



# Mindfulness-based empathy training supported by Obese Simulation Suit: Randomized Controlled Trial

Ganime Can Gür<sup>1</sup> · Emine Yılmaz<sup>2</sup>

Accepted: 30 January 2024  
© The Author(s) 2024

## Abstract

Nursing serves as the foundation of patient-centered healthcare services, and the empathetic connections formed between nurses and patients are integral to delivering quality care. In this context, the mental well-being and empathy levels of nurses significantly impact the efficiency of healthcare services and patient contentment. This study investigates the impact of mindfulness-based empathy training and obese simulation suits on nursing students' attitudes and empathy levels towards obese patients. The research, conducted as a randomized controlled trial, encompassed 84 nursing students and employed the "Attitude Scale Towards Obese Patients," "Jefferson Empathy Scale for Nursing Students," and "Descriptive Information Form." Data analysis involved two-factor ANOVA for mixed measurements. The study revealed significant interaction effects between group and time concerning nursing students' attitudes towards obese individuals [ $F(1,70) = 43.281$ ,  $p < 0.05$ ] as well as their empathy levels towards obese individuals [ $F(1,70) = 15.657$ ,  $p < 0.05$ ]. The experimental group exhibited a noteworthy increase in both attitudes and empathy levels compared to the control group. Furthermore, Single Factor ANOVA for Repeated Measures revealed a statistically significant difference in the experimental group's attitudes and empathy scores across pretest, posttest, and follow-up assessments [ $p < 0.01$ , partial  $\eta^2 = 0.492$  and  $0.186$ , respectively]. These findings underscore the effectiveness of these interventions in enhancing essential nursing competencies necessary for providing comprehensive patient care. Thus, integrating these methods into the curriculum is recommended to cultivate more positive attitudes and heightened empathy among nursing students, particularly concerning obese patients, throughout their educational journey.

**Keywords** Attitude · Empathy · Mindfulness · Obesity · Simulation Suit

## Introduction

Obesity, widespread all over the world, is an important public health problem that threatens developed and developing countries and its prevalence is rapidly increasing. According to the World Health Organization (WHO), individuals with a body mass index of 30 and above are considered obese (World Health Organization, 2018). A sedentary lifestyle, decrease in physical activity level, increase in ready-to-eat

food consumption, and changes in dietary habits lead to an increase in the number of obese individuals (Schwartz et al., 2003).

Obesity is not only a physiological but also a significant psychological health issue. Physiologically, obesity can increase the risk of serious chronic diseases such as diabetes, cardiovascular diseases, and cancer (Baker, 2021). Psychologically, it can negatively impact individuals' self-esteem, lead to depression and anxiety, and create a sense of exclusion within society (Nicholls et al., 2016). In the fight against obesity, individuals encounter not only physical challenges but also prevailing prejudices in society. Negative attitudes and discrimination towards obesity in their communities lead to the stigmatization of obese individuals (Tomiya, 2014). This stigma is driven by cultural assumptions and prejudices concerning obesity (Pearl et al., 2012). According to the literature, there is a connection between negative sentiments about obese people and the belief that an

✉ Emine Yılmaz  
emine.tog@hotmail.com

Ganime Can Gür  
ganime\_31@hotmail.com; ganimegur@pau.edu.tr

<sup>1</sup> Faculty of Health Science, Department of Psychiatric Nursing, University of Pamukkale, Denizli 20000, Turkey

<sup>2</sup> Faculty of Nursing, Department of Psychiatric Nursing, University of İnönü, Malatya 12000, Turkey

obese person can control their weight (Luck-Sikorski et al., 2017; O’Keeffe et al., 2020). In their study examining the connection between obesity knowledge and weight prejudice, O’Keeffe et al. (2020) found a link between weight prejudice and the belief that an individual’s behavior, such as overeating, rather than a medical condition, is to blame for their obesity. These negative attitudes are commonly observed among medical students and healthcare professionals working in obesity-related healthcare services (Brown & Thompson, 2007; Buxton & Sneath, 2013; Keyworth et al., 2013; Nicholls et al., 2016; Schwartz et al., 2003; Stone & Werner, 2012). Indeed, research done with nurses and nursing students revealed a link between prejudice against obese persons and the idea that obesity is something that can be controlled by the individual (Tanneberger & Ciupitu-Plath, 2018; Usta et al., 2021; Yılmaz & Yabancı Ayhan, 2019). In their study conducted with nursing students, Sert et al. (2016) reported that 74.8% of the students displayed bias and a tendency toward prejudice against obese individuals. It has been reported in another study that roughly 69% of obese people who seek medical attention at hospitals experience stigma from medical staff because of their weight. According to the literature, it is known that such stigmatization can adversely affect patients’ access to and quality of healthcare services related to obesity. Additionally, it can lead to a lack of confidence in relationships with healthcare professionals, resulting in failure in obesity management. Moreover, these prejudiced attitudes contribute to healthcare inequities (Friedman et al., 2008; Russell & Carryer, 2013). As a result, there is a rising need to identify the causes preventing access to healthcare services, comprehend the stigma faced by this group in light of the potential consequences for obese people, and devise effective methods to lessen its impact.

Empathy is a crucial value in healthcare that is required for the development of healthy and effective patient communication. Empathy is the capacity to recognize, comprehend, and share the thoughts and feelings of another person while preserving the self-other distinction (Kerasidou & Horn, 2016). Understanding patients’ feelings and engaging them empathetically has a favorable impact on treatment processes for healthcare providers (Dökmen, 2004; Terezam et al., 2017). For instance, empathy can improve mental health, symptom resolution, physiological measurements, and pain management in addition to increasing patient satisfaction, trust, and treatment adherence (Derksen et al., 2013; Kim et al., 2004). Empathy becomes even more important when individuals are suffering with chronic health conditions like obesity. Empathy among healthcare practitioners not only helps them understand the emotional challenges that overweight individuals face, but it also plays a vital role in lowering obstacles to healthcare access. Therefore, it is crucial that healthcare personnel focus on developing their empathy skills and aim to establish a more empathic communication

with patients in order to ensure that healthcare services are human-centered and efficient (Moudatsou et al., 2020). In the literature, interventions based on empathic approaches have been found in meta-analysis studies to be beneficial in lowering healthcare workers’ and nursing students prejudices toward obese individuals (Lee et al., 2014; Phelan et al., 2015).

At the same time, mindfulness-based interventions, called the ‘third wave’ of behavioural therapies in the literature, seem to increase the level of empathy (Ridderinkhof et al., 2017; Winning & Boag, 2015). Mindfulness activities improve empathy by allowing individuals to be aware of and observe the present moment without criticizing them, without being buried in their feelings and thoughts, and by allowing people to be aware of their own feelings and thus better comprehend emotional processes. According to Chun et al. (2011), mindfulness therapies should be integrated and practiced with other interventions such as psychoeducation, problem-solving, and skill training. In recent studies, mindfulness practices have been shown to increase general quality of life, emotion management, empathy, cognitive flexibility, and self-sensitivity, decrease rumination and anxiety, and improve interpersonal relationships in both sick and healthy people (Chiesa & Serretti, 2009; Keng et al., 2011; Khoury et al., 2013). Because empathy may be built via experience, there have been endeavors to establish appropriate programs to promote the empathy of healthcare students (Ozcan et al., 2010). One strategy aiming at eliminating the stigma and prejudice of healthcare students towards obesity is to simulate the lives of obese people (Hunter et al., 2018). A simulation is an educational strategy that allows students to engage in activities that simulate a realistic encounter or experience in a safe setting (Bland & Tobbell, 2016). Simulations enable students to assume a patient’s role to understand their viewpoints, feelings, and experiences (Bearman et al., 2015). Today’s changing and evolving health care system necessitates the selection of effective learning methods that will enable students to have cognitive, affective, and psychomotor competencies, as well as actively participate in the learning process in the educational environment, by basing nursing education strategies on holistic approaches (Fry et al., 2008). The use of simulation techniques in nursing education has been shown to improve the integration of academic knowledge and practical abilities. It promotes the development of psychomotor abilities, critical thinking, clinical decision-making, and effective therapeutic communication approaches in nursing students (Terzioğlu et al., 2012). Simulation applications integrated into mindfulness-based training interventions provide students, especially, with a perspective that enables them to look at the world through the “eyes” of another person. Because conscious mindfulness of one’s feelings and emotions helps individuals show compassionate feelings when faced with someone who is in pain,

simulations that allow them to "replace the patient" help them gain new insights into another person's feelings, perspectives, experiences, and needs (Batt-Rawden et al., 2013; Bearman et al., 2015; Dean et al., 2017; van Vliet et al., 2018). Russell et al. (2018) found that six nurses who were expected to perform their daily living activities while wearing a simulated obesity suit reduced their prejudices against obese people and boosted their empathic attitude as a result of this experience. Chua et al. (2021) discovered that simulation-based therapies were effective in boosting health students' empathy in a meta-analysis research. The study also stressed the need of educational institutions undertaking simulation-based treatments on a regular basis in order to constantly develop healthcare students' empathy throughout their academic journey.

