

The mediating role of nutrition knowledge level in the effect of mindfulness on healthy nutrition obsession

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Abstract. *Study Objectives:* The study aimed to determine the mediating role of nutritional knowledge level in the effect of mindfulness of individuals, who receive sports education at the undergraduate level, on the healthy nutrition obsession. *Methods:* The sample of the study consists of 339 participants, 163 of which are female and 176 are male, who continue their education in a higher education institution, which provides undergraduate sports education, in Ankara province in the 2019-2020 academic year. “Mindfulness Scale”, the “Orto-11 (Healthy Nutrition Obsession) Scale” and “Nutrition Knowledge Level for Adults Scale” were used as data collection tools. In addition to descriptive statistics, structural correlation models aimed at testing the Pearson Correlation and the constructed theoretical model were used in the analysis of the data. *Results:* The mean score obtained by the participants was determined as (\bar{x} =3.76) for the Mindfulness Scale, as (\bar{x} =2.20) for the Healthy Nutrition Obsession Scale, and as (\bar{x} =2.31) for the Adult Nutrition Knowledge Level Scale. A statistically significant effect was found in the relationship of mindfulness with a healthy nutrition obsession ($\beta_1=.16$; $p<.05$). However, the fact that mindfulness does not affect significantly nutritional knowledge level indicates that the mediating role is not realized. However, the Squared Multiple Correlations (R^2) values of the model show that nutritional knowledge level and mindfulness explain healthy nutrition obsession by 22.4% and mindfulness explains the nutritional knowledge level by .001%. *Conclusion:* It can be stated that mindfulness is important to eliminate the healthy nutrition obsession of individuals.

Keywords: Mindfulness, Healthy nutrition, Nutritional information, Sports.

Introduction

Nutrition has always played an important role in our lives. Several times every day, we choose foods that affect the health of our bodies. Daily food choices can have little benefit or harm to health, but over time, the results of these choices become important. When this is the case, paying close attention to good eating habits then promotes a healthy life. On the contrary, a careless selection of food can lead to chronic diseases (1). Therefore, nutrition is an issue that should always be emphasized during life. It is because it forms the basic elements of a healthy life from infancy to childhood,

from childhood to adulthood, and the end of life (2).

Healthy eating obsession is an eating disorder that defines excessive mental struggle against healthy foods (3). Nutritional disorder is a psychological condition that is characterized by a permanent, severe discomfort in a person's eating habits, causing inadequate or excessive dietary intake, which can cause serious physical and psychosocial impairments (4). Today, many scientifically unproven foods and beverages are presented to the information of the society with the wrong directions. However, it is thought that mindfulness will be much more effective in creating a healthy lifestyle. Awareness is an individual's understanding of the environment in

which s/he lives with all his/her senses, as well as being aware of what should be known, paying attention or showing sensitivity to something to be understood (5,6). Mindfulness is a process of acceptance, being open to experience, a skill that is related to curiosity, and a regular attention process that allows not to miss the awareness of the current events (7). Mindfulness means self-awareness at all times (8). The main feature of mindfulness is clear or accepting awareness and carefulness, which can be reflected as being more aware of the ongoing events and experiences than usual (9).

While the concept of mindfulness was originally explored in a clinical context, it has expanded in recent years towards behavioral research, social areas, and education (10). With this expansion, it has been the subject of various studies in the field of nutrition, which concerns the society. Mindfulness is thought to be an important factor in separating individuals from stereotypes, habits, and unhealthy behaviors in creating a healthy lifestyle in societies. From this point of view, it was aimed to reveal the effect of mindfulness on healthy nutrition obsession and to examine the mediating role of nutrition knowledge level on the model.

Material and Methods

Research Model and Hypotheses

The model of the research is designed with a relational screening model. Relational screening model is used to determine the relationship between two or more variables and to obtain hints about cause and effect (11). As a result of the literature review, the model of the research was created based on the variables preferred within the scope of the research. The model created was tested using the structural equation model. The structural equation is a combination of factor analysis, regression analysis, and is a theoretical structure represented by latent and observed variables (12,13). The hypotheses of the model created under the aim of the research as a result of the literature review are given below.

