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Research Article

THE INTERACTION BETWEEN EXERCISE ADDICTION AND NUTRITIONAL LEVELS AMONG STUDENTS OF THE FACULTY OF HEALTH SCIENCES: A CROSS-SECTIONAL STUDY

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Abstract: *Physical exercise is a voluntary, planned, structured, continuous activity aimed at developing and improving body and physical fitness. While nutrition constitutes one dimension of healthy lifestyle behaviors, exercise and physical activity constitute the other dimension. We aimed to examine the relationship between healthy nutrition levels and exercise addiction levels of students studying at the faculty of health sciences. Our study was performed on 133 students studying at Sakarya University of Applied Sciences, Faculty of Health Sciences. The nutrition levels of the participants were assessed with the Nutrition Exercise Behavior Scale (NEBS) and exercise dependence levels were assessed with the Exercise Dependence Scale (EDS). The mean values of age and body mass index of the subjects were 21.83±4.21 and 18.13±3.09, respectively. There were statistically significant and weak correlations between participants' healthy eating habits and exercise dependence level (r=0.386 - p<0.001), Extreme Focus and Emotion Change (r=0.376 - p<0.001), Postponement of Individual-Social Needs and Conflict (r=0.285 - p=0.001), and Tolerance Development and Passion (r=0.295 - p=0.001). There was a positive correlation between exercise addiction levels and various factors, including healthy nutrition levels, extreme focus and emotion change related to exercise, postponement of individual-social needs leading to conflicts, and the development of tolerance and passion for exercise. Interestingly, as students' exercise levels increased, they tended to prioritize maintaining healthy nutrition habits. These findings highlight the intricate interplay between healthy behaviors, exercise habits, emotional responses, social dynamics, and addiction-like tendencies, underscoring the influence of individual differences and environmental factors in shaping exercise-related behaviors among health sciences students.*

Keywords: *healthy eating, exercise, university student, addiction*

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1. Introduction

Living a healthy life requires that the human body is free from any discomfort or disability that may affect or limit daily life. This is extremely important to improve the quality of life of individuals and to preserve their freedom to do the activities they want. Therefore, adopting a healthy lifestyle and staying away from diseases is one of the most important tasks for people. This is because being healthy means being at full capacity both physically and mentally. However, an unbalanced diet can also have negative effects on physical health. Not getting the nutrients the body needs can lead to lower energy levels and a feeling of inadequacy when doing daily tasks. Therefore, for a healthy life, it is important to exercise regularly, eat a balanced diet, and keep up with health check-ups. In this way, we can avoid

diseases that affect the body, improve the quality of life, and perform the desired activities in a healthy way [1]. People who exercise regularly to achieve a healthy physical and physiological state may have different body structures and physical characteristics than those who do not exercise. In people who exercise regularly, the heart and lungs respond faster to exercise. This immediate response stimulates the human system to increase blood pumping and improve the circulation of oxygen. This results in increased muscle strength and endurance, while the flexibility of the joints increases and the risk of injury decreases.[2]. Regular exercise also helps with weight control by increasing the burning of body fat. In addition, key conditions for being clinically healthy include regular participation in exercise, eating a proper and balanced diet, controlling weight, avoiding alcohol and drug use, regular self-care, avoiding stress, using relaxation techniques, and getting enough sleep. These healthy living habits improve overall health and help prevent illness [3].

Nutrition plays a pivotal role in determining individuals' overall health status. While it's largely shaped by personal choices, maintaining a healthy diet is crucial for a well-rounded lifestyle [4]. The rise of digitalization in the evolving global landscape has led to an increase in sedentary lifestyles [5]. Moreover, recent challenges, such as those posed by the pandemic, have triggered shifts in people's behaviors and attitudes towards nutrition. The undergraduate phase is particularly crucial in shaping one's lifestyle, whether it leans towards healthiness or unhealthiness[6]. During this period, stress levels tend to rise, external factors gain more influence, and there's a propensity to resort to fast food due to being away from family and developing irregular eating patterns[7].