It is important that students, the future nurses, take a fair and safe attitude to all individuals in their areas of work and do not discriminate against anyone based on their weight. It is essential that nurse candidates who will deliver the appropriate approach to individuals have favorable attitudes about obese individuals as well as accurate knowledge based on scientific resources. Nurses who play a role in informing society as part of their independent role of educator can help break down prejudices by providing correct information while fulfilling this role, whereas providing incorrect information or displaying negative attitudes can cause prejudices to consolidate and continue. Given the importance of education received during the student years, the mindfulness-based empathy training supported by obese simulation suits was designed to positively affect the attitudes and empathy levels of nursing students, who will be at the heart of health care service, towards obese patients. Given the body of literature demonstrating that mindfulness techniques, empathy skills, and obese simulation suit are effective therapies for enhancing empathy, this study is notable since it is the first to integrate all three intervention strategies.

## Research hypotheses

**H1:** Nursing students who receive empathy training will have a more positive attitude than nursing students who have not received empathy training.

**H2:** Nursing students who received empathy training will have greater levels of empathy than nursing students who have not received any empathy training.

## Methods

### Study design

The study was conducted as a randomized controlled trial with a pre-test, post-test, and repeated measurement design and a control group.

## Participants and settings

The study was conducted in the 2020–2021 academic year on students enrolled in the nursing department of a university in eastern Turkey.

Initially, participants were notified by e-mail and social media that an informational meeting regarding the study would be place. The students who attended the meeting were provided information on the structure, the study procedure, and the participants' expectations. Students ( $n = 117$ ) who volunteered to take part in the study were invited to the faculty's training hall for preliminary assessments and tests. Potential participants in the training hall were evaluated based on the study's inclusion criteria. Students who failed to meet the study's inclusion requirements for a variety of reasons were identified ( $n = 33$ ). Participants ( $n = 84$ ) who satisfied the inclusion criteria provided written consent, and preliminary testing were carried out. A total of 84 students who completed the preliminary tests were included in the randomization procedure (Fig. 1).

The following were the study's inclusion criteria: a) having provided care for obese patient/patients, b) having completed at least year 2 of schooling, and c) volunteering to engage in the study.

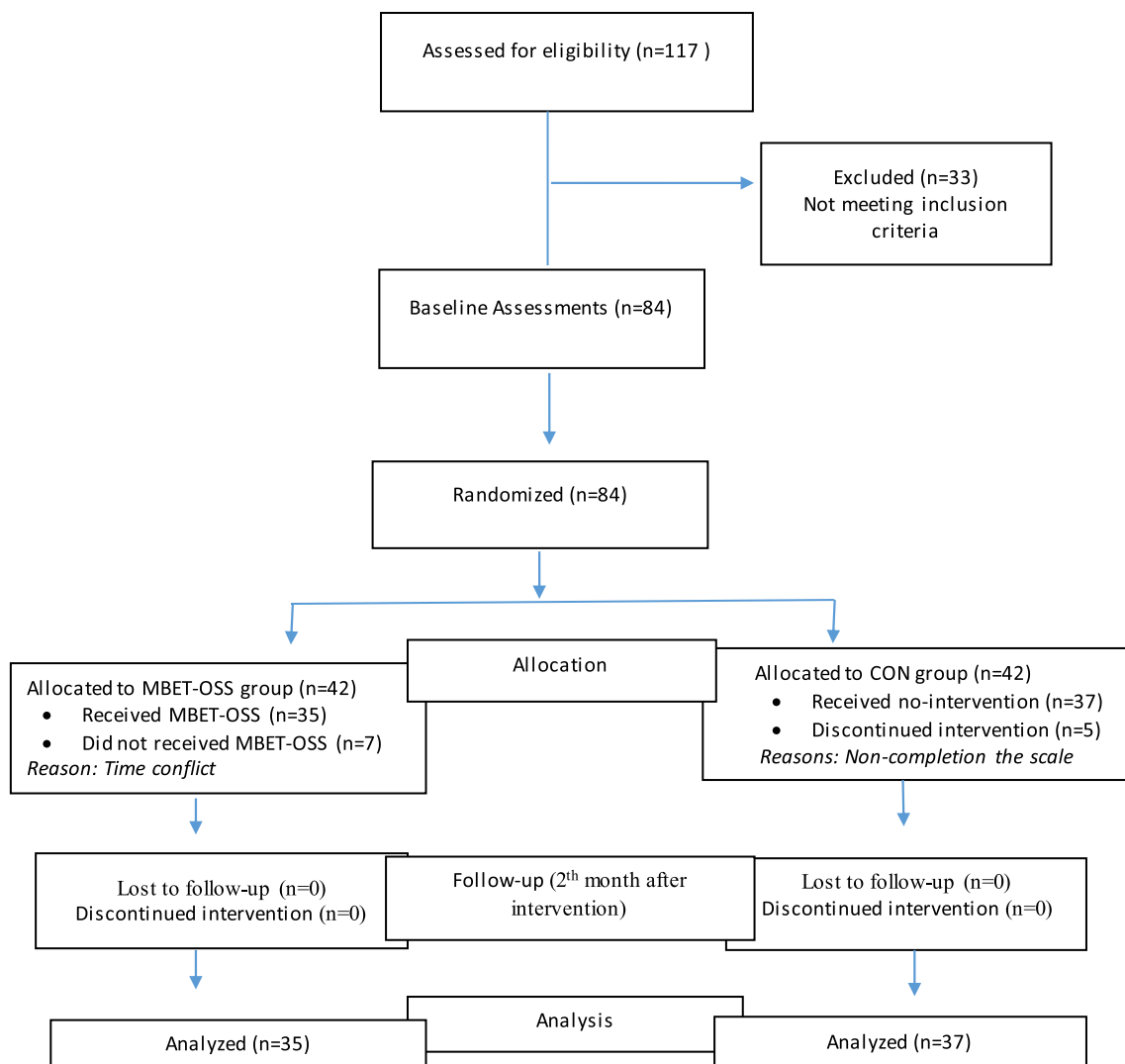
The following were the study's exclusion criteria: a) being a first-year student (Considering that first-year students have limited patient care experience and are less likely to encounter and provide care for obese patients, as they begin hospital practices in the spring term of their first year).

## Sample size

To determine the sample size, a priori power analysis was conducted using the G Power 3.1 analysis program before the intervention. The significance level ( $\alpha$ ), statistical power ( $1 - \beta$ ), and confidence interval were set at 0.05, 0.80, and 95%, respectively, for the mixed analysis of variance design in order to calculate the required sample size. The sample size for each group was calculated to be 35.

## Randomization

The "simple randomization method" was used in this study to assign participants to random groups. Following completion of the baseline assessments, participants were randomly assigned to equal numbers of intervention and control groups using the Statistical Package for Social Science (SPSS) 23.0 software. Participants were coded as "1" for the intervention group and "2" for the control group, and were randomized up to 84. The randomization outcome, numbering the 84 participants, was performed



**Fig. 1** Flow diagram of the study

by an individual other than the researchers, and the output was obtained. Additionally, the researcher prepared opaque envelopes with numbers ranging from 1 to 84. A non-researcher inserted these numbers into the envelopes, and all of the envelopes were then sealed. Throughout this process, both the researchers and the participants in both groups were unaware of their group assignments from the beginning of the study. The identities of participants in the intervention and control groups were revealed by the researcher after the envelopes were opened following participants' registration in the study. Thus, neither the researchers nor the participants knew which group they belonged to until the beginning of the study. While the researcher directly involved in interventions (second author) could not be blinded due to the nature of the

intervention, the researcher responsible for assessing the outcomes (first author) remained blinded to participants' allocated groups until all data were analyzed. This blinding helped maintain the study's integrity and reduced the risk of bias during outcome assessments.

## Measures

### Descriptive Information Form (DIF)

This form was developed by the researchers in line with the literature. It consists of a series of questions to gather information about the individual demographic characteristics of participating students.

## The Nurses' Attitudes Toward Obesity and Obese Patients Scale (NATOOPS)

This scale was developed by Watson et al. (2008) and its adaptation into Turkish was made by Menekli et al. (2018). The scale is a self-report scale that evaluates nurses' attitudes towards obesity and obese adult patients. The scale consists of 36 items and five subscales. The first subscale (F1 = 14 items) evaluates nurses' reactions to obese patients, the second subscale (F2 = nine items) the characteristics of obese patients, the third subscale (F3 = eight items) the factors contributing to obesity control, the fourth subscale (F4 = two items) obese individual stereotypes, and the fifth subscale (F5 = three items) support roles in the care of obese patients. Each item scores from 0 to 5. The highest score obtainable was 180 and the lowest score was 0. Higher scores represent a better attitude towards obese individuals. Attitude levels of nurses are evaluated according to the scores they get from each subscale. The total Cronbach's alpha coefficient of the original scale was 0.81, varying between 0.74 and 0.82 for the subscales. In this study, the total Cronbach's alpha coefficient of the scale was 0.92, varying between 0.76 and 0.90 for the subscales.

