Journal of Health, Population and Nutrition

RESEARCH

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# The influence of obesogenic environments on diet self-efficacy and physical activity among healthcare workers: a multicenter study

Mehmet Akif Sezerol[1,2,3], Zeynep Meva Altaş[4,5*], Melek Nur Aslan[6] and Şeyma Halaç[7]

## Abstract

**Background** The aim of the study was to determine the level of dietary self-efficacy, physical activity and obesogenic environment in several districts of Istanbul and to examine the relationship between them.

**Methods** In this cross-sectional study, a questionnaire was administered to primary health care workers working in three different districts of Istanbul. Sociodemographic questions, Dieting Self-Efficiency Scale (DSES), The Assessment of the Obesogenic Environment Scale (AOES), and International Physical Activity Questionnaire (IPAQ) were used in the survey. $p < 0.05$ was determined as the level of statistical significance.

**Results** A total of 639 healthcare workers responded to the study. The median age of the participants was 39.0 years (min-max: 21.0–67.0). Male and single participants had significantly higher DSES scores ($p = 0.014$, $p = 0.016$, respectively). Male participants and those with lower income and education level had significantly higher scores on the AOES ($p = 0.025$, $p = 0.024$ and $p = 0.024$, respectively). According to the IPAQ, 56.8% ($n = 283$) of the participants were minimally physically active, 29.7% ($n = 148$) were inactive and 13.5% ($n = 67$) were very active. Those who were physically minimally active and very active had significantly higher DSES scores and significantly lower AOES scores than those who were inactive ($p < 0.001$ and $p = 0.011$). There was a significant negative correlation between the DSES and AOES ($r$=-0.263, $p < 0.001$).

**Conclusion** In this study, the evaluation of the concepts of dietary self-efficacy, physical activity level and obesogenic environment in healthcare professionals, who can be role models in the society, may contribute to the studies and intervention strategies for the whole society.

**Keywords** Healthcare workers, Diet, Self-efficacy, Physical activity, Obesogenic environment

*Correspondence:
Zeynep Meva Altaş
zeynep.meva@hotmail.com
[1]Epidemiology Program, Institute of Health Sciences, Istanbul Medipol University, Istanbul, Türkiye
[2]Department of Public Health, School of Medicine, Istanbul Medipol University, Istanbul, Türkiye
[3]Sultanbeyli District Health Directorate, Istanbul, Türkiye
[4]Maltepe District Health Directorate, Istanbul, Türkiye
[5]Department of Public Health, International School of Medicine, Istanbul Medipol University, Istanbul, Türkiye
[6]Fatih District Health Directorate, Istanbul, Türkiye
[7]Eyüpsultan District Health Directorate, Istanbul, Türkiye

## Background

In recent years, chronic diseases have become an increasingly significant disease burden in all countries [1]. According to the World Health Organization (WHO), chronic diseases are among the most important health problems and are considered a global health threat [2]. Obesity is a complex chronic disease defined as an excessive accumulation of fat tissue in the body [3]. It develops through the interaction of genetic and environmental factors and is associated with many chronic diseases [4]. The prevalence of obesity and obesity-related comorbidities has rapidly increased worldwide in recent years, becoming a major public health concern [5].

The most important risk factors for chronic diseases are unhealthy diet, physical inactivity, smoking, and alcohol consumption [6]. Another important factor in weight control is diet self-efficacy. Diet self-efficacy is defined as an individual's belief in their ability to adhere to a diet to lose or maintain their current body weight [7]. Assessing diet self-efficacy in individuals can help plan more effective and focused dietary interventions for adopting a healthy lifestyle [8].

Physical activity, which plays an important role in health control and promotion, is defined by the WHO as any bodily movement produced by skeletal muscles that require energy expenditure [9]. For adults aged 18–64, the WHO recommends at least 150–300 min of moderate-intensity physical activity or at least 75–150 min of high-intensity physical activity, or a combination of moderate and high-intensity physical activity throughout the week. These activities should be performed in sessions of at least 10 min and spread over at least 5 days of the week [10].

The concept of an obesogenic environment, which emerged in the 1990s, refers to environments that contribute to weight gain and are not conducive to weight loss, both at home and at work [11]. In other words, an obesogenic environment promotes and contributes to the development of obesity [12]. Controlling obesity requires regulations to neutralize the obesogenic environment. The environment should generally be modified to promote a healthy lifestyle, thereby improving health, including weight control [13].

Environmental risk factors associated with obesity are more significant for sedentary workers and white-collar employees. Therefore, primary health care workers are exposed to these risk factors due to their extended desk time. In a study conducted in our country, approximately half of the healthcare workers were reported to be inactive [14]. Another study conducted in our country reported that the rate of overweight or obesity among healthcare workers in a university hospital was 66.4% [15]. Due to intense and stressful working conditions, healthcare workers may not engage in lifestyle activities such as physical activity and healthy eating [16]. Countries are developing various policies to address the risks associated with physical inactivity, unhealthy diet, and obesity. Understanding the current situation well is necessary for developing these policies appropriately. Having a healthy environment at the workplace and regulating environmental factors are crucial. The aim of this study is to determine the levels of diet self-efficacy, physical activity, and obesogenic environment among employees working in different centers in Istanbul and to examine the relationships between them.

