



## Research Article

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# Effects of Mindfulness Training Program on the Impulsivity Among Students with Learning Disabilities

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## Abstract

*In recent years, many studies showed positive effects of implementing mindfulness practices according to some cognitive and psychical well-being measurements among many participants; especially, adolescents and adults. Few studies appeared on the effectiveness of mindfulness practices for students with learning disabilities. Therefore, this study aimed to assess the effectiveness of mindfulness training programs on the impulsivity levels for participants with learning disabilities in inclusive elementary schools in Saudi Arabia. Thirty participating children with learning disabilities were divided randomly into two equivalent groups (experimental and control groups). Pre-and post-assessment using the Barratt Impulsivity Scale (BIS-11, Patton et al., 1995) were completed before and after the end of mindfulness sessions scheduled for ten weeks. Results indicated that the experimental group of children with learning disabilities significantly reduced their impulsivity in all impulsivity scale domains on the BIS-11. The authors discussed the impact of mindfulness intervention in reducing the impulsive behavior of students with learning disabilities. Finally, implications and recommendations were also noted in this study.*

**Keywords:** mindfulness, impulsivity, students with learning disabilities

## 1. Introduction

Learning disability is one of the most common pervasive disability, affecting 5% of public school students (Cortiella & Horowitz, 2014). Although the debate continues around the definition and processes for diagnosing learning disabilities, this disability reflects a deficit in one or more related cognitive processes such as attention, memory, cognition, reasoning, and oral language (Association, 2013). Learning disabilities appear in essential academic areas and language skills such as reading, writing, arithmetic, and oral expression. Also, learning disabilities may involve a deficit in social skills, social interaction, social perception, and understanding other perspectives (Stegemann, 2016).

In comparison with children without disabilities, children with learning disabilities are likely to

encounter many internal problems (anxiety and depression), external problems such as delinquency, aggression, impulsivity, and a feeling of loneliness associated with peers (Al-Yagon, 2012). Also, they face many challenges in mental health in adulthood (Milligan et al., 2019). This fact was also confirmed by many studies that children with learning disabilities exhibit an inability to perceive information, have emotional, behavioral, and cognitive deficits, exhibit problems in executive functions and memory, and have insufficient attention, which makes them face many difficulties during the implementation of the tasks and school assignments (Enoch, 2015; Haydicky et al., 2012; Montague, 2008).

Therefore, the impact of learning disability is essential, widespread and has negative repercussions in the long term, especially in the learning process and academic performance, and therefore educators and specialists should intervene to face these problems before they are exacerbated, and ensure healthy well-being is provided to those children (Johnson & Viljoen, 2017; Wilson et al., 2009).

## 2. Literature Review

Impulsive behaviors are known as a broad concept which has different meanings, such as acting before thinking, poor planning, and giving into cravings (Kirby & Finch, 2010), an inability to delay gratification, and poor motivation control (Sariyska et al., 2017), poor judgment and consequences, and low levels of patience (Salaria & Singh, 2015). Also, children with impulsive behavior make decisions and choose solutions quickly without thinking about the consequences (Al-Dababneh & Al-Zboon, 2018). Many researchers have linked this impulsivity to risk, poor planning, and quick decision-making (Barahmand et al., 2015).

Impulsivity may also be known as a natural personality (Salaria & Singh, 2015). However, high levels of impulsivity relate to many behavioral difficulties in childhood such as aggression, peer relationship problems, and disruptive behavior (Barahmand et al., 2015), attention deficit issues, flawed thinking, risky actions, and addiction (Crews & Boettiger, 2009; De Wit, 2009), and making decisions without considering the consequences, and weakness in problem-solving (Al-Dababneh & Al-Zboon, 2018; Nkrumah et al., 2015).