## Jefferson Empathy Scale (JSENS)

This scale was developed by Ward et al. (2009) and its adaptation into Turkish was made by Yanik and Saygili (2014). The scale is used to evaluate empathy in nursing students. The scale consists of 18 items and three subscales. These are as follows: compassionate care (F1 = seven items), perspective taking (F2 = nine items), and standing in patient's shoes (F3 = two items). Each item uses a 7-point Likert-type scale. The highest score obtainable was 126 and the lowest score was 18. High scores indicate a higher empathy level. The scale has positive and negative attitude statements. The Cronbach's alpha coefficient of the scale was 0.73. Cronbach's alpha coefficient of this study was 0.72.

## Physical measurements

The height and body weights of the participants were determined with the Seca brand sadiometer device. During the measurement, the individual was measured without shoes and wearing the thinnest sportive clothing possible (Norton & Olds, 1996).

## Collection of data

In the collection of data, "Introductory Information Form", "Nurses' Attitudes Towards Obesity and Obese Patients Scale", and "Jefferson Scale of Empathy in Undergraduate Nursing Students" were applied to both the intervention and control groups in the pre-test. The Body Mass Index (BMI) values were also calculated. After the interventions on the intervention group (12 sessions of Mindfulness-based Empathy Training) were completed, a post-test (Nurses' Attitudes Towards Obesity and Obese Patients Scale, and Jefferson Scale of Empathy in Undergraduate Nursing Students) and a follow-up test were administered to both groups at the end of the 2-month follow-up phase to determine the effect of the changes caused by the time-intervention interaction on the validity of the study. The data was collected in such a way as not to interfere with the students' educational process in the training hall, where the training would be done under the supervision of the researcher.

## Study protocol

The researcher who would perform Mindfulness-Based Empathy Training, participated in the Mindfulness-Based Cognitive Therapy Workshop in July 2015 and received a certificate as well as having a psychodrama certificate, one of the empathy training techniques which would be used in the sessions.

First, the participants were informed about the protocol of the study. Then, informed consent was obtained from the participants who volunteered to participate in the study and preliminary tests were performed. After randomization, training days are to be conducted with the intervention group were decided. Mindfulness-Based Empathy Training was given to the intervention group twice a week (during the period when the students did not have classes), lasting 6 weeks, consisting of 12 sessions, each of those lasting 40–50 min. Training sessions were conducted in the training hall of the faculty, and some of the mindfulness exercises were performed in the campus area (mindfulness walking exercise, etc.). In order to ensure participation in the training, each group was contacted via a mobile communication platform, and the training time was reminded in advance. After the training sessions were completed, the post-tests, and follow-up tests, two months after the post-tests, were applied to both groups to test the permanence of the training. During this period, both the intervention and control group students continued their hospital practices, twice a week, and theoretical lessons, and the sessions were planned in



a way that would not affect their learning processes. The control group did not have any intervention.

## The Mindfulness-Based Empathy Training Supported with Obesity Simulation Suit (MBET-OSS)

The components of mindfulness-based approaches are focusing on the present (mindfulness breathing exercise, mindfulness for daily life activities, etc.), non-judgment (the judgment of emotion and an opinion determines the direction of behaviour, it means observing experiences without classification and criticism), and acceptance (recognizing and allowing judgments and automatic patterns to be present). Individuals who live in the moment and are aware of it do not get caught up in the intensity of emotions and thoughts when faced with negativities, do not have prejudices against themselves and the people around them and control their impulsive reactions (auto-pilot) without realizing it (Catak & Oegel, 2010).

Interventions and practices to increase the empathic approach were combined in line with the literature in the Mindfulness-Based Empathy training intervention used in

this study. The training took 6 weeks, 2 sessions per week in a total of 12 sessions, and each of those sessions lasted about 40–50 min. The aim of each session was to develop and increase the mindfulness and empathic skills of the participants, which are based on improving their attitudes towards obese individuals. Session contents were created as shown in Table 1. Considering the lack of information about obesity, which is shown as one of the reasons for the prejudice and stigmatization towards the obese individual in the literature, two sessions of the training included information about obesity and were conducted by a dietitian who is an expert in the field, while the other ten sessions were conducted by the trainer researcher.

In education, techniques such as didactic teaching (the conveying of theoretical knowledge by a specialist), role-playing (pretending to play a character and trying to understand the feelings, behaviour, and emotions of that character) and creative drama (individuals making sense of an experience, an event, a thought in group work by making use of theatre and creative drama techniques such as improvisation, role-playing, etc. in "game-like" processes in which experiences, observations and experiences are reviewed through the rearrangement of old cognitive patterns and automatic thoughts) were used

**Table 1** Content of the mindfulness based empathy training supported by Obese Simulation Suit

<p>Session 1: Preparation session</p> <ul style="list-style-type: none"> <li>• Meet,</li> <li>• Introducing the FTPEE program,</li> <li>• Explaining the group rules,</li> <li>• Sharing the experiences and expectations of individuals</li> </ul> <p>Session 3: Communication Skills</p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Importance of communication skill</li> <li>• Basics of communication, I language study</li> <li>• To prevent communication accidents</li> </ul> <p>Session 5: Empathy</p> <ul style="list-style-type: none"> <li>• What is empathy?</li> <li>• What are the empathy steps?</li> <li>• What are the gains of the empathic approach?</li> </ul> <p>Session 7: Recognizing obesity</p> <ul style="list-style-type: none"> <li>• Obesity and quality of life</li> <li>• Obesity and mental problems</li> </ul> <p>Session 9: Stigma</p> <ul style="list-style-type: none"> <li>• What is stigma?</li> <li>• Stigma process</li> <li>• Prejudice and stigmatizing approaches towards obesity</li> <li>• Things to do in dealing with stigma</li> </ul> <p>Session 11: Staying in the Past or Living in the Present?</p> <ul style="list-style-type: none"> <li>• Friendship building meditation</li> <li>• Habit breaker</li> </ul>	<p>Session 2: Awareness</p> <ul style="list-style-type: none"> <li>• Awareness</li> <li>• Awareness breathing exercise</li> <li>• Raisin meditation</li> <li>• Awareness in daily activities</li> </ul> <p>Session 4: Not To Forget The Body</p> <ul style="list-style-type: none"> <li>• Body scanning meditation</li> <li>• Being aware of daily activities</li> <li>• Habit breaker</li> </ul> <p>Session 6: Recognizing Obesity</p> <ul style="list-style-type: none"> <li>• What is obesity?</li> <li>• What is the etiology of obesity?</li> <li>• Treatment process of obesity</li> </ul> <p>Session 8: Applying Emotions, Thoughts, and Behaviors (3D) Model, Mindfulness to Daily Life</p> <ul style="list-style-type: none"> <li>• What is a 3D model?</li> <li>• Autopilot recognition</li> <li>• Habit breaker</li> <li>• 10 finger gratitude app</li> </ul> <p>Session 10: Facing Challenges</p> <ul style="list-style-type: none"> <li>• Awareness breathing exercise</li> <li>• Body scanning meditation</li> <li>• Sounds and thoughts meditation</li> </ul> <p>Session 12: Evaluation</p> <ul style="list-style-type: none"> <li>• Reinforcing what has been learned</li> <li>• Evaluate the program</li> <li>• Receiving feedback</li> </ul>
---	--

and the teaching was continued with visual resources (projection), question and answer, practices and assignments. Students were dressed in an obese simulation suit in order to increase the effectiveness of the role-playing technique and to enable the students to experience the physical difficulties of the obese individual, their feelings as an obese individual, their emotions and some consequences of weight-related prejudice, negative attitude and stigma obese individuals face. Each student in the intervention group wore this suit for an average of 30 min, and during this period, they were ensured to perform their daily life activities (climbing stairs, walking, getting on public transport, eating, changing their clothes, going to the toilet, etc.). This suit is made of fabrics and materials, which are high-quality and durable, weighing an average of 7.5 kg. The user is not only able to look obese, but also feel the weight and experience performing their daily activities as an obese person. This simulation suit shows the BMI value of the individual between 30–39. At the same time, rubber made exercise floor mats with a length of at least 180 cm and a width of at least 60 cm were used in the practices. It is important that mindfulness exercises are performed in a comfortable environment and position, therefore the cushion has especially been used in breathing exercises.

