

Turkish Adaptation of the Blood Donation Fears Inventory: A Study on Validity and Reliability

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ABSTRACT

This study aims to investigate the psychometric properties of the “Blood Donation Fears Inventory” (BDFI) developed by Kowalsky et al. (2014), and conduct an adaptation study to implement in the Turkish population that would measure the fear of blood donation in terms of fainting symptoms, fear of blood and needles, fear of social evaluation, and fear of health screening results. A total of 321 participants consisting of 178 women and 143 men, between the ages of 18–51, were included in the study. Criterion fit validity, internal consistency coefficient, and confirmatory factor analysis was conducted in order to investigate the psychometric properties of the Turkish version of the BDFI. It was observed that the structure of the inventory with 18 items and four sub-dimensions was confirmed following the confirmatory factor analysis. During the study on criterion fit validity, significant positive correlations were observed between the Blood Donation Reactions Inventory (BDRI) and the Blood Injection Fears Scale (BIFS) and the BDFI. As a result of the computation of the internal consistency coefficient, the reliability was found to be .96 for the whole inventory. Based on the results of the analysis, it is determined that the Turkish version of the BDFI is a valid and reliable measurement tool.

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Blood donation, an example of altruism serving a humanitarian purpose (Hablemitoğlu et al., 2010), is necessary to save millions of lives each year (World Health Organization [WHO], 2010). Blood donation also serves an important role in the treatment of diseases and medical-surgical interventions (Ling et al., 2018). The supply of blood or blood products is of great significance for relevant institutions and organizations (Asmawi et al., 2019; Gould et al., 2007). This constant demand for blood and blood products must be met by blood donation organizations, as the only source of blood and blood products is human derived. Therefore, the need to explore the motivation or barriers that lead to blood donation is evident (Bednall & Bove, 2011; Moussaoui et al., 2016; Olaiya et al., 2004; Syed et al., 2022). Additionally, according to the WHO, despite all advances in science, technology, and health, there is no substitute for donated human blood (WHO, 2010).

The Red Crescent is one of the largest humanitarian aid organizations in Turkey that has met 90% of the country’s blood needs with 3,044,713 units in 2021 as a result of the practices it has carried out, and the policies it has followed. However, there is an ever-increasing need for donated blood (Blood Services Activity Book, 2021). Increases in population, life expectancy, the development of medical-surgical interventions (Papagiannis et al., 2016; Solomon, 2012; Vavic et al., 2012; WHO, 2010), unexpected accidents, blood-related chronic diseases (Alfouzan, 2014), coupled with the short shelf life of some blood products, results in an insufficient number of people available for blood donation (Davey, 2004; Martin-Santana & Beerli-Palacio, 2012). The transition of individuals who donate blood to those who require transfusion over the next 10–15 years due to an aging population dramatically increases the demand for blood and blood products (Greinacher et al., 2016; Schönborn et al., 2020).

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In studies done on raising awareness about blood donation and examining attitudes and behaviors on this issue, it was revealed that false information, beliefs and prejudices about blood donation were frequently recorded, and that the fear of blood donation prevented people from donating blood (Asamoah-Akuoko et al., 2017; Asmawi et al., 2019; Bednall & Bove, 2011; Birgili & Khorsid, 2011; Duboz & Cuneo, 2010; France et al., 2021; Mathew et al., 2007; Ngoma et al., 2013; Ossai et al., 2018; Vergülen-Yirmibeş, 2021; Viwattanakulvanid & Oo, 2021; Wiwanitkit, 2002; Zucoloto et al., 2019). The blood donation process includes various stimuli that can negatively affect blood donation, such as the presence of blood (France et al., 2014; Vergülen-Yirmibeş, 2021) and needles (Altundiş et al., 2019; France et al., 2013; Sojka & Sojka, 2008; Syed et al., 2022), and the experience of fainting symptoms and pain (Birgili & Khorshid, 2011; France et al., 2012; Olatunji et al., 2010; Zucoloto et al., 2019). Additional studies cite that the reasons for not donating blood include weakness and fear of dizziness (Kasraian et al., 2021; Mishra et al., 2016). Moreover, experiences had during and after blood donation constitute as an important criterion in gaining regular blood donors (Ling et al., 2018). It is reported that the fear and anxiety felt during the experience affects blood donors in becoming regular donors (France et al., 2021).