Impulsivity also harms school and academic work, as impulsivity has been associated with many reading mistakes (Sariyska et al., 2017). Moreover, recent theoretical studies have indicated that children with impulsive behavior have a reading and math deficit and weakness in attention and awareness compared to children without impulsivity (reflective children) (Rezaei et al., 2013; Umaru, 2013). Additionally, children with impulsive behavior are more likely to provide incorrect solutions during tests due to only looking at the first solution (Barahmand et al., 2015). Furthermore, they also fail to perform well in school tasks due to their inability to recognize the correctness of responses before choosing the appropriate option (Sariyska et al., 2017); for example, impulsive children like selecting the first response that comes to their mind without considering the accuracy of responses (Nkrumah et al., 2015). Thus, it is essential to explain children's low academic achievement may not be due to a lack of intellectual capabilities (Hall & Theron, 2016). Impulsivity may be one reason for low achievement, both in children with and without disabilities, which leads them to guess rather than thinking (Lee & Oak, 2012). The teachers also emphasized this as they pointed out that children who are impulsive usually when they show impulsive behavior face trouble in thinking before understanding attitudes, and their assignments are incomplete with many errors (Nkrumah et al., 2015).

In regards to the relationship of impulsivity to learning difficulties, there are some children with specific learning difficulties (SLD) who may have some traits such as lack of attention, hyperactivity, and impulsivity (Association, 2016). Many studies reported that children with SLD have high impulsivity levels, especially in severe cases (Barahmand et al., 2015; Donfrancesco et al., 2005; Sariyska et al., 2017). According to previous studies, Purvis and Tannock (2000) found that children with learning difficulties have levels of high impulsivity, especially among students who exhibit some types of dyslexia. Their research also showed that children with ADHD and reading disabilities are too

impulsive compared to children with ADHD without reading disabilities which indicates the impact of impulsivity and its association with dyslexia. Weed et al. (2011) also found that children with dyslexia tended to be faster in their responses and showed the highest level of cognitive impulsivity than other groups of children. The results of the study also indicated that children with learning difficulties have high levels of impulsivity and lack of premeditation, and lack of excitement and urgency or lack of perseverance. Also, other studies were completed related to impulsive behavior among SLD children, and indicated they have impairment in motor control, violation of social time rules, distraction inhibition (Al-Dababneh & Al-Zboon, 2018; Donfrancesco et al., 2005), and poor organization (Weed et al., 2011).

Mindfulness is a psychological concept associated with positive psychology (Enoch, 2015). Krishnakumar and Robinson (2015, p. 579) defined mindfulness as "intentionally focusing attention at the present moment, awareness and acceptance of experiences gradually, without making judgments, evaluation or actions on experiences, emotions or thoughts with an open mind and motivated reviews." There are two primary dimensions in mindfulness, including awareness of the present moment and unevaluated opinions (Enoch, 2015). Thus, through this method's continuous practice, trainees learn to control their attention so their focus is only on the present moment (e.g., breathing) (Tarrasch, 2018). Furthermore, they focused on the task they are doing without allowing their minds to be distracted, providing students with a new perspective that facilitates thinking and learning (Haydicky et al., 2012).

Mindfulness interventions are one of the current beneficial methods, which have begun to appear over the last thirty years ago, as there has been an increased interest in the use of mindfulness in clinical practices (Franco et al., 2016). Also, many techniques have emerged that were incorporated into treatment programs adapted from Buddhism and other eastern meditative practices, which are believed to produce significant results in the success of the treatment programs (Schonert-Reichl & Lawlor, 2010). For example, Samarghandi et al. (2019) conducted a study focusing on investigating mindfulness's predictive role in externalizing disorders among 250 high school students. The externalizing disorders of this study included aggression, inattention, lawlessness and impulsivity, and other disorders. Several statistical analyses were used to generate the results, which indicated a significant negative relationship between mindfulness and externalizing disorders and that mindfulness could have valid prediction for symptoms of externalizing disorders. Finally, they suggested that mindfulness training can be used with, and have significant advantages for, attention and impulsivity problems of students who are adolescents.

