

Adult's food label awareness: scale development and validation

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Abstract

Purpose – This study aimed to develop and validate the Food Label Awareness Scale (FLAS) to comprehensively assess adults' food label reading habits and expectations.

Design/methodology/approach – The FLAS was developed based on a literature review and expert input. Initial item generation was followed by expert evaluations for content and face validity. Data were collected through structured face-to-face interviews using the preliminary version of the FLAS and a sociodemographic questionnaire. A total of 300 adults aged 20–65 years participated. Food label awareness was assessed based on the three subdimensions: (1) product packaging and ingredients, (2) nutrition and health and (3) product brand. In addition, participants' age, gender and education level were recorded. Cronbach's alpha assessed internal consistency. Reliability was supported by comparing the highest and lowest 27% of total scores. Associations between demographics and subdimension scores were tested using appropriate statistical methods.

Findings – The finalized 18-item FLAS demonstrated a three-factor structure with acceptable model fit and internal consistency. Older adults had higher awareness of packaging and ingredients. Lower education was associated with greater reliance on product brand.

Research limitations/implications – A primary limitation is the geographically restricted sample, which may limit the generalizability of the findings.

Originality/value – This study is original in developing a valid and reliable scale specifically measuring adults' awareness of food label reading – an area less explored in the literature, which mostly emphasizes general nutrition knowledge or label reading frequency.

Keywords Food labeling, Health, Consumer behavior, Awareness, Psychometrics

Paper type Research paper

1. Introduction

Food labels are defined by the Food and Agriculture Organization as providing information about the product's identity and contents, as well as how to handle, prepare and consume it safely (FAO, 2016). Today, food labels are being used in numerous countries in the world and have gained importance both in research and the formation of social policies (Chimedtseren *et al.*, 2022). Although the primary purpose of food labels was initially to facilitate trade between countries and ensure food safety, their role has evolved to include



providing information on nutritional content and value, thereby enabling consumers to make more informed decisions (Todd *et al.*, 2021). Beyond detailing the content and allergenic components of food products, labels also provide information that aids in comparing, purchasing, consuming and evaluating these products, thereby encouraging more effective consumer use (Madilo *et al.*, 2020). However, food labels provide accurate and useful information about food products, some studies suggest that labels overloaded with information can be challenging for consumers to comprehend (Jones and Richardson, 2007). Research suggests that sociodemographic factors such as prior nutrition knowledge, educational attainment, age and gender significantly impact consumers' ability to read and comprehend food labels (Sinclair *et al.*, 2013; Viola *et al.*, 2016).

When purchasing a food product, consumers need clear and accurate information to easily and effectively evaluate the ingredients listed on food labels (Shireen *et al.*, 2022). Providing accurate information may help individuals maintain and improve their health or manage nutritional treatments for their conditions, potentially leading to a reduction in societal health expenses. In addition, food labels have been reported to play a significant role in advancing public health (Tian *et al.*, 2022). Besides ensuring that food labels are accurate, sufficient and understandable, the suitability of packaging is also crucial.

In many existing studies, food label reading habits have been evaluated using questionnaires without established validity and reliability (Ayaz *et al.*, 2021; van der Merwe *et al.*, 2014; Soederberg Miller *et al.*, 2015). Moreover, some research has focused only on the use of food labels within specific disease groups (Pan *et al.*, 2023). The absence of a validated and reliable scale designed for use in the general population represents a significant gap in the literature. Existing studies have mostly focused on specific aspects of food labels; however, a comprehensive scale evaluating packaging presentation and clarity has not been developed. Therefore, this study aimed to develop the Food Label Awareness Scale (FLAS) to assess adults' reading habits and awareness regarding food labels. By examining factors influencing label perception, the scale will contribute to a better understanding of the link between food label awareness and healthier food choices, and support the development of clearer and more consumer-friendly labeling systems.