Köse and Mandıracıoğlu (2007) conducted a study in order to develop a BIFS aiming to measure the fear of blood and needles in Turkey. This measurement tool takes into account only fear of injections and blood draws. However, there is no measurement tools designed to measure the fear of blood donation in Turkey. Therefore, the aim of this study is to adapt the BDFI developed by Kowalsky et al. (2014) in order to measure the fear of donating blood, fear of fainting symptoms, fear of blood and needles, fear of social evaluation and fear of health screening results, and to investigate its psychometric properties within a sample population in Turkey.

Method

Study Group

In this study, data were collected from two different study groups, ranging in ages between 18 and 51. The first study group consisted of 321 participants (178 women and 143 men) to test the structural validity of the scale. The second study group consisted of 60 participants (32 women and 28 men) in order to examine the criterion validity.

Data Collection Tools

BDFI: It was developed by Kowalsky et al. (2014) to measure fear in the context of blood donation. The scale consists of 18 items and each item is graded with scores ranging from 1 to 5. The inventory consists of four sub-dimensions: "Fear of Fainting Symptoms," "Fear of Blood and Needles," "Fear of Social Evaluation," and "Fear of Health Screening Results." There are no reverse items in the inventory. The original version of the inventory was developed after studies on participants ranging in ages between 18 and 51. According to the confirmatory factor analysis findings, the fit index values of the inventory were $\chi^2(129) = 339.79$, $p < 0.001$; CFI = 0.972, RMSEA = .060, SRMR = 0.033. Cronbach's alpha internal consistency coefficient was calculated as 0.97 for the total inventory, .98 for the sub-dimension titled "Fear of Fainting Symptoms," 0.91 for the sub-dimension titled "Fear of Blood and Needles," and 0.95 for the sub-dimension titled "Fear of Social Evaluation." The intraclass correlation coefficient for the sub-dimension titled "Fear of Health Screening Results," which consists of two items, was calculated and found to be .80 (Kowalsky et al., 2014).

BDRI: Developed by Meade, France and Peterson in 1996 in order to analyze reactions to blood donation, the inventory consists of 11 items and measures subjective symptoms: faintness, dizziness, weakness, flushing, visual disturbance, difficulty in hearing, mild drowsiness, rapid heartbeat or heart palpitations, sweating, fast or labored breathing, or stomach distress. Later, France et al. (2008) investigated the psychometric properties of the BDRI and consequently, the 11 items of the inventory were reduced to 4 items according to the findings of the analysis.

The inventory that is adapted to Turkish culture by İnce (2013) is scored on a 5-Point Likert Type Scale (0–5). There are no reverse items in the inventory. The scores on the inventory range from 0 to 20, with higher scores indicating stronger syncopal symptoms. Within the scope of the adaptation study, principal component analysis and varimax rotation methods were used for the purpose of revealing the factor structure of the inventory. A one-factor structure with an eigenvalue of 3.35, explaining 83.78% of the total variance, was obtained. Cronbach's alpha coefficient of the BDRI was calculated as 0.93 and the split-half reliability coefficient was calculated as 0.91 (İnce, 2013). In this study, the reliability coefficient of the inventory was found to be 0.91.

BIFS: Developed by Köse and Mandıracıoğlu (2007) in order to determine the fear of blood and injection in patients and healthy people, the scale consists of 20 items and is graded on a 5-Point Likert Type Scale (1–5). The total score on the scale ranges from 20 to 100 points. Lower scores indicate higher levels of fear. During the development phase of the scale, the participants filled out a Symptom Questionnaire comprised of 17 questions (Yes–No). Exploratory factor analysis and varimax rotation analysis were used to reveal the factor structure of the scale. The resulting two-factor structure was found to explain 84% of the total variance. The Cronbach’s alpha reliability coefficient of the BIFS was calculated to be 0.98 (Köse and Mandıracıoğlu, 2007). In this study, the reliability coefficient of the inventory was found to be 0.95.

