



# Effect of Breath Meditation on Stress Levels for Students Between Late Teenage and Early Adulthood

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**Abstract.** Meditation is known as a technique to achieve stabilized emotions, mental and physical relaxation. Listening to recorded meditation might be able to achieve the goal of reducing stress and adjusting emotions. Fifty-six 16+ subjects in the experiment were asked to complete a Self-rating Anxiety Scale survey in order to measure their stress levels then listen to recorded meditation. After listening, the subjects were asked to fill out the scale again in order to determine the change in their stress levels. The control group was asked to complete the scale twice with a 12-min interval. The two groups were contrasted to determine the relationship between listening to recorded mediation and people's stress levels. This paper aims to analyze the results in the experiments and concludes that breath meditation can reduce stress level in students. Finally, limitations of the experiment and future directions of meditation in coping with stress are pointed out.

**Keywords:** stress level · meditation · anxiety · relaxation

## 1 Introduction

Students in late teenage and young adulthood are mostly under a lot of stress. A study done by American Psychological Association in 2013 shows that teens rate their stress at 5.8 out of 10, and adults rate their stress at 5.1 out of 10, indicating that teenagers have a higher stress level than adults on average [1]. According to The American Institute of Stress, the potential sources of stress for teens are mainly academic stress, social stress, family discord, world events, traumatic events and significant life changes [2]. Therefore, with severe rate of stress, students tend to find ways to reduce stress, which most of them are proofed to be unhealthy. In 2022, American Addiction Center surveyed 980 students who were currently studying in universities or graduated within the five years about their feelings on stress and their strategies to reduce stress [3]. According to the study, 97.8% of the students said that stress had already affected their mental health, indicating that high pressure is very common for college students who are young adults.

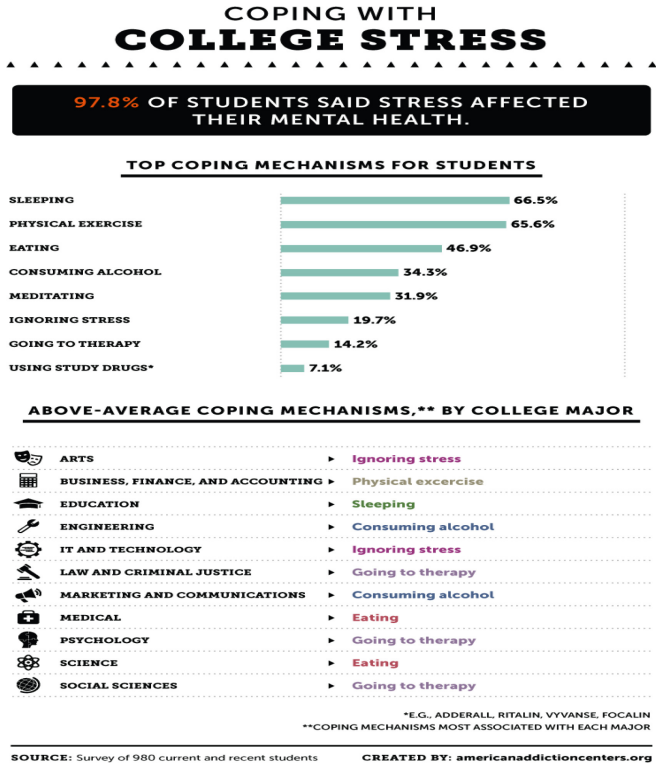


Fig. 1. Strategies college students use to cope with stress, 2022 [3].

### 1.1 Mechanisms to Cope with Stress

Figure 1 shows the top coping with stress mechanisms for students in college. From the survey of investigating the coping mechanisms of students, strategies that college students use to cope with stress include sleeping, physical exercise, eating, consuming alcohol, meditating, ignoring stress, going to therapy and using study drugs. According to the study, 66.5% students chose sleeping, indicating that more than half of the students chose to ignore their stressful mood. Only 14.2% students chose to go to therapy to seek help from professional therapists. However, there were also students who chose unhealthy ways to abreact their stress such as consuming alcohol (34.3%). As shown in the study, students studying engineering, marketing and communication tend to prefer drinking alcohol to cope with their academic stress more, probably because of the euphoria and intoxication caused by drinking can eliminate tension and anxiety. Noticeably, there were also 31.9% of the students who chose meditating as a method to cope with stress.