H₁: Mindfulness (M) positively affects healthy nutrition obsession (HNO).

H₂: Mindfulness (M) positively affects the nutrition knowledge level (NKL).

H₃: Nutrition knowledge level (NKL) positively affects healthy nutrition obsession (HNO).

Participants

The study group of the research consists of 339 participants who continue their education in a higher education institution in Ankara province that provides undergraduate sports education in the 2019-2020 academic year. In this study, the convenience sampling method, which is one of the purposeful sampling methods, was used (14). While 163 (48.1%) of the participants were female, 176 (51.9%) were male students, and 229 (67.6%) exercise regularly while 110 (32.4%) do not. In addition, 206 (60.8%) of the participants have a license from any sports branch, while 133 (39.2%) are not. The mean age and standard deviation of the participants was determined as 21.91±3.37.

Data Collection

In this section, besides the personal information form, scales of mindfulness, Orto 11, and Nutrition knowledge level for adults are used.

Mindfulness Scale (MS)

The Mindfulness Scale was developed by Brown and Ryan (2003) and adapted to Turkish by Özyeşil, Arslan, Kesici and Deniz (2011). The scale consisting of 15 items in total has a 6-point Likert type structure. The internal consistency coefficient of the scale is given as .80. Cronbach Alpha internal consistency coefficient obtained from the data set used in the study was determined as .88.

Orto-11 (Healthy nutrition obsession) Scale

This scale was developed by Donini et al (2004) and adapted to the Turkish by Arusoğlu, Kabakçı, Köksal and Merdol (2008). The scale, which is one-dimensional and consists of 11 items in total, is designed in a 4-point Likert type structure. The scale's total score is obtained by adding all the items on the scale where the answers reflecting the orthotic tendency have "1", and the answers reflecting the normal eating behavior tendency have the score "4", and the low scores obtained from the scale represent the orthorexic trend. The Cronbach Alpha internal consistency coefficient of the scale was .70, and the internal consist-

ency coefficient obtained from the data set used in the study was .73.

Nutrition knowledge level for Adults Scale

The Nutrition knowledge level for adults scale was included in the literature by making validity and reliability analyses by Batmaz (2018). The scale, which has 20 items in total, consists of a single dimension and has a 5-point Likert type structure. The highest score that can be obtained from the scale is 80. As the total score obtained from the scale decreases, the nutrition knowledge level decreases, while the total score increases, the nutrition knowledge level increases. The Internal consistency coefficient of the scale is given as .74. Cronbach Alpha internal consistency coefficient obtained from the data set used in the study was determined as .73.

Statistical analysis

The normality of the data obtained from the scales was examined by the Shapiro-Wilk test ($p < 0.05$). Skewness and Kurtosis values were examined. For all three scales, these values are between -1.5 and +1.5. This shows that the data are normally distributed (23). Whether the data is suitable for factor analysis was determined by carrying out Kaiser-Mayer-Olkin (KMO) coefficient and Bartlett test. According to the results of the analysis, the KMO, measure of sampling adequacy, was .91 for the Mindfulness Scale, .78 for the Healthy nutrition obsession scale, and .80 for the Nutrition knowledge level for adults scale. However, the result of the Bartlett test was also significantly determined for the scales used in the study ($p < .001$). Therefore, these values show the suitability of the data for factor analysis (24, 25). The demographic characteristics of

the participants are shown with percentages and frequency. Descriptive statistics were used to determine the mean scores of the scales used in the research.

In the research, the theoretical model created by establishing structural equation models were tested. Structural equation models are accepted as the basic method especially in studies where there are multiple relationships between latent and observed variables (13, 26). The main purpose of the structural equation models is to statistically test a theoretical model with the data obtained and to determine how much the theory and research findings match (27). The analyses in this study were carried out using SPSS 22.0, AMOS 22.0 package programs, and Excel database program.

