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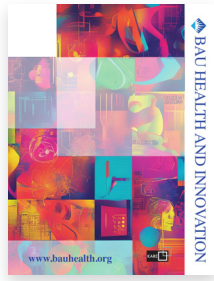

Original Article

Relationship Between Microbiota Awareness Probiotic Food Consumption Frequency and Orthorexia Nervosa in Health Professional Candidates

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Abstract

Objectives: This study aims to evaluate the relationship between microbiota awareness, frequency of probiotic food consumption, and orthorexia nervosa (ON) tendencies among university students studying health-related fields.

Methods: The study was cross-sectional and descriptive research with 275 voluntary participants from the faculties of Health Sciences, Medicine, Pharmacy, and Dentistry. The data were collected through an online survey. The analysis was performed using the Statistical Package for the Social Sciences 22.0 software.

Results: After analysing, the mean ORTO-11 score was 24.68±6.3 and the mean microbiota awareness scale score was 70.6±18.03. No significant relationship was found between the frequency of probiotic consumption and ON tendencies ($p>0.05$). However, a significant positive correlation was found between microbiota awareness and ORTO-11 scores ($p<0.05$). Regression analysis showed that microbiota awareness accounted for 16.4% of the variance in ORTO-11 scores. Each one-point increase in microbiota awareness score was associated with a 0.057-point increase in ORTO-11 score.

Conclusion: These findings suggest that as microbiota awareness increases, ON tendencies decrease. While few studies have reported the relationship between ON and probiotic consumption, no research has directly examined the relationship with microbiota awareness. A multidisciplinary approach combining nutritional psychology and microbiota research is essential to advance understanding of this topic.

Keywords: Eating behavior, microbiota, microbiota awareness, orthorexia, probiotics.

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The role of probiotics and gut microbiota in human health has gained significant attention in recent years. Probiotics, defined as live microorganisms that provide health benefits when consumed in adequately, are crucial in maintaining gut health and modulating the immune system.[1] Various probiotic food products have been classified based on their types and processing methods, with increasing interest in their applications in the food industry.[2,3] Recent studies highlight the impact of consuming foods rich in bacterial probiotics, postbiotics, and their metabolites on overall health.[4] The gut microbiota, a complex ecosystem of microorganisms, has been linked to multiple physiological processes, including digestion, metabolism, and even mental health.[5,6] Researchers emphasize the significance of gut microbiota in maintaining homeostasis and preventing various diseases.[7]

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Moreover, emerging research has explored the psychological aspects of dietary habits, particularly orthorexia nervosa (ON), which is characterized by an excessive preoccupation with healthy eating by Steven Bratman in 1997.[8] In 2016, Bratman and Dunn distinguished ON from the general desire to live a healthy lifestyle because of its negative consequences, such as malnutrition or impaired social functioning.[9] Orthorexic individuals are primarily concerned with the quality and perceived purity of food rather than its quantity. They often examine the source, processing, and packaging of foods in detail, avoiding items they believe may be harmful to health, such as those exposed to pesticides or containing additives. This health-focused fixation, unrelated to religious or environmental motives, can lead to restrictive and time-consuming eating patterns based on strict personal rules.[10] The diagnostic criteria and assessment tools for ON have been a subject of ongoing debate within the scientific community.[11,12] Some researchers propose a strong correlation between obsessive-compulsive tendencies, dieting behaviors, and ON.[13] In addition, the relationship between gut microbiota and mental health is an area of growing interest. The gut-brain axis, which refers to the bidirectional communication between the gut microbiome and the central nervous system, has been implicated in stress regulation and cognitive functions.[14,15] This connection highlights the potential influence of dietary choices on both physical and mental well-being.

In the literature, studies examining the relationship between gut microbiota, nutrition psychology, and eating disorders have been increasingly emerging. However, comprehensive research integrating these variables remains limited. Most existing studies focus on the effects of gut microbiota on mental health (e.g., depression, anxiety) or the association between probiotic consumption and psychological well-being.[5,16] Nevertheless, a clear framework has yet to be established regarding how microbiota awareness influences individuals dietary choices and how the balance between healthy eating and pathological eating behaviors is shaped in this process. In particular, the lack of studies directly investigating the relationship between ON and microbiota awareness is noteworthy. While it is known that orthorexic tendencies are often observed in individuals with a high awareness of healthy eating,[17] the extent to which awareness of gut health and probiotic consumption habits influence these tendencies remains unclear. Among groups with greater nutritional knowledge, such as future healthcare professionals, it has not yet been adequately explored whether this awareness contributes to the development of ON.