The target behaviours planned to be acquired by the students with the Mindfulness-Based Empathy Training Program were as follows:

- To enable them to know themselves better,
- To develop mindfulness skills,
- To increase their knowledge about communication and important concepts in communication,
- To increase their ability to recognize and express their emotions,
- To provide them with information about obesity and the stigma process,
- To develop the skills to respond empathetically to an obese person,
- To develop the skill to make the empathic response a life experience.

### Statistical analyses

The data were analyzed by SPSS, Version 21 (SPSS Inc., Chicago, IL, USA). Frequency, percentage, arithmetic mean, standard deviation, two-factor ANOVA for mixed measurements, one-way ANOVA for repeated measurements, Post-hoc (Bonferroni) statistical techniques were used in the analysis of the data. Whether the numerical data followed normal distribution or not was determined by Kolmogorov–Smirnov test and skewness coefficients. Homogeneity of variance was investigated using the Levene test. Effect size

was measured with partial Eta squared ( $\eta^2$ ).  $\eta^2 \leq 0.01$  was interpreted as small,  $\eta^2 = 0.06$  moderate, and  $\eta^2 = 0.14$  large effect (Cohen, 2013).

## Results

### Baseline characteristics of the participants

When examining the characteristics of the study participants, it was found that the mean age was  $21.27 \pm 1.64$  years, the mean height was  $164.44 \pm 7.22$  cm, and the mean weight was  $60.47 \pm 10.70$  kg. Of the participants, 86.9% were women, 65.5% perceived their physical weight as normal, 84.5% believed that obese individuals face discrimination, 86.9% had no prejudice against obese individuals, and 61.9% reported that obesity was important for both sexes (Table 2).

### Adherence to treatment

The participation rates of 42 participants in the 12-week MBET-OSS program are as follows: 100% for the 1st and 2nd sessions ( $n = 42$ ), 95% for the 3rd session ( $n = 40$ ), 95% for the 4th session ( $n = 40$ ), 95% for the 5th session ( $n = 40$ ), 90% for the 6th session ( $n = 38$ ), 90% for the 7th session ( $n = 38$ ), 83% for the 8th session ( $n = 35$ ), 86% for the 9th session ( $n = 36$ ), 88% for the 10th session ( $n = 38$ ), 83% for the 11th session ( $n = 35$ ), and 83% for the 12th session ( $n = 35$ ). The percentage of participants in the experimental group continuing the program is 91%. Four participants attended only 5 out of 12 sessions and did not complete the final tests; therefore, they were excluded from the study due to being below the average number of sessions and not completing the final tests. Additionally, three participants attended the first 9 sessions but did not attend the last 3 sessions due to personal reasons and did not complete the post tests. In this case, 7 participants had been determined to have failed to finish the study.

### Per-protocol analyses

In this study, participants who did not take part in the post tests at the end of six weeks were regarded as not having completed the study. Consequently, a total of seven participants from the intervention group were excluded from the study. Similarly, five participants from the control group were excluded because they did not complete the post-tests. As a result, the analysis included 35 participants from the intervention group and 37 from the control group (Per-Protocol Analyses).

**Table 2** Baseline characteristics of participants ( $n = 84$ )

Characteristics	Total $n = 84$		MBET-OSS Group $n = 42$		CON Group $n = 42$	
	$X \pm SD$		$X \pm SD$		$X \pm SD$	
Age (years)	21.27 $\pm$ 1.64		20.71 $\pm$ 0.77		21.83 $\pm$ 2.05	
Size (cm)	164.44 $\pm$ 7.22		162.57 $\pm$ 6.76		166.30 $\pm$ 7.25	
Weight (kg)	60.47 $\pm$ 10.70		58.21 $\pm$ 9.49		62.73 $\pm$ 11.46	
Sex	N	%	N	%	N	%
Female	73	86.9	40	95.2	33	78.6
Male	11	13.1	2	4.8	9	21.4
Weight perception						
Skinny	3	3.6	1	2.4	2	4.8
Weak	15	17.9	11	26.2	4	9.5
Normal	55	65.5	24	57.1	31	73.8
Overweight	9	10.7	4	9.5	5	11.9
Over-weight	2	2.4	2	4.8	-	-
Obese discrimination						
Yes	71	84.5	39	92.9	32	76.2
No	13	15.5	2	4.8	10	23.8
Attitude						
Non-judgmental	73	86.9	39	92.9	34	81
Unstable	11	13.1	3	7.1	8	19
Gender						
Female	32	38.1	15	35.7	17	40.5
Both	52	61.9	27	64.3	25	59.5

### Students' attitudes toward obesity and obese patients

The attitudes of students toward obesity and obese patients were assessed using NATOOPS. A two-way mixed-measures ANOVA was conducted to examine the main effects of condition and time, as well as the interaction between

condition and time. The Kolmogorov–Smirnov test was utilized to confirm the normal distribution assumption ( $p > 0.05$ , Table 3). After determining that the normal distribution assumption was met, the homogeneity of the variances was examined. The condition of equality of variances was met by accepting the null hypothesis that there was no difference between the variances ( $p > 0.05$ ) as a result of

**Table 3** Descriptive statistical values and normality test results of NATOOPS and JSENS pre-test, post-test and follow-up test measurements for each groups

Measures	Groups	N	Scales					
			NATOOPS			JSENS		
			$X \pm SD$	Min.-Max	Kolmogorov–Smirnov Testi	$X \pm SD$	Min.-Max	Kolmogorov–Smirnov Testi
Pre-test	MBET-OSS	35	108.62 $\pm$ 7.92	95–123	0.087*	108.51 $\pm$ 11.64	82–126	0.200*
	CON	37	109.40 $\pm$ 9.63	90–125	0.156*	109.35 $\pm$ 11.40	77–123	0.069*
Post-test	MBET-OSS	35	116.74 $\pm$ 8.44	102–129	0.119*	115.34 $\pm$ 10.68	84–129	0.094*
	CON	37	108.59 $\pm$ 11.20	85–125	0.081*	107.29 $\pm$ 11.02	81–124	0.200*
Follow-up Test	MBET-OSS	35	115.48 $\pm$ 7.86	100–128	0.057*	114.20 $\pm$ 11.05	83–129	0.200*
	CON	37	108.40 $\pm$ 11.49	85–125	0.058*	105.00 $\pm$ 10.67	81–122	0.200*

\* $p > 0.05$ ; NATOOPS: The Nurses' Attitudes Toward Obesity And Obese Patients Scale; JSENS: Jefferson Emphaty Scale



the Levené test performed to determine the homogeneity of variances assumption.

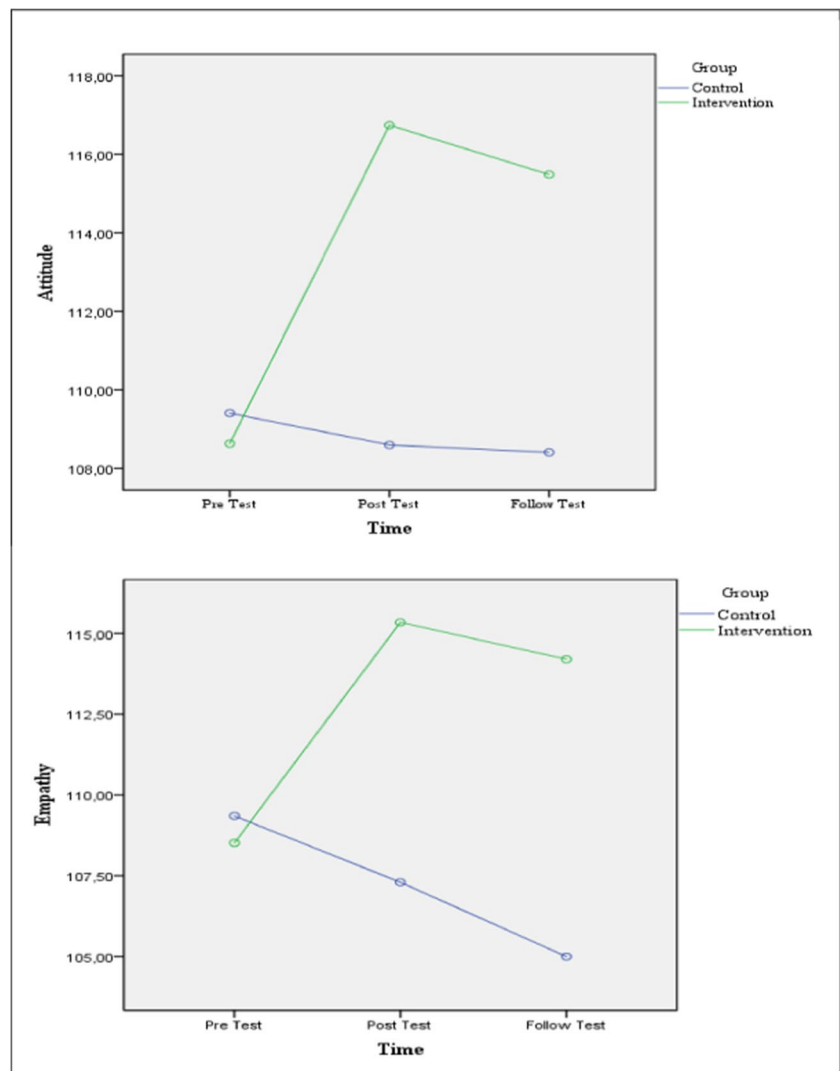
The mixed-effect ANOVA revealed that the main effect of group was not significant for the total NATOOPS scores [ $F(1,70)=3.037, p>0.05, \text{partial } \eta^2=0.042$ ]. The main effect of time was found to be significant [ $F(1,70)=28.982, p<0.05, \text{partial } \eta^2=0.293$ ]. The interaction effect between group and time was significant [ $F(1,70)=43.281, p<0.05, \text{partial } \eta^2=0.382$ ] (Table 5). In other words, the attitude scores of the experimental and control group participants towards obesity and obese patients show a significant difference depending on time. Considering the interaction effect, it has been determined that this difference arises between the pre-test and post-test ( $p<0.001, \text{partial } \eta^2=0.382$ ), and between the post-test and follow-up test ( $p<0.01, \text{partial } \eta^2=0.115$ ). Therefore, the increase in scores observed in the intervention group was significantly higher than that in the control group (Table 3 and Table 5, Fig. 2), providing support for hypothesis H1. Therefore, it can be concluded

