms of depression, anxiety, ruminative thinking, and pathological fears, and improves working memory, attention processes, self-compassion, and tolerance [6].

In December 2019, COVID-19 began spreading in China. In February 2020, all international students in China were required to stay in their universities, and no one could return home. Most of the time, they stay home and only call their family and friends using mobile phones. They should stay away from others outdoors and cover their mouths and noses with masks to avoid infection [7]. This was when everyone tended to feel lonely and experience negative emotions. Despite the preventive procedures taken by Chinese

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universities to protect international students who preferred to stay in China to continue their studies in light of the spread of the COVID-19 epidemic, anxiety remained in control of some of them. It was accompanied by a severe fear of infection with the virus, especially at the beginning of the second wave of the spread of the epidemic in several countries of the world. However, no study has looked at mindfulness's role in decreasing Fear of COVID-19 among international students in China. This study examines the effects of mindfulness on reducing fear of the COVID-19 epidemic among international students in China.

2. Fear of the COVID-19

COVID-19 dread is characterized as an exaggerated fear reaction to COVID-19 virus infection, resulting in anxiety [8] or depression [9], as well as excessive worry about physiological symptoms and severe stress over the personal and occupational loss [10]. COVID-19 Fear has three primary components that help to heighten the response to fear. First is the physiological aspect: The fight-or-flight response is triggered by a previous incident. Heart palpitations, tremors, difficulty breathing, dizziness, a change in appetite, and tiredness indicate persistent anxiety [2]. Second, fear of the infection may be accompanied by a preoccupation with the threat, which generates cognition [11]. Individuals engage in avoidance actions to escape consequences, the third behavioral component. Using public transit, touching any surface, being outside (markets, beaches, stadiums) and indoors (hotels, malls, theatres, indoor playgrounds), attending any public events, and standing in line are all feared [12].

Since the advent of infection control and vaccination against COVID-19, COVID-19 disease was not initially taken seriously [13]. They have ignored psychological and social issues such as fear and anxiety since the advent of infection control and vaccination against COVID-19, where COVID-19 disease was not taken seriously at first [13]. Furthermore, the dread of contracting COVID-19 leads to Fear of COVID-19; as COVID-19 anxiety grows, it will be more difficult for people to respond clearly and sensibly to COVID-19 and other events. Furthermore, staying at home for an extended period and enforcing quarantine measures promotes anxiety and depression and interacts directly with the high level of fear experienced by COVID-19 [14–16]. Furthermore, a global panic wave has emerged due to the quick diffusion of knowledge through the media, leading to anomalous human behavior [17,18].

Furthermore, the bad and inconsistent COVID-19 news, which is primarily viewed by people at home, on T.V., on the internet, and on social media, increases anxiety and can lead to an increase in COVID-19-related phobias [19,20]. Furthermore, they witnessed injured family members or acquaintances, exacerbating the terror. As a result, the dread of COVID-19 will enhance psychological symptoms in an individual and the virus's damage to humans [21].

3. Mindfulness

Mindfulness emerged as a widespread culture 2600 years ago in the Buddhist faith under different titles, the most well-known of which are Meditation and Yoga, which are still practiced today. Rhys Davids was the first to translate the Buddhist technical term "mindfulness" in 1881 [22]. In the fifties of the last century, research centers began to conduct in-depth research on this concept until the theoretical framework of mental alertness was formulated as a science by scientists, Most notably Ellen Langer and Jon Kabat-Zinn. In the 1970s, it was recognized in modern medicine and called Mindfulness-Based Cognitive Therapy (MBCT). Then it developed, and other therapeutic interventions appeared, including Mindfulness-Based Stress Reduction (MBSR) and others. Interest in mindfulness has also increased during the past three decades [23]. As a result, many universities rushed to establish centers for training mindfulness, most notably the University of Massachusetts and the University of Oxford.