## Methods

### Research type, population, and sample

The cross-sectional study was conducted between 28.05.2024–14.06.2024. The population of the study consisted of primary health care workers working in Sultanbeyli, Fatih and Eyüpsultan districts. Fatih and Eyüpsultan districts are located on the European side of Istanbul province in Türkiye, while Sultanbeyli district is located on the Anatolian side. The Sultanbeyli district has the lowest socio-economic development index when compared to other districts of Istanbul. Fatih district has a high socio-economic development index while Eyüpsultan district is in the middle [17]. The population of Sultanbeyli district was 360.702, while the populations of Fatih and Eyüpsultan districts were 356.025 and 420.194, respectively [18]. It was aimed to reach all healthcare workers without sample selection. There were a total of 308 health care workers working in primary care in Fatih district, 281 in Eyüpsultan and 283 in Sultanbeyli.

In our country, primary health care centers and District Health Directorates and affiliated organizations are primary health care institutions. Family Health Centers provide outpatient diagnosis and treatment services and preventive health services. District Health Directorates carry out administrative work and plan public health interventions to improve public health. There is a high number of Syrian people in Türkiye [19]. Migrant Health Centers (MHC) have been established in areas with significant numbers of Syrian refugees, affiliated with primary healthcare institutions, to enhance the accessibility of preventive and basic healthcare services for refugees in our country [20]. Healthy Living Centres are centers affiliated with District Health Directorates that serve to protect and improve the health of individuals and prevent diseases. These centers provide services in various areas such as supporting the public to acquire healthy living habits, management and follow-up of chronic diseases, nutrition counseling, physical activity and psychosocial support [21]. In Fatih, 31 Family Health Centers (FHCs) and 1 Tuberculosis Dispensary (TD), 1 Healthy Living Centres (HLC) and 2 Migrant Health Centres (MHCs) (one of them is Extended Migrant Health Centre) serve

as primary health care facilities. Eyüpsultan has 26 FHCs and 1 TD, while Sultanbeyli has 24 FHCs and 1 TD, 1 HLC and 1 Extended Migrant Health Centres (EMHC) affiliated to the District Health Directorate. In MHCs, the majority of the workers are Syrian and have Arabic as their mother tongue, so they were not included in the study. Syrian healthcare workers were excluded due to potential language barriers and cultural differences that can affect their healthy living habits and answers. Thus, healthcare workers from FHCs, TDs, HLCs, and district health directorates were included.

### Measurements and data collection

A questionnaire was used as a data collection tool. The questionnaire was administered online to all employees. The first section of the questionnaire includes sociodemographic questions and questions about health history. The second section of the questionnaire includes the "Dieting Self-Efficiency Scale (DSES)" and the "Assessment of Obesogenic Environment Scale". The last section includes the 7-question "International Physical Activity Questionnaire".

#### *Dieting self-efficiency scale (DSES)*

The scale was developed by Stich et al. in 2009 to evaluate individuals' self-efficacy regarding diet [22]. The validity and reliability study of the Turkish adaptation was conducted by Hamurcu et al. in 2023 [23]. The DSES is a 5-point Likert-type scale (Not confident at all: 1; Very confident: 5) and consists of 11 items. The scale has 3 sub-factors: High-Calorie Tempting Food, Social and Internal Factors, and Negative Emotional Events. "High-Calorie Tempting Food" refers to situations where exposure to foods such as cake or ice cream makes it difficult to resist eating; "Social and Internal Factors" refers to situations where social or internal factors such as being with friends or feeling tired make it difficult to resist eating; and "Negative Emotional Events" refers to situations where negative emotional events, such as having an upsetting argument with a romantic partner, make it difficult to resist eating. The total score of the scale ranges from 11 to 55 points. The scale does not have a cut-off point; higher scores indicate higher diet self-efficacy [22, 23].

#### *Assessment of obesogenic environment scale for adults*

The scale was developed by Kesik and Sağlam in 2022 [24]. The scale consists of 32 items on a 7-point Likert-type scale (1- Strongly Disagree, 4- Partially Agree, 7- Absolutely Agree). It has 4 sub-groups: Factors Regarding Physical Environment and Opportunities, Cultural Determinants and Access to Experts, Social Determinants and Their Effects, and Economic Determinants and Their Effects. Although there is no specific cut-off point for the scale, the higher the score, the higher the obesogenic factors. The scale contains 12 reverse-coded items [24].

#### *International physical activity questionnaire-short form (IPAQ-SF)*

The short form of the International Physical Activity Questionnaire (7 questions) provides information on time spent walking, in moderate-intensity, vigorous-intensity activities, and time spent sitting [25]. Sağlam et al. conducted the Turkish validity and reliability study of both the short and long forms [26].

The total score of the short form is calculated by summing the duration (minutes) and frequency (days) of walking, moderate-intensity activity, and vigorous-intensity activity. The energy expenditure required for activities is calculated using the MET-minute score (Metabolic Equivalent). One MET represents the energy expenditure at rest, which corresponds to an oxygen consumption of 3.5 ml/kg/min for an average individual weighing 70 kg [27]. Standard MET values have been established for activities: 1.5 MET for sitting, 3.3 MET for walking, 4.0 MET for moderate-intensity physical activity, and 8.0 MET for vigorous-intensity physical activity. The MET values assigned to activities are multiplied by the duration of the activity and the frequency of the activity (number of days) to calculate individuals' weekly total MET-minute scores. According to the total score of the questionnaire, individuals are classified into three categories: inactive, minimally active, and very active [25, 26].

### Statistics

Statistical analysis of research data was made with SPSS 24.0 package program. In the study, median, minimum and maximum values, numbers (n) and percentages (%) were used for descriptive data. Conformity of continuous variables to normal distribution was examined by histograms, probability graphs and analytical methods. The Mann Whitney U test was used to compare the two groups in the data that did not fit the normal distribution. Kruskal Wallis test was used to compare more than two groups in the data that did not fit the normal distribution. Spearman correlation test was used to determine the relationship between the two numeric values. Statistical significance level was determined as $p<0.05$.