that MBET-OSS is effective in improving students' attitudes towards obesity and obese patients.

It was found that the interaction between the group and time was statistically significant in the sub-dimensions of NATOOPS, specifically in "reaction to obese patients" [ $F(1,70)=6.337, p<0.05, \text{partial } \eta^2=0.083$ ], "controllable factors causing obesity" [ $F(1,70)=49.006, p<0.05, \text{partial } \eta^2=0.412$ ], and "stable characteristics of obese patients" [ $F(1,70)=23.879, p<0.05, \text{partial } \eta^2=0.254$ ] (Table 4 and Table 5). Accordingly, the impact of MBET-OSS on students' attitudes towards the NATOOPS sub-dimensions of "reaction to obese patients", "controllable factors causing obesity", and "stable characteristics of obese patients" seems to be more pronounced.

According to the Single Factor ANOVA for Repeated Measures conducted to assess differences in the pretest–post-test and follow-up tests within the intervention group, a statistically significant difference was observed in students' NATOOPS scores across the repeated measurements [ $F(2,$

**Fig. 2** Attitude and empathy scores for the intervention and control groups during the pre-test, post-test, and follow-up tests



**Table 4** Descriptive statistical values of the pretest and posttest measurements of the sub-dimensions of NATOOPS and JSSENS for each groups

Subscales		MBET-OSS		CON	
		Pre-test X ± SD	Post-test X ± SD	Pre-test X ± SD	Post-test X ± SD
NATOOPS	F1	49.41 ± 4.60	53.82 ± 3.30	50.34 ± 6.85	52.18 ± 8.39
	F2	27.71 ± 4.60	26.05 ± 4.37	26.64 ± 3.75	26.13 ± 3.93
	F3	18.51 ± 2.72	22.28 ± 4.23	19.05 ± 3.97	17.91 ± 4.04
	F4	6.51 ± 2.16	8.17 ± 1.80	6.48 ± 2.06	5.83 ± 1.95
	F5	6.48 ± 1.82	6.42 ± 2.11	6.89 ± 1.99	6.54 ± 1.64
JSSENS	F1	43.35 ± 3.15	45.83 ± 2.78	44.74 ± 2.47	44.52 ± 1.92
	F2	57.25 ± 7.83	60.94 ± 6.18	57.43 ± 7.38	55.59 ± 7.28
	F3	7.91 ± 2.38	8.57 ± 2.96	7.18 ± 3.15	7.18 ± 3.15

*NATOOPS* The Nurses' Attitudes Toward Obesity And Obese Patients Scale; Subscales of NATOOPS (F1: nurses reactions towards obese individuals; F2: characteristics of obese individuals; F3: factors contributing to the control of obesity; F4: reotypes of obese individuals; F5: roles in the care of obese individuals); *JSSENS* Jefferson Emphaty Scale; Subscales of JSSENS (F1: compassionate care; F2: perspective taking; F3: standing in patient's shoes)

**Table 5** Results of the two-way factor ANOVA for mixed measurements

Scales and Subscales		Source of Variation	Sum of Squares	df	Mean Square	F	p	partial η <sup>2</sup>
NATOOPS <sub>(Total)</sub>		Group	488.664	1	488.664	3.037	0.086	0.042
		Time	479.696	1	479.696	28.982	<b>0.000</b>	0.293
		<b>Group*Time</b>	716.363	1	716.363	43.281	<b>0.000</b>	0.382
Subscales	F1	Group	4.257	1	4.257	0.067	0.796	0.001
		Time	353.138	1	353.138	37.072	<b>0.000</b>	0.346
		<b>Group*Time</b>	60.360	1	60.360	6.337	<b>0.014</b>	0.083
	F2	Group	8.772	1	8.772	0.372	0.544	0.005
		Time	42.373	1	42.373	3.761	0.056	0.051
		<b>Group*Time</b>	11.762	1	11.7621	1.044	0.310	0.015
	F3	Group	131.714	1	131.714	5.388	<b>0.023</b>	0.071
		Time	62.502	1	62.502	14.148	<b>0.000</b>	0.168
		<b>Group*Time</b>	216.502	1	216.502	49.006	<b>0.000</b>	0.412
F4	Group	50.147	1	50.147	8.361	<b>0.005</b>	0.107	
	Time	9.146	1	9.146	4.568	<b>0.036</b>	0.061	
	<b>Group*Time</b>	47.813	1	47.813	23.879	<b>0.000</b>	0.254	
F5	Group	2.414	1	2.414	0.404	0.527	0.006	
	Time	1.501	1	1.501	1.192	0.279	0.017	
	<b>Group*Time</b>	0.778	1	0.778	0.618	0.434	0.009	
JSSENS <sub>(Total)</sub>		Group	467.301	1	467.301	2.275	0.136	0.031
		Time	205.006	1	205.006	4.523	<b>0.037</b>	0.061
		<b>Group*Time</b>	709.561	1	709.561	15.657	<b>0.000</b>	0.183
Subscales	F1	Group	0.088	1	0.88	0.008	0.927	0.000
		Time	45.223	1	45.223	14.021	<b>0.000</b>	0.167
		<b>Group*Time</b>	66.973	1	66.973	20.764	<b>0.000</b>	0.229
	F2	Group	156.602	1	156.602	1.970	0.165	0.027
		Time	72.937	1	72.937	3.012	0.087	0.041
		<b>Group*Time</b>	184.021	1	184.021	7.598	<b>0.007</b>	0.098
	F3	Group	39.937	1	39.937	2.587	0.112	0.036
		Time	3.884	1	3.884	2.158	0.146	0.030
		<b>Group*Time</b>	3.884	1	3.884	2.158	0.146	0.030

p < 0.05; NATOOPS: The Nurses' Attitudes Toward Obesity And Obese Patients Scale; JSSENS: Jefferson Emphaty Scale

68) = 32.939,  $p < 0.01$ , partial  $\eta^2 = 0.492$ ] (Table 6). As a result of the Bonferroni comparison test conducted to identify specific differences among these measurements, significant disparities were detected between the mean scores of the pre-test and post-test, pre-test and follow-up test, as well as post-test and follow-up test scores ( $p < 0.001$ ).

### Students' empathy towards obesity and obese patients

JSENS was utilized to assess students' empathy levels, and the assumptions of the two-way factor ANOVA for mixed measurements were met. The mixed-effect ANOVA revealed that the main effect of group was not significant for the total JSENS [ $F(1,70) = 2.275$ ,  $p > 0.05$ , partial  $\eta^2 = 0.031$ ]. The main effect of time was found to be significant [ $F(1,70) = 4.523$ ,  $p < 0.05$ , partial  $\eta^2 = 0.061$ ]. The interaction effect between group and time was significant [ $F(1,70) = 15.657$ ,  $p < 0.05$ , partial  $\eta^2 = 0.183$ ] (Table 5). In other words, the empathy scores of the experimental and control group participants towards obesity and obese patients show a significant difference depending on time. Considering the interaction effect, it has been determined that this difference arises between the pre-test and post-test ( $p < 0.001$ , partial  $\eta^2 = 0.183$ ). Therefore, the increase in scores observed in the intervention group was significantly higher than that in the control group (Table 3 and Table 5, Fig. 2), providing support for hypothesis H2. Therefore, it can be concluded that MBET-OSS is effective in improving students' empathy levels towards obesity and obese patients.