Mindfulness means accepting our thoughts and feelings as they are without judging them or accepting our beliefs without believing they are true or false. When we practice mindfulness, our thoughts align with what we are feeling in the present moment rather than reframing the past or imagining the future [24], which requires constant attention to the continuous sensory, cognitive and emotional experience without judging this experience, and intentionally staying in the present [25]. Williams and Penman [26] define it as "a mind-body-based approach that helps people change how they think and deal with their experiences by trying to live with them and confront them." In contrast, Langer [27] defines it as a state of sensory awareness that leaves the individual open to new. Mindfulness is also determined by Brown and Ryan [28] as attention and acceptance of reality, awareness of everything related to the events of the current experience, and the individual can fully pay attention to his experiences that occur in the immediate moment and accept and not judge them. Other researchers described mindfulness as an awareness of the quantitative extent of the experiences present here, attention to and acceptance of the current experience without judgment, whether pleasant or unpleasant, and acceptance of all personal experiences such as thoughts, feelings, and events, just as in the present moment [29–34].

4. Mindfulness and fear of COVID-19

In times of crisis, such as the current worldwide epidemic, meditation and mindfulness are techniques that can help healthcare professionals, patients, and the general public. As a result, introducing apps to practice mindfulness and meditation during this epidemic is a low-cost strategy that is excellent in assisting people in completing treatment and easing fear and worry among them [35]. According to studies, people who meditate for a long time show changes in brain parts that deal with stress and anxiety [36]. The prefrontal cortex, cingulate cortex, and hippocampus all show increased activity, whereas the amygdala shows decreased activity, indicating that emotional regulation has improved. Other research has found that evidence-based therapies, such as MBSR, produce brain alterations similar to traditional meditation [37].

Several meditation studies have revealed that practices using MBSR and MBCT demonstrated anxiety reduction [38,39], depression [40,41], stress [42], and blood pressure [43,44]. Belen [45] investigated the link between COVID-19 fear and anxiety and depression,

as well as the role of mindfulness in mediating this association. Mindfulness was found to be adversely associated with COVID-19 fear, anxiety, and depression, and to buffer the association between COVID-19 fear, anxiety, and depression.

5. The current study

Mindfulness-based cognitive therapy (MBCT) and Mindfulness-Based Stress Reduction (MBSR) have recently developed from formal meditation practices. These two applications require the practice of meditation for eight weeks, including 2-h meditation sessions per week, with extensive teaching about the program and homework. Studies revealed that teaching MBSR and MBCT online has become possible through meditation applications online and telehealth to provide such interventions [46,47]. Furthermore, many meditation apps, such as Calm, Headspace, and Insight Timer, are available for people to use during times like the COVID-19 pandemic. One of the benefit for people's sleep from practicing mindfulness [48]. In addition, several organizations offer these techniques remotely, such as the Royal College of Physicians and Dublin Buddhist Center, which offer online meditation learning sessions at a reduced cost or free.

A study conducted by Huberty et al. [47] showed the effectiveness of calm in reducing stress and improving alertness and self-compassion in stressed college students and that students' response to smartphone-based awareness may be similar to programs that require personal attendance. Furthermore, due to the dread associated with the pandemic, the new coronavirus illness (COVID-19) affects all aspects of people's lives, notably mental health. Therefore, the aim of this study was two folds: (a) to investigate the relationship between mindfulness and Fear of COVID-19 among Yemeni students in China under COVID-19 conditions and (b) to test the effect of mindfulness training online to decrease Fear of COVID-19 among Yemeni students in China under these conditions.

6. Method

The proposed research design is a pre-test post-test control group design, where an intervention program was executed based on mindfulness and employed a quasi-experimental non-randomized research design with a control group.

7. Participants

One hundred Yemeni students (20 female and 80 male) in Chinese universities who expressed low mindfulness in a previous study conducted by the first author in the second semester of the academic year 2020 participated in the study. They were divided randomly into the training group (50 students) and the control group (50 students). Some criteria for choosing the participant have been considered for more conditions, such as the participant knowing English very well (to answer the study scales). Moreover, the participant did not do meditation or yoga before. Of the training group, just 47 knew English very well, and from those, just 45 did not do meditation before. So, the training group was 41 participants. In contrast, the control group consisted of 44 who knew English well and had not done meditation before.

All the participants in both groups are Muslims. See [Table \(1\)](#) for more information on the participants' demographics.