Additional benefits of mindfulness with high school students were noticed in a study conducted by Franco et al. (2016) that implemented a psycho-educative training program based on mindfulness to reduce the level of impulsive and aggressive behaviors for a sample of students in high schools. The results were statistically significant in terms of analysis in the cognitive and total impulsivity dimensions, but medium in other dimensions of impulsivity and aggression. It was noticed that mindfulness training allowed students to recognize the first signs of impulsive behaviors by using practices and skills developed through mindfulness meditation.

Many studies support mindfulness to achieve greater relaxation, well-being, and academic improvement (Amutio et al., 2015; Choi et al., 2012). Recent findings of neurodevelopment also showed that mindfulness and emotional, social, and learning programs are implemented in schools. They have contributed to improving the executive functions of children and adolescents in terms of inhibitory control and enabled them to manage excessive levels of negative emotions interfering with academic performance (Franco et al., 2016; Sanger & Dorjee, 2015).

Adolescent students generally exhibit undesired behaviors that can hinder their academic progress and may have adverse effects on other students' learning in the classrooms. The most challenging behaviors impacting students' academic and social skills are aggression and impulsivity (Samarghandi et al., 2019). There are many effects of mindfulness in minimizing aggression and impulsivity for adolescents (Franco et al., 2016; Zare et al., 2016). Mindfulness meditation was beneficial in reducing impulsivity or acting without thinking for adolescents. Moreover, mindfulness reduced

impulsivity through supporting patients to determine the effectiveness of symptoms when making decisions impulsively (Zare et al., 2016). Mindfulness is a skill that helps students keep their attention focused on the present moment; therefore, their attention will no longer be concentrated on past or future experiences (Franco et al., 2016).

Several studies with both clinical and non-clinical samples have also demonstrated mindfulness-based training programs having many beneficial self-control and emotion management outcomes, including anger management (Fix & Fix, 2013). Some studies have also evaluated the effectiveness of mindfulness-based training programs and found that they can reduce impulsivity and aggression levels of children in school (i Farrés et al., 2019; Lattimore et al., 2011; Oberle et al., 2012). Other studies have also indicated a positive association of mindfulness with self-regulation (Leyland et al., 2019; Montague, 2008) and self-efficacy (Logan & Laursen, 2019), emotional organization (Hülsheger et al., 2013; Roemer et al., 2015), sympathy (McConville et al., 2017), improving attention level and self-control (Enoch, 2015), reducing stress (Lindsay et al., 2018), controlling anger (Gouda et al., 2016), improving quality of life and reducing mental health problems such as anxiety and depression (Amutio et al., 2015; Thornton et al., 2017).

Although mindfulness practices may seem to be suitable for adolescents or adults only, many studies indicated that young children have benefited from mindfulness training, as it was found that young children have the cognitive ability and awareness to engage in mindfulness activities (Enoch, 2015; Kaunhoven & Dorjee, 2017; Montague, 2008; Thompson & Gauntlett-Gilbert, 2008). Mindfulness has benefited many students with impulsive behaviors in elementary schools. For instance, Tarrasch (2018) conducted a qualitative study to investigate the effects of mindfulness practices on the attention of students in selected primary schools. Mindfulness training enabled primary school students to react with more self-control and less impulsivity; in fact, mindfulness mediation improved selective attention and impulsivity of primary school students and may have had critical outcomes for their well-being.

Indeed, impulsivity and mindfulness are naturally reciprocal (Murphy & MacKillop, 2012). Logically, when a person exhibits impulsivity, they are more likely to behave or act without paying attention to the future consequences that may negatively impact others. But thinking mindfully about the outcomes of such behaviors may reduce the possibility of impulse behaviors in many circumstances. Although impulsivity and mindfulness have a typical present-centered concentration, their presence is described differently (Lattimore et al., 2011; Peters et al., 2011; Stratton, 2009). Mindfulness seems to emphasize the notice of action and experiences without reactive behaviors, whereas impulsivity is only focusing on "now" without paying attention to the future or the positive or negative consequences of actions (i Farrés et al., 2019; Zare et al., 2016).

