

The Effectiveness of Mindfulness Training on Academic Achievement and Related Factors

Huanjie Xin^{1, a, †, *} Fan Zhang^{2, b, †}

¹ *University of Connecticut, Storrs, Connecticut, United States.*

² *Emporia State University, Emporia, Kansas, United States;*

**Corresponding author. Email: ^ahuanjie.xin@uconn.edu, ^bfzhang@g.emporia.edu*

†These authors contributed equally.

ABSTRACT

Mindfulness is about focusing on the present situation and accept all things coming to mind without judgement, and it works differently for different individuals. Mindfulness training has a lot of benefits including a positive influence on brain regions relate to emotion control, and it also helps to cope with stress, anxiety and other negative feelings so that people could focus on present events better. The effectiveness of mindfulness on academic achievement is not clear enough although there are studies about the effect on academic achievement from other approaches like digital learning and executive functions. Previous researches have already supported that mindfulness is effective to enhance immune systems and individual well-being. For the present study, how effective is mindfulness on the educational field would be discussed. The present study discusses the benefits of mindfulness training to students in different developmental stages with different developmental needs. Further, how mindfulness affects mediators to improve academic performance was also discussed. Limitations of studies are included, most studies did not systematically research mediators, instead, they have only one mediator discussed in each study. Most studies are cross-sectional instead of longitudinal, long-term changes across stages are needed. Moreover, the studies always use only one kind of mindfulness training, different effects from different kinds of mindfulness training need to be found.

Keywords: *Mindfulness, Academic achievement, children development, classroom climate, stress*

1. INTRODUCTION

The definition of mindfulness is focusing on the present situation without judgement and no emotional factor should go beyond thoughts, no unnecessary reaction should appear [1, 2]. Mindfulness training is not about getting rid of these processes or clearing the mind deliberately, but about coming to figure out the start of elaboration, stimulation, and avoidance progresses and the cease of natural and automatic reactions [3]. There is also the difference between individuals on mindfulness ability before training programs. This factor also needs to be considered in studies. People with better mindfulness ability before training would perform better on the pre-research test for measurements of executive function, working memory, etc. [4].

Previous studies have demonstrated the benefits of mindfulness in various ways. For example, in biology, Davidson et al. assessed participants' electrical activity of the brain after mindfulness training [5]. The result

showed that mindfulness programs can increase the probability of activating the left anterior part of the brain, thus increasing positive emotions and enhancing immunity. In the medical field, some psychotherapy (e.g., MBCT) is developed based on MBSR, a program that offers mindfulness training to assist people with stress, anxiety, depression and pain. MBSR can cultivate concentration, develop emotional control, and reduce anxiety to help trainers improve mental health. [6]. For individual development, a large number of studies evidences after 1990 showed that mindfulness training can effectively improve happiness and cognitive performance [7]. In the field of education we study, its effectiveness on students' academic performance is what we focus on.

There are two other approaches related to the effectiveness of academic achievements. The first is digital learning. Researchers from this study focus on how digital technology could help learners to learn effectively. Researchers working on this topic hold that leveraging

digital learning could reduce the gap between traditional learning and modern-way learning. Digital learning could help to solve the problem of inconvenient and unsatisfying environments, which means the limit of time and place would be solved. The data were collected widely from teachers to students, which means digital learning was used widely for this study, the result showed that digital technologies used in the study do help improve learning by enhancing students' ability of problem-solving [6]. The second comes to the effect of working memory and executive function to academic achievement in school. Researchers focus on how would process-based cognitive training in the domain of working memories and executive functions improve school achievement [7]. Studies support the point that training of working memory and executive function enhance the study, especially for the domain of language and reading.

Previous studies have shown that digital learning and executive function have a positive impact on academic achievement. However, some other approaches can also improve academic performance, such as mindfulness. The importance of mindfulness in various fields, including biology, medicine, and individual development, is undeniable. Although mindfulness has become popular recently, the study of its effectiveness on academic achievement is limited. This review aims to evaluate the importance of mindfulness in education to have a better understanding of how to use mindfulness to improve students' academic performance. Mindfulness impacts students of different developmental stages in that different features of mindfulness for students of each age and mediators influence the effect of mindfulness, such as classroom behavior and stress.