In this study, the relationship between microbiota awareness, the frequency of consumption of probiotic-containing foods, and ON was examined to assess the tendencies of future healthcare professionals from the perspective of nutrition psychology. While many studies have looked at probiotic and microbiota effects on mental health, few have directly examined how microbiota-related health consciousness influences pathological eating patterns, ON, especially among future health workers. The findings obtained may contribute to understanding the boundaries of healthy eating behaviors from a nutrition psychology perspective and to adopting more balanced nutritional approaches in the educational processes of healthcare professionals.

Materials and Methods

Study Design

This study is a cross-sectional and descriptive research examining the relationship between probiotic food consumption frequency and microbiota awareness levels with ON among university students. The study was conducted by the principles of the Helsinki Declaration, and ethical approval was obtained from the Bahçeşehir University Scientific Research and Publication Ethics Committee on 04.04.23 with the approval number E-20021704-604.02.02-56224.

The study was conducted between April 2023 and February 2024 with students aged 18 and older studying at Bahçeşehir University. The study population consisted of students from the Faculty of Health Sciences, Faculty of Medicine, Faculty of Dentistry, and Faculty of Pharmacy at Bahçeşehir University. A simple random sampling method was used for sample selection. The sample size of the study was calculated using the G*Power 3.1.9.4 power analysis program. Sample size calculations indicated that at least 266 individuals needed to be included at a 95% confidence level (alpha = 0.05) and 95% power. Participants took part in the study through an online survey form. The survey form was shared in WhatsApp groups of participants from the relevant departments. Before starting the survey, participants were asked to fill out an informed consent form and indicate whether they agreed to participate in the study.

Questionnaire

The "Sociodemographic Form," consisting of 10 questions, was used to determine individuals' sociodemographic characteristics, including gender, age, undergraduate class, marital status, employment status, presence of chronic diseases, smoking, and alcohol consumption status, and

anthropometric measurements such as height and weight. Participants body mass ındex (BMI) was calculated according to the classification of the World Health Organization.[18]

The "Probiotic food Consumption Frequency Form," developed by the researcher, was used to assess individuals' consumption of probiotic-containing foods or dietary supplements. This form consists of 14 categories, including "Probiotic Food Supplements (Sachet-Capsule)," "Probiotic-Enriched Milk," "Yogurt," "Types of Cheese," "Ayran," "Kefir," "Boza," "Brined Olives," "Turnip Juice," "Pickles," "Pomegranate Molasses," "Vinegar," "Beer," and "Red Wine," all of which are probiotic food options accessible to students.

The microbiota awareness scale (MAS) was developed by Külcü and Önal[19] to assess microbiota awareness levels in adults. This scale consists of 20 questions and is structured into four sub-dimensions: "General Information" "Product Knowledge", "Chronic Disease", and "Probiotics and Prebiotics". It is a five-point Likert-type scale ("1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree"). Questions 17 and 18 consist of multiple-choice knowledge questions, where each correct answer earns 1 point, and each incorrect answer that is not marked is also scored 1 point. Questions 19 and 20 are open-ended, and scoring is based on the number of responses: 1 point for no response, 2 points for one response, 3 points for two responses, 4 points for three responses, and 5 points for four or more responses. The total possible score on the scale ranges from a minimum of 18 to a maximum of 100. Since there is no cut-off point, higher scores indicate higher levels of microbiota awareness. The Cronbach's Alpha coefficient of MAS is 0.852, while in this study, it was found to be 0.952. Necessary permissions were obtained from the original researchers before conducting the study.

ORTO-11 was developed by Donini and Marsili,[20] and its Turkish adaptation was carried out by Arusoglu.[21] ORTO-11 is a four-point Likert-type scale, ranging from "always"[1] to "never."[4] Only question 8 is reverse-coded. The total score on this scale ranges from 11 to 44, with higher scores indicating lower orthorexic tendencies. The Cronbach's Alpha coefficient for scale is 0.62 Donini and Marsili[20] while in this study, it was found to be 0.687. Necessary permissions were obtained from the original researcher before conducting the research.