Mindfulness-based interventions have been associated with many beneficial outcomes for students with learning disabilities. There are many results of studies indicating the effectiveness of mindfulness training for children with learning disabilities, such as (Beauchemin et al., 2008) study which indicated that through training 35 children with learning disabilities on mindfulness for five weeks, there was a decrease in the level of anxiety, and an improvement in social skills. A study conducted by Haydicky et al. (2012) indicated that the level of anxiety in children with learning disabilities decreased, and the level of attention improved. The results of a study completed by Thornton et al. (2017) also showed the effectiveness of mindfulness training in children with learning disabilities in reducing anxiety and aggression, self-control, and school fear.

Mindfulness training has been used to decrease the impulsivity of students aged adolescents and youth frequently in special education. Magaldi and Park-Taylor (2016) carried out a study aimed at exploring the advantages of mindfulness practices in special education classrooms. In terms of impulsivity, the authors found that being mindful in situations helped students with special needs realize the reality of situations accurately and respond positively, reducing impulsive behaviors. Additionally, mindfulness provided students with the ability to develop their volitional control instead of adhering rigidly and increasing their self-control abilities and decreasing impulsive behaviors.

The literature indicated that some studies were conducted to investigate the effectiveness of mindfulness training in decreasing impulsive behaviors for elementary, middle, and high school

students. However, none of the studies examined the impact of mindfulness practices in reducing impulsivity levels specifically of students with learning disabilities in elementary schools. The present study attempted to fill this gap by implementing mindfulness intervention with elementary school students with learning disabilities exhibiting impulsive behaviors. Given the importance of mindfulness practices in reducing undesirable behaviors for students with disabilities, the current study aimed to reveal the impact of a training program based on mindfulness implemented on elementary students with learning disabilities who exhibit high impulsivity levels. Thus, the hypotheses were that students with learning disabilities exhibiting impulsive behaviors and participating in a training program based on mindfulness would exhibit a significant reduction of their impulsive behaviors compared to other students with impulsive behaviors who had not been exposed to mindfulness intervention.

### 3. Methodology

#### 3.1 Research Goal

The current study aimed to investigate whether mindfulness training reduces impulsivity for students with learning disabilities through the use of experimental design with two groups.

#### 3.2 Sample and Data Collection

The current study has (n=30) students with learning disabilities attending inclusive schools in the Najran region for the first academic term 2019/2020. The participants were divided into two groups, with 15 students in each group. This study was approved by the department of scientific research ethics at Najran University. In the first meeting, all participating children were notified of the study's goals. They were provided a written agreement to have signed by their parents or guardians to approve their participation. None of the study participants refused or discontinued participation during the training program. Also, the parents were provided with detailed information about the study. All students in the two groups were administered the pre-assessment instrument, Barratt Impulsiveness Scale (BIS-11). The experimental group was exposed to the mindfulness intervention; however, the control group received no intervention. Once the mindfulness training was finalized for the experimental group, students in both experimental and control groups took the post-assessment to measure their impulsive behaviors. To ensure the homogeneity and parity between the two groups in terms of impulsivity, one-way ANOVA was used to compare the participants' scores in both groups based on Barratt Impulsiveness Scale (BIS-11) (see table 1).