### 1.2 Effect of Meditation on Reducing Stress in Previous Studies

A research conducted by Oman, D. and colleagues in 2008 investigated how meditation lowers stress and supports forgiveness in college students. Their random controlled trial

research indicated that meditation-based stress-management practices can reduce stress and enhance forgiveness among college undergraduate students [4]. Another study conducted by K Myint and colleagues in 2011 was on 18 young university students who required to do mindfulness practice twice a day for one hour each, in a five-weekdays period. Measuring aspects includes heart rate, blood pressure, serum cortisol and Depression Anxiety Stress Scale (DASS). The results indicated that in neutral environment of university student, meditation had potential benefits of alleviating stress [5]. However, the experimental group of this study was too small, unable to represent a larger group of college students. In 2016, another study was conducted on 40 university students who were required to complete mindfulness-based meditation. Overall, these students showed a reduction in their stress and anxiety levels, suggesting meditation as a hope for stress reduction for students [6]. Another study in 2022 on university students about meditation and stress coping increased the use of meditation as students experience higher stress levels. The results showed that participants in the meditation group showed not only decrease in stress levels but also better academic performances and and positive feelings [7]. Overall, the past researches as shown that meditation has a positive effect on stressful university students and has potential benefit in coping with stress. Therefore, it is significant to conduct more studies on larger sample groups in order to find out whether meditation can reduce stress for students between late teenage and early adulthood since the results of the study are expected to contribute to the development of meditation in stress management in the future.

## 2 Goal

Past researches show that students in late teenage and adulthood are under a lot of stress. However, students tend to choose ways such as drinking alcohol, playing video games until midnight in order to alleviate their mood while only few of them know that breath meditation has an effect on stress levels. The main goal of this research is to discover the relationship between stress levels and breath meditation in order to determine whether breath meditation can assist in stress reduction. Then, it is able to achieve the goal of determining whether breath meditation can be recommended to students to help them alter their stress levels.

## 3 Hypothesis

Listening to recordings of guided formal meditation will reduce people's stress levels.

## 4 Method

Participants: 16+ Chinese, 56 samples.

Experimental design:

The study was conducted online. QR-code of the Self-Rating Anxiety Scale were sent to the participants for them to complete before and after watching the 12-min breath meditation video. Several zoom meeting rooms were used to play the breath meditation

video for people at different times of the day for them to join and follow the instructions in the video to complete breath meditation. 56 participants were randomly assigned into 2 groups, the experimental group and the control group. The 28 people in the experimental were required to filled out the Self-Rating Anxiety Scale before and after watching the video, while the 28 people in the control group were required to complete the scale before and after a 12-min break.

The meditation recording is the independent variable.

The change in stress level is the dependent variable.

**Anxiety Assessment:** Participants in this study completed a self-administered standardized stress level survey, specifically the Self-Rating Anxiety Scale (SAS) was used (ref). The SAS focuses on the most common general symptoms of anxiety disorders; anxiety is typically caused by coping with stress. The SAS test uses a four-point response scale, from 'none of the time to 'most of the time. In total, there are 20 questions, 15 of which increase in score value with anxiety level and 5 of which decrease in score value anxiety questions. When the total score is calculated, we used the scale below to determine their stress level.

1. 20–44 Normal Range.
2. 45–59 Mild to Moderate Anxiety Levels.
3. 60–74 Marked to Severe Anxiety Levels.
4. 75 and above Extreme Anxiety Levels.

William W. K. Zung created an English version of SAS, all the participants in this experiment completed the Chinese version of the SAS which is translated directly from the English version. Figure 2 shows the Zung Self-rating anxiety scale.

**Intervention (meditation):** A 12-min guided formal meditation video recording was used. This meditation video focuses mainly on guiding people's attention on their breathing, which is to feel the natural rhythm of inhaling and exhaling [9].