Process

Permission and the Translation Process: To adapt the BDFI for Turkey, the responsible author Christopher R. France, who is part of the research team that developed the inventory, was contacted through e-mail and the necessary permissions for adaptation was obtained from him. The BDFI was then translated into Turkish by four experts from the Department of Psychological Counseling and Guidance and an additional two experts from other departments who have a good command of the English language through the translation-retranslation method. Afterwards, a panel was organized with three experts from the Department of Psychological Counseling and Guidance in order to make the necessary arrangements in terms of meaning and grammar of the English and Turkish versions and a final Turkish version was agreed upon. Later, this Turkish version was translated back into English by two independent experts and the consistency between the two versions was evaluated. A pilot study was conducted with 30 participants in order to evaluate the linguistic comprehensibility of the Turkish version. Based on the feedback received after the pilot study, it was concluded that the Turkish version was understandable by the participants. Moreover, Turkish language experts were consulted for the created Turkish version. In the end, the final Turkish version was prepared and the application was initiated.

Statistical Analysis: A confirmatory factor analysis was conducted for the purpose of assessing the structural validity of the BDFI. In the confirmatory factor analysis, Chi-square goodness, CFI, GFI, RMSEA, Normed Fit Index (NFI) and TLI fit indices were used in order to determine the fit index values. A Pearson Product Moment Correlation analysis was conducted to examine the criterion-based validity between the BDFI and the BDRI and BIFS. Cronbach’s alpha coefficient was calculated in the context of reliability analysis of the inventory. AMOS 26 and SPSS 26 software were used to analyze validity and reliability.

Findings

Structural Validity

The results of the confirmatory factor analysis conducted to examine the structure of the original form of the BDFI consisting of 4 dimensions and 18 items are presented in Table No 1.

At the end of the analysis, the fit index values of the four-dimensional model of the inventory (Model 1 $\chi^2/df = 2.93$, RMSEA = .078, GFI = .871, CFI = .957, TLI = .949, NFI = .936, SRMR = .035) were found to be acceptable except for the GFI fit index. It is stated that the chi-square value should be less than 5 in relation to the degree of freedom (Kline, 2005). This ratio was found to be 2.93 at the end of the analysis. It is stated that the acceptable levels of the goodness of fit indices of the model should be 0.90 and above, and 0.08 and lower for RMSEA and SRMR values (Tabachnick & Fidell, 2001). In addition, considering that the GFI fit index is also sensitive to the sample size, it can be accepted that the GFI fit index is low because it is affected by low sample size (Mulaik et al., 1989). According to these criteria, the model was found to be a good fit.

The structure of the dimensions of the BDFI, including “Fear of Fainting Symptoms,” “Fear of Blood and Needles,” “Fear of Social Evaluation,” and “Fear of Health Screening Results,” and also the relationship between the dimensions are presented in Figure No 1. When the path diagram is analyzed, it is observed that the factor loadings of the items vary between 0.60 and 0.91.

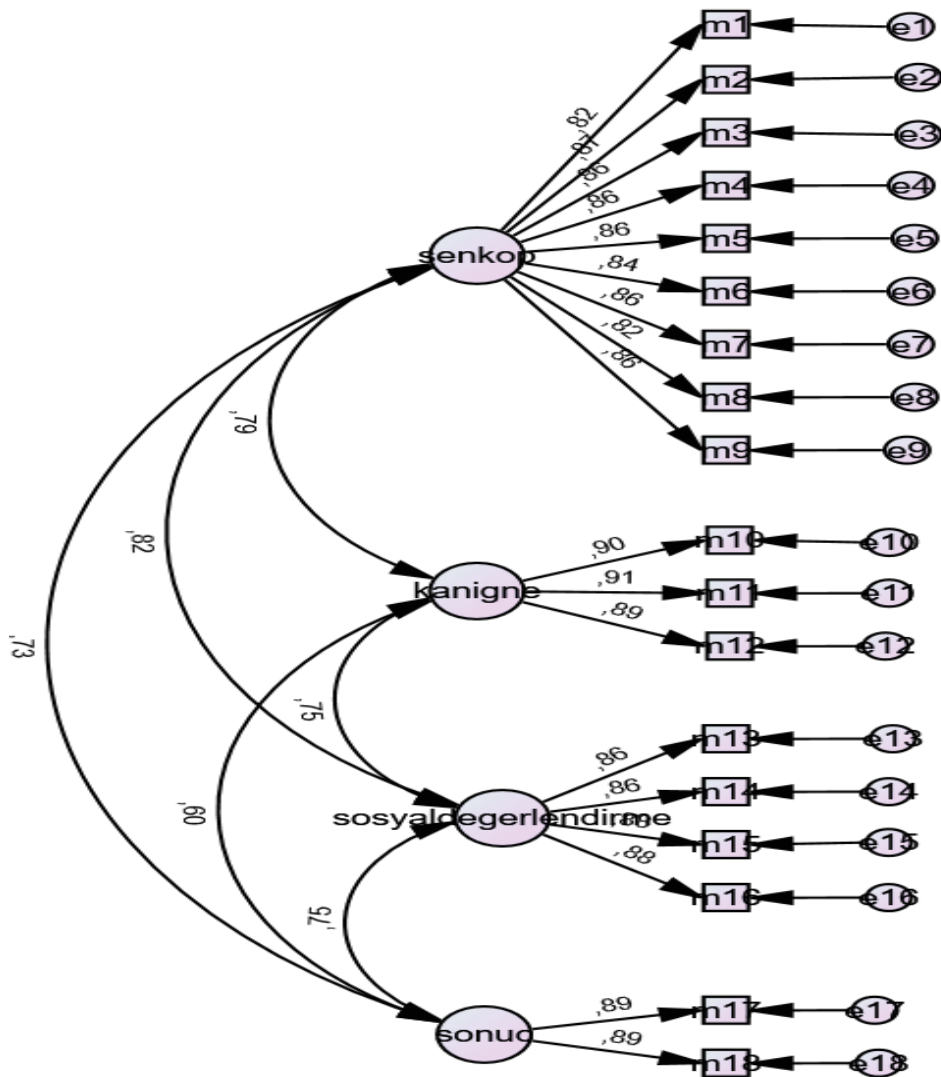
Table No 1
 Values Regarding Goodness of Fit Indices of the Blood Donation Fears Inventory