**Table 1.** ANOVA for the differences between groups' mean scores in the pre-application of Barratt Impulsiveness Scale

Barratt Impulsiveness subscale		Sum of Squares	Mean Square	F. ratio	Sig.
Attentional Impulsiveness	Between Groups	0.20	0.20	0.150	0.703
	Within Groups	24.0	1.33		
	Total	24.2			
Motor Impulsiveness	Between Groups	0.05	0.05	0.037	0.85
	Within Groups	24.5	1.36		
	Total	24.5			
Non-Planning Impulsiveness	Between Groups	0.45	0.45	0.196	0.663
	Within Groups	41.30	2.29		
	Total	41.75			
Total	Between Groups	1.25	1.25	1.14	0.711
	Within Groups	159.30	8.85		
	Total	160.55			

### 3.3 Mindfulness Workshop

The experimental group participated in a weekly workshop held at 10 am through three sessions for ten-weeks. The control group of children did not receive the mindfulness intervention. The mindfulness program was provided to the children during the first of the study year by planning providers who were competent in applying mindfulness practices. Every session took 60 minutes, and the classroom environment was convenient in terms of quietness in resource rooms. Every skill was trained individually during the experiment to ensure no interference, among other different skills. Every session was followed by the same assignments, including revising homework, presenting and practicing a new skill, and providing new homework. The mindfulness training involved various skills for the experimental group, including detailed instructions for each skill, training exercises, and role-play to provide feedback and supervision. Children participated based on protocols involving three specific exercises aiming to raise children's awareness of physical processes, feelings, and thoughts in every session.

This training program's adaption was based on multiple principles aiming to transfer the practices to exercises, especially during the first session. The training sessions were short, spending between five to ten minutes. Next, children were allowed to discuss their challenges, feelings, and discoveries. The length of training was increased from session to session during the academic term. At the end of every training session, students were gathered to share and discuss their experiences and difficulties and receive feedback about their participation. The mindfulness training was initiated based on the principles of mindfulness and Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2003)

The principles of mindfulness are essential and have six crucial elements. (1) Non-judging, which means refusing to issue pre-judgment toward a statue or experience, whether it is good or bad, as it can be unbeneficial and controlling our minds. (2) Patience means understanding and accepting every moment in current life to control our minds. Also, some issues can be unclear, and thus students need to be patient. (3) Beginner's Mind means dealing with recent experiences for the first time, not with previous attitudes and thoughts. (4) Trust means trusting current moments instead of focusing on the results. This trust will increase the mindful attention on the experiences and current position, and then the trainer will grant trust within the experiences and feelings of participants. (5) Acceptance means an individual increases self-acceptance and accepting situations. (6) Letting go means reinforcing the leaving concept of previous thoughts, feelings, and experiences and let them go away.

Most of the training sessions were physical and joyful. When children had problems in concentration, short games were engaged before continuing in the protocol. This protocol was flexible to allow changes based on mood and level of concentration in each session. Practitioners encouraged trainees to practice for an extended time, and they record the formal practice with reinforcement in each group session. After each exercise, children shared their experiences and feelings. Children were also encouraged to practice the training sessions in their homes. Every workshop was initiated with a short conversation about the previous session and their training practices at home. Discussions of exercises were planned to offer various topics to develop the differed traits [see table 2].

**Table 2.** Exercises used and their description

Exercises	Description
Training for mindful breathing	Popping bubbles, smelling the flowers, breathing through the stomach, and counting during the process of breathing "inhale and exhale" ten times. The participant should be careful not to be distracted during the count because that makes him start again
Meditation training to achieve relaxation.	Reading an appropriate text for the child while lying down on his back with extended arms and legs, closed eyes, and systematic breathing. The meditation bubble means each idea enters the bubble, raises, and disappears when popping the bubble—practicing yoga.
Training activities for mindful listening	Focusing and paying attention to surrounding sounds, mentioning these sounds, and returning to focus and listening to new sounds again. Asking participants to imagine animals and imitate their sounds during practicing different experiences (such as a snake's sound in a snake position). Also, asking them to run faster for one minute, then stop, freeze, breathe and heart, and then do a mindful walk.