Collected demographic:

The age mean of the experimental group is about 19.96 years old.

The age mean of the control group is about 19.42 years old.

## 5 Results

As shown in Table 1 for each participant in the experimental group and the control group, the difference in SAS score value is calculated by SAS score value after the intervention minus the SAS score before the intervention. In the experimental group, 21 samples out of 28 has a negative SAS score, suggesting their SAS score after the intervention is smaller than the previous score. 2 samples remain unchanged. In the control group, only 5 out of 28 samples shows a negative SAS value. 9 samples remain unchanged. Overall, in the experimental group, 75% participants show a negative SAS value, indicating that their stress level has decreased after the intervention. In the control group, only 17.9% participants show a decrease in SAS value, most of them show an increase in stress level after the 12-min interval.

As shown in Table 2, the mean difference of SAS value change is -1.857 and the standard deviation is 2.505 for the experimental group. The mean difference is 0.92 and the standard deviation is 2.040 for the control group.

**Zung Self-rating Anxiety Scale**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Listed below are 20 statements. Please read each one carefully and decide how much the statement describes how you have been feeling **during the past week**. Circle the appropriate number for each statement.

	None or a little of the time	Some of the time	Good part of the time	Most or all of the time
1. I feel more nervous and anxious than usual.	1	2	3	4
2. I feel afraid for no reason at all.	1	2	3	4
3. I get upset easily or feel panicky.	1	2	3	4
4. I feel like I'm falling apart and going to pieces.	1	2	3	4
5. I feel that everything is all right and nothing bad will happen.	4	3	2	1
6. My arms and legs shake and tremble.	1	2	3	4
7. I am bothered by headaches, neck and back pains.	1	2	3	4
8. I feel weak and get tired easily.	1	2	3	4
9. I feel calm and can sit still easily.	4	3	2	1
10. I can feel my heart beating fast.	1	2	3	4
11. I am bothered by dizzy spells.	1	2	3	4
12. I have fainting spells or feel faint.	1	2	3	4
13. I can breathe in and out easily.	4	3	2	1
14. I get feelings of numbness and tingling in my fingers and toes.	1	2	3	4
15. I am bothered by stomachaches or indigestion.	1	2	3	4
16. I have to empty my bladder often.	1	2	3	4
17. My hands are usually dry and warm.	4	3	2	1
18. My face gets hot and blushes.	1	2	3	4
19. I fall asleep easily and get a good night's rest.	4	3	2	1
20. I have nightmares.	1	2	3	4

Score Total\*:  \*Score is for healthcare provider interpretation.

Adapted from Zung WWW. A rating instrument for anxiety. *Psychosomatics*. 1971;XII:371-379. Reprinted with permission from *Psychosomatics*, ©1971, American Psychiatric Association.

**Fig. 2.** Self-Rating Anxiety Scale [8].

Figure 3 shows the mean difference and standard error for experimental group which includes people who have completed meditation, and control group which includes people who have completed SAS twice with an twelve-minutes interval as bar graph. The mean difference of experimental group is -1.8571 and standard error is 0.41613888. The mean difference of control group is 0.92 and standard error is 0.17386366.

Figure 4 shows a boxplot of the data collected. It shows that people’s change in stress level ranges from -6 to 6, indicating the greatest change in stress level is to increase or decrease SAS score value by 6. The upper quartile is 1, the lower quartile is -3. The median is 0.

By using the Shapiro-Wilk Normality Test, as shown in Fig. 5, the W value is calculated using the app Art Studio. The W value is 0.96622. With the W value closer to 1, the data collected is more likely to reach normal distribution. Formula1 shows the equation for calculating W value,  $x_i$  stands for the  $i$ th element in order. An example of  $x_i$  is the difference in SAS value.