2. Methods

2.1 Food label awareness scale and content validity

In light of the current gap in the literature regarding a standardized instrument to evaluate individuals' awareness toward reading food labels, the present study was undertaken to develop and psychometrically evaluate a novel scale addressing this need. In developing the scale, items were generated based on a thorough review of the relevant literature, following a deductive, literature-based approach. To construct the FLAS, an extensive literature review on food label reading was conducted, and an initial item pool was generated in Turkish. During the item formulation process, 40 statements – both positive and negative – were drafted regarding packaging, nutritional information, ingredients and health claims. A preliminary three-point Likert-type scale was developed, with positive attitude statements rated as follows: 1 - Disagree, 2 - Partially Agree, 3 - Agree, while negative statements were reverse-scored. Expert opinions were then sought from 10 professionals in nutrition and dietetics to evaluate the relevance and clarity of the items. Each item was accompanied by response options indicating “Appropriate,” “Inappropriate” and “Needs Revision.” Based on expert feedback, necessary revisions were made, and the scale was refined to include 30 items (Based on expert feedback, 10 items were removed due to redundancy and unclear wording).

The content validity of the scale was assessed using Lawshe's method, with the Content Validity Ratio (CVR) and Content Validity Index calculated (Lawshe, 1975). Items that did not meet the minimum CVR threshold were revised or excluded. The final item pool consisted of 30 items, which were then subjected to exploratory factor analysis (EFA).

2.2 Participants

In the study, 10 times the number of items was taken as the sample size. It is stated that 5–10 times the number of items is sufficient for the validity and reliability study of the scales (Schinka *et al.*, 2012). Initially, EFA was conducted with 300 participants aged 20–65 residing in Ankara, Türkiye. Subsequently, confirmatory factor analysis (CFA) was carried out with a separate group of 300 participants aged 20–65, also from Ankara in June 2020 to June 2021. Those who are younger than 20 or older than 65, illiterate individuals, those who are unable to understand and answer the scale due to severe visual impairment or cognitive impairment, those who do not speak Turkish, experts in the field of nutrition and food (dietitians, food engineers, etc.), pregnant women whose food label reading behaviors may differ compared to the general population due to their special medical conditions, and individuals with chronic diseases were excluded from the study.

A convenience sampling method was employed. Individuals who volunteered, were able to communicate effectively, and did not have any diagnosed mental health conditions were included in the study. A total of 633 individuals were reached, and 600 eligible participants were included in the study (33 individuals were excluded as they were experts in the field of nutrition and food).

Written informed consent was obtained from all participants. This study was conducted according to the guidelines laid down in the 1964 Declaration of Helsinki and all procedures involving research study participants were approved by the Ankara University Ethics Committee.

2.3 Data collection tools

A pilot study was conducted with a sample of 30 participants to evaluate the clarity and feasibility of the final scale items. Feedback from participants was used to refine item wording and structure before the final data collection phase. After the pilot study, to minimize time burden, selected survey items (item 1, item 7) were abbreviated without affecting their content validity. Data collected during the pilot phase were excluded from the main study. The main data were collected by the researchers using the FLAS, which they developed, along with a questionnaire on sociodemographic characteristics including gender, age and educational status. The questionnaires were administered via face-to-face interviews, each lasting approximately 15 min.

2.4 Analysis of the data

The data were analyzed using SPSS 22 (Statistical Package for the Social Sciences) (IBM, 2015a) and AMOS 24.0 (IBM, 2015b). FLAS was analyzed in terms of content and construct validity. Item analyses were conducted, and the correlations between the scores obtained from each item of the scale and total scale score were calculated. The validity of the developed FLAS was assessed through EFA and CFA, while its reliability was evaluated using the Cronbach's alpha internal consistency coefficient.

To assess the suitability of the data for factor analysis, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity were applied. A KMO value above 0.80 was considered indicative of adequate sampling adequacy, while a significant

Bartlett's Test ($p < 0.05$) was used to confirm the appropriateness of factor analysis by assessing the presence of correlations among variables. These analyses ensured that the data met the necessary assumptions for conducting EFA. EFA was performed using with varimax rotation. The number of factors was determined based on eigenvalues greater than 1 and the scree plot. CFA was conducted to test the fit of the hypothesized model using fit indices such as The square/degree of freedom (χ^2/df) Root mean square error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Residual (RMR), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), Incremental Fit Index (IFI). The analyses included an evaluation of common factor variance, item factor loadings, and the explained variance of each factor. Items with factor loadings of 0.30 or higher were retained within the factor structure (Büyükoztürk, 2017). In addition, lower and upper 27% of the sample, based on total scores, were compared using an independent samples t -test to evaluate the discriminatory power of the items (Table 3). The normality of the data obtained from FLAS and its subdimensions was examined using the Kolmogorov–Smirnov test, which confirmed that the data followed a normal distribution ($p > 0.05$). Descriptive statistics, the independent samples t -test and One-Way Analysis of Variance (ANOVA) were employed for data evaluation. Furthermore, following ANOVA, the Tukey test was conducted to determine the source of group differences, and pairwise comparisons were performed. Statistical significance was set at $p < 0.05$.