Exercises	Description
Activities developing rational and mindful movement.	During walking without wearing shoes, meditation and students listen to a text said by the trainer. These activities also include a slow, mindful walk with raising each leg and moving them from the ground with breathing concentration.
Activities developing mindful attention of feelings associated with touch	Placing students' hands at his back and asking his peers to put things and the student guesses the name of this thing through touches such as cars, animals, and fruits.
Activities for mindful taste	For example, participants taste various foods (sweet, salty, and sour)
Activities for calming the mind to be clear and more focused	Activity (mind in a glass)
Training for imagination	Imagination a comfortable and secure place with the care of in-depth details.

**Table 3.** Session by session content

Weeks	Session content
1	Introducing and chatting, mindfulness as to reduce impulsivity. How do we train?
2	Calm mind, dealing with ideas (yoga)
3	How to deal with pressures. (for example, negative feelings, physical pain)
4	Mindfulness for our reaction in stressful situations
5	Improving the ability to select reactions in stressful situations
6	Improving the ability for concentration
7	Developing the growth of ability on concentration
8	Developing our senses
9	Practicing mindfulness in our daily life during various situations
10	Abstract, revision, grow motivation to continue practicing

### 3.4 Measurements

Barratt's Impulsiveness Scale (BIS-11, (Patton et al., 1995) was used to measure students' impulsivity with learning disabilities before and after implementing the mindfulness training. This measurement is a self-reported questionnaire consisting of 30 questions; each question represents multiple choices, including "never/rarely, sometimes and always." Statement responses are arranged from one to four, and the range of responses lead to total points with three points gained from analysis of factors. First, attentional impulsiveness includes eight statements and represents the speed of making decisions; for example, "I feel anxious during class times." Second, motor impulsiveness includes 11 statements and focuses on actions based on motivations without thinking of outcomes; for example, "I do things without thinking." Third, non-planning impulsiveness includes 11 statements representing non-planning works for the future, such as "I am interested in the present more than the future" (Patton et al., 1995) High points from the scale indicate high levels of impulsivity. The BIS-11 scale has a good internal reliability (Cronbach's  $\alpha = 0.83$  and Spearman's  $\rho = 0.83$ ) (Stanford et al., 2009). In the current study the scale through was translated using back-translation. The scale was provided to a bilingual translator who translated the scale from English to Arabic, and then the Arabic version was provided to another bilingual translator to translate back to English. Both English and Arabic versions of the translation were compared for meaning equivalence.

### 3.5 Analyzing of Data

Participants in both the experimental and control groups responded on the Barratt Impulsiveness Scale before and after exposure to mindfulness training. Pre-assessment was applied to students with learning disabilities to measure their impulsive behaviors before the training program's first session. However, those students also completed this assessment during the following week of the final session.

To assess the differences between the two groups, ANOVA was used to compare participating students' homogeneity with learning disabilities. Also, the *t*-test for independent samples and averages of participant scores were employed to compare students' tasks in both groups at  $P < 0.05$ .

#### 4. Results

##### 4.1 Pre-assessment for impulsivity of participating students with learning disabilities

The current study results showed differences in participants' scores in both experimental and control groups in the pre-assessment of the Barratt Impulsiveness Scale. More specifically, the results revealed differences among averages of participants' scores in both groups related to impulsivity level, insignificant ( $\alpha = 0.05$ ). This result would infer that both groups' participants were homogeneous and have an equivalent impulsivity level before exposure to the mindfulness training [see table 1].