Behavioral addiction, distinct from substance-related addiction, showcases addictive traits through activities such as gaming, internet use, or exercise [8]. Detection of behavioral addiction employs criteria akin to those for substance addiction, encompassing mood alterations, tolerance, attentional focus, withdrawal symptoms, relapse proclivity, and interpersonal conflicts [9]. Exercise addiction specifically denotes persistent engagement in exercise despite experiencing emotional disturbances upon cessation. Individuals may prioritize exercise over obligations, escalate exercise parameters indiscriminately, and experience a sense of incompleteness or frustration in its absence, even in compromised health states [10]. Addiction is a condition in which repetitive and compulsive behaviors can negatively affect daily life. This includes excessive exercise, and sometimes such behaviors can negatively affect people's work, education, or social life [11]. Research shows that the risk of depression can increase when exercise is excessive. Exercise is often recommended as an important part of a healthy lifestyle. However, the type, duration, and intensity of exercise can affect a person's physiology and metabolism. Therefore, it is important to understand the relationship between athletic performance, heavy exercise, and physiological changes [12, 13]. Exercise addiction, like other addictions, is a controversial topic. Some experts argue that withdrawal symptoms from lack of psychoactive substance should be among the symptoms of a true addiction, while exercise addiction can be difficult to diagnose. Exercise addiction often involves behaviors such as over-exercising, devoting excessive time to exercise, and exercising so intensely that it causes negative effects on physical health [10]. Some research suggests that this type of addiction may develop depending on personal factors such as personality traits, psychological factors, age and gender [14]. In summary, exercise addiction is often associated with excessive exercise habits that impair physical health and, in some cases, can lead to psychological problems. More research needs to be done on this topic and diagnostic criteria need to be clarified. It is also important to find the balance between the benefits of exercising with a healthy lifestyle and the harms of excessive exercise. Literature contains various studies to determine the healthy eating and physical exercise habits of university students [15-17]. It is important for students of the faculty of health sciences to receive education on health, to develop healthy lifestyle behaviors and therefore to determine their levels of exercise addiction and healthy nutrition behavior. Additionally, examining the relationship between healthy life parameters can show that those who are careful about

their health may not be careful about their health on the other hand. It is seen that there are limited studies on this subject in the literature and it is noteworthy that more studies on the subject are needed. For this reason, our study aimed to examine the relationship between healthy nutrition levels and exercise addiction levels of students studying at the faculty of health sciences. At the end of the study, we aim to provide new information to the literature on exercise addiction and eating habit change, which are increasingly widespread in today's societies, for students of the faculty of health sciences.

2. Materials and Methods

2.1. Research Type

A cross-sectional - correlational study type.

2.2. Population and Sample

This cross-sectional and descriptive study population consisted of students at Sakarya University of Applied Sciences, Faculty of Health Sciences in the 2023-2024 academic year. G-power 3.1 program was used to calculate the number of people included in the study. Taking the Extreme Focus and Emotional Shifts value, which is the subdivision of the exercise addiction scale in the reference article, it was found that it was sufficient to include 112 people in the study with an effect size of 0.347, 95% confidence interval and 0.05 margin of error. 133 students participated in the study conducted between October 25, 2023 and February 2024. Participants' demographic information (age, weight, height, body mass index) and incomes were recorded. Descriptive statistics for the research are given in Table 1.

Table 1. Evaluation parameters

Evaluation parameters	Mean±SD
Age (year)	21.83±4.21
Weight (kg)	60.20±11.76
Height (cm)	165.62±7.56
BMI (kg/m2)	18.13±3.09
Healthy eating exercise behaviour (14-70)	47.56±6.22
Unhealthy eating exercise behaviour (14-70)	41.43±5.63
Meal pattern (6-30)	20.48±3.75
Psychological/addictive eating behaviour (11-55)	33.72±7.20
Exercise Addiction level (17-85)	47.29±8.34
Extreme Focus and Emotion Change (7-35)	27.28±3.86
Postponement of Individual-Social Needs and Conflict (6-30)	13.17±3.12
Tolerance Development and Passion (4-20)	9.85±2.98

SD: Standard deviation

2.3. Data Collection Instruments

The levels of exercise dependence were assessed with the Exercise Dependence Scale (EDS) and the level of nutrition was assessed with the Nutrition Exercise Behavior Scale (NEBS).

2.3.1 Exercise Dependence Scale (EDS):

The validity and reliability study were conducted by Demir et al. in order to measure the exercise dependence of the participants. This measurement tool consists of a 5-point Likert-type scale. The sub-dimensions of the scale are; Postponement of Individual and Social Needs (8, 9, 10, 11, 12, 13), Conflict,

Overfocus and Emotion Change (1, 2, 3, 4, 5, 6, 7) and Tolerance Development and Passion (14, 15, 16, 17). The scale consists of 3 sub-dimensions and 17 questions [18].

