

Nutrition Literacy and Quality of Life of University Students: Evidence from a Cross-Sectional Survey

ABSTRACT

Background and Objectives: Nutrition literacy is a concept that improves individuals' diet quality, and quality of life and contributes to enhancing their general health by using and interpreting nutrition-related information correctly. This study purposed to determine the nutritional literacy and quality of life levels of university students and relate them with anthropometric measurements.

Materials and Methods: This is a cross-sectional study and was conducted with 374 university students over the age of 18 at a state university. Nutrition literacy was assessed by using the Evaluation Instrument of Nutrition Literacy on Adults (EINLA), and quality of life was evaluated with the World Health Organization's Quality of Life Questionnaire (Turkish_WHOQOL-BREF). Waist, middle-upper arm, neck circumference, body weight, and height were measured in accordance with appropriate techniques by researchers. Independent t and One-Way ANOVA tests were used to determine differences between two and more than two mean values. Pearson correlation analysis was used to detect relationships between scores of total EINLA, its sections, total Turkish_WHOQOL-BREF and its dimensions, and other variables.

Results: The mean EINLA and WHOQOL-BREF scores of the participants were 25.3 ± 4.7 (borderline) and 54.3 ± 15.1 , respectively. While the EINLA score varied according to gender, faculty (health sciences vs others), and degree (1 to 4), the WHOQOL-BREF score varied according to gender and living place (home vs dormitory). EINLA and WHOQOL-BREF scores of BMI (underweight to obese), waist circumference, and neck circumference (normal vs at risk) groups were not different. It was found positive significant relationships between the second section of EINLA (reading comprehension and interpretation) and psychological health, the third section of EINLA (food groups), and social relationships ($p < 0.05$).

Conclusion: Nutrition literacy, anthropometric measurements, and quality of life of university students are affected by a multifactorial situation.

Paper Type: Research Article.

Keywords: Health Literacy, Food and Nutrition Literacy, Anthropometric Measurements.

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Introduction

Health literacy (HL), first used in the 1970s, is a term associated with individuals' knowledge and competencies in order to meet the complex demands of health in modern society (1). In recent years, HL has become a high priority in health care, and low HL has been associated with worse health and quality of life (QOL) (2). HL plays a crucial role in individuals' QOL (3). A study conducted in Portugal used the conceptual framework developed by the European Health Literacy Consortium and found that HL is closely linked to literacy and encompasses the knowledge, motivation, and competencies to access, understand, appraise, and apply health information to make decisions that improve QOL (4). A cross-sectional study conducted among health management specialists found that HL was positively associated with a higher sense of purpose in life and life satisfaction (5). This suggests that individuals with higher HL are more likely to have a better QOL.

On the other hand, HL skills that are important for making appropriate health decisions are content and context-specific (situation-specific), therefore nutrition researchers have turned to evaluating the concept of HL in terms of nutrition (6). The fact that the term nutrition literacy (NL) has emerged as a distinct form of HL, examinations relative to skills and features involved in food literacy (FL) and HL are continuing in the literature (7). The definition of nutritional literacy is similar to the definition of HL with its nutrition-specific competence dimension. Nutritional literacy is defined as the capacity to obtain, process, and understand the nutritional knowledge

and skills needed to make appropriate dietary decisions (8). As Nutbeam highlighted it is important to achieve HL at functional, interactive, and critical (9), this situation is similar for NL as well. Functional (basic), interactive (more advanced), and critical NL is concerned with the skills of reading and writing to understand simple nutrition messages, being aware of the quality of usefulness of nutrition information, and analyzing nutrition information critically, respectively (7). There is a lot of evidence that NL, along with HL, improves health and contributes to increased quality of diet and life both in childhood and adults (10-12).

