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Testing the Turkish version of the breastfeeding literacy assessment instrument: a validity and reliability study

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Abstract

Background Breastfeeding literacy is an essential component of maternal and child health, as it enables women to make informed decisions about breastfeeding practices. The objective of this study was to adapt the Breastfeeding Literacy Assessment Instrument for women in the perinatal period into Turkish and to conduct validity and reliability analyses.

Methods This study was conducted face-to-face between September 2023 and February 2024 and involved 470 women in the perinatal period. The data were analysed and evaluated using factor analysis, Cronbach's alpha coefficients, and item-total correlations. The level of statistical significance was accepted at 0.05.

Results The scale has 26 items within four subdimensions, namely Access, Understand, Appraise, and Apply. According to the factor analysis, the scale explains 55.65% of the variance with four factors. While the Cronbach's alpha value for the scale as a whole is 0.935, it varies between 0.773 and 0.860 for the subdimensions. The fit indices are as follows: $\chi^2 = 613.82$, $p < 0.001$, $\chi^2/SD = 2.09$, $GFI = 0.82$, $CFI = 0.88$, and $RMSEA = 0.069$ (95% CI: 0.061–0.077). The model fit of the Turkish version of the Breastfeeding Literacy Assessment Instrument is at an acceptable level and the scale maintained its original four-factor structure, demonstrating a robust factor structure.

Conclusion The Breastfeeding Literacy Assessment Instrument is a validated and reliable tool for the assessment of breastfeeding literacy among Turkish women in the perinatal period, and it can be used by health professionals.

Keywords Breastfeeding, Health literacy, Validity and reliability

Introduction

Breastfeeding is a key concept as a public health priority at the global level [1] and is a health-promoting behaviour [2]. Despite the recommendations from the World Health Organization (WHO) and the United Nations Children's Fund for exclusive breastfeeding for the first six months of life, the proportion of infants who are breastfed exclusively for this period (2023 data: 48%) remains below the target level [3]. In Türkiye, 71% of newborns are breastfed within the first hour of life, while 41% of children under six months of age are exclusively breastfed [4]. Breastfeeding rates are known to be negatively influenced by

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a variety of factors at the individual level (lack of knowledge about breastfeeding, mode of delivery, and insufficient milk perception), at the hospital and health care level (inappropriate communication by health professionals and number of antenatal care visits), at the community level (economic status, use of soothers, and place of residence), and at the workplace level (attendance at work/school) [5, 6]. In contrast to these factors, there is also evidence to suggest that there is a positive association between health literacy level and breastfeeding duration [7–10] and breastfeeding self-efficacy [11]. Indeed, health literacy has been identified as a critical and alterable factor in the improvement of health outcomes and the reduction of health inequalities [12].

One definition of health literacy, among several, is the “ability of an individual to obtain and translate knowledge and information in order to maintain and improve health in a way that is appropriate to the individual and system contexts” [13]. In addition, Sørensen et al. propose an integrated health literacy model that examines the cognitive and social skills that enable the individual to address the four competencies [(1) Access; (2) Understand; (3) Appraise; and (4) Apply)] and the three domains (health-care, disease prevention, and health promotion) in which the individual interacts with the health system [14].

In the literature, a number of different tools have been reported for identifying the relationship between health literacy and breastfeeding. These include the Newest Vital Sign [7, 15], Health Literacy Instrument for Adults [16], and Adult Health Literacy Scale [17]. However, these measurement tools evaluate the level of general health literacy. It should be noted that because there are different definitions and constructs of health literacy, researchers have developed different instruments to measure it in different groups, and each instrument measures one aspect of it [18]. Therefore, the use of group- or situation-specific assessment tools instead of using general health literacy tools to assess the relationship between breastfeeding and health literacy may provide valid and reliable results on breastfeeding literacy. Currently, the understanding of women’s breastfeeding literacy in Türkiye is limited because there is no measurement tool to assess women’s breastfeeding literacy in this country. Therefore, cultural adaptation and psychometric analyses of the Breastfeeding Literacy Assessment Instrument (BLAI) for women in the perinatal period were conducted in the present study. The research question was: [1] Is the Turkish version of the BLAI, developed to assess health literacy in perinatal women, valid and reliable?

Methods

Study design

This was a descriptive, cross-sectional, scale adaptation design study. The objective was to assess the reliability

and validity of the Turkish version of the BLAI. The measurement properties of the BLAI were evaluated in accordance with the Consensus-based Standards for the Selection of Health Measures guidelines [19].