8. Procedures

First, both groups (training and control groups) completed the online questionnaire, which took 15–30 min to complete. Second, program training was designed for the training group and divided into eight sessions of discussions and meditation exercises held twice weekly. Third, the training group received mindfulness strategies lectures and meditation exercises based on the meditation of around 45 min and the homework meditation. These lectures were held through the Tencent application (face to face) and contained a conceptual explanation, discussion, and instructions. Through this period, the control group did not receive any training or

Table 1
Demographics of the study participants.

| | Group | |
|-----------------------|---------|----------|
| | Control | Training |
| Sample size | 44 | 41 |
| Age | | |
| Mean | 21.48 | 21.10 |
| Gender | | |
| Male | 36 | 37 |
| Female | 8 | 4 |
| Level of study | | |
| Bachelor | 25 | 26 |
| Master | 19 | 15 |
| Years in China | | |
| Less than two years | 9 | 7 |
| Two to three years | 23 | 18 |
| Four years and above | 12 | 16 |

intervention in mindfulness. Finally, after the training group finished the eight mindfulness training sessions, we asked both groups to complete the online questionnaire again.

9. Instruments

Participants completed The Five-Facet Mindfulness Questionnaire (FFMQ) and the Fear of the COVID-19 scale. As following:

Mindfulness. The Five Facet Mindfulness Scale (FFMQ) contains 39 items on a 5-point Likert scale [49,50] has been mostly used to assess levels of Mindfulness state. In this study, the coefficient of Cronbach alpha for the FFMQ scale in the control group before and after consecutively were (0.89 and 0.90). However, the training groups before and after consecutively were (0.90 and 0.72).

Fear of COVID-19. The Fear of COVID-19 scale (FCV-19S), which contains seven items on a 7-point Likert scale, has been used to assess levels of a person's fears of COVID-19 [51]. Cronbach's alpha in this study for the FCV-19S scale in the control group before and after consecutively were (0.73; 0.73). However, the training groups before and after consecutively were (0.76 and 0.65).

10. The program

The mindfulness training meditation program was developed based on the principles of both Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) techniques. Before its implementation, the program underwent a review process by five psychology professors who provided valuable input that led to modifications. The primary objective of this program is to cultivate mindfulness ability and skills among international students in China as a proactive measure to help them cope with potential psychological challenges during the COVID-19 spreading period and minimize the symptoms of Fear of COVID-19. Then, after giving a substantial number of students to the training group, The program is administered through group counseling sessions. It incorporates techniques such as meditation training, modeling, feedback, open dialogue, interactive discussions, informative lectures, and assigned homework. Further details about these techniques can be found in the Appendix.

11. Data analysis

We used SPSS version 23 to compute mean values, standard deviations, and correlation coefficients among the study variables and to look for differences between groups before and after the training sessions.

12. Results

Means and standard deviations among pre-test and post-test groups were analyzed and presented in Table (2).

13. Correlation test

Pearson's correlation was used to examine the relationship between the main variables of the study, and the results are presented in Table (3). Pearson's correlation showed that mindfulness is negatively related to Fear of COVID-19 in post-test control and training groups.

14. Difference analysis

To investigate the effect of mindfulness on Fear of COVID-19, we used Paired sample tests for pre-test and post-test groups, which were analyzed and presented in Table (4). The results of the paired sample tests showed no differences between FFMQ and FCV-19S before or after the intervention, according to the control group. At the same time, there are differences between FFMQ and FCV-19S before and after the training, according to the training group.

Furthermore, Independent Samples Tests for both training and control were analyzed and presented in Table (5). The results of Independent sample tests showed there are differences between FFMQ or FCV-19S in the control group and training group before the training. At the same time, there are differences between FFMQ and FCV-19S in the control group and training group after the training.

Table 2

Mean and Standard Deviation for pre-test and post-test.

| | | FFMQ | | FCV-19S | |
|----------------|--------|------|-------|---------|-------|
| | | M | SD | M | SD |
| Control group | before | 2.22 | 0.447 | 3.88 | 0.624 |
| | After | 2.21 | 0.453 | 3.87 | 0.632 |
| Training Group | before | 2.22 | 0.460 | 3.84 | 0.676 |
| | After | 2.37 | 0.364 | 3.58 | 0.361 |

FFMQ: Five-Facet Mindfulness Questionnaire; FCV-19S: Fear of COVID-19 scale; M: mean; SD: standard deviation.

