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The Effects of Mindfulness Exercises on the Psychological Health of Active and Inactive Girl Students during the COVID-19 Pandemic

Farahnaz Afrough, Mohammad Reza Sadeghian Shahi *, Farahnaz Ayatizadeh Tafti, Behzad Aria

Department of Sports Sciences, Faculty of Psychology and Educational Sciences, Yazd University, Yazd, Iran

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Corresponding Author:
Mohammad Reza Sadeghian Shahi
rsadeghian@yazd.ac.ir

ABSTRACT

Background: In the face of stressful situations, people can be helped with purposive exercises that enhance cognitive functions but don't reduce social performances. The present study seeks to examine the effects of mindfulness exercises on the psychological health indices of active and inactive girl students during the COVID-19 pandemic. The study focuses on three major indicators of psychological health including attention, concentration, and stress.

Methods: To this end, 80 girl students ranging from 15 to 18 years of age were selected from some schools in the city of Yazd, Iran. The selection was based on the international physical activity questionnaire (IPAQ). In the pre-test phase, the students filled out a questionnaire about concentration and a stress questionnaire (DASS-21). They were then randomly classified into experimental active, experimental inactive, active control, and inactive control groups. The test groups attended 45-minute mindfulness training sesseions once a week for four weeks, while the control groups did their life routines. At the end of the last training session, the students took a post-test, and the results were recorded. The data were analyzed through repeated measures multivariate ANOVA in the SPSS software version 26.

Results: The mindfulness exercises could significantly affect the active and inactive students' attention, concentration, and stress ($p < 0.05$). Also, a comparison of the groups showed that the attendants in the test groups outperformed those in the control groups ($p < 0.05$).

Conclusion: Based on the findings, mindfulness trainings seem to be useful to improve girl students' psychological health indices.

Keywords: Mindfulness, Attention, Stress, COVID-19, Girl Students

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Introduction

In December 2019, a new type of coronavirus disease was identified in Wuhan, a Chinese city in the province of Hubei, known as COVID-19, The disease spread around the world quickly with symptoms like those of pneumonia (1). So far, the pandemic has caused many challenges in every aspect of social life, the consequences of which are predicted to linger for long (2). First, the disease was thought to affect only health issues, but, as it went on, it emerged to be of an absolutely pervasive nature (3). One of the domains adversely affected was public education as well as higher education. Being widespread and highly contagious, the disease made the education authorities all over the world turn from face-to-face to online and electronic training (4).

As reported by the World Health Organization (5), COVID-19 has not only inflicted food distribution, food health, social and economic activities and the other daily life issues, but also posed serious threats to the psychological health of the society. One of the COVID-induced psychological afflictions is stress.

In modern times, a general feature of human life is stress. Despite technological achievements, stress has come up to be considered as the disease of the century (6). People begin to experience it when the challenges in their physical, emotional and psychological health are beyond their capabilities or too many to face and solve (7). According to Manning and Fusilier (8), stress is a natural and inevitable characteristic of modern man and has been defined in different terms. Anyone who is under the pressure of stress loses his mental peace and starts suffering from reduced conscious power, creativity and innovation as well as significantly disturbed mental production, scientific achievement and vocational progress (9). Many capabilities of everyday life such as educational skills are affected too, which is due to the large prevalence of stress and its detrimental effects on organization and programming as well as active memory and attention (10).

Attention is one of the most important and complex factors involved in teaching and learning. Lack of it, indeed, is a frequent problem that reduces children's efficiency at school (11). According to Tamm et al. (12), attention can be interpreted as the process of selecting part of an infinite set of inputs. It is also referred to as a series of complicated mental operations that include focusing on a target, restraining oneself or tolerating and listening for a long time, decoding the features of a stimulus, and turning one's focus from one target to another (13). It is hard to identify the components of attention and measure it, because it is usually evaluated in respect to other activities (14). Besides, attention serves like the goalkeeper of the mind and is controlled by various parts of the brain. This occurs through the organization and prioritization of the stimuli processed by the central nervous system (ibid). Attention is of great significance in matters of cognition and behavior; even a slight distraction negatively affects task of learning (15). In education, the degree of attention in the classroom is a major determinant of how well the subject is learned. In this regard, Albert Bandura, as cited by Mitchell et al. (16), emphasizes that paying attention is the initial stage of any learning task and that insufficient attention disturbs the learning. Also, as Pinna et al. (14) believe, attention is a supreme mental activity and a major component of the cognitive structure that plays important roles in intelligence, memory, and understanding. It can affect many aspects of everyday life positively just as its deficiency can cause failure in those aspects. Researchers have found that limited attention leads to impulsive behavior, distraction, and educational decline. In this context, Siri et al. (13) found a strong connection between inattention and educational problems. They observed that higher levels of inattention would predict deeper behavioral problems.