Statistical Analysis

The data obtained in the study were analyzed in a computer environment using the statistical program Statistical Package for the Social Sciences (SPSS) for Windows, Version 22 (IBM SPSS Statistics for Windows, Version 22. Armonk, IBM Corp,, NY, USA). A normality analysis (Shapiro-Wilk and Kolmogorov-Smirnov tests) determined that the data followed a normal distribution; therefore, parametric tests were used for the analyses. Categorical variables were analyzed using frequency and percentage values. Quantitative variables were analyzed using minimum, maximum, mean, and standard deviation. Comparisons between the two groups were conducted using the chi-square test for categorical variables, and Student's t-test for quantitative variables. Comparisons among more than two groups were conducted using one-way analysis of variance (ANOVA). Spearman's correlation test was used for relational analyses, while Linear Regression was applied for effect analysis. A $p<0.05$ was considered statistically significant.

Results

This study was conducted between April 2023 and February 2024 with a total of 275 participants, of whom 76.7% were female and 23.7% were male. The participants ages ranged from 18 to 30 years, with a mean age of 21.2±2.18 years. The general characteristics of the participants are presented in Table 1.

The ORTO-11 scale scores of individuals were compared according to the frequency of consumption of various probiotic-containing foods and supplements. No statistically significant differences were observed between groups for any of the foods analyzed ($p>0.05$ for all). Although the mean scores showed slight variations across consumption frequencies, these differences were not statistically significant. For instance, individuals consuming probiotic supplements (sachet or capsule) <1–2 times/week had a mean ortho-11 score of 24.63±6.71, whereas those consuming them 1–2 times/week or more had a mean score of 22.71±7.44, and those who never consumed had a score of 25.13±5.85 ($p=0.718$). Similarly, for probiotic-enriched milk, mean scores were 25.41±6.21 (<1–2 times/week), 22.59±5.92 (≥1–2 times/week), and 24.74±6.34 (never), with no significant difference between groups ($p=0.146$). Among all the foods, turnip juice approached statistical significance ($p=0.052$), suggesting a potential trend toward differences depending on consumption frequency, although it did not reach the conventional threshold of statistical significance ($p<0.05$). Overall, the consumption frequency of probiotic foods and supplements did not significantly affect ORTO-11 scores in this sample (Table 2).

It is observed that the mean score of the general information sub-dimension is 24.21±7.26, the product knowledge sub-dimension is 9.41±2.03, the chronic disease sub-dimension is 17.78±5.43, the probiotic and prebiotic sub-dimension is 18.82±5.76, the MAS score is 70.23±18.2, and the ORTO-11 scale score is 24.68±6.3 (Table 3).

Table 1. Distribution of general information about participants

Characteristics	Min-max	Mean±SD	Characteristics	n (275)	%
Age (year)	18–30	21.2±2.18	Marital status		
Characteristics	**n (275)**	**%**	Single	271	98.5
			Married	4	1.5
Gender			Working status		
Female	211	76.7	Working	35	12.7
Male	64	23.3	Not working	240	87.3
Undergraduate department			Chronic disease		
Nutrition and dietetics	104	37.8	Yes	24	8.7
Speech and language therapy	6	2.2	No	251	91.3
Dentistry	12	4.4	Smoking		
Pharmacy	11	4	Yes	66	24
Physiotherapy and rehabilitation	20	7.3	No	209	76
Nursing	60	21,8	Alcohol use status		
Medicine	62	22.5	Yes	123	44.7
Class			No	152	55.3
1st	61	22.2	BMI		
2nd	89	32.4	Underweight (<18.5 kg/m^2)	29	10.5
3th	59	21.5	Normal weight (18.5–24.9 kg/m^2)	189	68.7
4th	56	20.4	Overweight (25–29.9 kg/m^2)	46	16.7
5–6th	10	3.6	Obese (≥30 kg/m^2)	11	4

SD: Standard deviation, BMI: Body mass index.

Table 2. Evaluation of ORTO-11 scores of individuals according to frequency of use of probiotic-containing foods and food supplements