$$W = \frac{(\sum_{i=1}^n a_i x_i)^2}{\sum_{i=1}^n (x_i - \bar{x})^2} \tag{1}$$

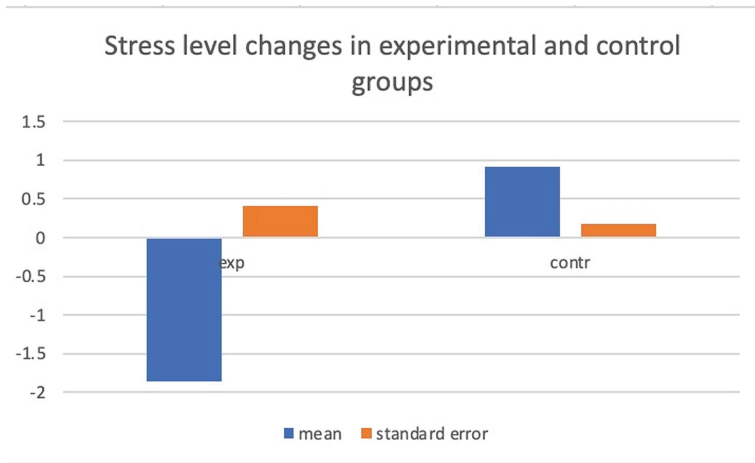
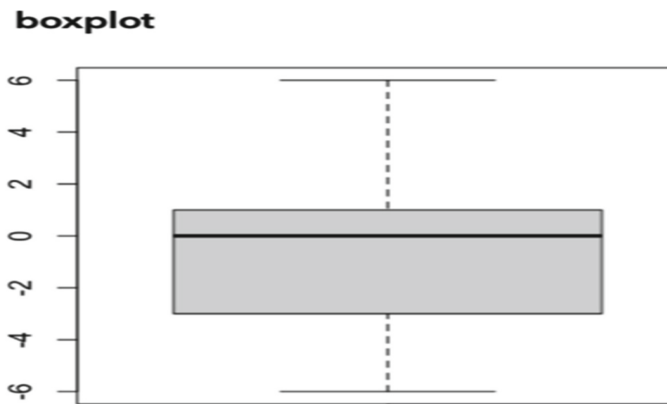
Figure 6 shows the Two Sample t-test. This test is used to test whether the means of Two populations are equal. Both populations are unknown, easily measure all the individuals in the population to find the population mean.

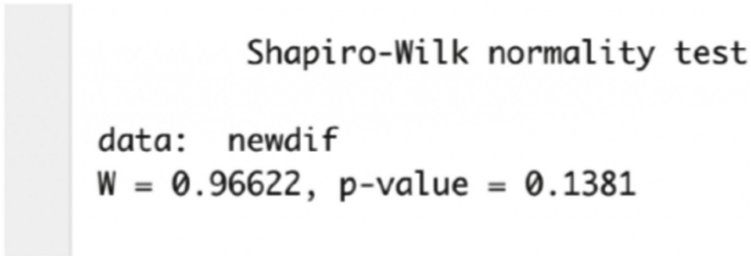
**Table 1.** Difference in SAS value before and after intervention in experimental group and control group [Owner-draw].

Group	Difference	Group	Difference
Experimental	-1	Control	1
Experimental	-5	Control	-1
Experimental	-2	Control	-3
Experimental	0	Control	0
Experimental	0	Control	0
Experimental	-1	Control	0
Experimental	-2	Control	5
Experimental	-6	Control	3
Experimental	-2	Control	-1
Experimental	6	Control	2
Experimental	-2	Control	0
Experimental	-3	Control	2
Experimental	-3	Control	1
Experimental	1	Control	0
Experimental	-3	Control	0
Experimental	-3	Control	0
Experimental	-3	Control	5
Experimental	1	Control	3
Experimental	-3	Control	-1
Experimental	-3	Control	0
Experimental	1	Control	5
Experimental	-5	Control	2
Experimental	-4	Control	1
Experimental	1	Control	0
Experimental	-1		
Experimental	-1		
Experimental	-5		
Experimental	-4		