2. THE EFFECTIVENESS OF MINDFULNESS INTERVENTION ACROSS DEVELOPMENTAL STAGES

The Preschool stage is one of the most indispensable stages to learn when we measure the effectiveness of mindfulness on academic achievement. Preschoolers have been characterized as lacking the classification abilities, communication skills, number concept, memorial skills, and a framework for reasoning about causal relationships between events that older children are granted [8]. John Locke believed that children are born as a "tabula rasa". The Preschool stage is the stage that as a blank sheet the most, children in this stage are flexible, good learning habits and training would be crucial for them. So the mindfulness effect on preschoolers would be important to find out. The preschool we discuss here would be the period when children do not attend primary schools. The research done by Karen and colleagues investigated the effectiveness of mindfulness training on executive function and language skills for preschoolers [4]. In their

study, there are two groups of students (age=4.55) which is the control group and the group which participates in mindfulness training. MindUP training was used as the intervention for preschoolers, consisting of 15 lessons and core mindfulness practice. The lessons were to build students' self-regulation and self-awareness skills. During the core mindfulness practice, preschoolers were led by their teachers doing two tasks: deep breathing and focusing on a resonant sound. The experiment lasted for 3 years. Teachers from prekindergarten and parents completed the assessment of language skills through the Peabody Picture Vocabulary Test (PPVT). Further, by the end of the kindergarten year, children were administered doing Istation's Indicators of Progress (ISIP), which is an early reading assessment. The working memory of MindUP group was improved well and better than the control group. MindUP group develop better English vocabulary than the control group. Taking mindfulness training into the preschool education system might be a doable and effective suggestion.

If students can learn to be "fully-present," they can increase the quality of their learning performance by being more focused [9]. For elementary school students, as their learning habits are forming, it is indispensable for them to learn how to focus on classes. Their academic performance at that time is crucial for their future. In this way, whether mindfulness training could help to cope with the problems primary school students have is important. Laura and colleagues did research on the effect of mindfulness on academic achievement for public elementary school students in the United States [10]. The mindfulness training is Mindfulness-Based Stress Reduction (MBSR) which contains 35 ten-minutes MP3 tracks, the study lasts for 8 weeks, the materials are pre-recorded and play for 10 minutes a day. The main focus of the material is to practice students' focused-awareness and open-awareness. At the beginning of the study, teachers provided the grades for the third quarter, which just ended. Afterward, the fourth quarter grades were provided as the result of the study. The grades include tests, quizzes, projects, homework and class participation. The study shows that the audio-guided automated mindfulness program has a positive effect on students' academic achievement in reading and science, as well as the classroom behaviors. As mindfulness helps to form high efficient learning habits for elementary school students, schools should consider providing mindfulness training programs to students.

The adolescent is a complex period of time during the development of human. It is a distinct maturational period that involves the structural and functional change of the brain and the change of social context, social roles and social responsibility. The emotional states are not stable in adolescent stages, it may affect academic achievement [11]. Whether mindfulness would be effective for academic performance for high school students was studied by Clemente and colleagues [12]. The program

was given 1 hour and 30 minutes per week, overall, in 10 weeks, students practice daily for 30 minutes. The program includes repeating words with a free and open mentality, directing attention towards how air flows in and out while breathing without manipulating how to breathe deliberately. The research assesses students' academic achievement and self-concept ability. Self-concept is our perception of "what we are like" from past events and experiences, it could also from how we think we are like in other people's views. As a result, the improvement made by the experimental group was significant, much better than the control group and the improvement includes all three subjects (philosophy, Spanish language and foreign language). The self-concept is also changed positively due to the program [13]. Therefore, mindfulness is a helpful way for adolescents to control their unstable emotions and improve academic performance. More adolescents should engage in learning how to do mindfulness training.