Thus, health and NL are closely linked to QOL. Adequate NL is associated with better QOL outcomes, including higher life satisfaction, sense of purpose, and overall well-being. However, more research is needed to further understand the complex relationship between NL and QOL. University education, which has an important place in human life, is a period in which the transition to adulthood, the ability to make one's own decisions, and self-confidence are formed. However, university students are one of the groups where nutritional problems are most common. In this period when learning and productivity are high, nutritional literacy is an issue that requires more attention. In this context, there was the necessity for conducting this study, which could be effective in clarifying common problems in students. This study is different in terms that it examined in detail the relationship between nutritional literacy, quality of life, and anthropometric measurements in university students. Additionally, data on how nutritional literacy and quality of life change

according to anthropometric measurements are limited. The purpose of this research is to evaluate NL and QOL of university students and associate them with anthropometric measurements.

Materials and Methods

Study design

The type of this study was self-reported, face-to-face cross-sectional and it was conducted with university students studying at Mardin Artuklu University located in the east of Türkiye. Students were reached by using random sampling method.

Participants

The sample size was decided according to the data collection period (four months) and was aimed to reach the maximum sample during the study time. The study was performed between February-May 2021 with 374 university students. The inclusion criteria were to be a volunteer, to study at Mardin Artuklu University, to be 19-64 years old, and to have healthy communication. Since it is thought that the level of nutrition literacy might be high, students in the Department of Nutrition and Dietetics were excluded from this study.

Data collection

Data on sociodemographic characteristics (age, gender, educational status, living place), health status, the Evaluation Instrument of Nutrition Literacy on Adults (EINLA), and World Health Organization's Quality of Life Questionnaire (Turkish_WHOQOL-BREF) scores of students were collected by the researcher with a questionnaire form using the face-to-face interview method.

The Evaluation Instrument of Nutrition Literacy on Adults (EINLA)

The tool was developed by Cesur et al in 2015 in Turkish. The correlation coefficient and the Cronbach's alpha reliability coefficient of the tool are 0.85 and 0.75, respectively. It is a valid and reliable instrument to evaluate the level of NL and has five sections respectively general nutrition information, reading comprehension and interpretation, food groups, the serving sizes, and how to read food labels and ability to do simple calculations. Each correct answer corresponds one point, on the other hand unanswered or incorrectly answered items were given 0 points. 0-3, 4-7, and 8-10 point(s), for the first and the third sections, 0-2, 3-4, and 5-6 point(s) for the second and the fifth sections, and 0-1, 2, and 3 point(s) for the fourth section were accepted as insufficient, borderline, and sufficient respectively. When the whole NL score was evaluated, a total score between 0 and 11 was considered as insufficient, between 12 and 23 as borderline, and between 24 and 35 as sufficient (13).

World Health Organization Measuring Quality of Life (Turkish_WHOQOL-BREF)

The WHOQOL-BREF is the short version of the WHOQOL-100. It adapted to Turkish by Eser et al in 1999, and it contains 2 items from the Overall QOL and General Health facet and one item from each of each of the 24 QOL facets. The instrument is currently scored in 4 domains including physical health, psychological health, social relationships, and environment health. It is a 5-likert scale and raw scores are between 4-20 were calculated for each domain, and then were transformed to 0-100 points according to the guidelines of

the WHOQOL-BREF. The higher the score means that the higher the QOL (14, 15).

Anthropometric measurement

Body weight, body height, waist circumference (WC), neck circumference (NC), and middle upper arm circumference (MUAC) of students were measured by the researcher in accordance with measurement techniques. Body weight was measured with a scale, taking into account that they were barefoot and wore light clothing. Height was measured using a stadiometer with the head in the Frankfort plane. WC, NC and MUAC were measured with a non-stretchable tape measure. Body Mass Index (BMI) [(body weight, kg) / (body height, m²)] were calculated and assessed according to WHO criteria, students with a BMI of <18.5 kg/m² (underweight), 18.5-24.9 kg/m² (normal), 25.0-29.9 kg/m² (overweight), and 30.0-39.9 kg/m² (obese) (16). Waist circumference >94 cm in men and >80 cm in women was considered risky classification (17). ≥35.5 cm in males and ≥32 cm in females of NC values were considered cut-off points (18).