It was found that the interaction between the group and time was statistically significant in the sub-dimensions of JSENS, specifically in "compassionate care" [ $F(1,70) = 20.764$ ,  $p < 0.05$ , partial  $\eta^2 = 0.229$ ], "perspective taking" [ $F(1,70) = 7.598$ ,  $p < 0.05$ , partial  $\eta^2 = 0.098$ ] (Table 4 and Table 5). Accordingly, the impact of MBET-OSS on students' empathy levels towards the JSENS

sub-dimensions of "compassionate care" and "perspective taking" seems to be more pronounced.

According to the Single Factor ANOVA for Repeated Measures conducted to assess differences in the pre-test–posttest and follow-up tests within the intervention group, a statistically significant difference was observed in students' JSENS scores across the repeated measurements [ $F(2, 68) = 7.761$ ,  $p < 0.01$ , partial  $\eta^2 = 0.186$ ] (Table 6). As a result of the Bonferroni comparison test conducted to identify specific differences among these measurements, significant disparities were detected between the mean scores of the pre-test and post-test, as well as between the pre-test and follow-up test scores ( $p < 0.001$ ).

### Discussion

The aim of this study was to investigate the impact of mindfulness-based empathy training supported by obese simulation suit on nursing students' attitudes and empathy levels towards obese patients. The findings revealed significant improvements in both attitudes and empathy levels among participants in the intervention group when compared to the control group.

Nurses' attitudes and skills towards patients play a critical role in their professional competence. In the literature, it is noted that nurses can exhibit negative attitudes towards obese patients, and this situation can adversely affect the quality of care (Buxton & Sneath, 2013; Keyworth et al., 2013). While improving students' positive attitude skills, particularly within the healthcare system, can increase the quality of healthcare services and clinical practices, negative attitudes can lead to medical errors (West et al., 2006). In the current study, students' attitudes were found to be above average before to beginning the education program; nonetheless, they were still found to be below the required level. This finding emphasizes the necessity of adopting more effective and personalized strategies in nursing education. It

**Table 6** Results of the One-Factor ANOVA with repeated measures for MBET-OSS Group

	Source of Variation	Sum of Squares	df	Mean Square	F	p	partial $\eta^2$
NATOOPS	Between groups	1,355,475.238	1	1,355,475.238	8726.078	0.000	.996
	Within Groups	<b>1335.162</b>	<b>2</b>	<b>667.581</b>	<b>32.939</b>	<b>0.000</b>	<b>.492</b>
	Error	1378.171	68	20.267			
	Total	1,358,188.571	71				
JSENS	Between groups	1,333,297.371	1	1,333,297.371	5306.990	0.000	.994
	Within Groups	<b>936.400</b>	<b>2</b>	<b>468.200</b>	<b>7.761</b>	<b>0.004</b>	<b>.186</b>
	Error	4102.267	68	60.327			
	Total	1,338,336.038	71				

$p < 0.001$ ; Bonferroni Post Hoc test: The differences between the NATOOPS mean scores in "pretest" and "posttest", "pretest" and "follow-up test", and "posttest" and "follow-up test" were found to be significant. The differences between the JSENS mean scores in "pretest" and "posttest", and "pretest" and "follow-up test" were found to be significant

underscores the importance of actively supporting students in maintaining a positive and empathetic attitude, rather than just changing existing negative attitudes. In the present study, mixed-effects ANOVA results revealed a significant interaction between groups and time points. This shows that attitude scores of students in both the experimental and control groups significantly differed over time points (pre-test, post-test, and follow-up test) concerning their attitudes towards obesity and obese patients. Additionally, it was observed that the difference between groups changed over time, becoming particularly pronounced between the pre-test and post-test, as well as between the post-test and follow-up test. This demonstrates that attitudes regarding obesity and obese patients improved dramatically over time, with students in the intervention group demonstrating a significant rise in attitudes when compared to those in the control group. This also supports our H1 hypothesis. Compared to similar studies in the literature, these findings confirm the impact of mindfulness-based education supported by simulation applications on the development of empathy and attitudes (Dean et al., 2017; Levett-Jones et al., 2019; Sari et al., 2020). These findings indicate that MBET-OSS improves students' attitudes and empathy levels not just in the short term, but also in the long term. In particular, the continued differences between groups suggest that students can maintain their sensitivity towards obesity and obese patients in a sustainable manner, making these interventions applicable in clinical practices. These findings provide significant insights into how mindfulness and empathy education programs in health education can shape students' cognitive understanding and attitudes. Furthermore, the current study's analysis results demonstrate that MBET-OSS significantly influenced attitudes in sub-dimensions of NATOOPS, including responses to obese patients, causes that are under control that contribute to obesity, and stable characteristics of obese patients, in a more distinct manner. This indicates that the educational program had a profound impact on students' thoughts and emotions, especially in these sub-dimensions. Furthermore, one-way ANOVA results indicate a significant change over time in NATOOPS scores among students in the intervention group. Especially between the pre-test and post-test, pre-test and follow-up test, as well as post-test and follow-up test, significant differences have been observed. These findings demonstrate that MBET-OSS positively altered students' attitudes towards obesity and obese patients over time and these changes are sustainable. These findings highlight the training program's effectiveness and long-term impact in permanently changing students' attitudes. The positive effects of MBET-OSS on students' attitudes support the value of mindfulness-based approaches in the design and implementation of educational.

The findings from the analysis of empathy levels using the JSENS scale provide valuable insights into the impact

of MBET-OSS on nursing students' empathetic responses towards obesity and obese patients. The mixed-effect ANOVA results indicated a significant main effect of time, suggesting that empathy levels among participants changed over the course of the study. This change was emphasized further by the interaction effect between group and time, which revealed that empathy scores of students in both the experimental and control groups differed significantly depending on the time points (pre-test, post-test, and follow-up test). In particular, empathy scores in the intervention group increased significantly from pre-test to post-test, providing empirical support for the effectiveness of MBET-OSS in improving students' empathic understanding of obesity and obese patients. The study results strongly support the hypothesis (H2) that nursing students who received empathy training exhibit significantly higher levels of empathy compared to nursing students who did not receive any empathy training. The current study shows that the training program carried out has a high effect size (partial  $\eta^2 = 0.183$ ). Similarly, studies designed to improve empathy in understanding patients' experiences show that students can improve their ability to attend to the patient's inner world and indicate their feelings and desires to use behavioral skills or observable gestures to demonstrate their empathic understanding to patients (Eymard et al., 2010; Gür & Yilmaz, 2020; Lam et al., 2020; Orr et al., 2013; Sari et al., 2020). Examining the sub-dimensions of JSENS, it was observed that the impact of MBET-OSS was particularly pronounced in the areas of "compassionate care" and "perspective taking." The statistically significant interaction effect in these sub-dimensions emphasizes the specificity of the training's influence. This suggests that MBET-OSS not only improves general empathy but also fosters specific aspects of empathy that are important in healthcare contexts. Participants in the intervention group demonstrated heightened levels of compassion and a more profound ability to adopt the perspectives of obese patients, skills vital in the healthcare profession. Furthermore, the One-Way ANOVA findings show a significant change over time among students in the intervention group. This change is particularly evident between the pre-test and post-test, as well as between the pre-test and follow-up test. These findings raise intriguing questions about the long-term effects of students' increased empathy levels. The long-term sustainability of this increase, as well as its implications for therapeutic applications, are crucial areas for future research. Such studies could delve more deeply into the potential of educational programs in the healthcare field to enhance students' empathy levels. This could substantially contribute to making healthcare professionals more effective and sensitive in their future practices. In addition, the improvement in participants' empathic abilities in this study signifies that the program incorporates effective strategies to enhance students' empathy skills. Thus, the fundamental attentional

processes incorporated in the MBET-OSS, notably observation, identification, and mindful action, are thought to significantly influence the development of participants' empathy levels. The capacity to be aware of the present moment and to observe and identify internal emotions may enhance the likelihood of these abilities manifesting more prominently in social relationships. Additionally, the opportunity for students to assume the role of a patient through simulation garments is believed to facilitate their understanding of the patient's perspective and enhance their ability to consider the patient's emotions, needs, and concerns. In the literature, it is observed that empathy training incorporating comprehensive and experiential simulation-based interventions leads to a substantial change and variation in empathy scores (Bearman et al., 2015; Levett-Jones et al., 2019). For example, in an Orr et al. (2013) study in which sound devices were used to simulate the experience of hearing sound, participants stated that they gained valuable information about the reality faced by an individual who has hearing problems and that they should empathize and determine their communication strategies while talking to them. In another study, Sari et al. (2020) investigated the effect of using elderly simulation clothing on nursing students' empathy and attitudes toward the elderly, and it was determined that using elderly simulation clothing is an effective educational technique that contributes positively to the development of nursing students' empathy and also makes a positive change in their attitudes toward the elderly. These findings suggest that mindfulness practices implemented in student education not only increase empathy for quality nursing care but also trigger mechanisms that contribute to enhancing individual strengths and potentials, thus fostering personal and social skills.