Sample population and sampling

In Türkiye, the Promotion of Breastfeeding and Baby-Friendly Health Institutions Programme, which aims to protect, promote, and support breastfeeding, has been implemented since 1991. The study was conducted with pregnant women who were registered at antenatal clinics and women who had given birth at the obstetric unit of a baby-friendly university hospital in the Black Sea region of Türkiye. A convenience sampling method was employed for participant selection. The inclusion criteria were as follows: (a) 18 years or older, (b) gestational age > 29 weeks, (c) vaginal or caesarean delivery within the previous two days, (d) Turkish literacy, (e) willingness to participate in the study and give written informed consent, and (f) ability to read and understand the questions. The following criteria were used to exclude participants from the study: (a) gestational age ≤ 28 weeks, (b) being more than two days postpartum, (c) multiple pregnancy, (d) neonatal intensive care unit admission, (e) refusal to participate in the study, and (f) illiteracy in Turkish.

There are different approaches in the literature for determining sample size in validity and reliability studies of measurement tools [20]. However, the recommended required sample size is a minimum of ten respondents for each scale item, i.e., the ideal ratio of respondents to items is 10:1 [21]. As there were 26 items in the pool for the BLAI, there was a target of 260 perinatal women to be included in the study. A total of 470 perinatal women who had volunteered to participate in the study and completed the questionnaires in their entirety were included. In addition, the power analyses of the scale used in the study were performed using the web power program and it was calculated that 470 participants reflect 90% power for structural equation modelling with a sampling error of 0.05 and an acceptable root mean square error of approximation (RMSEA) value (RMSEA = 0.00–0.05) at a 95% confidence interval [22].

Data collection tools

The descriptive information form

The descriptive information form was based on a literature review [10, 11, 15, 17, 23]. It consisted of eleven questions concerning women’s sociodemographic and obstetric characteristics.

The Breastfeeding Literacy Assessment Instrument (BLAI)

The BLAI was developed by Valero-Chillerón et al. in 2023 with the objective of assessing breastfeeding literacy in obstetric women [23]. It is used to assess the

breastfeeding literacy of women in the perinatal period. It consists of 26 items, each rated on a four-point Likert scale. The items in the scale are evaluated according to the following options: “ (1) Very difficult; (2) Difficult; (3) Easy; (4) Very easy”. The tool comprises four subdimensions: (1) Access (2), Understand (3), Appraise (4), Apply. The overall reliability of the questionnaire is $\omega = 0.949$, and the reliability analysis of the subdimensions of BLAI yielded the following: “Access $\omega = 0.809$; Understand $\omega = 0.810$; Appraise $\omega = 0.912$; Apply $\omega = 0.873$ ”. The results indicate that the scale is a valid measurement tool for the assessment of breastfeeding literacy in perinatal women.

Adaptation procedure of BLAI to Turkish

Language validity

The WHO translation guidelines were followed during the adaptation of the BLAI to Turkish [24]. Valero-Chillérón et al. (2023), the developers of the BLAI, granted permission for the Turkish adaptation and use of the scale via email at the outset of the study. The translation of the scale items into Turkish was carried out by two linguistics academics proficient in both Spanish and Turkish. The Turkish translations of the scale were subjected to evaluation and revision by the researchers and an independent expert. The revised scale was analysed by a Turkish linguist. Subsequently, two different linguists translated the Turkish scale back into Spanish. After back-translation, the Turkish version of the scale was found to be similar to the Spanish version. To ensure cultural relevance for the Turkish population, specific adaptations were implemented during the translation and reconciliation phase. These included: (1) adapting healthcare professional roles (e.g., ‘matrón/a’ to ‘ebe’), (2) translating community terms into concepts (e.g., ‘asociaciones’ to ‘dernekler’), (3) transforming sentence structures (direct commands to competency-based statements aligned with Turkish linguistic norms), (4) defining social circles (‘aile, arkadaşlar, tanıdıklar’) and (5) simplifying complex sentences. Subsequently, the researchers collated the translations and prepared them for further assessment by experts in the field.

Content validity

The content validity of the scale was evaluated using the expert panel method following the necessary language adaptation. The scale was sent to the experts via email. In order to ensure content validity, a total of 10 field experts were asked to evaluate both the Turkish and original versions of the scale items in terms of both linguistic and content-related aspects [25]. Five of these experts were from the field of obstetric and gynaecological nursing, while the remaining three were from the field of paediatric nursing, one had Turkish language skills and one was from the field of scale development and measurement

tool development. In order to assess the content validity of the scale, the content validity index (CVI) was calculated using the Davis technique. In order to evaluate the cultural appropriateness and clarity of the scale items within the context of Turkish culture, the experts were invited to assign a score on a scale ranging from 1 to 4, with 1 = inappropriate, 2 = slightly appropriate, 3 = quite appropriate, and 4 = very appropriate. The Turkish version of the scale was finalised by implementing the necessary corrections in accordance with the expert opinions. In the Turkish adaptation of the instrument, no items were removed.

