



## Original Article

## The Effectiveness of Training Mindfulness, Self-Compassion, and Self-Regulation on Physical Activity Enjoyment among Obese and Overweight Students

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### ARTICLE INFO

*Article History:*

Received: 26/11/2018

Revised: 25/12/2018

Accepted: 30/12/2018

*Keywords:*

Enjoyment

Mindfulness

Self-compassion

Self-regulation

Physical activity

### ABSTRACT

**Background:** Today, lifestyle-associated health problems are increasing, while healthy behaviors could reduce their consequences, e.g. mortality. The physical activity enjoyment (PAE) is one of the most important factors which might lead to enhanced physical activity, as a protective factor of chronic diseases and mental disorders. The main purpose of this research was to study the effectiveness of educating mindfulness, self-compassion and self-regulation on the PAE of obese and overweighted students.

**Methods:** This is a semi-experimental pre-post study on the effects of educational interventions on the PAE among the high-school students. After informing all participants about the goals of the research, through a list generated based on block randomization methods with size 4 in each block, they were divided randomly into 4 training groups (17 students per group). To assess the PAE, the valid and reliable version of 18-items questionnaire made by Kendzierski and Decarlo (1991) was employed.

**Results:** All participants were in grade 9 aging 14-16 years. Their BMI had a mean of  $32.10 \pm 2.35$  (ranged 26.22 to 37.28). All of the experimental groups had significantly higher levels of PAE than the control group.

**Conclusion:** The educational methods had a significant effect on increasing PAE. Mindfulness, self-compassion, and self-regulation might be used as educational methods to increase the PAE.

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### Introduction

Today, lifestyle-related health problems are increasing [1], while healthy behaviors could reduce their consequences, e.g. mortality [1-3]. Lack of physical activity as a healthy behavior is positively associated with increased risk of obesity, chronic diseases such as cardiovascular diseases, mental health disorders, and eventually mortality [4].

Enjoyment is proposed as an important factor that

affects humans' behaviors [3]. The physical activity enjoyment (PAE), as positive feelings obtained from physical activity, is one of the most important factors which might lead to enhanced physical activity [2, 3]. In addition, students who enjoy physical exercise and physical activities in the school experience heightened self-efficacy, sense of achievement [5], self-determination [6], orientation of assignment [7], the sense of desirability, and perceived competence [8].

In recent years, obesity, as an emerging health problem, can negatively affect the students and cause psychological and educational problems [9]. Obesity has increased dramatically in many developing countries [10]. The prevalence of obesity among adults in

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European countries ranges from 10% to 25%, and from 20% to 25% in North America [11]. In Iran, prevalence of obesity has been reported to be high varying between 18.5% and 25% for adults and 5.4% and 6.8% for the population under 18 years [12]. Diminished physical activity from childhood to adulthood, particularly in girls, might lead to inactivity and harmful health outcomes e.g. obesity [13]. Studies have suggested that the PAE can effectively improve the physical activity among children and adolescents thereby improving their health status [4, 13].

Because of the nature of PAE i.e. being related to motivations, cognition, and relying on the internal rewards instead of external ones, the proposed strategies that might affect it could be learning methods such as self-compassion, mindfulness, and self-regulation [2, 3].

Accordingly, this research attempts to evaluate the effectiveness of three educational methods, self-compassion, mindfulness, and self-regulation, on the improving PAE among the high-school over-weight students.

## Methods

### *Participants*

This is a semi-experimental pre-post study examining the effects of educational interventions on the physical activity enjoyment (PAE) among high-school students. Having coordinated with the officials of high schools randomly selected based on the multistage sampling in the capital city of Tehran, female students who were overweight or obese ( $BMI \geq 25$ ), were selected for the subsequent steps.

After selection of over-weight and obese students (350 samples), those who also had educational welfare problems were identified during an interview by the research team. Finally, 68 over-weight students with an educational welfare problem and willing to enroll in the study participated in the study.

The inclusion criteria were being female students in high school with educational welfare problems, without any diagnosed mental disorders and acute illness, and no history of using any kind of psychological drugs.

Students with normal weight, without educational welfare problems, with psychological disorders and history of mental illness, users of any kind of medications, or having symptoms of depression and anxiety due to physical disorders were excluded from the study.