2.3.2 Nutrition Exercise Behavior Scale (NEBS)

The NEBS is a five-point Likert-type scale comprising 45 items categorized into four sub-factors. Participants rate each item based on how well it describes them, with options ranging from "Completely defines me=5" to "Does not define me at all=1". However, specific items within the scale (7, 8, 9, 10, 11, 12, 14, 15, 17, 18, 20, 22, 30, 31, 32, 34, 35, 36, 37, 38, 39, 42, 43) may present positive statements but signify negative behaviors, impacting the overall scoring. The scale's scoring is divided into sub-dimensions and evaluated based on the total scores obtained. The "Psychological/Addictive Eating Behavior" sub-factor ranges from 11 to 55, with higher scores indicating more pronounced psychological or dependent eating behaviors. The "Healthy Eating-Exercise Behavior" sub-factor spans from 14 to 70, with elevated scores representing positive engagement in healthy diet and exercise habits. Conversely, the "Unhealthy Diet-Exercise Behavior" sub-factor also ranges from 14 to 70 but signifies unhealthy diet and exercise patterns with higher scores indicating such behaviors. Lastly, the "Meal Pattern" sub-factor encompasses scores between 6 and 30, with higher scores reflecting better meal ordering habits [19].

2.4. Ethical statement:

The present study was conducted in accordance with research and publication ethics. Approval for this study was obtained from Sakarya University of Applied Sciences Ethics Committee on 19.10.2023 with the number E.102278.

2.5. Data Analysis

In this study, descriptive statistics were used to summarize both categorical and numerical variables. For categorical variables, frequencies were employed to describe the distribution of categories. Meanwhile, numerical variables were described using mean ± standard deviation values, providing insights into central tendency and dispersion. Correlations between variables were analyzed using the Spearman Correlation Test, with correlation coefficients interpreted based on predefined criteria: very weak correlation if < 0.2, weak correlation between 0.2 and 0.4, moderate correlation between 0.4 and 0.6, high correlation between 0.6 and 0.8, and very high correlation if > 0.8. The statistical software SPSS 27, developed by IBM Inc. in Chicago, IL, USA, was utilized for data analysis. These statistical methods and software ensure a robust analysis, facilitating a deeper understanding of the relationships and patterns within the data.

3. Results

Participants' mean age and body mass index (BMI) were 21.83±4.21 and 18.13±3.09, respectively. Table 1 shows the means and standard deviations of the parameters evaluated and analyzed for correlation. When the monthly income levels of the participants were evaluated, it was seen that 34 (25.6%) people had an income between 0-500 TL, 16 (12.0%) people had an income between 500-1000 TL, 52 (39.1%) people had an income between 1000-2000 TL, 16 (12.0%) people had an income between 2000-3000 TL, and 14 (10.5%) people had an income between 3000-5000 TL.

There were statistically significant and weak correlations between participants' healthy eating habits and exercise dependence level ($p<0.001$), Extreme Focus and Emotion Change ($p<0.001$), Postponement of Individual-Social Needs and Conflict ($p=0.001$), and Tolerance Development and Passion ($p=0.001$). When we looked at the correlation between the sub-parameters of the Nutrition

Exercise Behavior Scale and the parameters of the Exercise Dependence Scale, there was no significant correlation (see Table 2).

Table 2. Correlation of exercise and nutrition data

	Exercise Addiction level		**Extreme Focus and Emotion Change**		**Postponement of Individual-Social Needs and Conflict**		**Tolerance Development and Passion**	
	r	p	r	p	r	p	r	p
Healthy Eating Exercise Behavior	0.386	**<0.001***	0.376	**<0.001***	0.285	**0.001***	0.295	**0.001***
Unhealthy Eating Exercise Behavior	0.073	0.401	-0.150	0.085	0.038	0.666	-0.051	0.562
Meal Pattern	0.005	0.958	-0.021	0.807	0.048	0.583	-0.010	0.911
Psychological/Addictive Eating Behavior	0.008	0.927	-0.037	0.676	0.096	0.274	-0.031	0.726