Variables	ORTO-11 scores according to frequency of use				
Foods	**<1–2 times/week**	**≥1–2 times/week**	**Never**	**F**	**p**
Probiotic supplements (sachet-capsule)	24.63±6.71	22.71±7.44	25.13±5.85	2.521	0.718
Probiotic-enriched milk	25.41±6.21	22.59±5.92	24.74±6.34	1.934	0.146
Yogurt	25.46±5.99	24.43±6.26	24.37±7.67	0.708	0.494
Cheese varieties	25.82±5.75	24.48±6.32	23.83±6.99	1.288	0.278
Ayran (Turkish Yogurt drink)	25.25±5.87	24.04±6.53	25.09±6.74	1.192	0.305
Kefir	24.87±6.07	23.59±6.41	24.84±6.41	0.640	0.528
Boza (fermented beverage)	25.00±6.51	24.17±9.09	24.64±6.20	0.074	0.929
Pickled olives	25.43±6.46	24.51±6.49	24.28±5.97	0.782	0.459
Turnip juice	24.10±6.189	21.21±7.475	25.15±6.173	2.986	0.052
Pickles	25.13±5.89	24.37±6.63	24.18±6.63	0.612	0.543
Pomegranate molasses	24.96±5.50	24.56±7.08	24.38±6.77	0.232	0.793
Vinegar	24.69±5.83	24.15±6.65	24.89±6.62	0.233	0.792
Beer	24.28±6.10	24.87±7.71	24.86±6.04	0.247	0.781
Red wine	25.10±6.52	25.24±8.14	24.42±5.94	0.414	0.661

ORTO-11: Orthorexia Nervosa Scale-11, F: Analysis of variance (ANOVA) test statistic.

In the comparison of the scale and sub-dimensions by gender, a statistically significant difference was found between gender and the chronic disease, probiotic, and prebiotic sub-dimensions, as well as MAS ($p<0.05$). The mean scores of female participants were found to be higher in the sub-dimensions and MAS where a significant difference was observed. No significant differences were found between BMI categories and class level. The ANOVA

Table 3. Score distributions of the scale and its subdimensions

	Min	Max	Mean±SD
General information	6	30	24.21±7.26
Product knowledge	4	16	9.78±2.14
Chronic disease	5	25	17.78±5.43
Probiotic and prebiotic	5	25	18.82±5.76
MAS score	22	95	70.6±18.03
ORTO-11 score	11	44	24.68±6.3

SD: Standard deviation, MAS: Microbiota awareness scale.

analyses for general information, product knowledge, chronic disease awareness, probiotic and prebiotic knowledge, MAS score, and ORTO-11 score showed no significant differences for BMI categories ($p>0.05$) and class level ($p>0.05$). The analysis revealed no significant relationship between BMI categories and MAS scale scores or its sub-dimensions ($p>0.05$) (Table 4).

In the relational analysis between participant age and the scale and its sub-dimensions, a low-level positive and statistically significant relationship was found between age and the ORTO-11 scale ($p<0.05$) (Table 5).

In the relational analysis of the ORTO-11 scale with MAS and its sub-dimensions, a positive, low-level, and statistically significant relationship was found between the ORTO-11 score and the general information, chronic disease, probiotic and prebiotic sub-dimensions, as well as MAS ($p<0.05$). In the impact analysis conducted between MAS and the ORTO-11 scale, it was determined that MAS affected ORTO-11 by 16.4% ($R=0.164$), that a 1-unit increase in the MAS score increased ORTO-11 by 0.057 points ($B=0.057$), and that this effect was statistically significant ($p<0.05$) (Table 6).

Table 4. Comparison of gender, grade level and BMI categories with scales and sub-dimensions

Scale	Female (n=211)	Male (n=64)	t	p	Class-level F	p	BMI F	p
General information	24.73±6.73	22.50±8.62	1.900	0.061	1.228	0.299	0.210	0.889
Product knowledge	9.81±2.18	9.70±2.00	0.351	0.726	0.712	0.584	0.847	0.469
Chronic disease	18.23±5.12	16.31±6.16	2.266	0.026*	1.631	0.167	0.540	0.655
Probiotic and prebiotic knowledge	19.36±5.51	17.04±6.25	2.847	0.005*	1.149	0.334	0.237	0.870
MAS score	72.13±16.91	65.56±20.68	2.320	0.011*	1.046	0.384	0.175	0.913
ORTO-11 score	24.63±6.10	24.86±7.04	0.255	0.799	1.491	0.205	0.473	0.701

Independent-samples t-tests were used for gender comparisons; one-way ANOVA for class-level and BMI-category comparisons. *: $p<0.05$. BMI: Body mass index, F: Analysis of variance (ANOVA) test statistic, MAS: Microbiota awareness scale, ORTO-11: Orthorexia Nervosa Scale-11, ANOVA: Analysis of variance.