Considering the incidence of COVID-19 as well as the subsequent increase of stresses and decrease of students's attention, various therapeutical approaches have been offered to

deal with the pandemic aftermaths. The studies conducted on groups of people with low psychological health have revealed the factors of vulnerability and laid the groundwork for more effective methods of treatment. Some of these methods are non-pharmaceutical, among which the third-wave cognitive-behavioral therapies have been of great success (15). One of the commonly-used treatments in this category is mindfulness.

Mindfulness is the result of a multi-millennial development rooted in the Eastern philosophy (17). As a kind of meditation, it involves tranquilization and control through which domains such as attention, beliefs, expectations, temperament and emotion regulation affect sensory processes (18). Mindfulness has also been defined as a type of nonjudgmental present-focused awareness of what is happening (19). Research has shown that, while doing mindfulness exercises, people attend to an increasing number of internal and external stimuli (20). Interventions based on mindfulness place the conscious attention on the present and raise the awareness of external and internal tokens, thus reducing the individual's stress and increasing his or her attentiveness (21). So far, such interventions have been of benefit for people suffering from stress and chronic pains (22), depression (23) and anxiety (24). However, it is not quite known to what extent these interventions can affect the cognitive skills and psychological states of active and inactive girl students. Since online education during the COVID-19 pandemic led to the decline of students' physical activities and predisposed various psychophysical disorders, purposive educational and interventional approaches can help to restore and maintain their health. Students are naturally stressed, but they were exposed to more psychophysical pressures during the pandemic (1). Many of them experienced school-related stress, anxiety, depression, and disturbed attention, which need to be treated with coping strategies (25). Considering the significant role of coping strategies in the improvement of psychological wellbeing, the present study seeks to examine the effects of mindfulness exercises on the psychological health indices of active and inactive girl students during the pandemic. To this end, the study specifically focuses on three indicators of psychological health including attention, concentration, and stress.

Methods

The present applied study is semi-empirical in terms of data collection. The experiments are based on pre-tests and post-tests as well as a control group to determine how mindfulness exercises affect attention, concentration, and stress of active and inactive girl students. The research population consisted of the first- and second-grade high school girl students in the city of Yazd during the school year of 2021-2022. The participants in the study were selected through available sampling method. To this end, International Physical Activity Questionnaire (IPAQ) was distributed among the students. Then, the questionnaires were collected and the responses were analyzed, based on which a total of 80 students were selected. They were equally divided into active and inactive ones ranging from 15 to 18 years of age. Forms of informed consent containing the personal information of the students were completed and signed up by their parents. All this process was performed under the health protocols of the pandemic time. The inclusion criterion was the lack of motor disorders, physical diseases, and congenital problems. The exclusion criteria were reluctance to take the tests and absence from mindfulness training sessions.

After the sampling was done and the forms of consent were collected, a pretest was conducted with a questionnaire on concentration and the DASS-21 questionnaire on stress, anxiety and depression. Based on their scores in this pretest, the participants were randomly classified into four 20-member groups including active experimental, inactive experimental, active control and inactive control groups. Also, the IPAQ served to determine the students' level of

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physical activity. Then, both test groups took part in mindfulness trainings once a week for four weeks. Each session lasted for 45 minutes, and the attendees had to do assignments at home for three times a week. These assignments included reviewing the previously presented subjects and implementing them in everyday life. Before each session, as also practiced by Kristeller et al., (26), the researcher evaluated the quality of the assignments according to the feedbacks received. It is to be noted that, during the weeks of training for the test groups, the participants in both active and inactive control groups were just doing their own life routines. Finally, after the last training session, the participants took the post-test, and the scores were recorded.

Assessment tools

IPAQ

A concise version of this questionnaire was used to assess the participants' physical activity. It consisted of three METs (metabolic equivalents of task) for walking, four METs for medium physical activity, and eight METs for severe physical activity. The values of these three activities (each calculated as MET × minute × day) were added up to measure the total physical activity per week. If the MET/min/week index was at least 3000 for seven or more days, the physical activity would be considered high. If that index was at least 600 for five or more days, the physical activity would be considered medium. However, if neither case held, the physical activity would be interpreted as low (27).

Depression, anxiety, and stress scale (DASS-21)

In this research, the DASS-21 questionnaire was used to measure stress. This tool includes three 7-question items which are, as proposed by Antony et al. (2019) (28), scored from 0 (not true about me) to 3 (quite true about me). The validity and reliability of the questionnaire were examined by Samani and Joukar (2007) (29). For the depression, anxiety, and stress scales, the test-retest reliability was 80%, 76%, and 77%, respectively. Also, Cronbach's alpha coefficients for those scales were found to be 81%, 74%, and 78%, respectively.

