

Predictors of Orthorexia Nervosa behavior in women within the framework of the theory of planned behavior

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Abstract

Purpose: This study aims to examine the predictors of Orthorexia Nervosa behavior in women.

Design and Methods: This cross-sectional study was conducted with 418 women of reproductive age in Turkey.

Findings: More positive attitudes towards healthy eating and higher levels of control were significantly associated with more positive intentions. High Orthorexia Nervosa and low control were significantly associated with high body mass index.

Practice Implications: Within the framework of the Theory of Planned Behavior, predictors of Orthorexia Nervosa behavior in women were determined as an attitude towards healthy eating, perceived behavioral control, intention, and body mass index.

KEYWORDS

body mass index, Orthorexia Nervosa, structural equation model, the theory of planned behavior

1 | INTRODUCTION

Eating disorders include being anxious about body weight and appearance due to an unhealthy increase or decrease in food intake (American Psychiatric Association, 2021). Recently, the fact that weakness has been shown as a source of happiness and well-being by social media and western culture causes more and more people to be diagnosed with eating disorders. Eating disorders are more common primarily among reproductive-age women who are overly concerned with body shape and weight (Saunders & Eaton, 2018).

Orthorexia Nervosa (ON) is known as a "healthy eating obsession" (Dell'Osso et al., 2018). ON is defined as obsession or fixation or concern/preoccupation (Cena et al., 2019). However, ON is not yet an official diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* (American Psychiatric Association, 2021) it is controversial whether it is different from anorexia nervosa (AN) or bulimia nervosa (Dunn & Bratman, 2016).

Individuals with ON avoid places where there is no suitable food for them. The effects of maintaining such ruthless eating behaviors are quite severe (Pieczykolan et al., 2017). Adequate and balanced nutrition affects women's reproductive health. Changes in nutrition

affect ovulation, menstrual cycle, development of secondary sex characteristics, pregnancies, live births, the success of assisted reproductive techniques, and sexual functions (Silvestris et al., 2019).

The ON tendency may present higher in those who attach importance to healthy nutrition and those who are concerned about obesity (Arslantaş et al., 2017). In addition to ON, the tendency is higher in those taking no vitamin supplements and non-dieters (Yılmazel, 2021). These individuals do not have a fear of gaining weight (Cena et al., 2019). Individuals with ON can have the characteristics of perceiving themselves as superior to others, praising themselves for choosing healthy foods, and excessive self-blame and condemnation after an unhealthy diet (Oberle et al., 2017). As in other obsessions, if the individual's behaviors disrupt their daily routines in ON, it becomes a problem. Further studies are needed to investigate risk factors or predictors of ON because they can help identify people at risk (Mandelli et al., 2020).

To obtain an increased understanding of factors influencing behaviors related to ON, this study tested a conceptual framework that integrates Ajzen's theory of planned behavior (TPB) (Ajzen, 1991). One of the many models and theories used in explaining human behavior is TPB (Ajzen, 1991). TPB tries to predict individual intention because, according to the TPB, the realization of a behavior depends on the intention of the

individual. The more an individual intends to exhibit a behavior, the more the behavior occurs. In TPB, the intention is explained with three basic components which are attitude towards the behavior, subjective norm, and perceived behavioral control (PBC) (Figure 1). Attitude towards the behavior is an individual's positive or negative evaluation of behavior. Subjective norm represents the social pressure perceived by the individual in exhibiting or not exhibiting the behavior. PBC is the individual's perception of behavior as easy or difficult to perform. One of the important factors affecting intention in the TPB is beliefs about the behavior. Beliefs about attitude, subjective norm, and PBC have an important place in determining these factors. The positive attitude towards the behavior, positive subjective norms, and the strong perception of the individual of the PBC facilitate the emergence of intention (Bosnjak et al., 2020).

Integrating the theory within practice allows health behaviors to be examined from a self-care and nursing perspective. It also provides the theoretical link from behavior to health outcomes (Kim & Choi, 2017). According to some studies (Grammatikopoulou et al., 2018; Parra-Fernández et al., 2018), since body mass index (BMI) and the ON tendency are related, this study linked beliefs to health behavior and health outcome by adding BMI to the model.