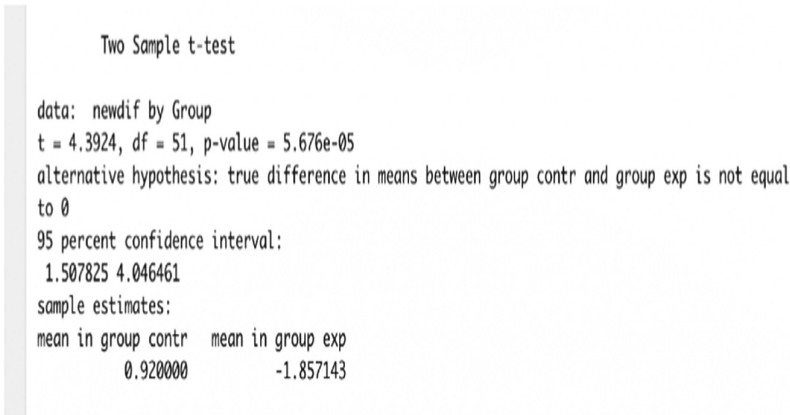
**Table 2.** Mean and standard deviatric for experimental group and control group [Owner-draw].

Mean(experimental)	-1.857142857
Standard deviatric	2.505021412
Mean(control)	0.92
Standard deviatric	2.039607805

**Fig. 3.** Mean difference and standard error of the experimental group and control group [Owner-draw].**Fig. 4.** Boxplot of data [Owner-draw].



**Fig. 5.** Shapiro-Walk normality test [Owner-draw].



**Fig. 6.** Two Sample t-test [Owner-draw].

## 6 Conclusion

The aim of this research was to investigate the effectiveness of meditation on reduction of stress among students between late teenage and young adults. In the study, 56 samples with a mean age of 19 years old were separated into experimental group and control group in order to make a contrast between the effects of meditation intervention on stress.

By contrasting the two groups, samples in the experimental group who had done the mediation show a greater decrease in SAS value. (57.1%), indicating their self-feelings of stress has decreased.

Unlike a study done by Paholpak, S. and colleagues in 2012, which fifty-eight medical students were separated into meditation group (30 students) and non-meditation group (28 students) [10]. The students were required to took part in short-term meditations which was 20 min before daily learning schedule. The stress levels measured by Symptom Checklist-90 (SCL-90), Wechsler Memory Scale-I (WMS-I), Raven's Advanced Progressive Matrices (APM), psychiatry course MCQ examination score which represents academic performances showed no significant differences between the two groups.



In a research conducted by Amit Mohan and colleagues in 2010, 32 adult male students took part in guided meditation before and after playing a stressful computer game which poses psychologic stress on them [11]. Measurements of stress included galvanic skin response (GSR), heart rate (HR), electromyography (EMG), sympathetic reactivity (QTc/QS2 ratio), cortisol, and acute psychologic stress scores. (Mohan, A., Sharma, R., & Bijlani, R. L., 2011). It was determined that meditation reduced the adverse effects of stress and improved memory. In the long term study by Singh, Y., Sharma, R., & Talwar, A. in 2012 which participants meditated daily for a month, it was measured that there was a decrease in stress levels and improvements in cognitive functions while no significant changes in heart rate and salivary cortisol [12]. Therefore, this study supports most of the results from the past studies and literature, showing that breath meditation can help to reduce people's stress levels since people who took breath meditation in the experiment showed a greater decrease in SAS value when they completed SAS survey again after the intervention. Participants who did not participate in the meditation did not show a significant decrease in their stress levels. Thus, breath meditation is a possible way for students to cope with stress.

Other beneficial effects of meditation have also been determined through studies such as improved memories, cognitive functions, emotion states, sleeping qualities which lead to better academic performances. A study was conducted on 60 undergraduate students separated equally into experimental group and control group which differs in meditation intervention in a public university in Thailand, 2022. Following the intervention, significant differences were observed in all four dependent variables, including an improvement in metacognitive, working memory abilities, reduction in stress levels and better academic performances for students in the experimental group [13]. A specific study was done by Rebeccah Fleischmann and Michael Posner on the effect of meditation on high school students' working memories (2020) measured by The Human Benchmark memory test and the Mindfulness Attention Awareness Scale before and after the intervention for daily meditation for a week. Memory test scores increased by 40.3% for the meditation group compared to 8.3% for the control group indicating significant improvements in the students' working memories [14]. Meditation has also been proved to improve social-emotional learnings. In a study by Valosek, L. and colleagues in 2019 among 101 six-grade middle school students which 51 students practiced transcendental meditation (TM) rated by Devereux Student Strengths Assessment (DESSA) and self-reporting. Significant improvements were found in the TM group compared to controls in social-emotional and a decrease in negative emotional symptoms was observed in high-risk TM students compared to controls [15]. Thus, it can be concluded that meditation not only reduces stress but also brings beneficial impacts on other physical or mental states.