Statistical analysis

Data obtained from the study were analyzed in the SPSS (Statistical Package for the Social Sciences) package program (IBM SPSS Statistics 23.0. Armonk, NY, USA: IBM Corp; 2013). The distribution of quantitative data was given with number percentages. The regularity of the distribution for each variable was evaluated using the Kruskal-Wallis test. The mean and standard deviation (SD) values were shown for values. Independent t test was used to compare two independent groups. To analyze more than two independent groups, One-Way ANOVA test were conducted. Bonferroni multiple

comparison test was performed to determine the difference between groups. Pearson's correlation coefficient was used to determine the relationship between two continuous variables. The correlation coefficients were evaluated as 0.00-0.10 (negligible), 0.10-0.39 (weak), 0.40-0.69 (moderate), 0.70-0.89 (strong), and 0.90-1.00 (very strong) (19). The statistical significance level was taken as $p < 0.05$.

Results

Some characteristics and Nutrition Literacy, Quality of Life

In this study, 374 university students participated; their mean age was 22.7 ± 2.6 years and 51.3% of them were female. The results of the present study showed that the mean EINLA and WHOQOL-BREF-TR scores were 25.3 ± 4.7 and 54.3 ± 15.1 , respectively. According to the mean total EINLA score, 1.9% of them were insufficient, 27.8% of them were borderline, and 70.3% of them were sufficient. The mean scores of EINLA were 7.6 ± 2.0 for the first section (general nutrition information), 5.0 ± 1.2 for the second section (reading comprehension and interpretation), 8.8 ± 1.8 for the third section (food groups), 1.6 ± 0.8 for the fourth section (the serving sizes), and 2.4 ± 1.5 for the fifth section (how to read food labels and ability to do simple calculations). In addition, 55.3%, 75.7%, 85.8%, 12.0%, and 9.4% were sufficient for sections, respectively (Figure 1).

When examining mean EINLA scores, the statistical results of the study showed no significant differences between groups of age, living place, education status of parents, and chronic disease. The mean EINLA score was higher in females (26.4 ± 4.0) than males (24.2 ± 5.2) ($t = 4.456$, $p < 0.001$); higher in

students studying health sciences (26.3 ± 4.6) than other faculties (24.2 ± 4.6) ($t=4.427$, $p<0.001$); higher in students studying fourth degree (26.9 ± 3.7) than both first degree (24.3 ± 5.3) and second degree (24.2 ± 5.0) ($F=7.896$, $p<0.001$). When examining mean WHOQOL-BREF-TR scores, the mean score was higher in males (56.0 ± 16.7) than females (52.8 ± 13.3) ($t=-2.062$, $p=0.039$); higher in students living at home (56.9 ± 15.5) than dormitory (52.5 ± 14.6) ($t=-2.817$, $p=0.005$). Students who do not have sufficient nutrition knowledge had lower score (the mean EINLA score was 23.6 ± 4.8 , the mean WHOQOL-BREF-TR score was 47.8 ± 16.1) than those who have sufficient (the mean EINLA score was 25.2 ± 5.1 , the mean WHOQOL-BREF-TR score was 56.8 ± 17.1) and partially sufficient (the mean EINLA score was 26.2 ± 4.2 , WHOQOL-BREF-TR score was 55.5 ± 12.2) nutrition knowledge ($F=8.707$, $p<0.001$ for EINLA score, $F=9.761$, $p<0.001$ for WHOQOL-BREF-TR score) (Table 1).

Anthropometric measurements and Nutrition Literacy, Quality of Life

Most of students (71.9%, 92.5%, 55.3%, respectively) had normal BMI, waist and neck

circumference. There was no statistically significant difference between groups of BMI, waist and neck circumference (Table 2).

The findings showed a positive relationship between age and psychological health ($r=0.139$, $p=0.007$). There was no any relationship between BMI with NL and BMI with QOL ($p>0.05$). WC, NC, and MUAC were associated with total EINLA and general nutrition information domain negatively [$r= (-0.10) - (-0.39)$, $p<0.05$], and with total WHOQOL-BREF-TR, physical health, environment health positively [$r= (0.10) - (0.39)$, $p<0.05$]. Also, there was a positive relationship between MUAC and EINLA food groups domain ($r=-0.135$, $p=0.009$). These all correlation coefficients showed weak relationships between variables (Table 3).