Results

First level confirmatory factor analysis was applied to test the construct validity of the Mindfulness, Healthy nutrition obsession, and Nutrition knowledge level scales. To make the results of the analysis more compatible, considering the suggestions of the Amos 22 package program, covariance assignments were made between the items 9 and 10 of the Mindfulness Scale, items 3 and 6 of the Healthy nutrition obsession Scale, and items 6 and 8 of the Nutrition knowledge level Scale. As a result of the application of the proposed modifications, the fit index values produced by the measurement model are given in Table 1. The fit index values determined as a result of the analysis show that the single-factor structures of the measurement tools are verified (20-22).

Correlation analysis was used to test the relationships between the “healthy nutrition obsession”, which

Table 1. Confirmatory factor analysis results of Mindfulness, Healthy Nutrition Obsession and Nutrition Knowledge Level Scales

Model Fit Index	Perfect Range	Acceptable Range	MS	HNOS	NKLS
χ^2/sd	$0 < \chi^2/sd < 2$	$2 < \chi^2/sd < 5$	2.99	4.08	3.39
RMSEA	$0.00 < RMSEA < 0.05$	$0.05 < RMSEA < 0.10$	.07	.08	.07
PGFI	$0.95 < PGFI < 1.00$	$0.50 < PGFI < 0.95$	.67	.60	.66
PNFI	$0.95 < PNFI < 1.00$	$0.50 < PNFI < 0.95$	.72	.61	.68
GFI	$0.90 < GFI < 1.00$	$0.85 < GFI < 0.90$	.91	.92	.89
AGFI	$0.90 < AGFI < 1.00$	$0.85 < AGFI < 0.90$	.88	.87	.86
CFI	$0.95 < CFI < 1.00$	$0.90 < CFI < 0.95$	.91	.93	.91

Table 2. Mean scores of the participants from the Mindfulness, Healthy Nutrition Obsession and Nutrition Knowledge Level Scales

Scales	N	\bar{x}	S.D.
Mindfulness Scale	339	3.76	.88
Healthy Nutrition Obsession Scale	339	2.20	.46
Nutrition Knowledge Level for Adults Scale	339	2.31	.40

is the primary variable observed during the analysis of the data, and the “mindfulness”, which is the latent variable, and the “nutrition knowledge level”, which is the mediator variable in the model. The relationships between the variables were determined by the Pearson Moments Product Correlation Analysis method. Analysis results are given in Table 3. The mean score of the participants from the Mindfulness Scale was (\bar{x} =3.76), (\bar{x} =2.20) from the Healthy nutrition obsession Scale, and (\bar{x} =2.31) from the Nutrition knowledge level for Adults Scale.

Considering Table 3, it is observed that there is a positive and low-level relationship between the participants’ total scores of “nutrition knowledge level” and the healthy nutrition status (r =.27, p <.01) and “mindfulness” (r =.22, p <.01). In addition, a positive and low-level correlation was determined between the

Table 3. Examination of the relationship between variables with Pearson Moment Product Correlation

Variable	Nutrition Knowledge Level	Healthy Nutrition Status	Mindfulness
Nutrition Knowledge Level	1	.27**	.22**
Healthy Nutrition Obsession	.27**	1	.20**
Mindfulness	.22**	.20**	1

** p <.01

“healthy nutrition obsession” and “nutrition knowledge level” (r =.27, p <.01), and “mindfulness” (r =.20, p <.01). A positive and low-level relationship was found between “Mindfulness” and “nutrition knowledge level” (r =.22, p <.01), and “healthy nutrition obsession” (r =.20, p <.01).

After examining the relationships between the latent, observed, and mediator variables of the research, the predictive effect of mindfulness on healthy nutrition obsession variables were tested with SEM analysis.

The fit indices in the model given in Figure 1 are shown in Table 4.