Table 5. Relational analysis of age with scales and subdimensions pearson correlation test

Variable	General information	Product information	Chronic disease	Probiotic and prebiotic	MAS score	ORTO-11 score
Age (r*)	-0.058	-0.069	0.005	-0.039	-0.034	0.127
Age (p*)	0.340	0.253	0.930	0.523	0.575	0.035

*: Spearman's correlation analysis. MAS: Microbiota awareness scale

Table 6. Results of the relational analysis (spearman correlation) and linear regression analysis of ORTO-11 scale and mas and its sub-dimensions

	General information	Product information	Chronic disease	Probiotic and prebiotic	MAS score
ORTO-11					
r	**0.158**	0.072	**0.179**	**0.120**	**0.164**
p**	**0.009**	0.231	**0.003**	**0.047**	**0.006**
	B	**R**	**t**	**p***	
(Constant)	20.639	0.164	13.604	<0.001	
MAS	0.057		2.752	**0.006**	

**: Spearman's correlation analysis (r), *: Linear regression analysis (B, R). MAS: Microbiota awareness scale, B: Unstandardized regression coefficient, R: Correlation coefficient in regression analysis.

Discussion

A literature review reveals a limited number of studies on microbiota awareness, and no study examining the relationship between microbiota awareness and ON has been found. In our study, the total score of the MAS was found to be 70.6±18.03. In the validity and reliability study of the MAS conducted by Külcü and Önal,[19] the total MAS score was found to be 64.74 for women and 62.42 for men. In a study involving students from various faculties, the average MAS score was found to be 68.4, while the score for Health Sciences Faculty students was 69.9, which was significantly higher.[22]

It has been the subject of various studies that probiotics modulate gut health, improve immune response, reduce intestinal inflammation, have cholesterol-lowering effects, and have positive effects on mental health through the brain-gut axis.[23,24] Probiotics, which are known to have these health effects, may increase their consumption in orthorexic individuals in the context of the etiology of orthorexia. Therefore, individuals with higher ON tendencies may consume probiotic foods more frequently to optimize their general health, thus, a positive relationship between ORTO-11 scores and probiotic consumption may be expected. Nevertheless, no relationship was found between the total ORTO-11 score and probiotic food consumption in our study. In a study evaluating the frequency of food consumption and ON tendency using a form consisting of 116 food groups, a significant difference was found between the consumption of full-fat yogurt and ON tendency. Individuals who consumed yogurt "5–6 times a week" had a higher ON tendency compared to those who consumed it "2–3 times a week".[25] The number of studies in the literature between ON and probiotic food consumption is quite limited. The lack of a significant relationship between probiotic consumption frequency and ON in our study may be because the frequency categories we assessed reflect foods easily accessible and commonly consumed in daily diets in the Turkish sample. Importantly, health sciences students generally have above-average knowledge about what probiotic foods are, what they do, and from which sources they can be obtained. This may indicate that their food preferences are more informed, but based on knowledge rather than orthorectic motivations. In other words, their probiotic consumption may not reflect their orthorectic behavior.

A high ORTO-11 score means there is a low tendency for ON. In this study, a positive correlation was found between ORTO-11 and age, meaning that as age increases, ON tendency decreases. Similarly, in Arusoğlu's[21] study, it was reported that ON tendency decreases with age. This may be related to the fact that as individuals age, their knowledge and experience regarding nutrition increase. In their study examining the effect of age on ON, Dunn et al.[26] found that younger individuals exhibited stricter attitudes toward healthy eating, but this tendency declined with age. Similarly, a meta-analysis conducted by Strahler,[27] showed that women are more prone to ON compared to men, but this tendency decreases with age in both genders. Considering that the participants in our study are prospective health professionals, it is expected that as they age, their knowledge base will expand, and they will develop a more balanced approach to nutrition.

In our study, a significant relationship was found between gender and the total MAS score, as well as the "probiotic and prebiotic" and "chronic disease" subdimensions. Women had higher scores in the significant subdimensions and the total MAS score. Similar studies have also found higher scores among female participants.[19,22,28]

The lack a of a significant association between BMI categories and scale scores in the present study. In a study examining MAS scores in nutrition and dietetics students, it was reported that students categorized as slightly overweight had significantly lower microbiota awareness compared to other BMI groups.[29] However, similar studies investigating adults have not found a significant relationship between microbiota awareness and BMI.[22,30]

There are conflicting results in the literature regarding the relationship between BMI and ON. One study found a very weak negative correlation between BMI and ON, although it was not statistically significant.[31] Arusoğlu et al.[21] stated that BMI had no significant effect on ON tendencies. Similarly, a study conducted with university students reported no relationship between BMI and ON.[32] A study conducted with 465 participants among undergraduate students found that although there was no relation between BMI and ON symptomatology, individuals who perceived themselves as relatively muscular and lean were more likely to exhibit ON symptoms.[33] The results of a systematic review of the risk of ON in healthcare workers and students offer mixed results. The relationship between BMI and ON remains inconsistent.[34] Overall, while some associations exist, they tend to be weak and inconsistent, with limited clinical significance.