As far as we know, the number of studies examining healthy nutrition within the framework of TPB is quite limited. A study explored the factors influencing the intention of 642 individuals to consume street food in Turkey. The same study revealed that PBC and subjective norm affected the intention to consume street food positively, while attitude towards behavior affected the intention to consume street food negatively (Şahin & Solunoğlu, 2019). There is a need to expand existing findings on healthy eating. This TPB-based study aims to examine the predictors of ON behavior in women. Results of this study are valuable in terms of guiding the interventions to develop healthy eating behaviors of women.

2 | MATERIALS AND METHODS

2.1 | Setting and sampling

This cross-sectional study was carried out between 24 June and 6 July 2020 in Turkey. According to the sample calculation with an

unknown population; the sample size was calculated as a minimum of 340, considering the incidence of ON as 33% (Dell'Osso et al., 2018) with a 5% margin of error at a 95% confidence level. The sample consisted of 418 women of reproductive age who met the inclusion criteria of the study. The criteria for inclusion in the study were being between the ages of 18–49, being a woman, not having a chronic disease, not being pregnant, and having Internet access. Women who did not meet the inclusion criteria were excluded from the study. Data of three women with chronic diseases were excluded from the study.

2.2 | Data collection tools

Data were collected through a self-completed Internet-based questionnaire (<http://www.surveeey.com/SurveyStart.aspx?lang=1%26surv=f7cd80438537498d9bff742087d6331>). A questionnaire link was sent to the social media accounts of the women who met the inclusion criteria and they were invited to the study. Study invitation was shared by the university and in the local communities through social media links. Before the questionnaire was accessed online, the purpose and objectives of the study were shared with the participants in the explanation section of the questionnaire. Approval of the explanation section was considered as consent to participate in the study (informed consent). Participants who gave consent gained access to the survey.

The questionnaire consists of 15 questions to determine the sociodemographic and nutritional characteristics of women, and the following TPB components:

2.2.1 | Attitudes

The healthy eating attitudes of women were evaluated using the Attitudes Towards Healthy Eating Scale (Tekkurşun Demir & Cicioğlu, 2019). The scale is a 5-point Likert-type scale consisting of 21 items and four factors. The items on the scale are scored between 1 (strongly disagree) and 5 (strongly agree). A higher score indicates a more positive (healthy) nutritional attitude. The Cronbach

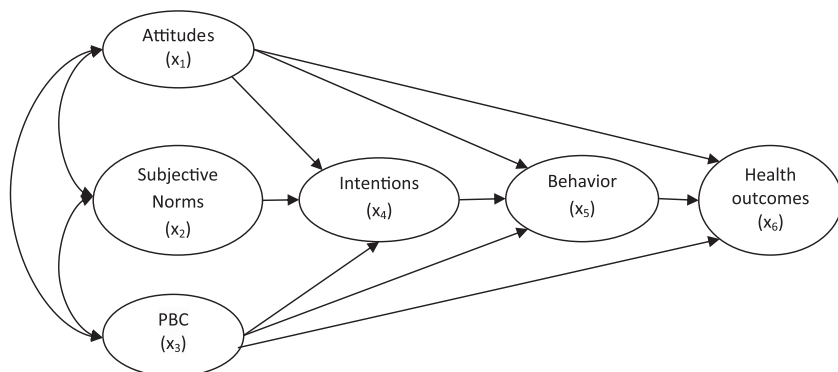


FIGURE 1 Theoretical model of the study

α coefficient of the scale ranged from 0.75 to 0.90 (Tekkurşun Demir & Cicioğlu, 2019), and it was 0.67 in this study.

2.2.2 | Subjective norms

The Social Appearance Anxiety Scale (SAAS) (Hart et al., 2008) was used to measure the social pressure perceived by women regarding healthy eating. The scale, which consists of 16 items on a 5-point Likert scale and a single factor. Each item is scored between 1 (totally inappropriate) and 5 (completely appropriate). Higher scores indicate increase appearance anxiety. The Cronbach α coefficient of the scale was 0.93 in the Turkish adaptation study (Doğan, 2010), and it was 0.93 in this study.

2.2.3 | PBC

Behavioral control of women regarding healthy eating was evaluated with the question of “Can you control yourself about healthy eating?” This question is scored between 1 (I can never control myself) and 3 (I can always control myself).