Table 1. The factor loads of the food label awareness scale

Items	Factor 1 Packaging and ingredients	Factor 2 Nutrition and health	Factor 3 Product brand	Item Total r	Item Excluded
Item 25	0.727			0.655	0.803
Item 27	0.713			0.660	0.803
Item 22	0.688			0.636	0.803
Item 26	0.678			0.497	0.806
Item 24	0.664			0.625	0.803
Item 21	0.547			0.527	0.805
Item 13	0.539			0.522	0.806
Item 30	0.537			0.446	0.807
Item 10		0.773		0.692	0.803
Item 11		0.764		0.513	0.806
Item 9		0.686		0.520	0.806
Item 14		0.640		0.504	0.806
Item 6		0.626		0.602	0.804
Item 15			0.739	0.039	0.815
Item 19			0.670	0.257	0.810
Item 16			0.644	0.082	0.814
Item 17			0.635	-0.061	0.817
Item 20			0.633	0.339	0.809
Declared variance					
	Total = %51.8	Factor 1 = %22.2	Factor 2 = %16.8	Factor 3 = %12.8	
	Alpha coefficient (α)	0.77	0.78	0.82	

Source(s): Authors' own creation

3. Results

The study was conducted with a sample of 300 adults, of whom 50.3% were male and 49.7% were female. The age distribution of participants was as follows: 26.7% were in the 20–24 age group, 25.3% in the 25–32 age group, 22.3% in the 33–40 age group and 25.7% were aged 41 years or older. The mean age of male participants was 36.0 ± 11.2 years, while the mean age of female participants was 33.0 ± 11.3 years, with an overall mean age of 35.0 ± 11.3 years for the total sample. In terms of educational background, 37.7% of participants were high school graduates, whereas 62.3% held a university degree (Data not shown on table).

3.1 Construct validity

With the purpose of determining whether factor analysis was suitable for the construct validity of the scale, the KMO coefficient and Barlett Sphericity test were analyzed. The KMO sampling proficiency scale was found as 0.846 and the Barlett Test as 1943.404 ($p < 0.05$). These values show that sample size is sufficient for validity analysis (Samuels, 2017).

Following the confirmation that the data were suitable for factor analysis, EFA was conducted to assess the construct validity and factor structure of FLAS. The analyses included an evaluation of common factor variance, item factor loadings and the explained variance of each factor. Items with factor loadings of 0.30 or higher were retained within the factor structure (Büyüköztürk, 2017). As a result, items 1, 2, 3, 4, 5, 7, 8, 12, 18, 23, 28 and 29, which had factor loadings below 0.30, were excluded from the scale, finalizing the FLAS with a total of 18 items (Supplementary Table 1).

The choices of the 15 positive items of the scale are scored as 1, 2, 3 and the choices of the 3 negative items (15, 16, 17) are scored reversely as 3, 2, 1. The score interval which can be received from the scale is between 18 and 54. As a result of the EFA, three factors whose eigenvalue is over 1 were achieved in FLAS. The scale explains 51.8% of the total variance. Using the varimax axis rotation technique, it was determined that the first factor consists of eight items (13, 21, 22, 24, 25, 26, 27, 30), the second factor consists of five items (6, 9, 10, 11, 14) and the third factor consists of five items (15, 16, 17, 19, 20). The content of the items were analyzed and the first factor was identified as “Packaging and ingredients”, the second factor as “nutrition and health” and the third factor as “product brand”. The factor load values for items in the factors were found as 0.537–0.727 in the first factor, as 0.626–0.773 in the second factor and as 0.633–0.739 in the third factor (Table 1).