Relationship between Nutrition Literacy, Quality of Life

When examining the relationship between NL and QOL, any relationships were not found except for reading comprehension and interpretation domain with psychological health (positive ad weak correlation $r=0.151$, $p=0.003$), and EINLA food groups domain with social relationships (positive ad weak correlation $r=0.109$, $p=0.035$) (Table 4).

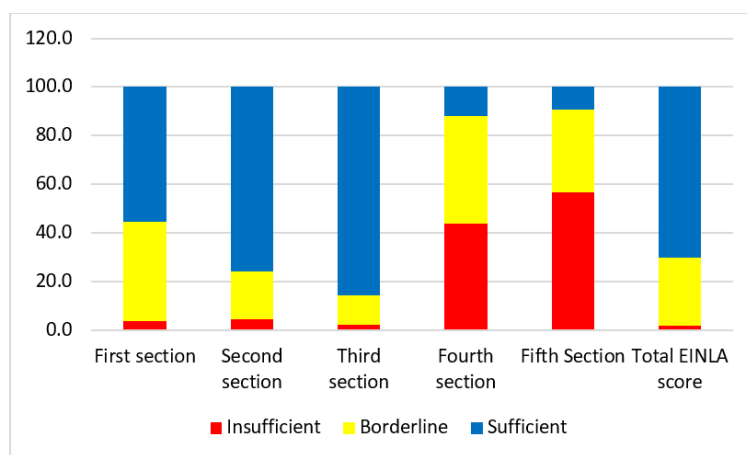


Figure 1. Distribution of EINLA and its sections

Table 1. Comparison of mean scores of scales according to some characteristics of university students (N=374)

Characteristics		N (Percentage)	Total EINLA Score Mean $\pm$ SD	Significance Values	WHOQOL- BREF-TR Mean $\pm$ SD	Significance Values
Age (year)	19-24	318 (85.0%)	25.4 $\pm$ 4.8	t=1.023 p=0.307	53.7 $\pm$ 14.7	t=-1.803 p=0.072
	25-38*	56 (15.0%)	24.7 $\pm$ 4.2		57.7 $\pm$ 16.9	
Gender	Female	192 (51.3%)	26.4 $\pm$ 4.0	t=4.456 p<0.001	52.8 $\pm$ 13.3	t=-2.062 p=0.039
	Male	182 (48.7%)	24.2 $\pm$ 5.2		56.0 $\pm$ 16.7	
Faculty	Health Sciences**	194 (51.9%)	26.3 $\pm$ 4.6	t=4.427 p<0.001	54.2 $\pm$ 15.1	t=-0.226 p=0.822
	Others***	180 (48.1%)	24.2 $\pm$ 4.6		54.5 $\pm$ 15.1	
Degree	1	82 (21.9%)	24.3 $\pm$ 5.3a	F=7.896 p<0.001	52.6 $\pm$ 12.4	F=1.850 p=0.138
	2	102 (27.3%)	24.2 $\pm$ 5.0a		54.5 $\pm$ 15.5	
	3	78 (20.9%)	25.7 $\pm$ 4.4ab		57.6 $\pm$ 14.7	
	4	112 (29.9%)	26.9 $\pm$ 3.7bc		53.2 $\pm$ 16.6	
Living place	Dormitory	218 (58.3%)	25.4 $\pm$ 4.4	t=0.464 p=0.643	52.5 $\pm$ 14.6	t=-2.817 p=0.005
	Home	156 (41.7%)	25.2 $\pm$ 5.1		56.9 $\pm$ 15.5	
Education of mothers	Illiterate/literate	149 (39.8%)	25.3 $\pm$ 4.0	F=1.484 p=0.218	52.0 $\pm$ 16.3	F=2.584 p=0.053
	Primary or secondary school graduate	166 (44.4%)	25.4 $\pm$ 4.9		55.2 $\pm$ 13.2	
	High School Graduate	40 (10.7%)	26.1 $\pm$ 4.4		57.6 $\pm$ 14.9	
	University Graduate	19 (5.1%)	23.3 $\pm$ 7.9		58.8 $\pm$ 19.7	
Education of fathers	Illiterate/literate	36 (9.7%)	24.8 $\pm$ 3.1	F=0.572 p=0.634	51.0 $\pm$ 16.6	F=1.737 p=0.159
	Primary or secondary school graduate	223 (59.6%)	25.2 $\pm$ 4.7		53.6 $\pm$ 14.6	
	High School Graduate	66 (17.6%)	25.9 $\pm$ 3.9		57.2 $\pm$ 13.1	
	University Graduate	49 (13.1)	25.4 $\pm$ 6.4		56.1 $\pm$ 18.3	
Chronic disease	Yes	44 (11.8%)	26.4 $\pm$ 3.6	t=1.592 p=0.112	55.8 $\pm$ 9.9	t=0.957 p=0.342
	No	330 (88.2%)	25.2 $\pm$ 4.8		54.1 $\pm$ 15.7	
Having sufficient nutrition knowledge on statements	Yes	122 (32.6%)	25.2 $\pm$ 5.1a	F=8.707 p<0.001	56.8 $\pm$ 17.1a	F=9.761 p<0.001
	Partially	174 (46.5%)	26.2 $\pm$ 4.2a		55.5 $\pm$ 12.2a	
	No	78 (20.9%)	23.6 $\pm$ 4.8b		47.8 $\pm$ 16.1b	