2.2.4 | Intention

The intention of women for healthy eating was evaluated with the question of “Do you intend to change your eating behavior in the coming days so that it is healthier?” The response “Yes” is given 1 point, while the response “No” is given 0 points.

2.2.5 | Behavior (ON behavior)

Women's obsession with healthy eating was evaluated with ORTO (Donini et al., 2005). ORTO-11 investigates the behavior of individuals in choosing, purchasing, preparing, and consuming foods that they consider healthy. The scale consists of 11 items which are rated on a 4-point Likert scale. Each item is scored between 1 (always) and 4 (never). Low scores (≤ 27) indicate the presence of ON behavior tendency. The Cronbach α coefficient of the scale was 0.62 in the Turkish adaptation study (Arusoğlu et al., 2008), and it was 0.70 in this study.

2.3 | Health outcome

According to some studies (Arusoğlu et al., 2008; Oberle et al., 2017), as a high BMI can predict the ON tendency, the objective health outcomes were evaluated using the BMI in the current study. BMI was calculated by dividing body weight by the square of height in meters (kg/m^2).

The questionnaire was pre-applied on 10 women out of the sample in terms of suitability, clarity, and understandability.

2.4 | Theoretical model and study hypotheses

The theoretical model and research hypotheses are shown in Figure 1. One-way arrows in the theoretical model represent study hypotheses.

2.5 | Data analysis

The data were analyzed with the structural equation model (SEM). Mean \pm SD, skewness, and kurtosis coefficients of numerical variables and number and percentage values of categorical variables were calculated. The Cronbach α coefficients of the scales were calculated. The problem of multicollinearity between variables was examined with the Pearson correlation coefficient and variance inflation factor (VIF). As PBC and Intentions are both based on one single question with binary or three possible values, the asymptotically distribution-free (ADF) method was used to estimate parameters and test models without a normal distribution assumption on variables. The Bootstrap Estimation Method was used to examine the theoretical model. The paths (hypotheses) suggested in the theoretical model were evaluated with the standardized direct and indirect path coefficients and statistical significance. The fit indices used to assess the fit of the final model is as follows: the ratio of Chi-square to degrees of freedom (χ^2/df), the goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). IBM SPSS Version 22 (IBM) and IBM SPSS AMOS Version 21 programs were used for statistical tests. The significance level was accepted as $p < 0.05$.

2.6 | Ethical considerations

Permission was obtained from the Ethics Committee (decision number: 2020/251). This study adheres to the international research ethical principles and was approved by the Selcuk University Medical Faculty Local Ethics Committee (decision number: 2020/251).

3 | RESULTS

3.1 | Sociodemographic and nutritional characteristics of women

Some of the sociodemographic and nutritional characteristics of the women in our study are given in Table 1. The average age of the women is 29.70 ± 8.60 (18–49), 67.2% are university graduates, 46.9% are

TABLE 1 Sociodemographic and nutritional characteristics of women (N = 418)

Features	n	%
Education status		
Primary education	16	3.8
High school	38	9.1
University	281	67.2
Postgraduate	83	19.9
Working status		
Not working	194	46.4
Working	224	53.6
Marital status		
Married	196	46.9
Single	222	53.1
Economic status		
High	128	30.6
Average	270	64.6
Low	20	4.8
Place of residence		
City left	305	73.0
District	82	19.6
Village	31	7.4
Family type		
Nuclear family	357	85.4
Extended family	61	14.6
Smoking status		
Yes	75	17.9
No	343	82.1
Regular physical activity status		
Yes	121	28.9
No	297	71.1
Body mass index		
<18.5	42	10.0
18.5–24.9	267	63.9
25–29.9	81	19.4
30–34.9	23	5.5
35.0–39.9	5	1.2
Pressure from the environment for a healthy diet		
Yes	110	26.3
No	308	73.7
The status of thinking about changing their diet so that they are healthier		
I don't think	78	18.7

TABLE 1 (Continued)

Features	n	%
I'm thinking	204	48.8
I already changed	136	32.5
The ability to control themselves about healthy eating		
Never	11	2.6
Sometimes	273	65.3
Always	134	32.1
Total	418	100.0

married, 53.6% are working, 64.6% have an average level income, 73% live in the city center, and 85.4% have nuclear families. 17.9% of the women smoke, and 71.1% do not do regular physical activity. One out of every four women is overweight or obese (26%). 26.3% of the women stated that they have been under pressure for healthy eating, 48.8% have been thinking about changing their diet so that they are healthier, and 65.3% stated that they can sometimes control themselves about healthy eating. 59.3% of women were found to have a healthy eating tendency.