In the context of scale development, CFA fit indices are employed to assess the adequacy of the model fit, indicating the extent to which the hypothesized measurement structure is consistent with the observed data. For this purpose, CFA was conducted with an independent sample of 300 participants aged 20–65 to assess the three-dimensional construct validity of the FLAS. The significance of the proposed model was evaluated through this analysis. The CFA values, along with their acceptable and good fit thresholds (Karagöz, 2016; Meydan and Şeşen, 2015; Sürücü *et al.*, 2021), are presented in Table 2.

The results of FLAS chi-square model test were ($p < 0.001$) in terms of the CFA result is significant. The values of χ^2/df was found 1.97. RMSEA = 0.05 and RMR = 0.04 were provide a fit model-data fit. CFI = 0.93, GFI = 0.92, AGFI = 0.90, IFI = 0.93 and TLI = 0.92. NFI = 0.87. All fit indices demonstrated a good model fit, with the exception of GFI, which was within the acceptable range. (Table 2).

The adequacy of the model was also tested with the path diagram according to CFA and three-dimensional structure was found to have adequate coherence (Figure 1). The path diagram presents the standardized factor loadings of the model as well as the correlations among the factors. A positive correlation was observed between Factor 1 and 2 ($r = 0.78$),

Table 2. Confirmatory factor analysis fit indices of the FLAS with good fit and acceptable fit ranges

Fit indices	Values	Good fit ranges	Acceptable fit ranges
χ^2/df	1.97	$0 \leq \chi^2/df \leq 3$	≤ 5
RMSEA	0.04	≤ 0.05	≤ 0.08
RMR	0.04	≤ 0.05	≤ 0.08
CFI	0.93	≥ 0.97	≥ 0.90
GFI	0.92	≥ 0.90	≥ 0.90
AGFI	0.90	≥ 0.90	≥ 0.90
NFI	0.87	≥ 0.95	≥ 0.90
IFI	0.93	≥ 0.95	≥ 0.90
TLI	0.92	≥ 0.95	≥ 0.90

Note(s): χ^2/df = the square/degree of freedom; RMSEA = root mean square error of approximation; RMR = root mean square residual; CFI = comparative fit index; GFI = goodness of fit index; AGFI = adjusted goodness of fit index; NFI = normed fit index; IFI = incremental fit index; TLI = Tucker–Lewis index

Source(s): Authors' own creation

whereas negative correlations were found between Factor 2 and 3 ($r = -0.26$) and between Factor 1 and 3 ($r = -0.28$). All estimated coefficients were statistically significant (Table 3).

Thus, according to the results obtained as a result of EFA and CFA, it is seen that the FLAS is confirmed to have 18 items and a three-dimensional model.

3.2 Scale reliability

With the purpose of analyzing the reliability of FLAS, item total score correlation and Cronbach's alpha coefficient, which indicates the degree of internal consistency among the items of the scale, and the discriminatory power of the items were also assessed by comparing the top and bottom 27% of participants based on total scores (Table 1, Table 3).

Cronbach's alpha internal coefficient of consistency was found as 0.81. The alpha values for the subdimensions of the scale were found as 0.77 for "packaging and ingredients"; as 0.78 for "nutrition and health" and as 0.82 for "product brand" (Table 1). The item discrimination analysis, based on the comparison of the top and bottom 27% of participants, revealed that all items significantly differentiated between the two groups ($p < 0.001$ for each item), indicating strong discriminatory power across the scale (Table 3).

3.3 Evaluation of food label awareness scale across demographics

Statistical analysis revealed no significant differences between FLAS or its subdimensions and gender ($p > 0.05$) (Table 4).