*The maximum age of participants was 38.

**Department of Nutrition and Dietetics were excluded.

*** Literature, Art, Sports, Tourism, Architecture and Economics

Independent t test and One Way ANOVA test were used.

Table 2. Comparison of mean scores of scales according to anthropometric measurements of university students (N=374)

Parameter		N (Percentage)	EINLA Mean $\pm$ SD	Significance Values	WHOQOL- BREF-TR Mean $\pm$ SD	Significance Values
BMI	Underweight	26 (7.0%)	23.9 $\pm$ 4.8	F=2.142 p=0.095	55.7 $\pm$ 14.6	F=1.288 p=0.278
	Normal	269 (71.9%)	25.7 $\pm$ 4.8		54.5 $\pm$ 15.1	
	Overweight	68 (18.2%)	24.8 $\pm$ 4.4		52.2 $\pm$ 15.5	
	Obese	11 (2.9%)	23.7 $\pm$ 3.8		61.2 $\pm$ 15.1	
Waist circumference	Normal	346 (92.5%)	25.3 $\pm$ 4.8	t=0.089	54.2 $\pm$ 15.3	t=-0.760
	At risk	28 (7.5%)	25.3 $\pm$ 3.5	p=0.929	56.4 $\pm$ 12.5	p=0.448
Neck circumference	Normal	207 (55.3%)	25.7 $\pm$ 4.8	t=1.492	53.7 $\pm$ 14.9	t=-0.910
	At risk	167 (44.7%)	24.9 $\pm$ 4.5	p=0.137	55.1 $\pm$ 15.4	p=0.363

BMI: Body mass index

Independent t test and One Way ANOVA test were used.

Table 3. Correlation coefficients between scores of scales and age and anthropometric measurements (N=374)