Fit Index	Model Value	Acceptable Goodness of Fit
χ^2/df	2.93	$2 \leq \chi^2/df \leq 5$
GFI	0.871	$0.90 \leq GFI \leq 0.95$
CFI	0.957	$0.90 \leq CFI \leq 0.95$
RMSEA	0.078	$0.05 \leq RMSEA \leq 0.08$
TLI	0.949	$0.90 \leq TLI \leq 0.95$
NFI	0.936	$0.90 \leq NFI \leq 0.95$
SRMR	0.035	$0.05 \leq SRMR \leq 0.10$

CFI: Comparative Fit index, RMSEA: Root Mean Square Error of Approximation, TLI: Tucker Lewis index, NFI: Normed Fit Index, SRMR: Standardized Root Mean Residual

Figure No 1

Path Diagram of the Blood Donation Fears Inventory



Criterion Validity

For the criterion-based validity of the BDFI, the relationship between the BDRI and the BIFS was examined. Table No 2 shows the correlation values and descriptive statistics of the Pearson Product Moment Coefficient between the measurement tools.

Table No 2 clearly exhibits a significant positive correlation at the level of 0.74, as found between the total score obtained from the BDFI and the total score obtained from the BDRI. A significant positive correlation at the level of 0.58 is found between the total score obtained from the BDFI and the total score obtained from the BIFS.

When the sub-dimensions of the BDFI are examined, a positive correlation at the level of 0.72 was found between the sub-dimension titled “Fear of Fainting Symptoms” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Fainting Symptoms” and the total score obtained from the BIFS. A significant positive correlation at the level of 0.61 was found between the total score obtained from the sub-dimension titled “Fear of Blood and Needles” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Blood and Needles” and the total score obtained from the BIFS. A significant positive correlation at the level of 0.58 was found between the total score obtained from the sub-dimension titled “Fear of Social Evaluation” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Social Evaluation” and the total score obtained from the BIFS. A positive significant correlation at the level of 0.31 was observed between the total score obtained from the sub-dimension titled “Fear of Health Screening Results” and the total score obtained from the BDRI, but no significant correlation was found between the sub-dimension titled “Fear of Health Screening Results” and the total score obtained from the BIFS.