### Ethics

Ethics committee approval was obtained from Istanbul Medipol University (date: 18.04.2024, decision number: 408).

## Results

A total of 639 participants responded to the study. In Fatih, Eyüsultan and Sultanbeyli districts, 81.2%, 71.9% and 66.1% of primary health care workers, respectively, responded to the study. The median age of the participants was 39.0 years (min-max: 21.0–67.0). 70.4% ($n$=450) of the participants were female and 66.5% ($n$=425) were married. The majority of the participants had a university degree or higher ($n$=564, 88.3%). Other sociodemographic characteristics of the participants are given in Table 1.

Participants' attention to being healthy was evaluated. About half of the participants ($n$=320, 50.1%) paid attention to being healthy most of the time, while 59.3% ($n$=378) rated their health as good or very good. Smoking and alcohol use were 23.9% ($n$=153) and 15.2% ($n$=97), respectively. 35.4% ($n$=226) of the participants had a chronic disease. 42.6% ($n$=272) of the participants had previously consulted a dietitian. The proportion of participants who had previously received healthy nutrition education and physical activity education were 47.9% ($n$=306) and 23.9% ($n$=153), respectively. The majority of the participants ($n$=263, 41.4%) were of normal weight. The total proportion of overweight and obese participants was 56.2% ($n$=357) (Table 2).

Participants' scores on the DSES and the AOES scales were evaluated. The median total score for the DSES was 32.0 (11.0–55.0). Among the subscale scores of the DSES, participants scored the highest on the Social and Internal Factors subscale and the lowest on the Negative Emotional Events subscale. The median total score for the AOES was 127.0 (32.0-176.0). Participants scored the highest on the Physical Environment Factors and Facilities subscale of the AAOES and the lowest on the Economic Determinants and Effects subscale. Participants' physical activity levels were classified according to the IPAQ scale. Of the participants, 56.8% ($n$=283) were minimally active, 29.7% ($n$=148) were inactive, and 13.5% ($n$=67) were very active (Table 3).

**Table 1** Sociodemographics of the participants

| | | ***N*** **(%)** |
|---|---|---|
| Gender | Female | 450 (70.4) |
| | Male | 189 (29.6) |
| Marital status | Married | 425 (66.5) |
| | Single | 162 (25.4) |
| | Divorced/Living alone | 52 (8.1) |
| Educational status | Primary education | 9 (1.4) |
| | High school | 66 (10.3) |
| | University and above | 564 (88.3) |
| Income status | Income less than expenses | 161 (25.2) |
| | Income equal to expenses | 321 (50.2) |
| | Income more than expenses | 157 (24.6) |
| District | Eyüpsultan | 202 (31.6) |
| | Fatih | 250 (39.1) |
| | Sultanbeyli | 187 (29.3) |
| Institution | Family Health Center | 395 (61.8) |
| | District Health Directorate | 213 (48.5) |
| | Healthy Living Centre | 23 (3.6) |
| | Tuberculosis Dispensary | 8 (1.3) |
| Profession | Physician | 244 (38.2) |
| | Nurse, midwife | 231 (36.2) |
| | Administrative personnel | 92 (14.4) |
| | Other healthcare personnel | 72 (11.3) |

The sociodemographic characteristics related to the participants' DSES and AOES scores were evaluated. Male participants and singles had significantly higher DSES scores ($p$=0.014 and $p$=0.016, respectively). No significant relationship was found between DSES scores and income level, education level, presence of chronic disease, smoking, and alcohol consumption ($p$>0.05) (Table 4). Male participants and those with lower income and education levels had significantly higher AOES scores ($p$=0.025, $p$=0.024, and $p$=0.024, respectively). There was no significant relationship between AOES scores and marital status, presence of chronic disease, smoking, and alcohol consumption ($p$>0.05) (Table 4).

Participants' characteristics related to DSES and AOES scores were evaluated. Physically minimally active and very active participants had significantly higher DSES scores than inactive participants ($p$<0.001). Participants who were underweight and normal weight had significantly higher DSES scores than those who were overweight and obese ($p$<0.001). Those who rated their health as good and very good had significantly higher DSES scores than those who rated their health as poor and fair ($p$<0.001). Those who were physically inactive had significantly higher scores on the AOES than those who were minimally active and very active ($p$=0.011). Those who were overweight and obese had significantly higher AOES scores than those who were underweight and normal ($p$=0.003). Those who rated their health as poor and fair had significantly higher scores on the AOES than those who rated their health as good and very good ($p$<0.001). Receiving nutrition education and physical activity education did not have a significant effect on the scores of the DSES and the AOES ($p$>0.05) (Table 5).

The correlation between the participants' DSES scale scores and the AOES scale scores was evaluated. A significant negative correlation was observed between the DSES scale and the AOES ($r$=-0.263, $p$<0.001) (Fig. 1) This indicates that higher perceptions of obesogenic environments are associated with lower dietary self-efficacy among participants. The effect of age variable on scale scores was evaluated. A significant positive correlation was observed between the DSES scale and age ($r$=0.186, $p$<0.001) (Fig. 2). No significant correlation was observed between age and the AOES ($r$=-0.075, $p$=0.058) (Fig. 3).