Variables	Age	BMI	WC	NC	MUAC
EINLA	r=0.095 p=0.067	r=0.016 p=0.754	r=-0.111 p=0.032	r=-0.179 p<0.001	r=-0.116 p=0.024
EINLA First Section	r=0.095 p=0.066	r=0.003 p=0.955	r=-0.138 p=0.008	r=-0.218 p<0.001	r=-0.115 p=0.026
EINLA Seconds Section	r=0.002 p=0.965	r=0.089 p=0.085	r=-0.007 p=0.898	r=-0.079 p=0.126	r=0.013 p=0.805
EINLA Third Section	r=0.058 p=0.262	r=-0.025 p=0.628	r=-0.078 p=0.133	r=-0.089 p=0.084	r=-0.135 p=0.009
EINLA Forth Section	r=0.007 p=0.886	r=0.013 p=0.802	r=-0.044 p=0.399	r=-0.079 p=0.127	r=-0.061 p=0.237
EINLA Fifth Section	r=0.100 p=0.052	r=0.002 p=0.970	r=-0.052 p=0.319	r=-0.074 p=0.155	r=-0.036 p=0.483
WHOQOL-BREF-TR	r=0.100 p=0.054	r=0.031 p=0.547	r=0.131 p=0.011	r=0.103 p=0.047	r=0.141 p=0.006
WHOQOL-BREF-TR First Domain	r=0.051 p=0.324	r=0.067 p=0.197	r=0.110 p=0.034	r=0.155 p=0.003	r=0.149 p=0.004
WHOQOL-BREF-TR Second Domain	r=0.139 p=0.007	r=-0.034 p=0.509	r=0.024 p=0.637	r=0.017 p=0.745	r=0.041 p=0.427
WHOQOL-BREF-TR Third Domain	r=0.061 p=0.236	r=0.010 p=0.848	r=0.060 p=0.246	r=-0.030 p=0.569	r=0.028 p=0.585
WHOQOL-BREF-TR Forth Domain	r=0.053 p=0.311	r=0.036 p=0.482	r=0.182 p<0.001	r=0.126 p=0.015	r=0.170 p=0.001

- BMI: Body mass index, WC: waist circumference, NC: neck circumference, MUAC: middle upper arm circumference.

- EINLA first section: general nutrition information, second section: reading comprehension and interpretation, third section: food groups, forth section: the serving sizes, fifth section: how to read food labels and ability to do simple calculations.

- WHOQOL-BREF-TR first domain: physical health, second domain: psychological health, third domain: social relationships, forth domain: environment health.

*Pearson correlation test was used.

Table 4. Correlation coefficients between scores of EINLA and WHOQOL-BREF-TR (N=374)

Variables	WHOQOL-BREF-TR	WHOQOL-BREF-TR First Domain	WHOQOL-BREF-TR Second Domain	WHOQOL-BREF-TR Third Domain	WHOQOL-BREF-TR Forth Domain
EINLA	r=0.039 p=0.454	r=0.023 p=0.658	r=0.101 p=0.050	r=0.093 p=0.074	r=-0.039 p=0.447
EINLA First Section	r=-0.005 p=0.922	r=-0.007 p=0.891	r=0.043 p=0.410	r=0.057 p=0.274	r=-0.070 p=0.174
EINLA Seconds Section	r=0.091 p=0.078	r=0.043 p=0.404	r=0.151 p=0.003	r=0.098 p=0.058	r=0.019 p=0.710
EINLA Third Section	r=0.018 p=0.726	r=0.010 p=0.852	r=0.089 p=0.086	r=0.109 p=0.035	r=-0.053 p=0.307
EINLA Forth Section	r=0.006 p=0.914	r=0.008 p=0.884	r=-0.015 p=0.775	r=-0.045 p=0.387	r=0.052 p=0.318
EINLA Fifth Section	r=0.035 p=0.501	r=0.033 p=0.519	r=0.051 p=0.324	r=0.038 p=0.468	r=-0.011 p=0.830

- EINLA first section: general nutrition information, second section: reading comprehension and interpretation, third section: food groups, forth section: the serving sizes, fifth section: how to read food labels and ability to do simple calculations.

- WHOQOL-BREF-TR first domain: physical health, second domain: psychological health, third domain: social relationships, forth domain: environment health.

*Pearson correlation test was used.

Discussion

In recent years, the role of food literacy and NL concepts in promoting health has gained importance. Along with knowledge, motivation, competence, and awareness that determine the relationship between food, the food system, and nutritional information (20), more specifically, NL is a major determinant for improving diet and eating quality (20, 21). Although there is satisfying evidence relative to the effect of diet quality (22, 23), HL (3, 24), and NL (12, 25) on health-related QOL, studies researching the relationship between NL and QOL in healthy adults remain limited. This study aimed to examine the variables affecting nutritional literacy and QOL in university students and the relationship between these concepts.