Table No 2

Correlation Coefficients for the Relationships between the Blood Donation Fears Inventory and Blood Donation Reactions Inventory and Blood Injection Fear Scale

Variables	1	2	3	4	5	6	7
1. Blood Donation Fear Inventory	1	0.58**	0.74**	0.94**	0.78**	0.78**	0.54**
2. Blood Injection Fear Scale		1	0.51**	0.56**	0.56**	0.39**	0.18
3. Blood Donation Reactions Inventory			1	0.72**	0.61**	0.58**	0.31**
4. Fainting Symptoms				1	0.66**	0.62**	0.41**
5. Fear of Blood and Needles					1	0.52**	0.24
6. Fear of Social Evaluation						1	0.42**
7. Fear of Health Screening Results							1
Average ()	37.51	42.00	4.35	18.30	6.30	6.82	6.10
Standard Deviation (Sd)	13.59	17.42	3.85	7.79	3.28	3.19	2.09
Kurtosis	.37	1.23	.08	-0.10	.26	4.35	-0.78
Skewness	1.00	1.07	.91	.95	.95	1.72	.27

** $p < .01$

Item Analysis and Reliability Analysis

Corrected item-total score correlations were examined and reliability analysis was performed in order to investigate the predictive power and item discrimination of the BDFI. The results of the corrected item-total score correlations are presented in Table No 3.

Table No 3
Corrected Item-Total Score Correlation Values of Blood Donation Fears Inventory

Item No	Corrected Item-Total Score Correlation Values	Mean	Ss	Kurtosis	Skewness
1. Dizziness After Donating Blood During The Blood Donation	0.79	2.39	1.07	0.52	-0.40
2. Dizziness After Blood Donation	0.82	2.32	1.09	0.55	-0.40
3. Dizziness During Blood Donation	0.81	2.38	1.09	0.53	-0.51
4. Feeling Of Weakness After Blood Donation	0.82	2.38	1.14	0.50	-0.65
5. Feeling Of Drowsiness After Blood Donation	0.83	2.37	1.07	0.56	-0.36
6. Feeling Of Light-Headedness After Donating Blood During Blood Donation	0.79	2.58	1.13	0.33	-0.71
7. Feeling Of Drowsiness After Donating Blood During Blood Donation	0.82	2.36	1.06	0.52	-0.44
8. Feeling Of Light-Headedness During Blood Donation	0.77	2.62	1.13	0.19	-0.78
9. Feeling Of Light-Headedness After Blood Donation	0.82	2.52	1.16	0.27	-0.85
10. Seeing the Needle	0.75	2.44	1.15	0.54	-0.53
11. Having A Needle In Your Arm	0.75	2.50	1.14	0.47	-0.57
12. Taking Blood From Your Arm	0.76	2.45	1.12	0.45	-0.56
13. Dizziness In Front Of People You Know	0.76	2.09	0.95	0.72	0.14
14. Feeling Of Light-Headedness In Front Of People You Know	0.76	2.16	0.96	0.68	0.17
15. Feeling Of Weakness In Front Of People You Know	0.77	1.98	0.95	0.83	0.19
16. Feeling Of Drowsiness In Front Of People You Know	0.77	1.98	0.93	0.92	0.71
17. Discovering That You Already Are Suffering From An Illness	0.68	3.12	1.01	0.05	-0.59
18. Finding Out That You Are Not As Healthy As You Thought	0.68	3.16	1.04	0.16	-0.68

As can be seen in Table No 3, the correlation coefficients between the items and the total score in the BDFI found to vary between 0.68 and 0.83. At the end of the reliability analysis, Cronbach's alpha internal consistency coefficient for the total score of the BDFI was found to be 0.96. The internal consistency coefficient of the sub-dimension titled "Fear of Fainting Symptoms" is calculated as 0.95; the internal consistency coefficient of the sub-dimension titled "Fear of Blood and Needles" is calculated as 0.92; the internal consistency coefficient of the sub-dimension titled "Fear of Social Evaluation" is calculated as 0.92; and, the internal consistency coefficient of the sub-dimension titled "Fear of the Result of Health Screening" is calculated as 0.88.

Discussion

The aim of this study was to adapt the BDFI developed by Kowalsky et al. (2014) in order to measure the fear of donating blood, fear of fainting symptoms, fear of blood and needles, fear of social evaluation and fear of health screening results within the Turkish population.

For this purpose, the inventory was translated into the Turkish language by experts in the Department of Psychological Counseling and Guidance, and the Department of English. Subsequently, the inventory was translated back into English by two independent experts and the differences were examined. Following the pilot study, the final Turkish version was reviewed by experts in the Department of Linguistic and Semantic Knowledge, and the final Turkish version was ready to be implemented.