The relationship between FLAS and its subdimensions with educational status was examined, and a significant difference was identified only in the "Product Brand" subdimension ($p < 0.05$). Based on the mean scores, it was observed that individuals with a middle to high school education placed greater importance on product brand compared to other educational groups. Also, the results indicated a statistically significant difference in the "Packaging and ingredients" subdimension of FLAS across age groups ($p < 0.05$). To identify the specific groups contributing to this difference, a post hoc Tukey test was performed, revealing that the significant variation was driven by differences between the 20–24 age group and the ≥ 41 age group. The findings suggest that individuals aged 20–24 placed the least importance on product packaging and ingredients, whereas those aged 41

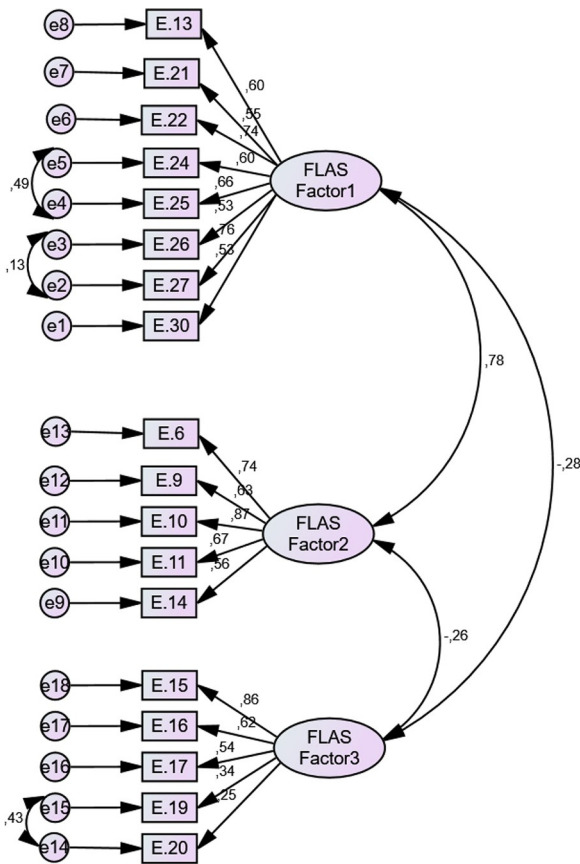


Figure 1. Standardized path diagram coefficients showing sub-dimensions and items of the FLAS model obtained as a result of CFA

Note(s): CFA (Confirmatory factor analysis) was used

Chi-square/Degrees of freedom (χ^2/df) = 1.97, p value = 0.000, Root Mean Square Error of Approximation (RMSEA) = 0.05, Comparative Fit Index (CFI) = 0.93, Goodness of Fit Index (GFI) = 0.92, Adjusted Goodness of Fit Index (AGFI) = 0.90, Incremental Fit Index (IFI) = 0.93, and Tucker-Lewis Index (TLI) = 0.92. Norm Fit Index (NFI) = 0.87

Source: Authors' own creation

and above assigned the highest level of importance. This finding shows that individuals pay more attention to food packaging and ingredients with age ($p < 0.05$) (Table 4).

4. Discussion

Today, ensuring that food labels provide accurate information is crucial in reducing the rising prevalence of nutrition-related diseases. These labels serve as essential tools for helping consumers make healthier food choices and improve their health literacy. To the best of our knowledge, this study is among the first attempts to develop and validate a scale examining food label awareness in the adult population. The validity and reliability analyses of the

Table 3. Results of item discrimination analysis comparing lower and upper 27% of participants based on total scores

Items	<i>t</i>	<i>p</i> value
Item 6	13.8	<0.001
Item 9	11.6	<0.001
Item 10	12.5	<0.001
Item 11	12.5	<0.001
Item 13	10.8	<0.001
Item 14	6.6	<0.001
Item 15	3.9	<0.001
Item 16	3.1	<0.001
Item 17	2.9	<0.001
Item 19	1.3	<0.001
Item 20	5.2	<0.001
Item 21	13.8	<0.001
Item 22	12.5	<0.001
Item 24	7.3	<0.001
Item 25	9.2	<0.001
Item 26	7.7	<0.001
Item 27	10.5	<0.001
Item 30	14.8	<0.001

Note(s): Independent samples *t*-test was performed. *Italic* values indicate statistical significance ($p < 0.05$)

Source(s): Authors' own creation

Table 4. Differences in FLAS scores and subdimensions by demographic characteristics