**Table 2** Healthy living behaviors, health perceptions, and risk factors of participants

| | | ***N* (%)** |
|---|---|---|
| Frequency of Paying Attention to Being Healthy | Never | 35 (5.5) |
| | Sometimes | 238 (37.2) |
| | Often | 320 (50.1) |
| | Always | 46 (7.2) |
| Self-Assessment of Health | Very bad | 0 (0) |
| | Bad | 27 (4.2) |
| | Moderate | 233 (36.5) |
| | Good | 327 (51.3) |
| | Very good | 51 (8.0) |
| Smoking | No | 418 (65.4) |
| | Yes | 153 (23.9) |
| | Quit | 68 (10.6) |
| Alcohol Consumption | No | 542 (84.8) |
| | Yes | 97 (15.2) |
| Presence of chronic disease | No | 413 (64.6) |
| | Yes | 226 (35.4) |
| Presence of Obese Individuals in the Family | No | 457 (71.5) |
| | Yes | 182 (28.5) |
| Previous visit to HLC | No | 578 (90.5) |
| | Yes | 61 (9.5) |
| Consulting a Dietitian | No | 367 (57.4) |
| | Yes | 272 (42.6) |
| Receiving Healthy Eating Education | No | 333 (52.1) |
| | Yes | 306 (47.9) |
| Receiving Physical Activity Education | No | 486 (76.1) |
| | Yes | 153 (23.9) |
| Currently Following a Diet | No | 344 (53.8) |
| | Yes | 295 (46.2) |
| Weight classification* | Underweight (BMI < 18.5 kg/m$^2$) | 15 (2.4) |
| | Normal (BMI = 18.5–24.9 kg/m$^2$) | 263 (41.4) |
| | Overweight (BMI = 25.0–29.9 kg/m$^2$) | 247 (38.9) |
| | Obese (BMI > 30 kg/m$^2$) | 110 (17.3) |

*HLC: Healthy Living Centre*, *The BMI data for 635 participants is available*

**Table 3** Participants' scores on the DSES, AOES scales, and physical activity classification

| | | **Median (min-max)** |
|---|---|---|
| DSES total score | | 32.0 (11.0–55.0) |
| DSES-High Calorie and Tempting Food | | 11.0 (4.0–20.0) |
| DSES-Social and Internal Factors | | 12.0 (4.0–20.0) |
| DSES-Negative Emotional Events | | 9.0 (3.0–15.0) |
| AOES total score | | 127.0 (32.0-176.0) |
| AOES- Factors Regarding Physical Environment and Opportunities | | 44.0 (10.0–65.0) |
| AOES-Cultural Determinants and Access to Experts | | 31.0 (10.0–64.0) |
| AOES-Social Determinants and Their Effects | | 31.0 (8.0–56.0) |
| AOES-Economic Determinants and Their Effects | | 19.0 (4.0–28.0) |
| Physical activity level, n(%) | Inactive | 148 (29.7) |
| | Minimally active | 283 (56.8) |
| | Very active | 67 (13.5) |

*DSES*: *Dieting Self-Efficiency Scale*, *AOES: The Assessment of the Obesogenic Environment Scale*

**Table 4** Relationship between sociodemographic characteristics and DSES and AOES scores

| Gender | DSES Median (min-max) | *P* value | AOES Median (min-max) | *P* value |
|---|---|---|---|---|
| Female | 32.0 (11.0–55.0) | 0.014 | 126.0 (32.0-176.0) | 0.025 |
| Male | 33.0 (11.0–55.0) | | 128.0 (57.0-167.0) | |
| **Marital status** | | | | |
| Unmarried | 34.0 (11.0–55.0) | 0.016 | 128.0 (32.0-173.0) | 0.519 |
| Married | 31.0 (11.0–55.0) | | 127.0 (46.0-176.0) | |
| **Income status** | | | | |
| Income less than or equal to expenses | 32.0 (11.0–55.0) | 0.205 | 128.0 (32.0-176.0) | 0.024 |
| Income more than expenses | 33.0 (11.0–55.0) | | 124.0 (56.0-155.0) | |
| **Educational status** | | | | |
| Below university | 32.0 (11.0–55.0) | 0.171 | 128.0 (70.0-167.0) | 0.024 |
| University and above | 32.0 (11.0–55.0) | | 127.0 (32.0-176.0) | |
| **Smoking** | | | | |
| No/Quit | 32.0 (11.0–55.0) | 0.242 | 127.0 (32.0-176.0) | 0.191 |
| Yes | 32.0 (11.0–55.0) | | 128.0 (73.0-173.0) | |
| **Alcohol consumption** | | | | |
| No | 32.0 (11.0–55.0) | 0.147 | 127.0 (32.0-176.0) | 0.502 |
| Yes | 34.0 (11.0–55.0) | | 127.0 (57.0-164.0) | |
| **Presence of chronic disease** | | | | |
| No | 32.0 (11.0–55.0) | 0.452 | 127.0 (56.0-169.0) | 0.531 |
| Yes | 32.0 (11.0–55.0) | | 127.0 (32.0-176.0) | |

*DSES: Dieting Self-Efficiency Scale, AOES: The Assessment of the Obesogenic Environment Scale*

**Table 5** Relationship between Physical Activity and Nutrition-Related Characteristics and Health Perception with DSES and AOES scores

| Physical activity level | DSES Median (min-max) | *P* value | AOES Median (min-max) | *P* value |
|---|---|---|---|---|
| Inactive | 29.5 (11.0–54.0) | < 0.001* | 128.0 (70.0-167.0) | 0.011* |
| Minimally active | 33.0 (11.0–55.0) | | 127.0 (56.0-167.0) | |
| Very active | 36.0 (11.0–55.0) | | 121.0 (32.0-157.0) | |
| **Weight classification** | | | | |
| Underweight/Normal | 35.0 (11.0–55.0) | < 0.001 | 124.0 (32.0-173.0) | 0.003 |
| Overweight/Obese | 29.0 (11.0–55.0) | | 128.0 (56.0-176.0) | |
| **Receiving Healthy Eating Education** | | | | |
| No | 32.0 (11.0–55.0) | 0.930 | 128.0 (70.0-169.0) | 0.176 |
| Yes | 31.0 (11.0–55.0) | | 126.0 (32.0-176.0) | |
| **Receiving Physical Activity Education** | | | | |
| No | 32.0 (11.0–55.0) | 0.419 | 127.0 (56.0-176.0) | 0.588 |
| Yes | 32.0 (11.0–55.0) | | 126.0 (32.0-173.0) | |
| **Self perception of health** | | | | |
| Poor/Moderate | 29.0 (11.0–55.0) | < 0.001 | 130.0 (80.0-176.0) | < 0.001 |
| Good/Very Good | 34.0 (11.0–55.0) | | 124.0 (32.0-167.0) | |