In addition, since meditation has the ability to reduce stress, there's a possibility to achieve prevention and mitigation of mental disorders caused by stress. Roughly 35% of college students report depression as a significant concern. In the study conducted on 72 college students which 33 of them participated in a 10-min mindfulness meditation everyday for 14 days, the results showed that prescribed use of a gamified mindfulness meditation application significantly decreased depression symptom severity as measured by the PHQ-9 [16]. Another study on the effect of meditation on obsessive compulsive disorder (OCD) was conducted by Hanstede, Marijke MA\*, Gidron, Yori

PhD†; Nyklíček, Ivan PhD in 2008. The study demonstrates that a mindfulness intervention reduces OCD symptoms, possibly explained by increasing letting go capacity [17]. Moreover, in a study using meditation as a method to improve math problems solving among ADHD students, researchers found out that Samatha meditation may enhance cognitive processes in students with ADHD at a level to benefit them academically [18].

To conclude, from the contrast of experimental group and control group, the experimental group which participants took part in meditation shows a greater reduction in stress levels. Thus, it is possible to use mediation in daily life to reduce stress since it is safe, highly mobile, and effective especially in long-term persistence. Other physical and mental factors accompany with stress are also measured demonstrating that meditation has a positive impact on cognitive functions, emotion status, memory, sleeping qualities. For some psychological diseases caused by stress, meditation provides a new solution and opportunity but the effectiveness of this method needs to be strengthened in future research.

### **6.1 Limitation**

The sample size of this research is relatively small, not able to represent a larger group of students. The sample age is relatively small, with an average of 19 years old. The research should include more students from different age groups in order to determine if age can affect the results since people at different age experience different kinds and intensity of stress. Another limitation is that, since the participants were required to complete the scale again after a 12-min interval, the results for the second time were highly affected by the answers participants filled in the first time since the time interval was too short. Moreover, the things that the control group would do during the 12-min interval varies, if they do something very stressful, it might affect the results after the interval. In addition, the research only focused participants from China. In other countries and regions, special event, lifestyle, diet, sleep quality also play important role in affecting the level of stress. Thus, it is not comprehensive to conduct the study on Chinese only. Last but not least, measuring stress level only through surveys is too univocal and subjective. People might base on their current feelings, which are not accurate. Stress level should also be measured through different ways such as change in pupil size, change in heart rate, change in blood pressure and different types of measuring scale in order to make a comprehensive decision on whether stress level has decreased or increased.

### **6.2 Future Directions**

In the future, more research can be conducted on the finding of which frequency of mediation should students do in order to achieve the best effect of reducing stress. Another approach is how long should students do meditation each time in order to reduce stress. For students, they have limited time and they run out of patience easily when it takes a long time. Sound effect and music might also affect stress reduction. Some people indicates that listening to softened music can achieve mental relaxation better than rock music. However, this is still debatable so it is also one approach in the future. Other than meditation, other strategies might also be effective or more effective in reducing stress such as exercising, sleeping, surfing the Internet. In order to determine

the relationship between these strategies and stress level, researches can be conducted. Another approach is meditation on physical and mental factors, such as the change in human body after meditation. Heart rate, pupil size, blood pressure, body temperature are all factors that can be measured in the future. Mental factors such as improvements in memory, reduction in anxiety and depression. In addition, the effect of meditation in treating mental disorders is also a considerable and important approach. Overall, since meditation brings significant benefits and opportunity to treat mental illness, its uses and factors to increase the effectiveness should be further explored in the future.

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