Demographics	Packaging and ingredients	<i>P</i>	Nutrition and health	<i>p</i>	Product brand	<i>p</i>	FLAS	<i>p</i>
	M±SD		M±SD		M±SD		M±SD	
<i>Sex</i> ^a								
Male	11.1 ± 3.5	0.810	7.6 ± 2.2	0.567	9.0 ± 2.1	0.328	27.7 ± 5.7	0.997
Female	11.0 ± 3.2		7.5 ± 2.2		9.2 ± 2.1		27.7 ± 4.8	
<i>Age</i> ^b								
20–24	10.2 ± 2.9	0.013	7.1 ± 1.7	0.090	9.5 ± 1.8	0.143	26.8 ± 4.9	0.224
25–32	10.8 ± 3.1		7.8 ± 2.1		9.0 ± 2.2		27.6 ± 5.2	
33–40	11.3 ± 3.4		7.5 ± 2.2		9.1 ± 2.3		27.9 ± 5.2	
≥41	11.9 ± 3.8		7.9 ± 2.7		8.7 ± 2.2		28.5 ± 5.6	
<i>Educational status</i> ^a								
High school	11.0 ± 3.0	0.789	7.7 ± 2.1	0.497	9.9 ± 1.9	0.010	28.1 ± 4.9	0.248
University	11.1 ± 3.5		7.5 ± 2.2		8.8 ± 2.2		27.4 ± 5.4	

Note(s): M±SD = mean ± standard deviation; ^aIndependent sample *t*-test, ^bOne-Way ANOVA test Bold values indicate statistical significance ($p < 0.05$)

Source(s): Authors' own creation

FLAS were conducted, and the scale was confirmed to have a three-factor structure: product packaging and ingredients, nutrition and health and product brand. The factor loadings were found to be at an acceptable level, supporting the structural validity of the scale. In addition, CFA results indicated that the model had acceptable fit indices (Karagöz, 2016; Meydan and Şeşen, 2015; Sürücü, *et al.*, 2021). NFI = 0.87 was considered to be near the threshold for acceptable fit. The reliability analysis demonstrated a high Cronbach's alpha coefficient ($\alpha = 0.81$), indicating strong internal consistency. The reliability coefficients for the subdimensions ranged from 0.77 to 0.82, further confirming the reliability of the scale's factors (Tavakol and Dennick, 2011). Based on these findings, the FLAS can be considered a valid and reliable measurement tool. Higher scores on the scale indicate that individuals have a habit of reading food labels, whereas lower scores suggest that they do not. The χ^2/df was calculated as 1.97, indicating an excellent model fit.

Consumers' understanding and using food labels can be associated with numerous factors (gender, age, socioeconomic status, psychological and external factors, etc.) (Mandle *et al.*, 2015). Food choices and eating behaviors exhibit differences between genders (Grzymisławska *et al.*, 2020). As a result of this study, no significant differences were found between gender and the FLAS total score, as well as the subdimensions of product packaging and ingredients, nutrition and health and product brand ($p > 0.05$). In a study conducted in Mauritius, it was found that women read more label information compared to men ($p < 0.05$), but that the state of understanding label information does not differ according to gender ($p > 0.05$) (Cannoosamy *et al.*, 2014). Other studies, conducted in Korea (Azila-Gbetteo *et al.*, 2013), United Arab Emirates (Basarir and Sherif, 2012), Singapore (Kim and Kim, 2009) and Ghana (Vijaykumar *et al.*, 2013) found that women use food labels more often, as they are more concerned about their health. In contrast, a study from India reported that men show more interest in food labels (Ali and Kapoor, 2009). These discrepancies may be attributed to cultural and societal differences in health, nutrition and shopping habits between men and women. For instance, in some societies, women are more responsible for family health, which may increase their likelihood of reading

food labels. In addition, variations in education and nutrition knowledge, methodological differences across studies, and differing levels of health awareness and motivation may further explain these contrasting findings.

In this study, while the product brand subdimension of the FLAS differed according to educational status ($p < 0.05$), the FLAS total score did not. [Saxena et al. \(2021\)](#) reported that as education level increases, individuals read and understand food labels more. Some other studies have shown that an increase in individuals' educational levels positively affects the use of food labels ([Ambak et al., 2018](#); [Bryła, 2020](#); [Çoşkun and Kayışoğlu, 2018](#)). As educational level increases, individuals tend to interpret information more accurately, leading to more precise evaluations and brand preferences based on reliability ([Srivastava et al., 2016](#)). Furthermore, it has been reported that individuals with lower socioeconomic status are more responsive to television advertisements ([Adams et al., 2012](#)). This heightened responsiveness may result in a stronger influence of product brands on these individuals and an increased focus on brand recognition. Consequently, individuals with lower educational levels may place greater emphasis on product brands.