Concentration questionnaire

As a 48-item questionnaire devised by Rabi'e and Salehi (30), this tool serves to measure concentration or focused attention. The scores range from 48 to 240, and the questions concern attention (12 items), concentration (20 items), and distraction (16 items). The scoring is based on the 5-point Likert scale (i.e., none, a little, medium, much, very much). In the present study, questions 3, 4, 5, 7, 11, 15, 23, and 24 were reversely scored, and Cronbach's alpha coefficient for the reliability of the questionnaire was 92%.

Statistical analysis

Descriptive statistics such as frequencies, percentages, means and standard deviations (SDs) were used to organize, analyze, and interpret the data. Moreover, considering the bulk of the research data and their presumed normal distribution, hypothesis testing was performed with repeated measures ANOVA with between group factors. The calculations were done through SPSS version 26 at the p-value of 0.05.

Results

The participants in this study were in the range of 15 to 18 years of age. The Shapiro-Wilk test also proved the normality of the data distribution at the confidence level of 95%. Considering their normal distribution, the scores were analyzed with repeated measures ANOVA with between group factors. In addition, based on Levene's test results (p-0.741), the variances were presumed to be equal. Table 1 presents the means and SD of attention, concentration, and stress in the studied groups of participants.

According to the numerical results reported in Table 1, both active and inactive test groups outperformed the control groups.

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Table 1. The means and SDs of the variables for the research groups

Group	Attention		Concentration		Stress	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
	Mean and SD		Mean and SD		Mean and SD	
Active Ex.	26.8 ± 2.3	43.1 ± 3.1	36.5 ± 1.8	51.1 ± 2.6	17.8 ± 1.2	12.9 ± 1.4
Inactive Ex.	24.3 ± 1.8	38.2 ± 2.6	34.7 ± 1.5	47.3 ± 2.1	18.3 ± 1.5	14.2 ± 1.3
Active control	26.9 ± 2.2	28.7 ± 2.1	36.1 ± 1.6	37.7 ± 1.4	17.4 ± 1.6	17.9 ± 1.2
Inactive control	25.1 ± 2.4	26.7 ± 2.2	34.7 ± 1.7	35.1 ± 1.5	18.6 ± 1.8	19.2 ± 1.7

Table 2. Results of the repeated measures ANOVA with between group factors to examine the research variables in the studied groups

Variable	Setting	Sum of squares	Degree of freedom	Mean of squares	F	P	Eta squared
Attention	Group	56.31	3	18.77	8.12	*0.001	0.401
	Stage	19.23	1	19.23	9.46	*0.001	0.431
	Gr-St	118.42	3	39.73	22.19	*0.001	0.492
Concentration	Group	43.56	3	14.52	6.20	*0.001	0.372
	Stage	13.74	1	13.74	6.79	*0.001	0.395
	Gr-St	116.80	3	38.93	14.72	*0.001	0.452
Stress	Group	52.30	3	17.43	9.45	*0.001	0.426
	Stage	22.96	1	22.96	14.26	*0.001	0.572
	Gr-St	119.23	3	39.74	18.65	*0.001	0.610

* Significant at $P \leq 0.01$

As it can be seen in Table 2, for each of the three variables, the effects of group, stage, and group-stage interaction were significant. In others words, there were significant differences among the groups rated for their attention, concentration, and stress. Since the group-stage interactive effects were significant, the other effects were ignored, and the groups were compared in pairs using Tukey's test for post hoc analysis. Regarding the attention variable, the active Ex. group emerged to be significantly different from the active control group (P-0.042) and the inactive control group (P-0.032), but its difference from the inactive test group was not significant (P-0.216). Also, the inactive Ex. group significantly outperformed the active control group (P-0.046) and the inactive control group (P-0.040). In the case of the concentration variable, the active Ex. group was significantly better than the active control group (P-0.047) and the inactive control group (P-0.041), but its difference from the inactive Ex. group was not significant (P-0.326). As the results indicated, the inactive Ex. group performed significantly better than the active control group (P-0.049) and the inactive control group (P-0.043). For the stress variable, the active Ex. group outperformed the active control group (P-0.047) and the inactive control group (P-0.042); the differences were statistically significant. That group also scored higher than the inactive Ex. Group, but it was not significant (P-0.126). In the same context, the members of the inactive Ex. group significantly outscored those in the active control group (P-0.048) and the inactive control group (P-0.043).

Discussion

This study aimed to examine the effects of a series of mindfulness exercises on the psychological health indicators of active and inactive girl students during the COVID-19 pandemic. In this regard, three indicators including attention, concentration, and stress were investigated. The exercises were found to be of significant effects on the attention and concentration of active and inactive girls, and the test groups outperformed the controls. These results were in agreement with the findings of

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Joshua et al. (31), Norris et al. (32), and Lee et al. (11). These researchers showed the positive and significant effects of mindfulness intervention on the attention and concentration of their subjects.