3.2 | Correlations between variables and descriptive statistics

In our study, the absolute values of the skewness and kurtosis of the TPB components were found between 0.24–1.04 and 0.22–1.70, respectively. Correlation coefficients between the variables were found between 0.09 and 0.37. These values ($r < 0.70$) and VIF < 10 show that there is no multicollinearity problem among the variables (Senaviratna & Cooray, 2019) (Table 2).

3.3 | The fit statistics of the theoretical model

The effect of each latent variable on ON behavior was examined with the SEM fit statistics. As a result of the SEM analysis ($\chi^2/df = 4.817/3 = 1.606$; $p = 0.186$; GFI = 0.99; AGFI = 0.97; NFI = 0.96; CFI = 0.98; RMSEA = 0.038), it was determined that three of the nine ways suggested by the model were not statistically significant (H_2, H_6, H_8 ; $p > 0.05$). These pathways were removed and modifications were made in the model. The goodness of fit indices of the final model had good fit values ($\chi^2/df = 2.432/3 = 0.811$; $p = 0.488$; GFI = 0.99; AGFI = 0.98; NFI = 0.98; CFI = 1.00; RMSEA = 0.000) (Gürbüz, 2019). Thus, it can be said that the theoretical model reflects the TPB well.

3.4 | Direct, indirect, and total effects of variables

Six of the nine pathways suggested by the theoretical model are statistically significant ($p < 0.05$). More positive attitude towards healthy eating (H_1 ; $\beta = 0.15$, $p = 0.004$) and higher PBC

TABLE 2 Correlations between variables and descriptive statistics

Variables	Mean	SD	Skewness	Kurtosis	VIF	Pearson correlation				
						1	2	3	4	5
1. Attitudes	78.55	10.82	-0.58	0.78	1.345					
2. Subjective Norms	30.04	12.24	0.86	0.22	1.220	-0.37**				
3. PBC	2.29	0.51	0.29	-0.65	1.243	0.36**	-0.29**			
4. Intentions	0.33	0.46	0.74	-1.44	1.109	0.27**	-0.19**	0.30**		
5. Behavior (ON)	26.35	4.09	-0.24	0.53	1.127	-0.21**	0.03	-0.07	-0.13**	
6. Health Outcome	22.89	3.94	1.04	1.70	1.071	0.02	0.09*	-0.15**	0.05	-0.17**

Abbreviations: BMI, body mass index; ON, ortorexia nervosa; PBC, perceived behavioral control; SD, standard deviation; VIF, variance inflation factor. * $p < 0.05$; ** $p < 0.01$.

TABLE 3 The direct, indirect, and total effects of variables on health outcomes

Endogenous variables	Exogenous Variables	β	CR	SMC	SDE	SIE	STE
Intentions	← Attitudes	0.15	2.84**	0.05	0.15*		0.15*
	← PBC	0.13	2.45*		0.14*		0.14*
Behavior (ON)	← Attitudes	-0.18	-3.92***	0.08	-0.18**	-0.02*	-0.20**
	← PBC					-0.02*	-0.02*
	← Intention	-0.20	-4.15***		-0.20*		-0.20*
Health outcome (BMI)	← Attitudes			0.05		0.03**	0.03**
	← PBC	-0.16	-3.60***		-0.16**		-0.16**
	← Intention					0.03*	0.03*
	← Behavior (ON)	-0.19	-3.58***		-0.19*		-0.19*
Attitude	↔ PBC (r)	0.37	7.44***				

Abbreviations: BMI, body mass index; β , standardized regression weight; CR, critical ratio; ON, ortorexia nervosa; PBC, perceived behavioral control; SDE, standardized direct effects; SIE, standardized indirect effects; SMC, squared multiple correlations; STE, standardized total effects. * $p < .05$; ** $p < .01$; *** $p < .001$.