College students need to adapt to new learning environments, in terms of the increased complexity of the material to be learned and more time and efforts required to do so; and the need to constantly self-regulate and to develop better-thinking skills, including learning to use specific learning techniques [14]. First-year college students may experience a sense of displacement for their abrupt shift from a familiar environment to a new one. The subsequent psychological symptom which would emerge from this experience is called homesickness. There is a significant relationship found between homesickness and cognitive failures, poor concentration, decreased work quality, lower academic performance, and higher score on anxiety and depression measures [15]. In this case, a study of whether mindfulness training is effective for academic performance for college students was done by Eyal and Malka [16]. First of all, according to the study, the intervention in this study is the mindfulness workshop: students who participate in the workshop have five 30-minutes weekly sessions. During the session, students participate in some mindfulness training (breathing meditation, body scan, imaginary mindful walk in a forest, imaginary mindful chocolate-eating, and concentrating on auditory and tactile stimuli). Students also practice at home according to the instructions from emails every time after practice. Two workshops have been conducted consecutively. The mean grades from the first semester have been collected after students participate in the workshops for one month, and the mean grades at the end of the academic year have been collected as result within eight months after the workshop ended. The results support that loneliness has negatively associated with memory performance. Participants with high loneliness level have performed better academically after mindfulness training. For college students with negative psychological states caused by feelings like loneliness, mindfulness would be

helpful. There should be more advertisements about the benefits of mindfulness training in campuses.

3. MEDIATORS BETWEEN MINDFULNESS TRAINING AND ACADEMIC ACHIEVEMENT

Classroom Climate refers to the relatively stable psychological state of perception, attention and emotion shown by the interaction between teachers and students in the classroom. Mindfulness training may affect academic achievement through the mediator of classroom climate. In a positive classroom climate, including class activities and group discussions, most of the students are in a positive state of mind. They can help each other, and their interest in learning is high so that they can achieve efficient learning. Students can quickly grasp the knowledge they have learned with high efficiency, which is reflected in high academic performance. In the negative classroom climate, students' mental state is generally in a negative state: upset and irritable. And they may even develop resistance to the class, resulting in low learning efficiency. Therefore, students are not able to make full use of the class to consolidate their knowledge, leading to low academic performance. López-González et al. have employed a mindfulness project to intervene and measure the classroom climate [17]. The result of the study shows that mindfulness has a significant impact on the class climate. Mindfulness practice can improve students' focusing and class enthusiasm. Students with high focusing and high enthusiasm may be willing to participate in classroom activities and actively interact with classmates and teachers, which will improve the quality of students' class learning and the effectiveness of teachers' class teaching, thus conducive to creating a positive class climate. All in all, the class climate might act as a mediator, which positively affects mindfulness and thus positively affects academic performance.

Aggressive behavior is the behavior aimed at harming the body or mind of another life, including hostile, hurtful or destructive behavior towards others. Impulsivity is a kind of dangerous behavior in adolescence, which is related to hostile aggression and antisocial behavior. Classroom behavior refers to how students respond to what is happening around them. Mindfulness may help to improve student's behavior, which will further affect the academic performance. Students with aggressive behavior and impulsivity may lack empathy and self-control, which means that they cannot actively interact with classmates or teachers, resulting in a negative class climate that is not conducive to their learning. Similarly, classroom behavior problems, such as inattention, excessive anxiety and some aggressive behaviors, may also damage the teacher-student relationship and disrupt the class climate, affecting students' learning efficiency. Low learning efficiency will lead to low academic performance. In Franco et al.'s study, compared to the

control group without mindfulness intervention, the level of aggressive behavior and impulsivity in the experimental group with mindfulness intervention is significantly lower [18]. Also, in comparison with pre-intervention that without mindfulness training in Black et al.'s study, the number of classrooms behavior problems at immediate post-intervention with mindfulness training is significantly decreased [1]. Mindfulness practice help students to divert attention from negative emotions, enhance positive emotional experience, and reduce the probability of students participating in aggressive behavior, impulsivity as well as classroom behavior problems. Therefore, mindfulness might improve academic performance by reducing negative behaviors, including aggressive behaviors, impulsivity and classroom behavior problems.