### *Interventions*

After informing all participants about the goals of the research, through a list generated based on the block randomization methods with size 4 in each block, they were divided randomly into 4 training groups (17 students per group).

Experimental groups consisted of training self-compassion, mindfulness, and self-regulation. A group receiving no training was also considered as control.

During two months, eight 1.5-h sessions (one session per week) were devoted independently for teaching and

training each experimental group.

Self-regulation was taught to the students based on the Pintrich Model (1999) [13], mindfulness based on the Kabat Zein et al. (1992) [14], and self-compassion based on the Gilbert model (2009) [15]. The study protocol was approved by the Shahid-Beheshti University.

### *Outcome Measurement*

After completing the education, to assess the enjoyment of physical activity, the 18-item questionnaire developed by Kendzierski and Decarlo (1991) [16] was employed. On this scale, the subjects are asked to determine how they feel about their physical activity based on a 7-degree Likert scale. People with higher score on this scale have more enjoyment of physical activity. After forward-backward translation of the questions, the final translated questionnaire was reviewed by the research team. In addition, we confirmed the validity and reliability of the questionnaire based on the 50 samples of the over-weight and obese students. The Cronbach's alpha of 0.78 indicated good internal consistency of the questionnaire. All participants were asked to respond to the questionnaire before and after of the training programs.

### *Statistical Analysis*

Quantitative and qualitative variables were described using mean  $\pm$  standard deviation (SD) and frequency (percent), respectively. The Kruskal-Wallis test was used for comparison of quantitative variables between the groups. The Mann-Whitney test was employed for post hoc multiple comparisons. The changes within the groups were examined through the Wilcoxon test. The qualitative variables were compared between the groups using the chi-square test. All statistical analyses were performed by statistical package for social sciences (SPSS) version 25. A P value less than 0.05 was considered as statistically significant.

## Results

All participants were in grade 9 and aged between 14 and 16 years. Their mean height and weight were  $162.85 \pm 7.91$  (ranged 150 to 176 cm) and  $85.03 \pm 7.27$  (ranged 70 to 97 kg), respectively. Their BMI had a mean of  $32.10 \pm 2.35$  (ranged 26.22 to 37.28). A total of 14.7% of participants were over-weight ( $25 \leq BMI < 30$ ) and the rest were obese. Weight, height, and BMI were not significantly different between the groups. GPA and self-reported socio-economic status were also the same across the groups. Table 1 presents the comparison of the demographic characteristics between the groups.

PAE before the training was not significantly different between the groups ( $P=0.846$ ). However, all of the experimental groups were significantly different from the control group. Pairwise comparisons of self-compassion, mindfulness, and self-regulation indicated no significant difference. Table 2 reports the details of comparison of enjoyment in physical activity within and between the groups.

**Table 1:** comparison of the demographic characteristics between the groups

		Self-compassion	Mindfulness	Self-regulation	Control	P value
GPA		17.12±1.62	17.34±1.53	16.53±1.59	16.41±1.37	0.275
Weight, kg		84.64±7.14	86.23±7.25	84.29±8.49	84.94±6.58	0.827
Height, cm		161.70±8.74	166.64±5.92	160.29±7.87	162.76±8.05	0.147
BMI, kg/m <sup>2</sup>		32.40±2.01	31.07±2.43	32.79±2.26	32.14±2.54	0.338
Obesity status	Over-weight	1(5.9)	4(23.5)	2(11.8)	3(17.6)	0.668
	Obese	16(94.1)	13(76.5)	15(88.2)	14(82.4)	
Socio-economic status	Poor	5(29.4)	9(52.9)	3(17.6)	7(41.2)	0.495
	Moderate	6(35.3)	5(29.4)	8(47.1)	5(29.4)	
	Good	6(35.3)	3(17.6)	6(35.3)	5(29.4)	

**Table 2:** comparison of enjoyment in physical activity within and between the groups

	Before	After	P value	Change (after - before)
Self-compassion	68.35 ± 10.09	92.82 ± 6.56a	0.001	24.47 ± 10.03a
Mindfulness	67.35 ± 7.67	92.82 ± 7.09a	0.001	25.47 ± 10.61a
Self-regulation	66.58 ± 11.59	91.64 ± 6.83a	0.001	25.05 ± 10.15a
Control	69.64 ± 9.12	74.23 ± 8.70	0.001	4.58 ± 3.84
P value	0.846	0.001		0.001

\*The same lower-case letters within columns indicate significant differences between the groups

## Discussion

This study examined the effects of the educational methods, i.e. self-compassion, mindfulness, and self-regulation, on improving the PAE among high school over-weight and obese students. Although all of the three methods were not significantly different, they indicated achievement of higher levels of PAE than the control group.