Preliminary test

Following the acquisition of expert opinion, a pilot study was conducted with 30 women (15 who had recently given birth and 15 who were pregnant at that time). These women met the established inclusion criteria and participated in the study to assess the readability and comprehensibility of the scale. In the absence of any negative feedback or corrections during the pilot study, the Turkish version of the BLAI was found to be adequately readable and comprehensible. The research sample excluded those women who had participated in the pilot study.

Data collection

The researchers (EKE and NTÖ) collected the data through face-to-face interviews. During the study period, the researchers made regular visits to the antenatal clinic and obstetric unit. All eligible women who were present during these visits were approached, informed about the purpose and procedures of the study, and invited to participate. Two methods were employed for data collection: [1] for pregnant women, data were gathered from women who attended the nonstress test room during the application period, and [2] for women who had given birth, data collection commenced no later than 12 h after delivery. The data collection period spanned from September 2023 to February 2024. The data collection process was completed in approximately 10 min for each participant.

Data analysis

The data were analysed using the software packages IBM SPSS Statistics 25.0 and AMOS 23.0. Descriptive statistics were presented as numbers (n), percentages (%), mean $\pm$ standard deviation, minimum (min), and maximum (max). For the linguistic validity of the scale, the translation–retranslation method was used. In order to assess the content validity of the scale, CVI values were calculated. In the analysis, the accepted statistical significance level was set at 95% confidence interval and $p < 0.05$. The dataset was randomly divided into two groups, designated n_1 and n_2 , with n_1 comprising 231 instances and n_2 239 instances. Exploratory factor

analysis was performed on n_1 , which included 231 participants, and confirmatory factor analysis was performed on n_2 , which included 239 participants. The reliability, item, and internal consistency analyses of the scale were performed on the entire data set of 470 participants.

Validity and reliability. Confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) are widely used in scale development and scale adaptation studies. If the relationship between the items is unknown, it is recommended to use EFA, but if the relationship is tested and the factors and related items are known, it is recommended to use CFA [26]. Because the factors and associated items are known in scale adaptation studies, CFA should be used first, but if the theoretical model fit scores are low according to the CFA, the factor structures of the instrument should be examined using EFA. The most appropriate model is chosen by comparing the model fit values of the structure revealed by the EFA and the theoretical structure of the measurement instrument [26, 27]. EFA and CFA were conducted to assess the validity of the BLAI for women in the perinatal period. EFA was used to determine the item–factor relationship, whereas CFA was used to assess whether the items and subdimensions adequately explained the original structural framework of the scale. The conditions required for EFA were a Kaiser-Meyer-Olkin (KMO) value greater than 0.60 and a p -value of less than 0.05 for Bartlett's chi-squared test [20]. The goodness-of-fit indices were employed to assess the fit of the CFA models to the data [27]. These included the chi-squared/standard deviation ratio, the goodness of fit index (GFI), the comparative fit index (CFI), and the RMSEA. The χ^2/SD value is expected to be less than 5, while CFI and GFI are expected to be between 0.90 and 0.95. If the RMSEA value is below 0.05, the fit is perfect and if it is below 0.08, the fit is acceptable. Values between 0.08 and 0.10 are indicative of moderate agreement, while values below 0.10 are considered unacceptable [27].

In the reliability analysis, Cronbach's alpha coefficients and item–total correlations of the BLAI Turkish version were examined. It was determined that values exceeding 0.70 for the Cronbach alpha coefficient [28] and values exceeding 0.20 for the item–total correlations were acceptable [27] for the instrument in question and its associated subdimensions. Pearson's correlation analysis was used to conduct item–total score analysis of the scale.

Results

Study population

Table 1 presents the demographic and obstetric characteristics of the participants. A total of 470 women in the perinatal period were included and their mean age was 30.62 ± 5.69 years. Most had high school degrees ($n = 146$,

31.1%), were housewives ($n = 388$, 82.6%), had no economic difficulties ($n = 246$, 54.3%), and had social security coverage ($n = 431$, 91.7%). Most were multiparous ($n = 313$, 66.6%) and had planned pregnancies ($n = 287$, 61.1%).

Content validity

To determine the content validity indices for the study, ten experts were asked to review and rate each item on the draft scale. The CVI was calculated by dividing the number of experts who gave a rating of 3 or 4 by the total number of experts. Using the Davis method, the resulting CVI for the scale was 0.96, demonstrating a high level of expert agreement.

Validity analysis

In order to test the construct validity of the BLAI developed by Valero-Chillerón et al. (2023), it was first tested using CFA.