(H_3 ; $\beta = -0.13$, $p = 0.014$) were found to be associated with more positive intention. Together, they explain 5% of the intention variability. More positive attitude towards healthy eating (H_4 ; $\beta = -0.18$, $p < 0.001$) and higher intention (H_5 ; $\beta = -0.20$, $p < 0.001$) increase the tendency for ON. Together, they explain 8% of ON behavior variability. Higher ON tendency (H_7 ; $\beta = -0.19$, $p < 0.001$) and lower PBC (H_9 ; $\beta = -0.16$, $p < 0.001$) are associated with higher BMI. Together, they account for 5% of the BMI variability. A correlation was found between attitude towards healthy eating and PBC ($p < 0.001$) (Table 3; Figure 2).

When the indirect effects of variables on ON behavior are examined, it is seen that attitude towards healthy eating and PBC indirectly affect ON behavior ($\beta = -0.02$, $p = 0.010$; $\beta = -0.02$, $p = 0.020$, respectively). More positive attitudes, PBC, and intentions towards healthy eating ($\beta = 0.03$, $p = 0.009$; $\beta = 0.005$, $p = 0.015$; $\beta = 0.03$, $p = 0.036$, respectively) indirectly affect the increase in BMI (Table 3; Figure 2).

4 | DISCUSSION

In this study, the predictors of ON behavior were examined on a theoretical model based on TPB (Ajzen, 1991). As predicted in the TPB, a strong intention for healthy eating was associated with ON behavior. Also, women with ON behavior tendencies had a high BMI. There was a relationship between the attitude towards healthy eating and PBC.

A high eating attitude score which indicates a negative nutritional attitude was found to be associated with ON behavior tendency (Agopyan et al., 2019). In our study, it was determined that a positive attitude towards healthy eating affects healthy nutrition intention directly and ON behaviors both directly and indirectly. It was also found that women who have a positive attitude towards healthy eating have more ON behavior tendencies. Studies on this topic yield conflicting results. Some studies found increased ON behavior tendency in those with negative eating attitudes (Strahler et al., 2018;

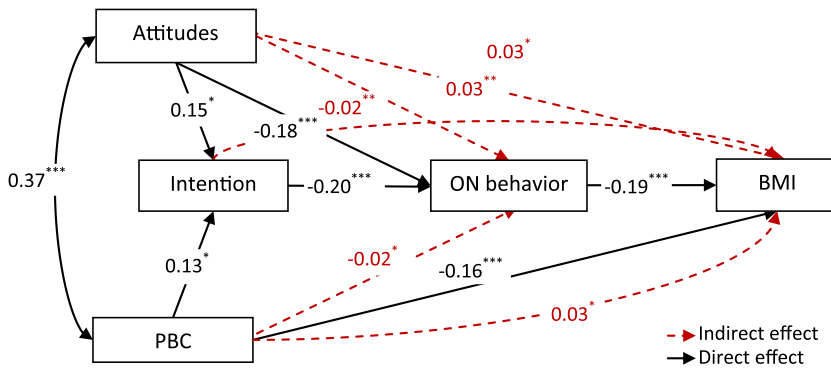


FIGURE 2 Final model [Color figure can be viewed at wileyonlinelibrary.com]

Tremelling et al., 2017) and decreased ON behavior tendency in another study (Brytek-Matera et al., 2015). Also, individuals with a tendency for ON behavior were found to prefer more Mediterranean diets (Strahler et al., 2018) and organic food (Barnett et al., 2016), and limit their food/energy intake more (Brytek-Matera et al., 2019). At the same time, these individuals consume saturated and animal fat products less (Grammatikopoulou et al., 2018). There is a relationship between the use of a special diet in the past and ON behavior. Individuals with ON behavior tendency were found to consume more vegetables, fruits, and nuts than sugar, snacks, and fatty products (Plichta et al., 2019). These results are important in terms of showing that individuals with ON tendency try to make the best diet.

Aesthetic and social expectations seem to motivate some women more than health concerns about healthy eating (Scott et al., 2020). A study conducted to determine the relationship between ON behavior and social pressure in Spain revealed that dissatisfaction with body image was higher in university students with ON behavior than in those without ON behavior (Parra-Fernández et al., 2018). In our study, the social pressure variable was removed from the model because it does not affect intention and ON behavior. Similar to our study, Barthels et al. (2017) determined that the tendency for ON behavior does not affect body dissatisfaction. Dietitian nutritionists with ON tendencies have been found to evaluate their appearance more negatively (Tremelling et al., 2017). These different findings may be attributed to different sample characteristics.