When Table 4 is analyzed, it is seen that the model provide the necessary goodness of fit criteria, the data obtained with the model established with a different ex-

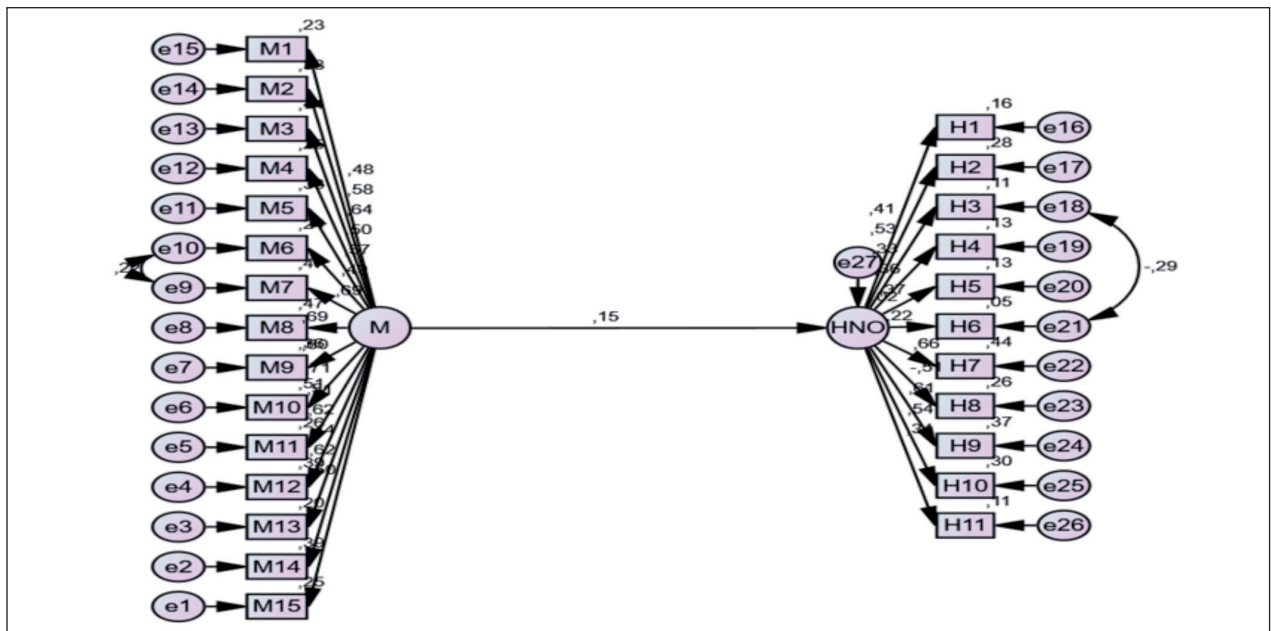


Figure 1. Structural equation model

Table 4. Structural equation model fit index values

Model Fit Index	Perfect Range	Acceptable Range	Model
X^2/sd	$0 < X^2/sd < 2$	$2 < X^2/sd < 5$	2.63
RMSEA	$0.00 < RMSEA < 0.05$	$0.05 < RMSEA < 0.10$	.07
PGFI	$0.95 < PGFI < 1.00$	$0.50 < PGFI < 0.95$	.71
PNFI	$0.95 < PNFI < 1.00$	$0.50 < PNFI < 0.95$	.65
GFI	$0.90 < GFI < 1.00$	$0.85 < GFI < 0.90$	.88
AGFI	$0.90 < AGFI < 1.00$	$0.85 < AGFI < 0.90$	.85
CFI	$0.95 < CFI < 1.00$	$0.90 < CFI < 0.95$	.93

pression provide a sufficient level of compliance and the model is verified ($\chi^2/sd = 2.63$, RMSEA = .07, PGFI = .71, PNFI = .65, GFI = .88, AGFI = .85, CFI = .93).

After examining the goodness of fit index values for the model, the paths in the model, and the parameter estimates for the model were examined. Standardized β coefficients, standard error, critical ratio, p , and R^2 values between variables are shown in Table 5 according to the model created.

As a result of the analysis, a statistically significant effect was found in the relationship of mindfulness with healthy nutrition obsession ($\beta_1 = .16$; $p < .05$). According to the findings obtained, the hypothesis number 1 of the study was accepted. When the model's Squared Multiple Correlations (R^2) value is considered, it is seen that 2.5% of the healthy nutrition obsession is explained. With the acceptance of the hypothesis number 1 of the study, the test was performed by adding a mediating variable to the model.