** : $p < 0.01$.

Table 3

Pearson's correlation among the main study variables.

| | Control group | | Training Group | |
|------|---------------|-------|----------------|-------|
| | FCV-19S | | | |
| | R | p | R | p |
| FFMQ | -0.351* | 0.020 | -0.368* | 0.018 |

FFMQ: Five-Facet Mindfulness Questionnaire; FCV-19S: Fear of COVID-19 scale; R: Person's correlation.

Table 4

Paired Samples Tests for pre-test and post-test groups.

| | | Control Group | | Training Group | |
|---------|--------|---------------|-------|----------------|-------|
| | | T | P | T | p |
| FFMQ | before | 0.140 | 0.889 | 2.269 | 0.029 |
| | After | | | | |
| FCV-19S | before | 0.078 | 0.938 | -2.220 | 0.032 |
| | after | | | | |

FFMQ: Five-Facet Mindfulness Questionnaire; FCV-19S: Fear of COVID-19 scale; T: Paired Samples Tests.

Table 5

Independent Samples Tests for control and training groups.

| | | Before | | After | |
|---------|----------|--------|-------|--------|-------|
| | | T | P | T | P |
| FFMQ | Control | 0.143 | 0.976 | 2.432 | 0.000 |
| | Training | | | | |
| FCV-19S | Control | 0.090 | 0.998 | -2.311 | 0.000 |
| | Training | | | | |

FFMQ: Five-Facet Mindfulness Questionnaire; FCV-19S: Fear of COVID-19 scale; T: Independent Samples Tests.

15. Discussion

During the global COVID-19 pandemic, understanding effective interventions to mitigate the psychological impact of the epidemic has become paramount. The study at hand delves into a crucial aspect of this issue by investigating the effects of mindfulness training on reducing fear of the COVID-19 epidemic, specifically among international students in China during the challenging academic year of 2020.

The research employed a well-structured design, utilizing both a training group and a control group to examine the impact of mindfulness training systematically. The participants' pre- and post-training states were assessed using two established English questionnaires: The Five-Facet Mindfulness Questionnaire (FFMQ) and the fear of the COVID-19 scale (FCV-19S). The study's results offer insights into the potential of mindfulness as a tool for enhancing mental well-being in the face of a pandemic.

One of the pivotal findings is the significant negative relationship between mindfulness and fear of the COVID-19 epidemic. This finding echoes prior research highlighting mindfulness's beneficial impact on emotional regulation and anxiety reduction. The study provides empirical evidence that higher levels of mindfulness are associated with lower levels of fear and distress related to the pandemic. This aligns with the fundamental principles of mindfulness, which emphasize present-moment awareness, acceptance, and non-reactivity to challenging emotions.

The results showed that mindfulness is negatively related to Fear of COVID-19 in both pre-test and post-test control and training groups. This result consents with a study conducted by Belen [35], which found mindfulness related negatively to Fear of COVID-19 and anxiety and depression and mediated the relationship between Fear of COVID-19 and anxiety and depression.

Furthermore, the study's experimental aspect, which involved comparing the training and control groups, yielded notable insights. Participants who underwent mindfulness training demonstrated substantial improvements in mindfulness levels and a significant reduction in their Fear of COVID-19 compared to the control group. This finding not only corroborates the overall negative relationship between mindfulness and fear but also suggests that mindfulness interventions can be effective in a relatively short time frame. The implication is that even a brief online mindfulness meditation training can contribute to alleviating COVID-19-related fear and enhancing emotional well-being. The results showed that individuals in the training group, compared to the control group, demonstrated a statistically significant increase in mindfulness levels and decreased Fear of COVID-19. In contrast, the control group participants' mindfulness and Fear of COVID-19 did not change.