If consumers have acquired the habit of reading food labels and think there is a higher relationship between nutrition and health, then this can increase the frequency of reading food labels. However, it has been reported that low educational levels, vision loss due to old age and similar situations can affect the habit of reading food labels ([Obead et al., 2022](#); [Whitelock and Ensaff, 2018](#)). Existing literature suggests that younger individuals may be more inclined to examine ingredients of food labels ([Hess et al., 2012](#); [Kim et al., 2014](#)). However, the mean rank scores of product packaging and ingredients were found different in terms of age groups ($p < 0.05$). In this study, individuals aged 41 and over had higher scores for product packaging and ingredients ($p < 0.05$), which may be explained by the increasing prevalence of nutrition-related chronic diseases with age. Previous studies also reported that as age increases, sections of food labels regarding cholesterol, preservatives, colorants, artificial sweeteners, fiber and low sugar content are read more attentively ([Çoşkun and Kayışoğlu, 2016](#)).

The originality of this study stands out in several key aspects. First, it contributes to the development of a valid and reliable scale for assessing food label awareness of adults. While existing literature mainly focuses on general nutrition knowledge or the frequency of label reading, there are limited scales that directly measure food label reading awareness. Therefore, the development of the FLAS fills a significant gap, particularly in the fields of consumer awareness and nutrition education. In addition, the three-factor structure of the scale allows for a more comprehensive evaluation of different components of food label reading behavior.

One of the strengths of this research is that the scale has been tested through both EFA and CFA, which is a crucial step in supporting its structural validity. However, certain limitations of the study should be acknowledged. For instance, the fact that the majority of participants were from a specific region (Ankara city) raises concerns about the generalizability of the findings. Future research should include participants from diverse socioeconomic and cultural backgrounds to further assess the generalizability of the scale. Also, the convenience sampling method was used, and therefore the results cannot be generalized to the entire population. The applicability of the developed scale should be reassessed in terms of validity and reliability in different populations.

Moreover, the impact of individual differences, such as vision impairment, as well as digitalization on food label reading habits should be investigated in future studies. In particular, further research on how mobile applications and Quick response (QR) codes influence food label reading behaviors would be beneficial.

In conclusion, the FLAS developed in this study has been shown to be a valid and reliable measurement tool. This scale can serve as an essential instrument for assessing individuals' food label reading behaviors' and conducting awareness-raising initiatives in this area. In addition, it can be applied in health policies and consumer education to promote healthier eating habits in society.

5. Implications for research, practice and policy

The development of FLAS offers significant implications for future research, practice and policy. For research, the FLAS serves as a valid and reliable tool for measuring food label reading awareness, contributing to a gap in the existing literature, which primarily focuses on general nutrition knowledge rather than specific food label behaviors. Future studies should aim to apply the scale in diverse populations, including participants from various socioeconomic and cultural backgrounds, to assess its generalizability. Moreover, investigating the influence of individual factors, such as vision impairment and the role of digitalization (e.g. mobile applications and QR codes), on food label reading habits will provide deeper insights into consumer behaviors.

From a practical perspective, the FLAS can be utilized in nutrition education and consumer awareness programs to enhance individuals' understanding of food labels and encourage healthier eating behaviors. It provides a comprehensive approach by evaluating various dimensions of food label reading, offering practitioners a nuanced tool for assessing and improving food literacy.

At the policy level, the FLAS could be an essential instrument for shaping health policies aimed at promoting better consumer knowledge and healthier food choices. It can be integrated into public health campaigns to evaluate and monitor the effectiveness of nutrition labeling and education initiatives. However, the scale's findings should be interpreted cautiously until further validation studies are conducted across broader populations, ensuring its broader applicability and impact.

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Ethics statement and informed consent statements

Approval was obtained from the ethics committee of Ankara University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. All participants provided written informed consent.

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Supplementary material

The supplementary material for this article can be found online.

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