The mediating role of nutrition knowledge level in the effect of mindfulness on the healthy nutrition obsession was tested by the method consisting of three stages proposed by Baron and Kenny (1986). The first stage proposed is to determine the effect of the latent variable on the observed variable (Figure 1). The structural equation model created to investigate the second and third stages is presented in Figure 2.

Standardized β coefficients, standard error, critical ratio, p and R^2 values between variables are shown in Table 7 according to the model created.

The mediation effect cannot be mentioned for the model since mindfulness does not significantly affect the nutrition knowledge level and cannot provide the second stage specified in the reference of Baron and Kenny (1986). According to this reference, in the first stage, the independent variable affects the dependent variable; in the second stage, the independent variable affects the mediating variable; in the third and final stage, when the

Table 5. Structural equation model results

	Variables	Standardized β	Standard Error	Critical Ratio	p	R^2
Mindfulness	Healthy nutrition obsession	.15	.04	2.25	.02	.025

Table 6. Structural equation model fit values created to measure the mediation effect

Model Fit Index	Perfect Range	Acceptable Range	Model (Mediating)
X^2/df	$0 < X^2/df < 2$	$2 < X^2/df < 5$	3.75
RMSEA	$0.00 < RMSEA < 0.05$	$0.05 < RMSEA < 0.10$	.07
GFI	$0.90 < GFI < 1.00$	$0.85 < GFI < 0.90$	.86
CFI	$0.95 < CFI < 1.00$	$0.90 < CFI < 0.95$	.90
PGFI	$0.95 < PGFI < 1.00$	$0.50 < PGFI < 0.95$	.70
PNFI	$0.95 < PNFI < 1.00$	$0.50 < PNFI < 0.95$	.81
AGFI	$0.90 < AGFI < 1.00$	$0.85 < AGFI < 0.90$	.90