Initially, an analysis of the single-factor structure of the instrument was conducted, which revealed that the fit indices of this model were inadequate [$\chi^2 = 764.58$, $p < 0.001$, $\chi^2/SD = 2.55$, GFI = 0.77, CFI = 0.82, and RMSEA = 0.084 (95% CI = 0.075–0.090)]. Subsequently, the scale's theoretical four-factor structure was analysed, and the analysis determined that the model fit values were acceptable [$\chi^2 = 613.82$, $p < 0.001$, $\chi^2/SD = 2.09$, GFI = 0.82, CFI = 0.88, and RMSEA = 0.069 (95% CI = 0.061–0.077)]. Therefore, it was decided to conduct EFA to determine the factor structure of the scale in the Turkish population. The results of the EFA of the BLAI are presented in Supplementary Table 1.

The results of the preliminary analysis conducted prior to the EFA indicated that the KMO value was sufficiently high (0.930), and that there were four factors with eigenvalues greater than 1 (Supplementary Table 1). The results of the analysis indicated that the Cronbach's alpha value of the BLAI was 0.935, while the values of the subdimensions of the scale ranged from 0.785 to 0.870. The EFA showed that the items in the Apply subdimension did not change and were categorised in the same factor. In the original scale, item 5 of the BLAI in the Access subdimension was categorised in the Understand subdimension, while item 10 (Understand subdimension) and items 16, 17, and 18 (Appraise subdimension) were categorised in a separate subdimension (Supplementary Table 1). In addition, items 11, 12, 13, 14, 15, and 20, which were originally categorised in the Appraise subdimension, are now included in the Understand subdimension (Supplementary Table 1). The EFA demonstrated that the scale's original structure had undergone substantial modification, with the scale's subscales being represented by multiple factors (Supplementary Table 1). Based on these results, it was decided to compare the

Table 1 Distribution of women by sociodemographic and obstetrics characteristics (n=470)

Characteristics	n	%
Age, mean (SD), years (min-max)	30.62 (5.69)	19–44
Educational level		
Primary school and ↓	88	18.7
High school	146	31.1
Associate degree	100	21.3
University degree and ↑	136	29.0
Work status		
Employed	82	17.4
Unemployed	388	82.6
Economical status		
Low income	19	4.0
Middle income	205	43.6
High income	246	52.3
Social Security		
Yes	431	91.7
No	39	8.3
Type of residence		
Rural	289	61.5
Urban	181	38.5
Gestational age, mean (SD), weeks (min-max) (n=323)	31.75 (3.71)	28–41
Parity		
Primipara	157	33.4
Multipara	313	66.6
Planned pregnancy		
Yes	287	61.1
No	183	38.9
Mode of previous delivery (n=147)		
Vaginal birth	19	12.9
Cesarean section	128	87.1

SD Standard Deviation

*min minimum, max maximum

structure revealed by the EFA with the theoretical structure of the scale using CFA.

Therefore, based on the results of the EFA, which indicated significant changes in the original structure of the Turkish version of the BLAI and the presence of correlated factors, the fit indices of the proposed four-factor model were examined. It was concluded that the model fit indices were better than those of the theoretical four-factor structure of the scale [$\chi^2=571.67$, $p<0.001$, $\chi^2/SD=1.95$, GFI=0.84, CFI=0.89, and RMSEA=0.064 95% CI=0.056–0.072)]. However, the model fit values of the theoretical four-factor structure of the Turkish form of the BLAI were lower than those of the model proposed in the EFA. Since the structure of the scale was completely changed in the EFA, an alternative model was created by removing items with lower regression coefficients, namely BLAI items 5, 10, and 12. The model fit values of the proposed four-factor alternative model were better [$\chi^2=391.82$, $p<0.001$, $\chi^2/SD=1.75$, GFI=0.87, CFI=0.92, and RMSEA=0.057 (95% CI=0.048–0.066)].

Following this stage, the opinions of the panel of experts evaluating the content validity of the scale were sought again. They agreed that removing items from the Turkish version of the BLAI would disrupt the theoretical structure of the scale, and a four-factor proposed model was developed. In the proposed model, error covariances were added between the latent variables of BLAI items 1 and 5 (which are in the same dimension) as well as between the latent variables of other item pairs in the same dimension, namely items 12 and 16, 12 and 18, 13 and 15, and 16 and 19. The model was then reanalysed. The analysis revealed that, although the CFI and GFI values were lower than those of the theoretical four-factor alternative model, the model fit values were still acceptable [$\chi^2=566.20$, $p<0.001$, $\chi^2/SD=1.96$, GFI=0.85, CFI=0.89, and RMSEA=0.065 (95% CI=0.057–0.073)]. However, no significant change was observed between the theoretical model and the proposed model, thereby validating the theoretical 4-factor structure of the scale [$\chi^2=613.82$, $p<0.001$, $\chi^2/SD=2.09$, GFI=0.82, CFI=0.88,

and RMSEA = 0.069 (95% CI = 0.061–0.077)] (see Fig. 1; Table 2).