Our results were in line with previous studies suggesting the effectiveness of the mind-consciousness on the apparent assessment, satisfaction with certain areas of the body, and muscle building [14-17].

The studies had shown that mindfulness was related to the apparent perception and satisfaction with areas of the body after taking into account negative emotions and body mass index [18-20]. The results revealed that men with a high level of consciousness are characterized by the momentary attention and vigilance of their experiences. They have the greatest bodily satisfaction and the least reluctance to follow their muscles instantly. For example, they continuously weigh themselves, they use various energy materials and strive to increase their muscle mass. Therefore, mindfulness, either directly or indirectly, can have a significant effect on the physical activity of these individuals [18-20]. Indeed, mindfulness creates a different attitude or relationship with thoughts, feelings, and emotions, which involves maintaining full and instant attention and having an attitude of acceptance and judgment. Through mind-set-based exercises and techniques, one becomes aware of their daily activities and of the automatic functioning of mind in the past and future world, through instantaneous awareness of thoughts, emotions, and physical states on them. It is controlled and abandoned from the everyday and automated mindsets focused on the past and the future, so the same factors reduce nutritional disorders in students and cause activity enjoyment [21]. Self-awareness is associated with a decline in eating sweets

and fasting glucose levels. Also, the findings suggested that self-conscious eating may lead to weight loss. Some studies reviewed an interesting study as an intervention for eating disorder, eating and weight loss. They concluded that the mind effectively focused on emotional overeating and eating in the affected population. In this regard, therefore, the effects of mindfulness training can make these people more intelligent about their bodies, and they realize they need to be sensitive about their weight in order to gain social acceptance [21, 22].

Students who were overweight and learned self-compassion indicated that if they were more caring, they would make their physical activity more enjoyable, which was confirmed by previous research [23-25]. The studies suggest that self-compassion can enhance individual well-being as it helps people feel secure, connected, and relaxed [26]. Harvard, D. suggested using self-concept thinking which is based on the principles of evolutionary biology, neurobiology, and attachment theory, with self-compassion suggesting a system of threats with insecurity, defensiveness, and limbic system related to the problem activating the self-alleviating system associated with the emotional attachment safety and the security of the opiate system [20]. Therefore, in overweight people, self-compassion may also change their neurological processes and increase their safety and safety, which will provide a basis for changing the physical activity system. It assumes the self-pacifying features of self-compassion, intimacy, effective regulation of emotion, successful exploration, and success with the environment. Self-referencing in many respects can be considered as an emotion regulation strategy. It is beneficial to overweight people, where painful and distressing feelings are brought to the consciousness of the person, rather than being avoided, with kindness, insight, and sense of humanity.

In addition, it is known that in the self-regulation system, an individual systematically sets his thoughts, feelings, and behaviors in achieving the desired goals.

Therefore, it is justifiable to consider the effectiveness of self-regulation on the PAE [21, 22, 27]. Self-regulation is a powerful predictor of student persistence [15]. It is suggested that education and planning play an important role in emotional learning and patient education. Therefore, when self-regulation prompts students to pursue their goals better, dietary goals and weight loss may be one of the goals of these individuals. Increasing physical activity can play an important role in weight loss in high school students, which requires increased physical activity. Indeed, high school students need to be able to work on their own ideas in order to be able to share them with other friends and peers for gaining social acceptance. This may be the reason why science students enjoy physical activity.

## Conclusion

The educational methods had a significant effect on enhancing PAE. Mindfulness, self-compassion, and self-regulation might be used as educational methods to increase the PAE.

## Acknowledgment

This article is part of a Ph.D. thesis written by Reza Nazeri in Shahid Beheshti University. The authors gratefully acknowledge the children and their families who participated in the study. This study was reviewed and ethical approval was received through the Psychology Department of Shahid Beheshti University.

**Conflict of interest:** None declared.

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