##### 4.2 Post-assessment for mindfulness level for participating students with learning disabilities

To investigate whether there were significant differences in participating students' impulsivity level after implementing the mindfulness training on the experimental groups, *T*-Test for two independent samples was completed [see table 4]. The table shows the differences between the modified gain ratio for participants on the Barratt Impulsiveness Subscale for Total Non-Planning Impulsiveness, Motor Impulsiveness, and Attentional Impulsiveness was  $T = 7.20, 7.81, 11.31, 18.53$ , respectively. The experimental group's mean score on the Barratt Impulsiveness Subscale was  $M = 17.03, 22.62, 26.14, 65.76$  respectively; however, the mean score of the controlled group was  $M = 19.81, 26.93, 31.37, 77.92$ , respectively. In other words, there was a significant difference between the two groups on the impulsivity level. This result would indicate that the modified gain ratio for students with learning disabilities in the experimental group trained through mindfulness was higher than other students who were not exposed to mindfulness training. Therefore, it is evident that mindfulness training was significantly practical for reducing impulsive behaviors for students with learning disabilities. Also, the use of Eta Squared ( $\eta^2$ ) assured the results by revealing the level of reduction for impulsive behaviors of the experimental group of students with learning disabilities. Eta Squared ( $\eta^2$ ) was computed for both groups for impulsivity level on the Barratt Impulsiveness subscale, which was  $0.742, 0.772, 0.877, 0.950$ , respectively. Therefore, it is appropriate to use mindfulness training for impulsive students with learning disabilities as it has a strong impact on reducing attentional, motor, and non-planning impulsiveness for the experimental group.

**Table 4.** The significance of differences between mean scores of students' grades in both groups regarding the Barratt impulsiveness subscale

Barratt Impulsiveness subscale	Groups	M	SD	Mean Difference	T ratio	Sig.
Attentional Impulsiveness	Experimental group	17.03	0.94	2.81	7.20	0.00
	Control group	19.81	0.78			
Motor Impulsiveness	Experimental group	22.62	1.17	4.22	7.81	0.00
	Control group	26.93	1.22			
Non-Planning Impulsiveness	Experimental group	26.14	0.65	5.21	11.31	0.00
	Control group	31.37	1.33			
Total	Experimental group	65.76	1.41	12.23	18.53	0.00
	Control group	77.92	1.52			

#### 5. Discussion

The current study results indicated that mindfulness training sessions for students with learning disabilities were effective in reducing impulsivity level as measured by the BIS-11. Specifically, there was

a significant reduction in the experimental group compared to the control group in three domains of the BIS-11. This result supported the current study's hypothesis that students with learning disabilities who were trained through mindfulness sessions improved in the three domains of attentional, motor, and non-planning impulsiveness in the BIS-11. The current findings are consistent with the results of (Franco et al., 2016; Soler et al., 2016), who pointed out that improvement by experimental participants were noted after mindfulness training in the three domains of BIS-11.

There are different demonstrations of mindfulness results, such as reducing rumination (Calvete et al., 2017; Korponay et al., 2019), increasing self-control (Franco et al., 2016; Yusainy & Lawrence, 2014). Additionally, mindfulness practices may help reduce internal behaviors in which participants became less affected by mood and urgency. This finding corresponds with activating the mindful situation, and prioritizing the long-term consequences of behaviors (Linehan, 2014). Moreover, during mindfulness practices, internal and external attention is processed, mainly allowing processing information to flow with more intense, which infers the reduction of impulsivity (Soler et al., 2016).

The essential elements of impulsivity are the speed and non-planning reactions for interests before processing (Moeller et al., 2001). Mindfulness training prevents thinking and impulsive behaviors by paying attention to the current moment and the characteristics of acceptance, openness, and curiosity (Stratton, 2006). In reality, an important point of concentration in mindfulness training was empowering an individual to interact with less impulsivity and more self-control (Franco et al., 2016). As a result, it is possible to reflect the reduction of impulsivity level resulting from training children in the experimental group based on their performance on the BIS-11 scale. This was clear through the significant differences in the scores between the experimental and control groups on the BIS-11 after the training program. It was found that the training sessions for children with learning disabilities in a group of important activities and practices such as meditation and deep breathing which are essential in developing attention level, reduced impulsivity, and resulted in actions based on learning from training sessions (Linehan, 2014). This finding was assured by Siegel (2009), who pointed out that practicing mindfulness activities helps a person to have sufficient time among any interest and following responses allowing opportunities for individuals to make correct decisions contributing to problem-solving. Franco et al. (2016) believed that individuals practicing mindfulness activities could support their social and damaging behaviors, reinforcing their acceptance, ability to pay attention, and concentration in school with less impulsivity. Also, it helped change automatic responses for individuals, which improved their self-regulation.