Some sociodemographic characteristics are among the factors that are associated with NL (26-28). In a study, in which NL was determined using EINLA, 61.4% of individuals were adequate and 38.6% were borderline. In

addition, women's NL levels were found to be higher than men, education level was a determinant for NL (28). In this study, NL scores differed in gender, faculty, and degree groups, while age, parents' education level, and place of residence were not determinants. In Kamarlı-Altun et al study, similar to this study, having a chronic disease did not have an effect on NL (26). According to participants' statements, EINLA scores and QOL scores of students who had adequate and partially adequate nutrition knowledge were higher than others. In fact, this was an expected result, however, this result shows that although students are not aware of NL, they are aware of what they know. Additionally, having sufficient nutrition knowledge mediates to increase QOL.

BMI, calculated using height and body weight measurements, provides information about body fat and future health risks (29). Therefore, BMI is an index indicating obesity and it is known that dietary habits are poor in

obesity (30, 31). In fact, although it is thought that the skills included in the definition of nutritional literacy affect body weight and inadequate nutritional literacy mediates obesity (32) similar to the results of this study, some researchers show that there is no difference in nutrition literacy levels between BMI groups (26, 33). However, in a study, adequate numerical literacy and food label reading rates in overweight/obese women were found to be lower than in non-overweight/obese women (34) while it was found that nutrition literacy was inversely associated with overweight/obesity among adolescents in another study (35). In this study, no correlation was found between BMI and both total and any section scores. However, in Eroğlu Son's study, the prevalence of total EINLA, portion knowledge, and reading food label sections varied between BMI groups (28). At this point, it should be kept in mind that obesity is a complex disease affected by a multifactorial etiology and many factors. For this reason, in future studies, it should be adjusted the effects of other potential factors. Additionally, WC and NC are among other anthropometric indicators of obesity. As a matter of fact, in a study conducted in Portugal, the interaction between HL and dietary habits has a direct effect on the abdominal perimeter and NC, although it is not found to be associated with BMI (36). However, in a study conducted with adolescents, the means of WC and NC were not found to be different between nutrition literacy groups. In this study, while there was no difference between the mean EINLA scores between normal and risk groups (both WC and NC), weak correlations were

detected between the total EINLA score WC, NC. In future studies, the relationship with the waist-hip ratio should be examined. Thus, in a study similar to this study, while there was no relationship between age, BMI, WC, NC, and NL, the waist-hip ratio (WHR) was found to be higher in the limited NL group (26). On the other hand, anthropometric measurements may also be related to QOL. In a study conducted with obese, the waist/height ratio was the only anthropometric indicator correlated with the physical component of the QOL (37). In a study conducted with women, weak negative correlations were found between QOL and body weight, BMI, WC, WHR (38). In the study of Fan et al., it was determined that QOL was related to waist-to-height ratio (WHtR), WHR, body composition (especially fatty mass) (39). In this study, considering that there was no significant statistical relationship between WC, NC, MUAC, and WHOQOL-BREF-TR and its domains, it was considered necessary to examine WHR, WHtR, body composition. When the relationship between QOL and NL is examined, evidence shows that competencies within the scope of food and nutrition literacy improve the quality of life while improving non-communicable diseases and malnutrition (40). However, increasing the level of nutrition literacy seems to be more effective in developing the QOL of patients (12, 41, 42). In this study, weak positive relationships were detected between the second section of EINLA (reading comprehension and interpretation)-psychological health, and the third section of EINLA (food groups)-social relationships. This might be due to the fact that most of the students are healthy.

Study Limitations and Strengths: This study was conducted with students from only one university. Future studies should be done with larger groups to generalize the results. Additionally, other anthropometric measurements could be involved in further studies, such as skinfold thicknesses.

Conclusion

This study is one of the limited studies examining the relationship between NL, QOL, and anthropometric measurements and contributes to the literature in this field. It reveals that the majority of university students had sufficient nutrition literate levels and their quality of life is moderate, and these parameters are not importantly related to anthropometric parameters, especially BMI. Future studies should pay attention to the points mentioned as limitations of this study.

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Author contributions: Jiyan Aslan Ceylan:

The idea/scope, data collection, literature review, manuscript writing. Aylin Bayındır Gümüş: Data analysis and interpretation, literature review, manuscript writing. All authors read the article and approved the final version of the article.

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