r: Pearson Correlation, *p<0.001

4. Discussion

The aim of this study was to assess the prevalence of exercise and nutritional habits among university students enrolled in the Faculty of Health Sciences, as well as to examine the potential relationship between these habits. Analyzing participants' exercise addiction levels based on their self-perceptions revealed that those who perceived themselves as having high exercise addiction also scored high on the sub-dimensions and overall dimension of the EDS. Several factors and theories can elucidate these findings. Firstly, exercise addiction denotes a strong dedication to exercising, while perceived exercise addiction reflects individuals' awareness of their own addiction levels. This perception can intensify their commitment to exercise, prompting them to engage in more physical activity. In line with existing literature, Paksoy et al. noted that individuals who believed they were exercise addicts exhibited the highest scores in dimensions such as postponement of individual-social needs and conflict, as well as tolerance development and passion [20]. Similarly, Karabıyık et al. found that those who perceived themselves as exercise addicts scored highest across all dimensions of the exercise addiction scale, followed by those who were undecided and those who did not consider themselves exercise addicts [21]. Particularly among the younger generation, having a negative body image or idealizing a certain size can lead to excessive participation in exercise. According to a study, women's reasons for participating in sports are to keep fit, lose weight, relax, socialize and have fun, while men's reasons are to exercise, have fun, relax, lose weight and socialize [22].

There's a statistically significant but weak correlation between participants' healthy eating habits and their level of exercise dependence. This implies that while there is a relationship between these two variables, it's not a particularly strong one. It could suggest that having healthier eating habits doesn't strongly predict exercise dependence. Similarly, there's a significant but weak correlation between extreme focus and emotion change in relation to exercise habits. This could indicate that individuals who exhibit extreme focus on exercise may also experience more significant emotional changes related to their exercise routines. The correlation between postponement of individual-social needs and conflict is significant. This suggests that individuals who tend to postpone their individual or social needs due to exercise may also experience conflicts related to this behavior. The correlation between tolerance development and passion related to exercise is also significant. This could mean that individuals who develop a tolerance to exercise (possibly needing more exercise to achieve the same effects) may also have a stronger passion for exercise. The lack of significant correlation between the sub-parameters of the Nutrition Exercise Behavior Scale and the parameters of the exercise addiction scale is interesting.

We suggest that specific behaviors related to nutrition and exercise addiction may not be strongly linked or may be influenced by different factors. This could indicate that while healthy eating habits might be related to exercise habits in general, they may not directly correlate with addiction-like behaviors specifically related to exercise. Overall, our findings provide insights into the complex relationships between healthy behaviors, exercise habits, emotional responses, social dynamics, and addiction-like tendencies related to exercise. we suggests that these factors interact in nuanced ways and may be influenced by various individual differences and environmental factors. There are several studies in the literature on eating habits and exercise. When we examine these; Türkoğlu et al. discovered a significant variance in total healthy eating scores based on exercise participation, indicating higher healthy eating attitudes among active individuals. They also noted differences in the nutritional knowledge sub-dimension and feeling toward nutrition sub-dimension based on physical activity status. Conversely, no distinctions were found in the Nutrition Positivity and Malnutrition sub-dimensions [23, 24]. Furthermore, Arı and Çakır similarly found significant differences in healthy eating scores related to physical activity, especially due to regular physical activity, with higher scores observed among those engaging in activities 3-4 times a week. This positive difference was particularly evident in the positive nutrition sub-dimension. The researchers suggest that practicing regular physical activity alongside healthy nutrition likely contributed to these findings. It's noted that the level of physical activity plays a direct role in shaping healthy lifestyle behaviors, aligning with previous literature findings [25]. Overall, these results mirror findings from existing research, highlighting the intertwined relationship between physical activity levels, healthy nutrition attitudes, and overall lifestyle habits [26]. In general, we see that we obtained similar results with the literature.

5. Conclusion and Recommendation

As a result, although the exercise addiction levels of the Faculty of Health Sciences students are at a high level, it is seen that the students are sensitive about exercise addiction. Additionally, it was observed that there was a positive relationship between students' exercise addiction and healthy nutrition level, Extreme Focus and Emotion Change, Postponement of Individual-Social Needs and Conflict, Tolerance Development and Passion. Accordingly, it is seen that as the exercise level of students increases, more importance is given to healthy nutrition.

Generally, these findings provide insight into the complex relationships between healthy behaviors, exercise habits, emotional responses, social dynamics, and exercise-related addiction-like tendencies. It shows that these factors interact in subtle ways and may be influenced by a variety of individual differences and environmental factors.

Ethical Statement

The present study was conducted in accordance with research and publication ethics. Approval for this study was obtained from Sakarya University of Applied Sciences Ethics Committee on 19.10.2023 with the number E.102278.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Contribution

The author’s contribution to the study is equal.

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