According to TPB, PBC is one of the variables that affect behavior (Ajzen, 1991). In the current study, we found that PBC and attitude towards healthy eating indirectly affect ON behavior. Individuals with high self-control have been reported to be more successful (Palmen et al., 2020) and highly motivated (Pala & Başbüyük, 2021). These results indicate that self-control is important in the realization of the behavior.

In the TPB, the main factor that determines a behavior is intention. The intention and the probability of exhibiting the behavior are directly proportional (Bosnjak et al., 2020). According to this theory, if one thinks that the resources and opportunities required for behavior are lacking, he/she will not be able to form a strong intention regarding that behavior (Korkmaz & Ermeç Sertoğlu, 2013). In our study, it was determined that the intention for healthy eating affects ON behavior directly and BMI indirectly. The intention of healthy

eating tends to increase BMI. Similarly, a study conducted with young consumers in Turkey revealed that overall the strong intention to exhibit a behavior is effective in the emergence of sustainable food consumption behavior (Korkmaz & Ermeç Sertoğlu, 2013). These findings are important in terms of showing that intention is effective in the emergence of ON behavior.

In our study, BMI was used to objectively evaluate the results of ON behavior and it was determined that women with ON behavior tendency have higher BMI. In a systematic review, inconsistent relationships were found between BMI and ON behavior (McComb & Mills, 2019). Some studies determined that there is no relationship between BMI and ON behavior (Barrada & Roncero, 2018; Oberle et al., 2017). Similar to our results, in Greek dietetic students (Grammatikopoulou et al., 2018) and the German population (Luck-Sikorski et al., 2019), high BMI was determined as a risk factor for ON behavior. These conflicting results suggest that different studies are needed.

4.1 | Limitations

This study has a few limitations. First, this study is that it only includes women participants. The majority of women are university graduates and live in urban areas. Therefore, the results are limited in terms of generalizability. Second, healthy eating obsession in women in our study was examined using a self-completed internet-based questionnaire. Therefore it was accessible only by those who had Internet access. Third, The data is based on the statements of the participants, and it has not been clinically confirmed. Fourth, the extent of ORTO-11 in determining ON may be limited due to its psychometric properties.

5 | CONCLUSION

Our findings show that a positive attitude towards healthy eating and high behavioral control positively affect the intention to eat healthy, which in turn increases the tendency to ON behavior. In this study, in which we examined the predictors of ON behavior in women within the framework of TPB, it was determined that the

attitude towards healthy eating, PBC, and intention were the most important predictors of ON behavior. In addition, this study is important in that it is one of the first studies to investigate the predictors of women's ON behavior.

6 | IMPLICATIONS FOR NURSING PRACTICE

Interventions that provide positive attitude and behavior control towards healthy eating and positively affect healthy eating intentions can be effective in improving women's health outcomes. In this context, the current study can guide interventions that consider predictors of women's ON behavior. It is thought that interventions based on the TPB model may contribute to reducing the morbidity and mortality caused by ON behaviors in women and improving women's health. Nurses should organize screening and training programs for reducing ON behaviors and should combine their experience with nursing research and practice.

AUTHOR CONTRIBUTIONS

Concept: Tuba Özaydın and Ayse Tastekin Ouyaba. **Design:** Tuba Özaydın and Ayse Tastekin Ouyaba. **Supervision:** Tuba Özaydın and Ayse Tastekin Ouyaba. **Resource:** Tuba Özaydın and Ayse Tastekin Ouyaba. **Materials:** Tuba Özaydın and Ayse Tastekin Ouyaba. **Data collection and/or Processing:** Tuba Özaydın, Ayse Tastekin Ouyaba, and Selma Infal Kesim. **Analysis and/or interpretation:** Ayse Tastekin Ouyaba. **Literature review:** Tuba Özaydın, Ayse Tastekin Ouyaba, and Selma Infal Kesim. **Writing:** Tuba Özaydın, Ayse Tastekin Ouyaba, and Selma Infal Kesim. **Critical review:** Tuba Özaydın, Ayse Tastekin Ouyaba, and Selma Infal Kesim.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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