**Significance is between the physical activity levels of inactive participants and minimally active participants, as well as between inactive participants and very active participants. DSES: Dieting Self-Efficiency Scale, AOES: The Assessment of the Obesogenic Environment Scale*

## Discussion

Health promotion is associated with the acquisition of healthy life behaviors. Healthcare workers can provide counseling services such as healthy nutrition and physical activity in the acquisition of healthy life behaviors and can be role models for the society. In this study, we evaluated dietary self-efficacy, physical activity level and the concept of obesogenic environment in healthcare workers.

Health perception and satisfaction are subjective markers that can be used to evaluate the health of individuals [28]. In our study, approximately half of the participants paid attention to being healthy most of the time and 59.3% of them evaluated their health as good or very good. In a study in the literature, the self-perception of health of employees in a university hospital was evaluated and 60.8% of the participants were reported to be satisfied with their own health, similar to our study [29].

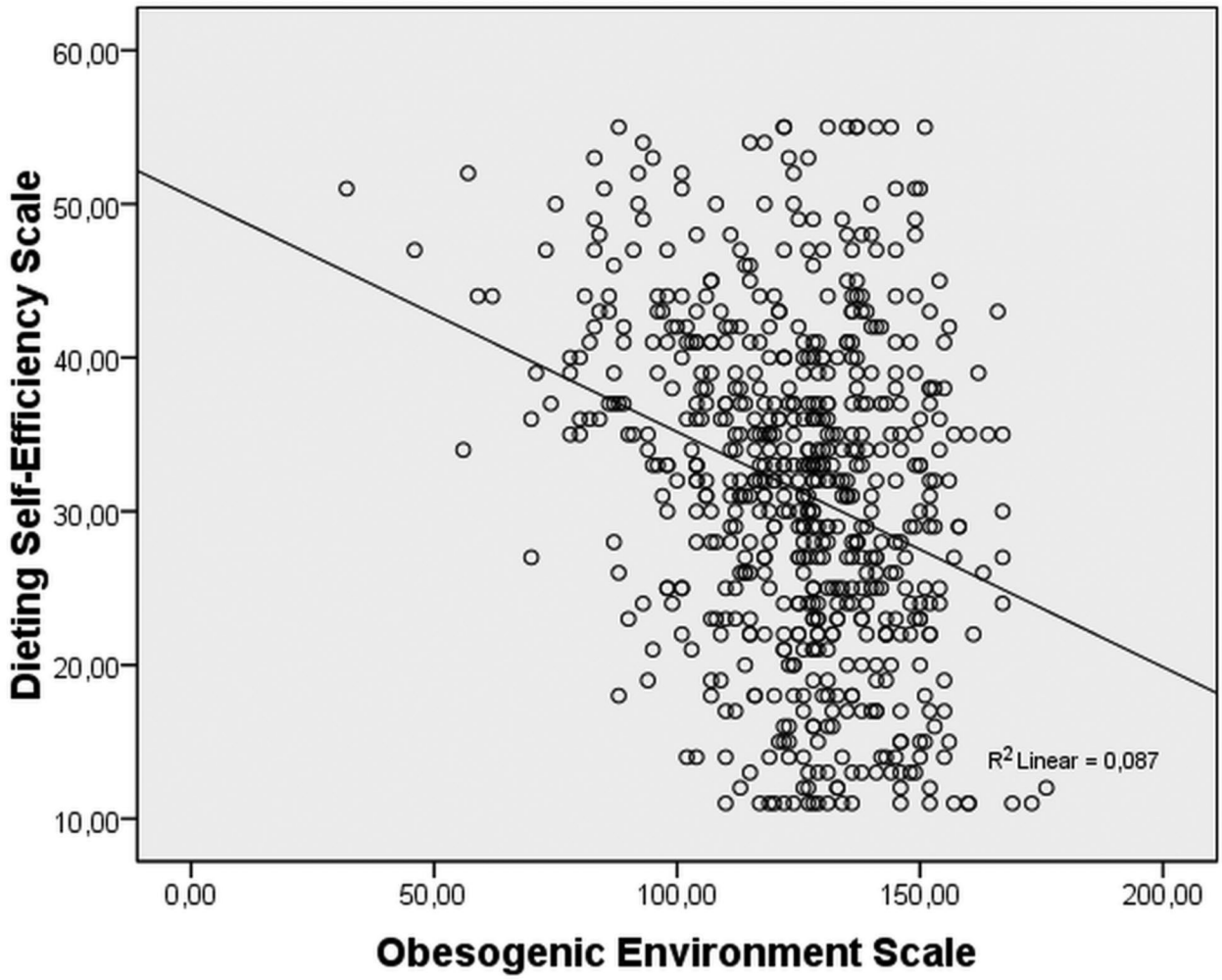


**Fig. 1** The correlation between DSES and AOES

Regular physical activity is extremely beneficial for mental and physical health. According to WHO data, 31.0% of adults do not meet the recommended physical activity level [30]. In our study, when the physical activity levels of the participants were classified, approximately half (56.8%) were minimally active, 29.7% were inactive and 13.5% were very active. The fact that almost one out of 3 healthcare workers in our study was inactive emphasizes the need to determine the barriers to physical activity in healthcare workers and to develop interventions to encourage physical activity in healthcare workers.