Such findings on the issue may be due to the natural relationship of mindfulness and human attention and concentration. Attentiveness can be enhanced considerably with certain tasks and practices that help to focus on external stimuli and, thus, to notice the key points faster or divert one's attention to new points. This leads to better decisions and, ultimately, promotes performance (33). EEG (Electro Encephalo Geraphy) patterns are supportive of this point. A relationship was found between the reduced activity of the brain and a higher capacity for attention after three months of meditation. This suggests the potential of mindfulness practices to raise the level of attention by corroborating neural functions (ibid). Similarly, Weinberg and Gould (34) believe that, in some important respects, mental disengagement has to do with high levels of attention and concentration. Indeed, the research on disengagement provides implicit evidence for the relationship of mindfulness and attention. Mindfulness allows one to act consciously while focusing on what is being done with a sense of control and clear processing of feedbacks. In terms of concepts, these three features correspond to selective attention, continuous attention, and situation awareness, respectively. Mindfulness is the raised attentiveness and awareness of what is going on now, and it is based on non-judgemental treatment, intentional awareness and focus on the present (35). Once attention is focused on the present, all the aspects of the ongoing experience can be processed due to concerted cognitive, physiological, and behavioral activities (36). Through practicing mindfulness techniques, one becomes conscious of his or her activities, and the continuous consciousness of one's thoughts, feelings, and physical moods enhances the individual's attention and concentration.

The findings of this study about the role of mindfulness were in line with Lee et al. (10). They reported a positive and significant relationship between students' mindfulness and their attention and concentration. Similar results were reported by Norris et al. (31). In mindfulness-based cognitive therapy, which is part of the intervention protocol of the present study, individuals are aware of the state of their mind and cognition at any moment. By concentrating on two mental traits, namely being at the moment and acting, they learn to transfer their mind and cognition from one solution to another. Success in this respect requires teaching specific behavioral, mental and metacognitive strategies about how to pay attention. In intervention programs, as the ability to attend and concentrate rises, negative thoughts and moods begin to decrease.

Mindfulness exercises could lead to a significant reduction of stress in active and inactive girl students in Yazd city. This was the case more about the test groups compared to the control ones. In agreement with these results, one may refer to the studies by Song (37), Masuda and Tully (38), McManus et al. (24), and Monno et al. (15). These researchers have all reported the significant effect of mindfulness-based intervention programs on the reduction of stress. Mindfulness practices allow relevant thoughts to pass through while blocking or reducing negative thoughts, thus inducing a kind of peace of mind, less tension and fewer physical disorders. Besides, mindfulness positively affects stress in at least the two ways of deterring mind rumination and decreasing automatic emotional responses (39).

Since the testees in this research were students, the general interpretation of the results is that the achievement of academic professions and success in them depends on the type and quality of the corresponding early educational occasions. These occasions as well as students' desire for success are among the major contexts for school achievement emotions (40). There is a body of evidence that negative emotions such as anxiety, depression, and stress adversely affect learners' cognitive processes and motivational orientations. They endanger not only the educational performance of students but also their mental, psychological, and emotional health. On the other hand, it is thought that achieving the ways and

means of mindfulness helps individuals improve their physical, psychological, and emotional wellbeing and reduce their stress and anxiety sensitivity (41). In this case, mindfulness trainings have proved to intercept thoughts and behaviors and filter them, thus helping one to depict the status quo and reduce one's stress and anxiety-based emotions as well as depressive symptoms. The ultimate outcome is the reduction of anxiety sensitivity (42). As a matter of fact, through mindfulness-based trainings, students acquire the skills of self-management in terms of behavior, emotions, and cognition and learn how to live at the moment. This helps them truly know the rules governing their mind so as to manage it and make the best use of its potentials (43).

Conclusion

Through training sessions, students learn to look back, analyze the situations in which they experienced stress, and tackle similar stressful situations with new approaches. These approaches, replacing old trite ones, serve to reduce stress. Mindfulness techniques have been derived from cognitive-behavioral therapies and are considered important in the third-wave therapeutical models in psychology. By reducing negative emotions, they promote life quality (44).

Based on the issues discussed in this study, those interested in the field can also examine cultural and gender differences as well as the predicting roles of other environmental, individual, and family variables. The present research has some limitations including the low number of the intervention sessions and the negligence of the participants' motivation and moods during the tests.

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Conflicts of interest

The authors declare no conflict of interest.

Authors' contributions

MR. S, F. A and F. AT; conceptualized and designed the project, MR. S and F. A; performed the experiments and data collections, B. A and F. AT; analyzed and cured the data, F. A; wrote the manuscript. All authors provided critical feedback and helped editing the final manuscript.

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