Executive function is a mental process, including cognitive flexibility, working memory, inhibitory control, which helps us to deal with a variety of tasks. The executive function may be influenced by mindfulness, which in turn affects academic achievement. Cognitive flexibility, an ability to adapt to different rules, can help students to make appropriate responses to the changing rules in class. Students who show advantages in cognitive flexibility may increase their chances of academic success. For example, in writing, grammar has different rules, which requires students to deal with them through cognitive flexibility. Similarly, there are also different algorithms (e.g., elementary arithmetic) in mathematics and cognitive flexibility is better to help students adapt and use them to solve math problems. As children grow older, the rules they learn become more and more complex, thus cognitive flexibility helps students achieve long-term success in learning. Zelazo et al. have intervened in mindfulness training for children aged 47–63 months and measured cognitive flexibility [19]. For instance, children who perseverate on Head-toes-knees-shoulders (HTKS) have been taught to play a game that requires them to do the opposite of what they had heard. The result showed that executive function (cognitive flexibility) has been improved in groups with mindfulness training intervention. Children need to be conscious of their cognition and behavior when dealing with a new rule. If children regard the new rules as old, it may lead to the failure of cognitive flexibility. In the process of problem-solving, mindfulness training can improve the efficiency of neural circuits and enhance these skills. Therefore, mindfulness probably further raises academic performance by improving executive function.

Stress is the result of feeling overwhelmed due to problems in life. Stress may be a mediator of mindfulness affecting academic performance. Too much stress on students makes it difficult for them to concentrate, which may affect their classroom performance and limit their ability to think critically, and thus may reduce learning efficiency. Besides, students with great stress may isolate

themselves from others, which leads to poor interpersonal relationships and mental health. It also leads to the decline of their learning efficiency, such as poor academic performance. Moreover, reducing stress may improve memory, so students can recall the details required to answer questions during the exam period and their academic performance will be improved. In the study of An et al., the stress is measured by two questions from the Stress Scale and mindfulness is measured by MAAS questionnaire. The results have shown that participants with a higher mindfulness level have a weakened relationship with stress [20]. The stress may come from random thoughts about the past and worries about future things or taking subjective speculations as objective facts. Mindfulness training is beneficial for jumping out of these thoughts and having the ability to reflect so as to reduce stress. Also, mindfulness training may help students adjust their stress so that they can calm down and stay focused. Besides, students after mindfulness training may accept some negative thoughts and feelings without judgment, which may reduce the impact of stress and negative emotions. All in all, classroom climate, aggressive behavior, executive function and stress may be the mediators of mindfulness influencing academic performance. Among them, mindfulness might improve the classroom climate and executive function, and reduce aggressive behavior and stress. As a result, it improves the academic performance.

4. LIMITATION AND FUTURE DIRECTION

Although more and more studies on mindfulness have been carried out, the research on the impact of mindfulness on academic achievement is limited. To start with, most studies only focus on one mediator in which mindfulness affects academic performance. For example, the study of Franco et al. have shown that aggressive behavior is a mediator [2], and Zelazo et al.'s study indicates that executive behavior is a mediator [19]. The interrelationship between these mediators has not been known. Besides, most studies are limited to one developmental stage. To be specific, the study of Thierry et al. has assessed the impact of mindfulness on preschool students [9], while the study of Dahl et al. has assessed the impact of adolescence [12], which means that these studies are deficient in exploring long-term changes in different stages. Finally, most studies fail to pay attention to the children's personality characteristics, so it is unknown that which type of mindfulness is most effective for children of which personality.

Although current studies have limitations, they also provide a direction for future study. At first, future studies can focus on systematic research about interactions among mediators so that we may have a better understanding of which mediator is the most effective to mediate mindfulness. Then, future studies can focus on

the effect of mindfulness at different stages of development to understand the dynamic influence of mindfulness through the stages. Lastly, future research can focus more on exploring the impact of mindfulness training on children with different personalities to maximize and specify the effectiveness of mindfulness.

5. CONCLUSION

Mindfulness is a helpful tool for students from preschool to college. In the current research, mindfulness is effective for preschool students in that their working memory and vocabulary accumulation are both improved. For students in elementary schools, their overall abilities including tests and class participation are all promoted by mindfulness training. Mindfulness is also useful for improving adolescents' academic achievement and self-concept. College students who have strong feelings of loneliness could also use mindfulness to help themselves to achieve better academic performance.

Mindfulness training also affects mediators which promote academic performances. It improves the classroom climate, reduces aggressive behaviors and enhances students' executive functions which are crucial for academic performance in school. Further, stress, one of the most serious problems for all students, is also reduced by mindfulness training.

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