Recently, the prevalence of obesity has been increasing and overweight and obesity pose a threat for health problems. The rates of overweight and obesity in adults worldwide are reported to be 43.0% and 16.0%, respectively, according to the WHO [3]. In our country, the prevalence of overweight and obesity in individuals aged 15 years and older has been reported as 55.8% [31]. In our study, 56.2% of the participants were overweight or obese, similar to the general population. In a study conducted in hospital workers in South Africa, 73% of healthcare workers were reported to be overweight or obese [32]. The higher rate of overweight and obese in hospital workers compared to primary healthcare workers may be thought to be due to the negative effects of conditions such as shifts on eating patterns and physical activity [22]. At the same time, the prevalence of overweight and obesity may vary in different societies [3].

Smoking and alcohol use are health-related behaviors. In the literature, high rates of tobacco use have been reported in healthcare workers compared to the general population [33]. For this reason, smoking and alcohol use rates were also evaluated in our study and found to be 23.9% and 15.2%, respectively. In a systematic review in the literature, similar to our study, tobacco use in healthcare workers was reported as 22.0% [34]. In a study conducted in our country, the prevalence of alcohol consumption was reported as 15.4% in physicians and 8.9% in nurses [35]. In our study, the rates of smoking and alcohol use were found to be similar to the literature.

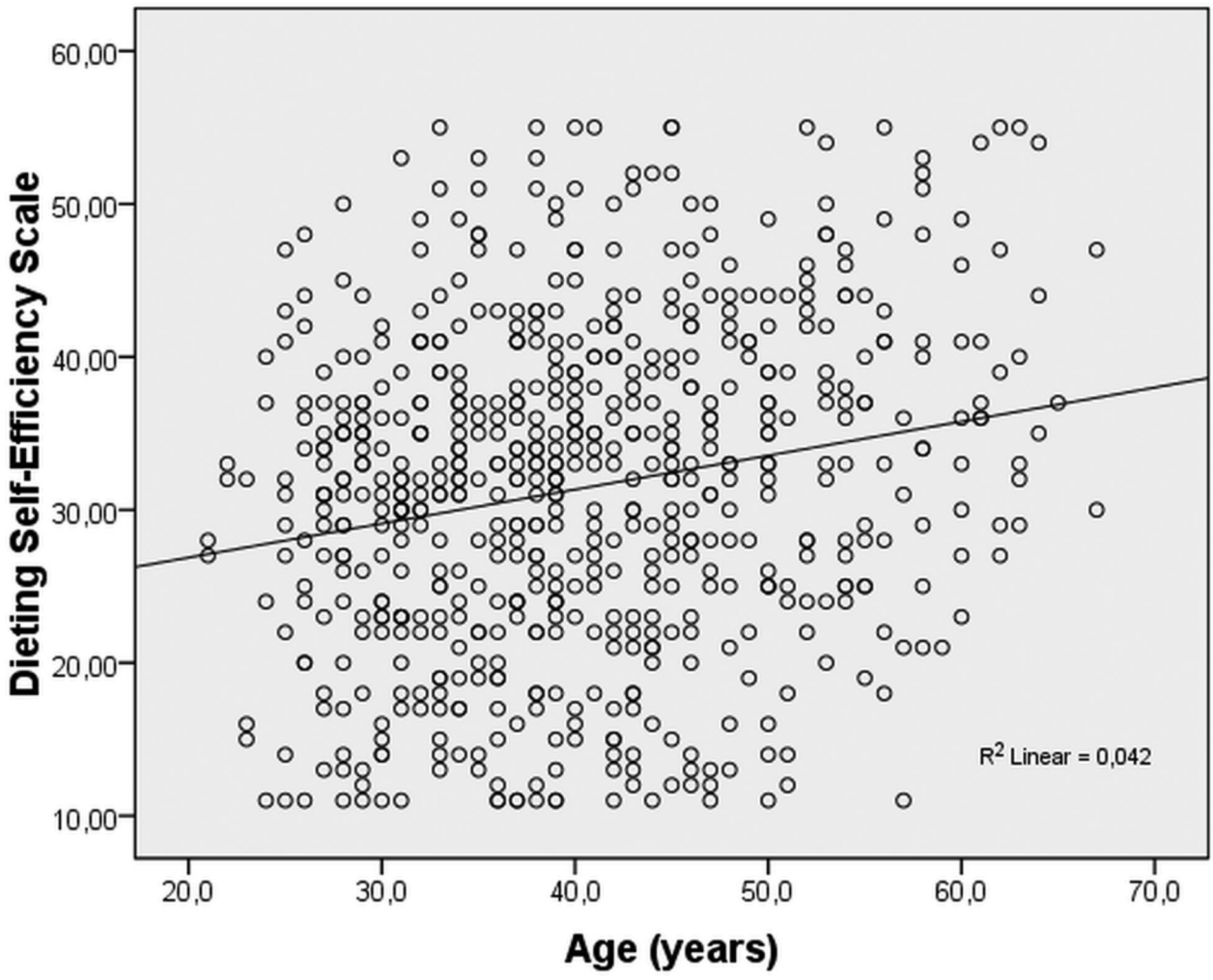


**Fig. 2** The correlation between age and DSES

Considering that healthcare professionals are role models for the society and recommend healthy lifestyle behaviors to their patients, it is important to control the prevalence of smoking and alcohol use in healthcare professionals.