Reliability analysis

The internal consistency and item analyses of the Turkish form of the BLAI are presented in Table 3. These analyses of the theoretical four-factor model proposed in the CFA of the scale revealed moderate and high levels.

The results of the correlation analysis of the scale and its subdimensions are presented in Table 4. The Pearson's correlation coefficients of the scale and its subdimensions

were above 0.70, indicating an acceptable level of correlation. In addition, the smallest value in the correlation matrix of the items was above 0.20 (in Supplementary Table 2). In the evaluation of the parallel-form reliability of the Turkish version of the BLAI resulting from the split-half technique, the Cronbach's alpha coefficients were 0.888 and 0.886. The coefficient of correlation between the two forms was 0.795 (in Supplementary Table 3).

In addition, Tukey's test for nonadditivity was performed for the total BLAI and its subscales (Access,

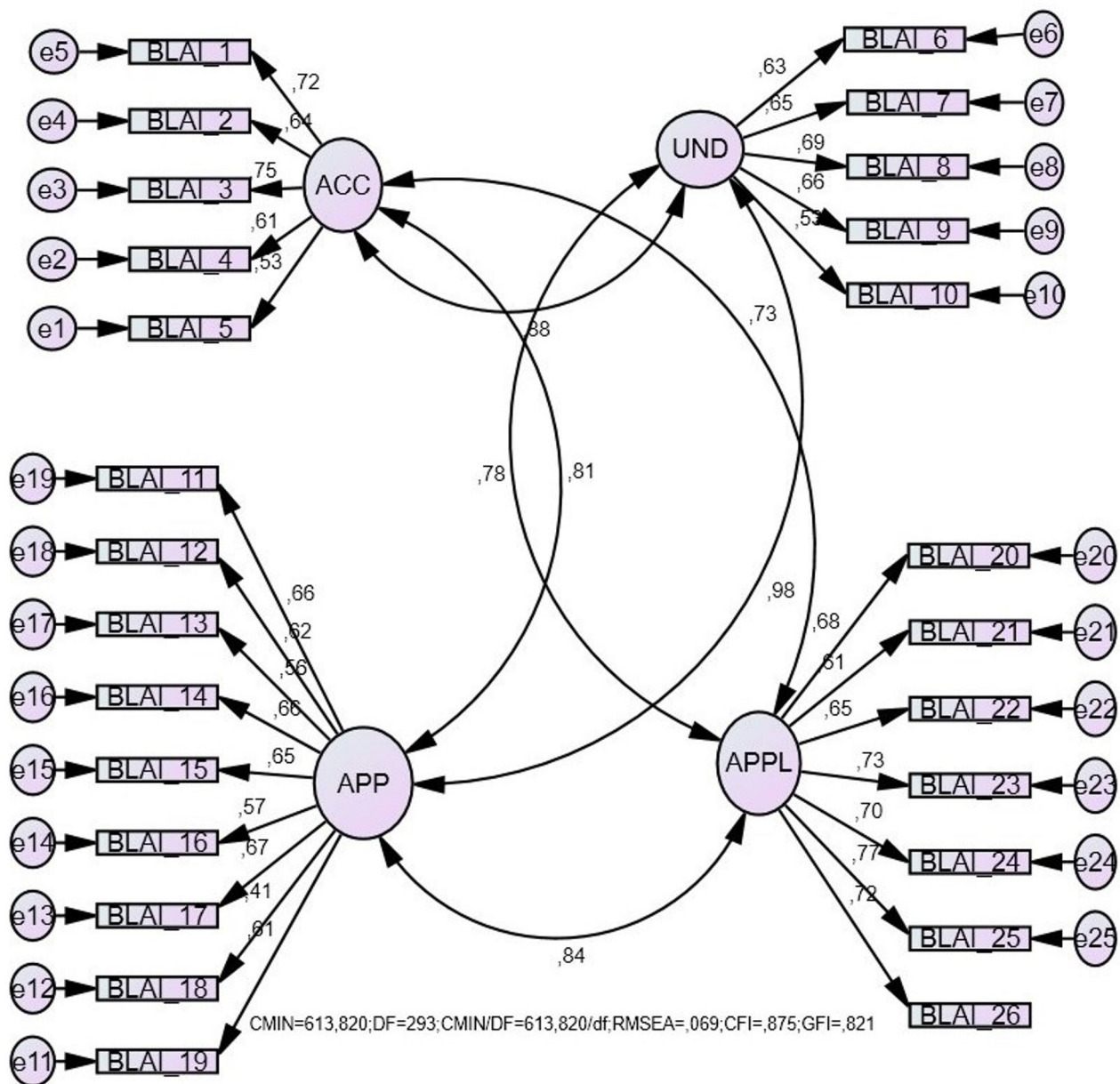


Fig. 1 Measurement models for items from the BLAI

Note: ACC: Access; UND: Understand; APP: Appraise; APPL: Apply, BLAI: Breastfeeding Literacy Assessment Instrument