According to the results of the confirmatory factor analysis conducted to test the structural validity of the BDFI, it was concluded that the four-dimensional structure of the original version of the scale was confirmed. The item factor loadings obtained from confirmatory factor analysis ranged between 0.60 and 0.91. Since the representation power of the items with a value of 0.30 and above is considered adequate, no item was removed from the scale within the scope of the adaptation study (Büyüköztürk, 2020). When the fit index values of the scale are examined, it can be seen that $\chi^2/df = 2.93$, RMSEA = .078, GFI = .871, CFI = .957, TLI = .949, NFI = 0.936, SRMR = 0.035 fit index values for the four-factor structure are at an acceptable level except for the GFI fit index. However, considering that the GFI fit index is sensitive to the sample size since it is highly affected by low sample size, the GFI fit index is also acceptable (Mulaik et al., 1989). Based on the above, it can be concluded that the BDFI is a valid measurement tool.

For criterion-based validity, the relationships between the BDRI and the BIFS were examined. A significant positive correlation at the level of 0.74 was found between the total score obtained from the BDFI and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.58 was found between the total score obtained from the BDFI and the total score obtained from the BIFS. It can be stated that these correlations are important evidence for the criterion-based validity of the BDFI.

When the sub-dimensions of the BDFI were examined, a positive correlation at the level of 0.72 was found between the sub-dimension titled “Fear of Fainting Symptoms” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Fainting Symptoms” and the total score obtained from the BIFS. A significant positive correlation at the level of 0.61 was found between the total score obtained from the sub-dimension titled “Fear of Blood and Needles” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Blood and Needles” and the total score obtained from the BIFS. A significant positive correlation at the level of 0.58 was found between the total score obtained from the sub-dimension titled “Fear of Social Evaluation” and the total score obtained from the BDRI, and a significant positive correlation at the level of 0.56 was found between the sub-dimension titled “Fear of Social Evaluation” and the total score obtained from the BIFS. A positive significant correlation at the level of 0.31 was observed between the total score obtained from the sub-dimension titled “Fear of Health Screening Results” and the total score obtained from the BDRI, but no significant correlation was found between the sub-dimension titled “Fear of Health Screening Results” and the total score obtained from the BIFS. Although there are measurement tools already available in Turkey that show high correlations with the sub-dimensions titled “Fear of Fainting Symptoms” and “Fear of Blood and Needles,” these measurement tools show low correlations with the sub-dimensions titled “Fear of Social Evaluation” and “Fear of Health Screening Results.” Based on the findings in this study, and the fact that our adapted BDFI also measure the “Fear of Social Evaluation” and “Fear of Health Screening Results,” enables our measurement tool to be unique to introduce in Turkey’s population.

The Cronbach’s alpha coefficient of the scale is calculated as 0.96 for the entire scale, 0.95 for the sub-dimension titled “Fear of Fainting Symptoms,” .92 for the sub-dimension titled “Fear of Blood and Needles,” 0.92 for the sub-dimension titled “Fear of Social Evaluation,” and 0.88 for the sub-dimension titled “Fear of the Health Screening Results.” According to Büyüköztürk (2020), it is recommended that the Cronbach’s alpha internal consistency coefficient of a measurement tool should be at minimum 0.70 and above. According to our results, it can be stated that BDFI is a reliable measurement tool.

For the item analysis of the BDFI, the corrected item-total correlation was used. According to Büyüköztürk (2020), in order for item-total correlation values to be considered adequate, a value of 0.30 and above is needed. The higher the correlation values are, the more likely it is that the items in the measurement tool will have a significant capacity to adequately discriminate. Since the obtained item-total correlation values ranged between 0.68 and 0.83, it can be stated that the items are adequate in terms of their capacity to discriminate.

Results and Suggestions

In conclusion, according to the analyses, the adapted BDFI for Turkey’s population, which aims to measure fear of blood donation in the context of fear of fainting symptoms, fear of blood and needles, fear of social evaluation and fear of health screening results, proves to be a valid and reliable measurement tool. It is understood that the BDFI will lead to the evaluation of the fear experienced by blood donors, and thus, encourage development in studies and intervention

methods intended to increase future blood donation and future regular blood donor participation. Within the scope of this adaptation study of the BDFI, which only focused on individuals between the ages of 18 and 51, an endeavor of forthcoming studies should evaluate the BDFI psychometric properties for samples in later adulthood.

Ethical approval

This study was approved by the Ethics Committee of Kırklareli University (Date: 18.11.2022 No: E-35523585-302.99-68593).

Authors' contribution

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