A healthy diet is essential for the protection and promotion of health. In the litarture, the diet quality was not good, and nutrient intakes were insufficient among healthcare workers [36] In our study, dietary self-efficacy of the participants was evaluated because it may be related to healthy eating behaviors of individuals. The median value of the total score of the participants was 32.0 (11.0–55.0). The highest score was obtained from Social and Intrinsic Factors and the lowest score was obtained from Negative Emotional Events subscale. In a study conducted in university students in our country, the highest score was obtained from 'social and intrinsic factors' and the lowest score was obtained from the 'negative emotional events' subscale [23]. According to the results, in line with the literature, social or intrinsic factors may make it less difficult to resist eating, whereas negative emotional events such as having had an upsetting argument with a partner may make it more difficult to resist eating.

Participants' characteristics related to their DSES scores were evaluated. Those who were minimally physically active and very physically active had significantly higher DSES scores than those who were inactive. Accordingly, we can think that healthy lifestyle behaviors such as physical activity and healthy eating positively affect each other. In our study, participants who were underweight and normal weight had significantly higher diet self-efficacy than those who were overweight and obese. According to this result, we may think that low dietary self-efficacy may increase the risk of obesity. Since our study has a cross-sectional design, prospective studies should be conducted to better interpret the causal relationship. Those who rated their health as good and very good also had higher dietary self-efficacy than those who rated their health as poor and fair. The positive effect of self-perception of health on dietary self-efficacy

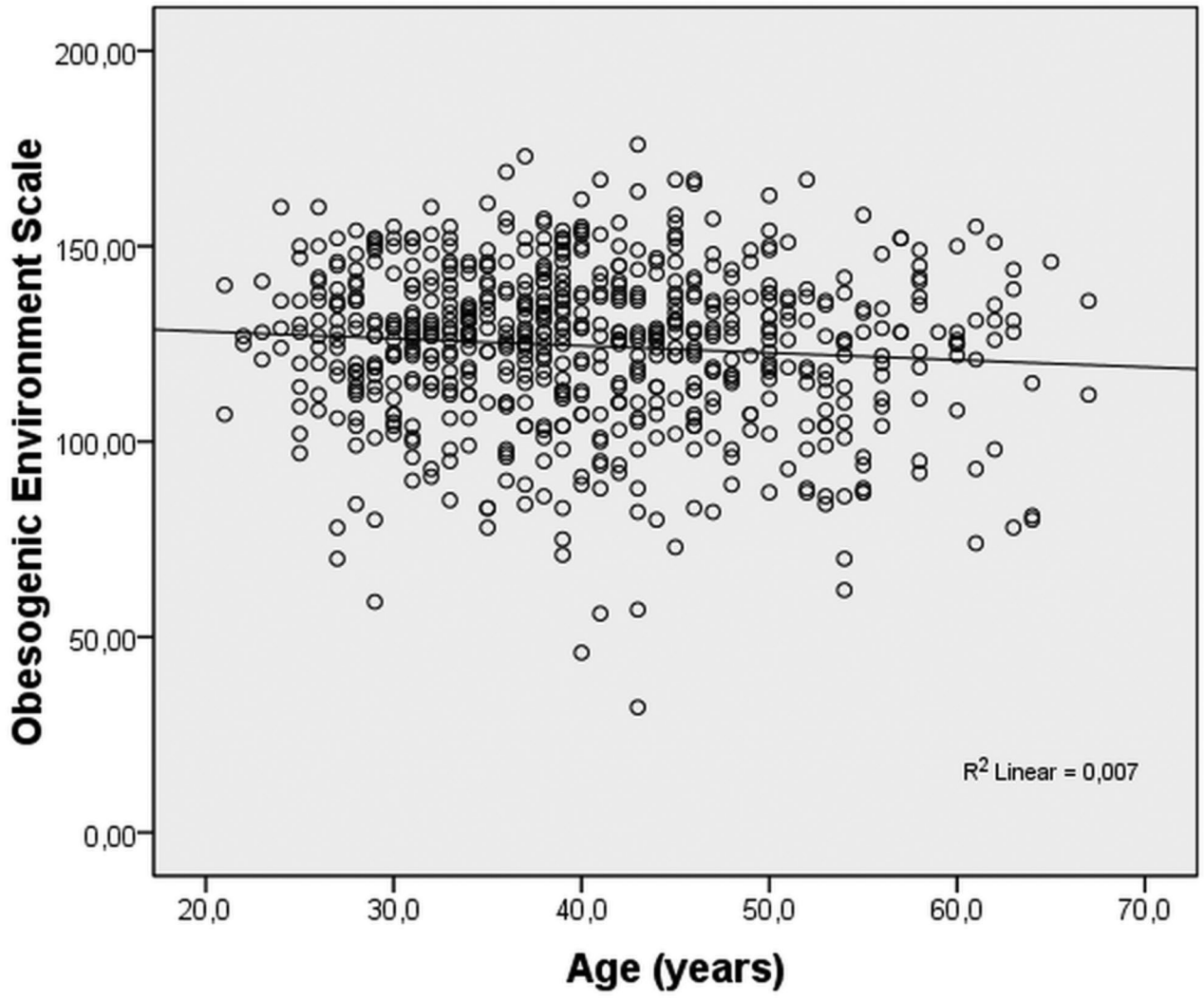


**Fig. 3** The correlation between age and AOES

emphasizes the positive effect of improving individuals' health, including physical and mental health, on nutrition.