Table 2 Results of confirmatory factor analysis and goodness-of-fit indices ($n = 239$)

Modeller	χ^2	p	χ^2/SD	CFI	GFI	RMSEA	%95 GA RMSEA
The single-factor structure	764.58	< 0.001	2.55	0.82	0.77	0.082	(0.075–0.090)
The proposed four-factor model	571.67	< 0.001	1.95	0.89	0.84	0.064	(0.056–0.072)
The proposed four-factor alternative model	391.80	< 0.001	1.75	0.92	0.87	0.057	(0.048–0.066)
Theoretical four-factor structure	613.82	< 0.001	2.09	0.88	0.82	0.069	(0.061–0.077)
The theoretical four-factor alternative model	566.19	< 0.001	1.96	0.89	0.87	0.065	(0.057–0.073)

Table 3 Item-related descriptive statistics and correlation coefficient ($n = 470$)

		Mean $\pm$ SD	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	Item-Total Correlation
Access	BLAI_1	2.84 $\pm$ 0.66	0.588	0.932	0.779	0.390–0.633
	BLAI_2	3.03 $\pm$ 0.64	0.563	0.933		
	BLAI_3	2.89 $\pm$ 0.66	0.582	0.932		
	BLAI_4	2.82 $\pm$ 0.75	0.558	0.933		
	BLAI_5	3.16 $\pm$ 0.76	0.523	0.933		
Understand	BLAI_6	2.91 $\pm$ 0.65	0.626	0.932	0.773	0.486–0.624
	BLAI_7	3.00 $\pm$ 0.67	0.645	0.932		
	BLAI_8	3.04 $\pm$ 0.57	0.661	0.932		
	BLAI_9	3.08 $\pm$ 0.65	0.627	0.932		
	BLAI_10	2.68 $\pm$ 0.81	0.503	0.934		
Appraise	BLAI_11	2.91 $\pm$ 0.62	0.618	0.932	0.825	0.387–0.616
	BLAI_12	3.04 $\pm$ 0.82	0.584	0.933		
	BLAI_13	2.84 $\pm$ 0.73	0.535	0.933		
	BLAI_14	2.94 $\pm$ 0.67	0.635	0.932		
	BLAI_15	2.80 $\pm$ 0.67	0.590	0.932		
	BLAI_16	2.65 $\pm$ 0.82	0.531	0.933		
	BLAI_17	2.87 $\pm$ 0.71	0.619	0.932		
	BLAI_18	2.52 $\pm$ 0.94	0.439	0.936		
Apply	BLAI_19	2.90 $\pm$ 0.70	0.570	0.933	0.860	0.575–0.669
	BLAI_20	2.97 $\pm$ 0.57	0.664	0.932		
	BLAI_21	3.08 $\pm$ 0.70	0.536	0.933		
	BLAI_22	3.22 $\pm$ 0.72	0.584	0.932		
	BLAI_23	3.04 $\pm$ 0.59	0.655	0.932		
	BLAI_24	3.09 $\pm$ 0.64	0.577	0.933		
	BLAI_25	3.04 $\pm$ 0.64	0.614	0.932		
	BLAI_26	3.13 $\pm$ 0.62	0.609	0.932		
BLAI Total	BLAI	76.61 $\pm$ 11.24			0.935	0.523–0.664

Table 4 Pearson correlations between the BLAI and BLAI subscales

	Mean $\pm$ SD	BLAI	Access	Understand	Appraise	Apply
BLAI	76.61 $\pm$ 11.24	1				
Access	14.77 $\pm$ 2.55	0.827**	1			
Understand	14.73 $\pm$ 2.45	0.883**	0.708**	1		
Appraise	25.51 $\pm$ 4.37	0.935**	0.679**	0.797**	1	
Apply	21.59 $\pm$ 3.32	0.865**	0.612**	0.656**	0.736**	1

** Correlation is significant at the 0.01 level (2-tailed), SD Standard Deviation

Understand, Appraise, Apply). The results indicated a statistically significant nonadditivity only for the total scale and certain subscales, while others approached additivity (see Supplementary Tables 4–8). The grand means ranged from 2.8350 to 3.0851, and Tukey's estimates of the power required to achieve additivity ranged from -2.172 to 3.079 , indicating that the scale items generally maintained additivity across participants.