16. Limitations

Despite the valuable theoretical and empirical contributions of this study, several limitations call for consideration in future research endeavors. The sample selection process did not restrict participants in the experimental and control groups based on academic level. This introduces the possibility of confounding variables, as academic level could influence responses to the intervention. Additionally, the study employed a non-randomized design, where participants were not randomly assigned to either the experimental or control group. Randomization is a critical element for controlling pre-existing differences between participants and strengthening causal inferences drawn from the results. Future studies should prioritize random assignment to bolster the design's robustness.

Furthermore, the study relied solely on self-reported data through questionnaires. Self-report measures can be susceptible to response bias or subjective interpretations by participants. To provide a more comprehensive picture, future research could incorporate objective physiological and psychological state measures alongside self-report data. The relatively small sample size in this study also presents a limitation. A smaller sample size restricts the generalizability of findings to a broader population. Future studies should aim for larger and more diverse samples to enhance the generalizability of results.

Finally, the study focused on Yemeni students in China, potentially limiting the generalizability of findings to other populations and cultures. The influence of cultural factors on responses to mindfulness training remains unexplored in this research. Future studies could address this gap by testing the model on more diverse samples, allowing for a deeper understanding of how cultural beliefs and practices interact with the effectiveness of mindfulness interventions.

17. Implications

This study significantly advances the growing body of research on the effectiveness of mindfulness interventions for addressing mental health challenges during the COVID-19 pandemic. Focusing on international students in China it reveals the positive impact of mindfulness training in reducing fear related to the pandemic. This underscores the potential of mindfulness as a tool to enhance emotional resilience and well-being during crises. These findings encourage the integration of mindfulness interventions into mental health support systems, potentially fostering a more adaptive response to the uncertainties of the pandemic.

The study's focus on international students in China introduces a crucial cultural dimension. Cultural backgrounds can influence perceptions of health threats and responses to interventions. However, this study doesn't delve deeply into the potential influence of cultural factors on participants' reactions to mindfulness training. A more in-depth exploration of how cultural beliefs and practices interact with mindfulness could provide further insights.

This research contributes to the expanding knowledge base on the role of mindfulness in promoting emotional well-being during global health challenges. It demonstrates the positive potential of mindfulness training to influence fear associated with the COVID-19 pandemic and highlights the practical implications of incorporating such interventions into educational and mental health contexts. As the world grapples with the complexities of the pandemic, these findings advocate for mindfulness training as a valuable tool to strengthen psychological resilience and enhance overall well-being, particularly among vulnerable populations.

18. Conclusion

This research meticulously explored the impact of mindfulness training on mitigating fear associated with the COVID-19 pandemic among international students in China during the demanding academic year of 2020. The study engaged both a training group (N = 41) and a control group (N = 44), subjecting them to pre-and post-training assessments utilizing two well-established English questionnaires: The Five-Facet Mindfulness Questionnaire (FFMQ) and the Fear of the COVID-19 scale (FCV-19S).

The results of this investigation provide compelling insights into the interplay between mindfulness training and the reduction of fear concerning the COVID-19 epidemic. The study's examination of the pivotal relationship between mindfulness and fear of the COVID-19 epidemic affirms a significant negative correlation. Notably, a noteworthy finding emerges from the comparison between the training group and the control group. The individuals who participated in the mindfulness training exhibited remarkable advancements in their levels of mindfulness, accompanied by a substantial decrease in Fear of COVID-19 when contrasted with the control group.

Consequently, the findings of this study shed light on the potential efficacy of concise online mindfulness meditation training as an intervention to alleviate fear associated with the COVID-19 pandemic. The observed improvements in mindfulness levels and the concurrent reduction in fear underscore the practical value of integrating mindfulness-based strategies in addressing psychological distress during times of crisis.

Ethical statement

Ethical considerations for this study on strategies and meditation programs encompass the assurance of participant confidentiality, voluntary participation, informed consent, and adherence to established research ethics guidelines. We get permission from the ethics committee of the psychology school of Shandong Normal University (12/2020).

Data availability statement

The data that support the findings of this study are available from the corresponding author (Dr. Aamer Aldbyani) upon reasonable

request. Please contact the corresponding author (aameraldbyani@gmail.com) for inquiries regarding data access.

CRedit authorship contribution statement

Aamer Aldbyani: Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Data curation, Conceptualization. **Zaid Ahmad Nasser Alhadoor:** Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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