Malinowski (2013), during the meditation process, noted children focus on a practice such as breathing, which needs continuous attention, but when children lose attention during the practice, they can lose their concentration. Children can respond to attention loss by activating executive attention and returning to meditation with direct attention. Thus, practicing mindfulness can improve automatic attention. The current findings support previous results which indicated that children can benefit from the positive impacts of mindfulness for attention processing (Franco et al., 2016; i Farrés et al., 2019; Jensen et al., 2012; Jha et al., 2007; Korponay et al., 2019; Milligan et al., 2019; Murphy & MacKillop, 2012; Nkrumah et al., 2015).

Reducing children's impulsivity with learning disabilities in elementary schools may have beneficial impacts on their performance and well-being. Thus, controlling the impulsivity level can improve the academic level, in which self-regulation and impulsivity develop school readiness (Tarrasch, 2018; Willis & Dinehart, 2014). In addition, it helps develop attention and self-awareness, which leads to higher academic efficacy (Manor et al., 2012).

In reality, attention skills such as achieving tasks, social-emotional competence, and self-regulation are related to academic achievement (Rhoades et al., 2011). It was found that mindfulness training improves academic performance (Lin & Mai, 2018). Some impacts of impulsivity can be associated with the reduction of stress (Lovallo, 2013) which has been associated with negative self-regulation (Lovallo, 2013), and interferes with academic performance (Lozano et al., 2014). Although the current study supports the hypothesis that mindfulness practices with students with learning disabilities were effective, clear improvements were also noted for students with learning disabilities

exhibiting hyperactivity and lack of attention. In addition, the training sessions of the current study were smooth and well-administrated due to the small number of children with learning disabilities who participated in this study, which allows for careful and specialized training in a resource room.

## 6. Conclusion

The current study examined mindfulness training's effectiveness in reducing impulsivity for elementary school students with learning disabilities. Children exposed to mindfulness training improved attentional, motor, and non-planning impulsiveness. In addition, mindfulness training created significant changes in reducing internally driven behaviors in which participants became less affected by mood and urgency; this corresponds with activating the mindful situation, which prioritizes the long-term consequences of behaviors.

## 7. Recommendations

The current study results should be replicated with a large sample to identify the specific impacts of mindfulness on impulsivity. Future research should assess the improvements after implementing mindfulness specifically on children with hyperactivity disorders and lack of attention associated with learning disabilities. Finally, the current study's encouraging results revealed the possibility of mindfulness training among children with learning disabilities. Additional studies in similar situations may help specifies the minimum requirements to process mindfulness effectively in the educational system based on teachers, students, and instructional methods.

## 8. Limitations

The current study has some limitations that could impact the effectiveness of mindfulness training. First, this study's main limitation is the small sample size of students with learning disabilities participated in this study. Second, although the current study relied on assessing mindfulness workshops through a mindfulness scale, no information was gathered from teachers, parents' perspective about students' impulsivity after the intervention. Third, the current study did not incorporate tests assessing related fields; for example, stress, behavioral problems, and academic achievements, which could help investigate the validity of results. In addition, the current study used a group of male students with learning disabilities because mixed gender is prohibited or unpopular in Saudi Arabia. Future researchers can apply a similar study for female students with learning disabilities in communities allowing mixed-gender education to ensure mindfulness programs' success. Although the length of time children with learning disabilities practicing at home may impact the results, we had no means to assess this length of time. Children are less likely to significantly exercise mindfulness practices at home, but information on their practice can inform findings and discussion. Monitoring home practice should be collected in future research. Fifth, the data collected was limited to students with learning disabilities in Najran, Saudi Arabia. Therefore, to enhance the results' generalizability, researchers need to conduct similar studies in different cities. Finally, the future direction will be to see whether these results can be replicated across and among other groups of children with disabilities.

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