Discussion

The objective of the present study was to adapt the BLAI into Turkish and to conduct psychometric analysis (construct validity and internal consistency). The results confirmed the language validity of the scale and showed that the content validity was high. The four-factor model of the BLAI proposed in line with expert opinions was structurally valid and reliable in Turkish women in the perinatal period. In this section of the study, the validity and reliability properties of the Turkish version of the BLAI, which assesses the breastfeeding literacy of women in the perinatal period, were evaluated and discussed.

It has been reported that adequate health literacy may be a protective factor in breastfeeding maintenance [7, 11, 29]. For this reason, it is important to determine the level of breastfeeding literacy among women. The first measurement tool specifically designed to assess breastfeeding literacy was the BLAI, developed by Valero-Chillérón et al. [23]. In the present study, this measurement tool underwent a systematic cross-cultural adaptation into Turkish, followed by psychometric testing to evaluate its validity and reliability.

The BLAI was adapted to Turkish because it was designed based on the definition of the health literacy concept adapted to the breastfeeding context by the authors [23]. In this context, the concept has four dimensions: D1: Access to breastfeeding-related information; D2: Understanding of such information; D3: Appraise the veracity of information related to breastfeeding; D4: Application of that information. This is the first specific measurement tool for the assessment of breastfeeding literacy in Türkiye. Therefore, it is important to emphasise this measurement tool to assess women's breastfeeding literacy in order to improve breastfeeding indicators, identify links between breastfeeding duration and breastfeeding literacy, and promote breastfeeding.

Validity analysis of the BLAI

The validity of the Turkish version of the BLAI was assessed using language validity, content validity, and factor analysis methods. The content validity of the scale was evaluated using the Davis technique, which assesses the appropriateness of the items. The CVI value of 0.96 found indicates a high degree of consensus among experts, an adequate representation of the subject matter,

and sufficient content validity [30]. These findings are consistent with the content validity results of the original study [23]. In addition, the Bartlett's test of sphericity $p < 0.001$ and the KMO value (0.930) > 0.60 were determined in our study. The results indicate the suitability of the data for factor analysis and confirm that the sample size is sufficient [21, 31]. In the original study [23], the Bartlett's test of sphericity was significant ($p < 0.001$) and the KMO value (0.924) was greater than 0.60, which is consistent with the findings of our study.

According to the EFA, the Turkish version of the BLAI showed strong construct validity as it explains $> 50\%$ of the total variance (55.65%) with four dimensions (Access, Understand, Appraise, and Apply) and all factor loadings exceed 0.40 [20, 21, 31]. In addition, the fact that the item factor loadings in the original study were > 0.40 and the total variance was 60.54% [23] could suggest that the results of the study are consistent. The results of the present study can be regarded as parallel to those of the original study, as the item factor loadings in the original study were > 0.40 and explained 60.54% of the total variance [23]. However, as a result of the EFA in the present study, some of the items under certain subdimensions in the original scale were included in different subdimensions. It should be kept in mind that changes could occur in the structures of measurement tools translated from one language into another and adapted to another culture. Therefore, the structure revealed in the EFA was compared with the theoretical structure of the scale using CFA. The CFA evaluated the EFA four-factor model, the theoretical four-factor model, the alternative theoretical four-factor model, and the proposed theoretical four-factor model (original model). The results of the CFA confirmed the validity of the revised 26-item, four-subdimension model proposed for the BLAI as the Theoretical Four-Factor Recommended Model. Some subdimensions have more items. Therefore, numerous modifications and adjustments were made to achieve acceptable model fit indices. Following the modifications, the Turkish version of the BLAI demonstrated acceptable goodness-of-fit indices for the Theoretical Four-Factor Model, thus confirming the model's validity. The Turkish version of the BLAI is compatible with the original scale, which consists of 26 items and four subdimensions. However, as the original study did not include CFA, a direct comparison could not be made [23]. The Turkish version retained robust psychometric properties, as evidenced by CFA results and reliability indices. Although some variations were observed between the EFA and CFA structures, these differences can be understood within the framework of cross-cultural adaptation. When a measurement instrument is adapted from one linguistic and cultural context to another, shifts in factor loadings or item distributions are common. Such differences generally reflect

variations in language structure, healthcare systems, or cultural perceptions of breastfeeding literacy rather than methodological flaws. Therefore, the minor variations observed in the Turkish version of the BLAI should be regarded as evidence of a successful cultural adaptation that maintained conceptual equivalence while ensuring cultural appropriateness for the Turkish population.