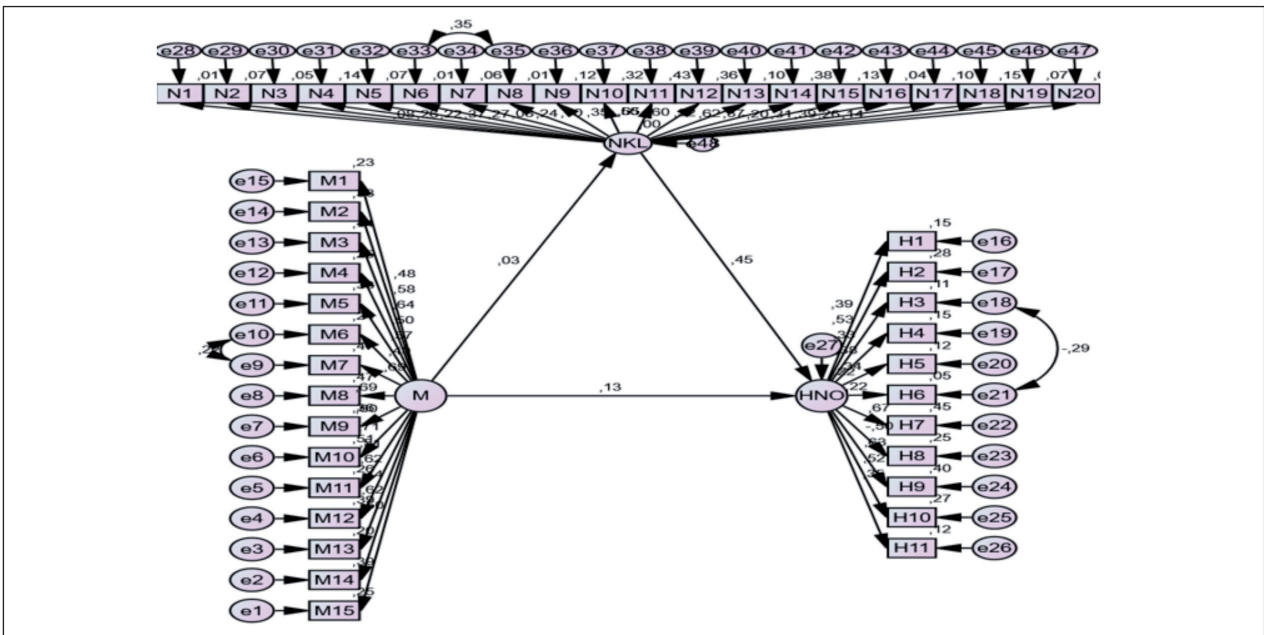


Figure 2. Structural equation model created for mediation effect

mediating variable is included in the model in the first stage, the effects of the independent variable on the dependent variable decrease while the mediating variable affects the dependent variable. Therefore, hypotheses 2 and 3 in the study were rejected.

When the results of the analysis are taken into consideration, the Squared Multiple Correlations (R^2) values obtained from the model indicate that the nutrition knowledge level and mindfulness explain the healthy nutrition obsession by 22.4%, and mindfulness explains the nutrition knowledge level by .001%.

Discussion and Conclusion

The results of longer working hours, travels and current lifestyles that the modern world has brought to human beings have had negative effects on human

health. Especially stuck in the monotony of urban life, people are affected by many negative environmental factors (intense work tempo, pressure, fatigue, etc.). The long time spent in front of television and computer outside of business life has become an addiction especially for children and young people and has become the main element of the culture of sedentary lives (33). All these processes that have made rapid changes in human life have had a direct impact on the field of healthy nutrition. This effect resulted in a nutritional system with fast and processed foods. This nutritional change has greatly changed people’s lifestyles.

Physical inactivity, environmental pollution, and unhealthy nutrition have become the most important causes of chronic disease worldwide (34). In addition, an unhealthy diet and lifestyle habits can cause obesity and metabolic syndromes (35). Nutrition forms the basis of healthy lifestyle behavior (36). It has become

Table 7: Structural equation model coefficients created to measure the mediation effect

Variables		Standardized	Standard error	Critical Ratio	p	R ²
Mindfulness	Nutrition Knowledge Level	.025	.008	.35	.72	.001
Nutrition Knowledge Level	Healthy Nutrition Obsession	.45	2.51	.88	.37	
Mindfulness	Healthy Nutrition Obsession	.13	.038	2.06	.039	.224

one of the main risk factors for some chronic and non-communicable diseases, including other situations related to unhealthy eating habits, cardiovascular diseases, cancer, diabetes, and other conditions associated with obesity (37, 38). To prevent these changes, the most important solution is seen as increasing the nutrition knowledge level. It is considered that university students, who are seen as a step from youth to adulthood, are an important group in this regard. In addition, studies Kabat-Zinn (1994) in the field of nutrition knowledge level shows that the focus is on university students globally. Research results focusing on the relationship between nutritional habits and mental abilities in recent years have shown the existence of the relationship between individuals' mental functions and healthy nutritional characteristics. These mental functions include the concept of mindfulness, which is often defined as a person's focus on those currently occurring by accepting and without judging (9, 39). In the study, it was determined that mindfulness levels of university students had a positive effect on healthy nutrition obsession level. In other words, the concept of mindfulness is a predictive variable in university students' adoption of a healthy diet. Studies show that awareness application can help individuals develop conscious and healthy eating behaviors (40, 41). In other studies (42-45), it shows that awareness has the potential to promote sustainable consumer behavior. In this way, it can be said that the awareness level has an important potential to develop the right behavior style for healthy eating. It can be stated that there is a consistency between the empirical results obtained in the studies and the findings obtained from this study.

In terms of healthy nutrition, nutritional knowledge levels of individuals as well as their mindfulness levels are an effective concept. Many studies showed that nutrition knowledge level has a decisive effect on nutritional behavior (46-48). In addition, many studies emphasized the relationship between increased nutrition knowledge level and healthy food preference (47, 48).

Conflicts of interest

The authors declare that there is no conflict of interest about this manuscript.

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