By evaluating the effects of the factors constituting the obesogenic environment on healthcare professionals, healthcare professionals will be able to both guide the society in terms of these obesogenic concepts and direct their own lifestyles in order to prevent obesity. There is evidence in the literature that individual-based workplace-based interventions can provide modest weight loss [37]. Participants received the highest score in the Factors regarding physical environment and opportunities subgroup of the AOES scale. According to our results, there is a need to organize factors related to the physical environment, such as walking areas, gyms, and areas where access to healthy foods in the work environment will be increased. Moreover, the integration of advanced technologies like ChatGPT in personalized obesity management may offer innovative approaches to addressing obesogenic environments and diet self-efficacy [38].

Participants' characteristics related to their AOES scores were evaluated. Those who were physically inactive had significantly higher AOES scores than those who were minimally active and very active. Those who were overweight and obese had significantly higher scores than those who were underweight and normal. According to the literature, obesogenic environment increases the obesity risk of individuals and the society, and creates limitations in access to sustainable healthy food with accessible wages and in the provision of safe and easy physical activity [13]. According to our results, although we can interpret that obesogenic environment creates a barrier to physical activity and poses a risk for obesity, prospective studies are needed to evaluate causality.

The relationship between participants' dietary self-efficacy and obesogenic environment characteristics was evaluated. A significant negative correlation was observed between the DSES scale and the AOES ($r$=-0.263, $p<0.001$). According to our results, it can be concluded that decreasing the effects of obesogenic environments may increase dietary self-efficacy. This finding highlights the importance of dealing with external environmental factors to enhance people's confidence in maintaining healthy dietary habits. Addressing obesogenic environmental factors in workplace could play a crucial role in improving dietary self-efficacy among healthcare workers. The findings on obesogenic environments suggest a need for holistic approaches and workplace interventions such as creating walking areas, providing access to gyms, offering healthy food options, implementing regular wellness programs, and promoting active commuting initiatives.

## Limitations and strengths

Our study has several limitations. Firstly, the sample size and representativeness may not fully reflect all healthcare workers. In our study, 70.4% of the healthcare workers are women. This may reflect the higher representation of women in the healthcare sector as observed in many countries [39]. However, women are more engaged in cooking and household responsibilities, and have a significant impact on influencing others' behaviors, such as smoking and alcohol consumption. These factors may contribute to the specific characteristics and health behaviors observed in our study population. Another limitation is the cross-sectional nature of the study that makes it difficult to determine causality among diet self-efficacy, physical activity, and the obesogenic environment. Future longitudinal or intervention-based studies could address this limitation by examining how improvements in obesogenic environments affect self-efficacy and physical activity over time. These further studies would help develop effective interventions to reduce the negative impact of obesogenic environments on health behaviors and outcomes. Another fact is that, the self-reported nature of the data collection increases the likelihood of social desirability bias.

Despite the limitations, our study has several strengths. The multicenter design provided extensive data and allowed for the evaluation of diet and physical activity habits of primary healthcare workers from different occupational groups. Examining various variables such as diet self-efficacy, physical activity, and the obesogenic environment together provided a broad perspective on the relationships between these factors. To our knowledge, no study in the literature has evaluated diet self-efficacy, physical activity level, and the concept of the obesogenic environment together in healthcare workers. The contribution this study makes to the literature in this field is another strength.

## Conclusion

In the study evaluating the concepts of diet self-efficacy, physical activity, and the obesogenic environment among healthcare workers, approximately half of the participants (56.8%) were minimally active, 29.7% were inactive, and 13.5% were very active. Those who were minimally and very active had significantly higher DSES scores compared to those who were inactive. Inactive participants had significantly higher AOES scores compared to those who were minimally and very active. A significant negative correlation was observed between the DSES and the AOES. Moreover, in the study 56.2% of the participants are overweight or obese. Healthcare workers serve as role models in society, and their health behaviors can influence behaviors of the society. Therefore, interventions targeting the promotion of healthy weight and lifestyle behaviors among healthcare workers are crucial, not only for their own health but also for enhancing their ability to advocate healthy behaviors to the community. Thus, evaluating diet self-efficacy, physical activity levels, and the obesogenic environment in healthcare workers can contribute to the development of interventions and strategies for the entire population. Future research should focus on longitudinal and intervention-based studies to explore causal relationships and assess the long-term impact of targeted strategies addressing the identified challenges. Workplace wellness programs, educational campaigns, and policy-driven initiatives to support healthy living among healthcare professionals could be beneficial intervention in this regard.

### Abbreviations

| | |
|---|---|
| WHO | World Health Organization |
| DSES | Dieting Self-Efficiency Scale |
| AOES | The Assessment of the Obesogenic Environment Scale |
| IPAQ | International Physical Activity Questionnaire |
| MHC | Migrant Health Centre |
| EMHC | Extended Migrant Health Centre |
| TD | Tuberculosis Dispensary |
| HLC | Healthy Living Centre |
| FHC | Family Health Center |

### Acknowledgements

The authors are grateful to the participants in this study.

### Author contributions

In this study, the authors' roles and contributions were as follows: MAS, ZMA MNA and ŞH were responsible for conceptualizing the study and developing the methodology. MAS, MNA, ŞH carried out the data collection. MAS, ZMA MNA and ŞH were involved in the initial drafting of the paper and the final manuscript. ZMA conducted the data analysis. All authors thoroughly reviewed and approved the final manuscript for publication.

### Funding

This research received no specific grant from any funding agency, commercial entity, or not-for-profit organization.

**Data availability**
No datasets were generated or analysed during the current study.

## Declarations

**Ethical approval and consent to participate**
The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval was obtained from Istanbul Medipol University (date: 18.04.2024, decision number: 408). Informed consent to participate was obtained from all of the participants.

**Consent for publication**
Not applicable.

**Competing interests**
The authors declare no competing interests.

Received: 27 September 2024 / Accepted: 25 December 2024
Published online: 27 December 2024

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## Publisher's note