Reliability Analysis of the BLAI

Cronbach's alpha coefficient is a statistic that is commonly used in the assessment of internal consistency reliability [28]. It is evaluated as “quite reliable” between 0.60 and 0.80, and “highly reliable” between 0.80 and 1.00 [31]. In the present study, the Cronbach's alpha value for the scale as a whole was 0.935, whereas for the subdimensions it ranged from 0.773 to 0.860. The alpha values obtained in our study indicate that the scale is highly reliable overall, with the subdimensions being quite reliable. This suggests that the scale is valid for assessing breastfeeding literacy in women during the perinatal period. Valero-Chillerón et al. (2023) reported that Cronbach's alpha values for the subdimensions ranged from 0.809 to 0.912, with the overall scale exhibiting an alpha value of 0.949 [23]. This result indicates that the structure of the adapted version of the scale is similar to that of the original.

The split-half method is also used to assess internal consistency reliability [28]. It is recommended that a value greater than 0.70 be used to evaluate the consistency of the alternative form [30, 32]. The results of the split-half analysis indicated that the Cronbach's alpha values of both halves (0.888 and 0.886) and the correlation coefficient between the two forms (0.795) were > 0.70 . The results of our study indicate that the scale can consistently measure the intended concept, that the items are related, and that the scale has a high degree of reliability. This is evidenced by the split-half analysis values and correlation coefficients. As split-half analysis was not conducted in the original version of the study, it was not possible to make comparisons with the study results [23].

Limitations and strengths

The present study has several strengths. Firstly, this tool allows the assessment of the breastfeeding literacy of women in Türkiye in four dimensions. Secondly, it can be used during antenatal care to provide women with quality breastfeeding advice, starting before delivery. Thirdly, the fact that the data were collected face-to-face shows that the data in the study were reliable. The study has some limitations. Firstly, a convenience sampling method was employed, with participants being enrolled on the basis of their willingness and availability, as opposed to being selected at random from the general population. This may limit the generalizability of the

findings. Secondly, the test–retest technique was not utilised. Thirdly, while the implementation of face-to-face data collection methods ensured reliability, it is possible that this approach may have introduced the potential for social desirability bias, where participants might have provided answers they perceived as socially acceptable. In conclusion, despite the satisfactory sample size, the study was conducted in a single baby-friendly hospital in a specific region of Türkiye. This may limit the generalizability of the findings to women from different cultural or socioeconomic backgrounds, or to those receiving care in non-baby-friendly or primary care settings.

Practice implications

Considering the BLAI as a valid and reliable measurement tool for the Turkish population, it is recommended to first determine the level of breastfeeding literacy among women in the perinatal period and then conduct studies specifically focusing on the impact of exclusive breastfeeding. Specifically, future research should investigate whether there are statistically significant differences between the scores obtained in the different dimensions of the BLAI and the maintenance of exclusive breastfeeding at six months of age, as recommended by the World Health Organization. The BLAI can also be used by health professionals to assess women's breastfeeding literacy during antenatal visits due to its ease of use, practicality, and speed of administration. Additionally, it is recommended to examine the factor structure of the BLAI using a random sampling method, to test the parallel-form reliability via a health literacy scale used in the Turkish population, and to conduct test–retest analysis to measure the scale's stability.

Conclusion

The BLAI was found to be valid and reliable when applied to a Turkish sample of perinatal women. The BLAI consists of a total of 26 items with four subdimensions. The BLAI assesses four domains of BFL in the perinatal period: (1): Access to breastfeeding-related information; (2): Understanding of such information; (3): Appraise the veracity of information related to breastfeeding; (4): Application of that information. It can be used to assess the BFL of women in the perinatal period.

Supplementary Information

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Supplementary Material 1

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Authors' contributions

All authors contributed as follows: Conceptualisation, all authors; methodology, KYÇ, EKE, ÖA; software, ÖA, and EKE; validation, ÖA; formal analysis, ÖA, and EKE; investigation, all authors; data curation, EKE, and NTÖ; writing—original draft preparation, EKE, KYÇ, and ÖA; writing—review and editing, all authors; visualisation, ÖA and EKE; supervision, KYÇ, and EKE.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Written permission was obtained from the author of the BLAI via email to adapt it to Turkish. Prior approval for the study was obtained from the Karadeniz Technical University Health Sciences Scientific Research Ethics Committee (approval number: E-13562490-051.99-380450). Additionally, institutional permission was obtained from the institution where the study was conducted. Prior to the collection of data, all women in the study were informed about the subject matter, objective, and methodology of the research. Prior to their participation, all individuals provided written informed consent for inclusion. The study was conducted in accordance with the fundamental principles of scientific research and ethical standards for publication.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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