Additionally, class level was not found to be a significant predictor of the measured scale variables in this study. Similarly, some studies have reported no difference between orthorexia scores and grade level in their studies of nutrition and dietetics students.[35–37] In our study, there was no significant relationship between undergraduate class and MAS scores, but the group with the lowest average in the MAS total score was composed of 1st-year students. A study shows In a study, it was reported that the level of microbiota awareness increased significantly

with increasing age in nutrition and dietetics students and awareness was significantly higher in 4th grade students compared to other grades.[29] Although it is an expected result that the groups with lower undergraduate grade levels have lower MAS scores, the reason for the lack of a significant relationship can be explained by the fact that the score gap between the grade groups is not very wide.

Results of the relational analysis of the ORTO-11 scale and MAS it was observed that MAS influenced ORTO-11 and that an increase in MAS scores led to an increase in ORTO-11 scores. The increase in MAS scores may be associated with a decrease in orthorexic tendencies. Our study suggests that as individuals' microbiota awareness increases, their ON tendencies decrease. The observed relationship between MAS and ORTO-11 in our study can be explained by the fact that individuals with high microbiota awareness may act more consciously regarding nutrition, leading to a lower tendency for ON.

Limitations of the Study

- The gender distribution of our participants is not equal and they completed the survey online, their responses were accepted without external validation which may limit the generalizability of impacts and outcomes to other demographic groups.
- In addition, a detailed dietary assessment method such as a 24-h food consumption record or a several-day diet diary was not used. This may have resulted in the actual consumption levels of individuals not being fully reflected and the association between the ORTO-11 score and probiotic consumption not being detected.

Strengths of the Study

- The study explores the novel intersection of microbiota awareness, probiotic food consumption, and ON, contributing to emerging research in health and nutrition.
- The study integrates concepts from microbiology, nutrition, psychology, and public health, providing a comprehensive perspective on the topic.

Conclusion

In recent years, interest in health and healthy eating habits has been increasing across various scientific disciplines. ON is a controversial eating disorder characterized by an excessive preoccupation with the purity of food. It is important for healthcare professionals/candidates to be well-informed about healthy nutrition and to understand what constitutes a healthy diet. This knowledge is essential for them to provide beneficial guidance to their patients or clients in their professional practice.

The findings of this study indicate that participants with higher levels of microbiota awareness exhibit lower tendencies toward ON. This suggests that as awareness increases, the risk of ON decreases. This outcome may be explained by the fact that participants perceive healthy eating not as an obsession but as an integral part of a healthy lifestyle. Given the limited number of studies investigating microbiota awareness, future research in this area is of significant importance.

The study shows no significant relationship was found between the frequency of probiotic consumption and ON. The number of studies exploring the link between probiotic consumption and ON in the literature is quite limited. Considering the growing interest in probiotics in recent research, future studies could investigate this relationship in a broader sample, incorporating various food categories beyond probiotics. In this context, the findings of our study provide valuable insights into the influence of microbiota awareness on ON tendencies.

The present findings suggest that the relationship between microbiota awareness, consumption of probiotic foods, and orthorexic tendencies among future healthcare professionals should be carefully evaluated. In this context, incorporating more content into healthcare education curricula that promote balanced and flexible eating behaviors may help students develop a knowledge-based, yet non-obsessive, approach to healthy eating. Future research should be conducted with larger and more homogeneous samples from different age groups and professional backgrounds to establish stronger correlations and better understand causal relationships. A multidisciplinary approach, integrating nutritional psychology and microbiota research, is essential for advancing knowledge in this field.

Disclosures

Ethics Committee Approval: The study was approved by the Bahçeşehir University Scientific Research and Publication Ethics Committee (no: E-20021704-604.02.02-56224, date: 04/04/2023).

Informed Consent: Informed consent was obtained from all participants.

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