Additionally, the high program participation rates show that participants are generally committed to the intervention and have a general interest in the MBET-OSS program. However, it should be taken into account when analyzing the study's findings as some participants were unable to finish the program and were thus unable to take the final tests. Given that four individuals withdrew from the program and only attended five sessions, an in-depth examination is required to comprehend the reasons behind these participants' withdrawals and the program's effects. Furthermore, it is important to consider the circumstances surrounding the three individuals who were unable to attend the last three sessions for personal reasons. This underscores the necessity for additional research on the factors that impact treatment adherence. Future research is therefore required to improve treatment adherence and sustain high participation rates by concentrating on program delivery and structure.

The following are the study's strengths: The fact that the research includes an innovative intervention method such as obesity simulation clothing may bring a new perspective to the literature on the subject. Positive changes observed

immediately after the intervention and during short-term follow-up provide valuable insights into the immediate effects of similar interventions. The use of the obesity simulation suit to assess participants' subjective experiences with obesity shows to be an important tool for understanding their emotional and cognitive reactions. The study creates opportunities for further investigation into innovative uses of obesity simulation methods, potentially enhancing their impact on both clinical practice and educational settings.

This study has some limitations as well as its strengths. The study was conducted in a specific context—nursing students in a particular university during a specific academic year. The findings might not be applicable to nursing students in different settings or from different cultural backgrounds. The study's assessment of attitudes and empathy levels relied on self-reported measures, which may not accurately represent actual behaviors or attitudes in clinical practice. Therefore, qualitative research methods such as semi-structured interviews or focus group discussions can be used to acquire a better understanding of participants' subjective experiences. While the study demonstrated positive changes in attitudes and empathy levels immediately after the intervention and during a 2-month follow-up, the long-term sustainability of these effects beyond the follow-up period was not evaluated. Long-term effects on attitudes and empathy could potentially differ from the observed short-term effects. Conducting a more extended follow-up could offer valuable insights into how the intervention's effects might evolve over time. Additionally, the unique aspect of the intervention involved the use of an obesity simulation suit. However, the limited duration of wearing the suit (30 min) might not fully capture the experiences of obese individuals. Real-life experiences related to obesity are intricate and multifaceted, and a brief simulation may not comprehensively reflect these complexities.

## Conclusion

The results of this study show that nursing students' attitudes and empathy levels toward obese patients are significantly impacted by Mindfulness-Based Empathy Training Supported with Obesity Simulation Suit (MBET-OSS). The results reveal that the intervention significantly improved students' attitudes and empathy, highlighting the efficacy of this novel approach in nursing education. The findings indicate that MBET-OSS not only improves in general empathy but also fosters particular aspects of empathy, such as compassionate care and perspective-taking, which are important in healthcare settings. The simulation-based experiences provided by the obesity simulation suit appear to facilitate a deep understanding of patients' perspectives, enabling students to develop empathetic responses effectively. Furthermore, the



study emphasizes the persistence of these favorable improvements over time, emphasizing the intervention's long-term influence. Educating nurses, who play a critical role in protecting individual health and increasing public well-being, about obesity during their school years before beginning their professional careers is critical. Assessing their biases against obese individuals and implementing interventions to reduce these biases not only enhances the quality of care provided to obese patients, but it also empowers nurses to battle unfavorable attitudes and behaviors common in society. Nurses, as respected members of the healthcare community, serve as role models, influencing public opinions and attitudes. Nurses can actively assist to minimizing societal discrimination against obese people by developing empathy and eliminating biases throughout their formative years. This, in turn, produces a more inclusive and accepting society, supporting general health and well-being. These results hold significant implications for nursing education and practice. Nursing schools can actively alter students' attitudes and empathy levels by introducing mindfulness-based training and simulation experiences into the curriculum. This not only improves the quality of healthcare services but also contributes to patients' general well-being. This study emphasizes the critical significance of innovative, immersive, and sympathetic education in developing healthcare workers who are not only knowledgeable but also caring. Studies should be carried out to assess the applicability of MBET-OSS-like programs in various health professional groups. Its impact on various health professionals such as doctors, nutritionists, and physiotherapists should be studied. Long-term follow-up studies should be conducted to evaluate the long-term effects of this type of training. Studies evaluating the permanent effects of this training on post-graduate clinical practices and interaction with patients are important.

**Author Contributions** Conceptualization, Methodology, Investigation, Analysis, Writing original draft, Review and editing, and Supervision: GCG (equal), EY (equal). Project administration: EY (lead), GCG (equal).

**Funding** Open access funding provided by the Scientific and Technological Research Council of Türkiye (TÜBİTAK). The authors acknowledge the financial support of The Scientific and Technological Research Council of Turkey (TUBITAK) for funding under project No: 119K885. The funding source had no role in the design or conduct of the study; collection, management, analysis and interpretation of data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

**Data availability** Data available upon request.

## Declarations

**Ethics approval** Ethics approval was obtained from the Ethics Committee of the Faculty of Medicine at Bingöl University in accordance with the Declaration of Helsinki (application number 2019/4). Formal

written information was obtained from the departments where the study was conducted.

**Consent to participate** All participants signed the written consent to participate in the study after being informed in detail about the study procedures. They were informed about the right to withdraw from the study at any stage of the study. The principle of “autonomy” was fulfilled by recruiting participants on a voluntary basis, and the principle of “privacy and protection of privacy” was met by assuring participants that any information obtained would be kept confidential.

**Consent for publication** Consent to publish based on de-identified data was obtained from all participants included in the study.

**Conflict of interest** All authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Baker, C. (2021). *House of commons library: Briefing paper number 3336, 12 January 2021: Obesity statistics*.
- Batt-Rawden, S. A., Chisolm, M. S., Anton, B., & Flickinger, T. E. (2013). Teaching empathy to medical students: An updated, systematic review. *Academic Medicine*, 88(8), 1171–1177.
- Bearman, M., Palermo, C., Allen, L. M., & Williams, B. (2015). Learning empathy through simulation: A systematic literature review. *Simulation in Healthcare*, 10(5), 308–319.
- Bland, A. J., & Tobbell, J. (2016). Towards an understanding of the attributes of simulation that enable learning in undergraduate nurse education: A grounded theory study. *Nurse Education Today*, 44, 8–13.
- Brown, I., & Thompson, J. (2007). Primary care nurses' attitudes, beliefs and own body size in relation to obesity management. *Journal of Advanced Nursing*, 60(5), 535–543.
- Buxton, B. K., & Snethen, J. (2013). Obese women's perceptions and experiences of healthcare and primary care providers: A phenomenological study. *Nursing Research*, 62(4), 252–259.
- Catak, P. D., & Oegel, K. (2010). Mindfulness as a therapy method. *Noropsikiyatri Arsivi-Archives Of Neuropsychiatry*, 47(1), 69–73.
- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, 15(5), 593–600.
- Chua, J. Y. X., Ang, E., Lau, S. T. L., & Shorey, S. (2021). Effectiveness of simulation-based interventions at improving empathy among healthcare students: A systematic review and meta-analysis. *Nurse Education Today*, 104, 105000.



- Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge.
- Dean, S., Foureur, M., Zaslowski, C., Newton-John, T., Yu, N., & Pappas, E. (2017). The effects of a structured mindfulness program on the development of empathy in healthcare students. *NursingPlus Open*, 3, 1–5. <https://doi.org/10.1016/j.npls.2017.02.001>
- Derksen, F., Bensing, J., & Lagro-Janssen, A. (2013). Effectiveness of empathy in general practice: A systematic review. *British Journal of General Practice*, 63(606), e76–e84.
- Dökmen, Ü. (2004). *İletişim çatışmaları ve empati*. Sistem Yayıncılık.
- Eymard, A. S., Crawford, B. D., & Keller, T. M. (2010). “Take a Walk in My Shoes:” Nursing students take a walk in older adults’ shoes to increase knowledge and empathy. *Geriatric Nursing*, 31(2), 137–141. <https://doi.org/10.1016/j.gerinurse.2010.02.008>
- Friedman, K. E., Ashmore, J. A., & Applegate, K. L. (2008). Recent experiences of weight-based stigmatization in a weight loss surgery population: Psychological and behavioral correlates. *Obesity*, 16(S2), S69–S74.
- Fry, H., Ketteridge, S., & Marshall, S. (2008). *A handbook for teaching and learning in higher education: Enhancing academic practice*. Routledge.
- Gür, G. C., & Yılmaz, E. (2020). The effects of mindfulness-based empathy training on empathy and aged discrimination in nursing students: A randomised controlled trial. *Complementary Therapies in Clinical Practice*, 39, 101140.
- Hunter, J., Rawlings-Anderson, K., Lindsay, T., Bowden, T., & Aitken, L. M. (2018). Exploring student nurses’ attitudes towards those who are obese and whether these attitudes change following a simulated activity. *Nurse Education Today*, 65, 225–231.
- Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31(6), 1041–1056.
- Kerasidou, A., & Horn, R. (2016). Making space for empathy: Supporting doctors in the emotional labour of clinical care. *BMC Medical Ethics*, 17(1), 1–5.
- Keyworth, C., Peters, S., Chisholm, A., & Hart, J. (2013). Nursing students’ perceptions of obesity and behaviour change: Implications for undergraduate nurse education. *Nurse Education Today*, 33(5), 481–485.
- Khoury, B., Lecomte, T., Gaudiano, B. A., & Paquin, K. (2013). Mindfulness interventions for psychosis: A meta-analysis. *Schizophrenia Research*, 150(1), 176–184.
- Kim, S. S., Kaplowitz, S., & Johnston, M. V. (2004). The effects of physician empathy on patient satisfaction and compliance. *Evaluation & the Health Professions*, 27(3), 237–251.
- Lam, A. H. Y., Lin, J. J., Wan, A. W. H., & Wong, J. Y. H. (2020). Enhancing empathy and positive attitude among nursing undergraduates via an in-class virtual reality-based simulation relating to mental illness. *Journal of Nursing Education and Practice*, 10(11), 1. <https://doi.org/10.5430/jnep.v10n11p1>
- Lee, M., Ata, R. N., & Brannick, M. T. (2014). Malleability of weight-biased attitudes and beliefs: A meta-analysis of weight bias reduction interventions. *Body Image*, 11(3), 251–259.
- Levett-Jones, T., Cant, R., & Lapkin, S. (2019). A systematic review of the effectiveness of empathy education for undergraduate nursing students. *Nurse Education Today*, 75, 80–94.
- Luck-Sikorski, C., Riedel-Heller, S., & Phelan, J. (2017). Changing attitudes towards obesity—results from a survey experiment. *BMC Public Health*, 17(1), 1–13.
- Menekli, T., Yildirim, Y., & Fadiloğlu, Ç. (2018). An Examination of the validity and reliability of the Turkish version of the nurses’ attitudes toward obesity and obese patients (Natoops) scale. *COJ Nursing & Healthcare*, 3, 258–264.
- Moudatsou, M., Stavropoulou, A., Philalithis, A., & Koukouli, S. (2020). The role of empathy in health and social care professionals. *Healthcare (Basel)*, 8(1), 26.
- Nicholls, W., Pilsbury, L., Blake, M., & Devonport, T. J. (2016). The attitudes of student nurses towards obese patients: A questionnaire study exploring the association between perceived causal factors and advice giving. *Nurse Education Today*, 37, 33–37.
- Norton, K., & Olds, T. (1996). *Anthropometrica: A textbook of body measurement for sports and health courses*. UNSW press.
- O’Keeffe, M., Flint, S. W., Watts, K., & Rubino, F. (2020). Knowledge gaps and weight stigma shape attitudes toward obesity. *The Lancet Diabetes & Endocrinology*, 8(5), 363–365.
- Orr, F., Kellehear, K., Armari, E., Pearson, A., & Holmes, D. (2013). The distress of voice-hearing: The use of simulation for awareness, understanding and communication skill development in undergraduate nursing education. *Nurse Education in Practice*, 13(6), 529–535.
- Ozcan, C., Oflaz, F., & SutcuCicek, H. (2010). Empathy: The effects of undergraduate nursing education in Turkey. *International Nursing Review*, 57(4), 493–499.
- Pearl, R. L., Puhl, R. M., & Brownell, K. D. (2012). Positive media portrayals of obese persons: Impact on attitudes and image preferences. *Health Psychology*, 31(6), 821.
- Phelan, S. M., Burgess, D. J., Yeazel, M. W., Hellerstedt, W. L., Griffin, J. M., & van Ryn, M. (2015). Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obesity Reviews*, 16(4), 319–326.
- Ridderinkhof, A., de Bruin, E. I., Brummelman, E., & Bögels, S. M. (2017). Does mindfulness meditation increase empathy? *An Experiment. Self and Identity*, 16(3), 251–269.
- Russell, L., & MacDonald, C. (2018). A qualitative study to explore the impact of simulating extreme obesity on health care professionals’ attitudes and perceptions. *Ostomy/Wound Management*, 64, 18–24.
- Russell, N., & Carryer, J. (2013). Living large: The experiences of large-bodied women when accessing general practice services. *Journal of Primary Health Care*, 5(3), 199–205.
- Sari, D., Taskiran, N., Baysal, E., Acar, E., & CevikAkyil, R. (2020). Effect of an aged simulation suit on nursing students’ attitudes and empathy. *European Geriatric Medicine*, 11(4), 667–675.
- Schwartz, M. B., Chambliss, H. O., Brownell, K. D., Blair, S. N., & Billington, C. (2003). Weight bias among health professionals specializing in obesity. *Obesity Research*, 11(9), 1033–1039.
- Sert, H., Seven, A., & Çetinkaya, S. (2016). Evaluation of prejudice against obesity in health high school students. *Online Türk Sağlık Bilimleri Dergisi*, 1, 9–17.
- Stone, O., & Werner, P. (2012). Israeli dietitians’ professional stigma attached to obese patients. *Qualitative Health Research*, 22(6), 768–776.
- Tanneberger, A., & Ciupitu-Plath, C. (2018). Nurses’ weight bias in caring for obese patients: Do weight controllability beliefs influence the provision of care to obese patients? *Clinical Nursing Research*, 27(4), 414–432.
- Terezam, R., Reis-Queiroz, J., & Hoga, L. A. K. (2017). The importance of empathy in health and nursing care. *Revista Brasileira De Enfermagem*, 70, 669–670.
- Terzioğlu, F., Kapucu, S., Özdemir, L., Boztepe, H., Duygulu, S., Tuna, Z., & Akdemir, N. (2012). Simülasyon yöntemine ilişkin hemşirelik öğrencilerinin görüşleri. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi*, 19(1), 16–23.

- Tomiyama, A. J. (2014). Weight stigma is stressful. A review of evidence for the cyclic obesity/weight-based stigma model. *Appetite*, 82, 8–15.
- Usta, E., Bayram, S., & AltınbaşAkkaş, Ö. (2021). Perceptions of nursing students about individuals with obesity problems: Belief, attitude, phobia. *Perspectives in Psychiatric Care*, 57(2), 777–785.
- van Vliet, M., Jong, M. C., & Jong, M. (2018). A mind–body skills course among nursing and medical students: A pathway for an improved perception of self and the surrounding world. *Global Qualitative Nursing Research*, 5, 2333393618805340.
- Ward, J., Schaal, M., Sullivan, J., Bowen, M. E., Erdmann, J. B., & Hojat, M. (2009). Reliability and validity of the Jefferson Scale of Empathy in undergraduate nursing students. *Journal of Nursing Measurement*, 17(1), 73.
- Watson, L., Oberle, K., & Deutscher, D. (2008). Development and psychometric testing of the nurses' attitudes toward obesity and obese patients (NATOOPS) scale. *Research in Nursing & Health*, 31(6), 586–593.
- West, C. P., Huschka, M. M., Novotny, P. J., Sloan, J. A., Kolars, J. C., Habermann, T. M., & Shanafelt, T. D. (2006). Association of perceived medical errors with resident distress and empathy: A prospective longitudinal study. *JAMA*, 296(9), 1071–1078.
- Winning, A. P., & Boag, S. (2015). Does brief mindfulness training increase empathy? The role of personality. *Personality and Individual Differences*, 86, 492–498.
- World Health Organization. (2018). *Obesity and overweight*. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>. Accessed Feb 2020.
- Yanik, A., & Saygılı, S. (2014). Validity and reliability of the turkish version of jefferson scale of empathy for nursing Students/Hemsirelik öğrencileri için jefferson empati ölçeğinin türkçe versiyonunun geçerlik ve güvenilirliği. *Türkiye Klinikleri. Tıp Bilimleri Dergisi*, 34(1), 111.
- Yılmaz, H. Ö., & Yabancı Ayhan, N. (2019). Is there prejudice against obese persons among health professionals? A sample of student nurses and registered nurses. *Perspectives in Psychiatric Care*, 55(2), 262–268. <https://doi.org/10.1111/ppc.12359>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.