

## Original Article

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**Abstract**

**Objectives.** This study is aimed to evaluate the validity and reliability of the Cancer Stigma Scale for the Turkish population (CASS-T).

**Methods.** The sample of the study consisted of 412 students of a foundation university located in Ankara, Turkey. The reliability of the CASS was evaluated using the Cronbach alpha reliability coefficient and item-total score correlations. Exploratory factor analyses were applied to examine the factor structure of the scale and its construct validity. To test the time invariance of the scale, the relationships between the scores obtained from the first and second applications were examined using the intraclass correlation coefficient (ICC).

**Results.** The Cronbach's alpha coefficient of CASS-T was 0.83. In the factor analysis, it was confirmed that the scale has a six-dimensional structure in parallel to original version, namely *Avoidance, Severity, Responsibility, Policy opposition, Awkwardness, and Discrimination*. The ICC values all remained in the range that indicates the reliability of the 0.63–0.71 to be substantial. The contribution of the six factors of the CASS-T scale to the variance is 57.8.

**Significance in results.** The Turkish version of the CASS was confirmed to have good reliability and validity for evaluating stigma toward cancer in Turkish society.

**Introduction**

Stigma can be defined as a “sign” that distinguishes a person from others in terms of having undesirable or unwelcome qualities. Stigmatization is a set of behaviors that lead to society's attitude toward certain individuals or patient groups as a result of prejudices and to exclude them from society. Health-related stigma is defined as a social process characterized by exclusion, rejection, or blame resulting from the actual (enacted) or felt (perceived) experience of an adverse social judgment (Weiss et al., 2006). It is stated that stigma harms the health and well-being of labeled individuals and groups. Individuals in society may be exposed to stigma due to many features. These stigmas may be caused by characteristics such as skin color, sexual identity, socioeconomic status, and physiological or mental health problems (obesity, schizophrenia, AIDS, etc.). (Larson and Corrigan, 2010; Kaplan et al., 2012).

A cancer diagnosis may have profound effects on an individual's cognitive, psychological, emotional, and social aspects. The diagnosis and treatment process of the disease may cause changes in the patient's self-esteem, perception of his body, quality of life, functioning of life, sexual life, personal and social roles, and relationships with family and environment (Fujisawa and Hagiwara, 2015). Cancer is seen in many societies not only as an illness but also as an incurable, mortal disease that symbolizes death. This negative perception toward cancer causes the development of negative attitudes toward cancer patients and reveals the stigma associated with cancer. The cancer-related stigmas may lead to social isolation, hiding the disease, delay in applying to the health institution, deterioration in family relations, fear of illness (Fujisawa and Hagiwara, 2015; Lebel et al., 2016). The stigma toward cancer is based on the structural characteristics of society. Cultural beliefs, prejudice, discriminatory behaviors, and seeing cancer as a “death penalty,” the social and economic burden of the disease, and the perception of the disease as incurable and contagious create negative feelings and thoughts. Stigma, the person is exposed to loss of status in society and structural segregation. If the individual has gained internal control and took responsibility for the situation that creates the stigma, it may not harm self-worth, as all the reactions of other people to stigmatization will not cause the individual to perceive him or herself as others perceive. If stigma affects the self-esteem and self-efficacy perception of the individual, it causes the individual to experience negative emotions such as anxiety, isolation, shame, depression, discontent, hatred, panic, and refusal of treatment (Goffman, 1963; Larson and Corrigan, 2010).

The severity and consequences of stigma vary from individual to individual, from society to society, and according to the situation and level of internalization of the individual. The internalization of stigma in society causes serious trauma to individuals and caregivers. Society's

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perception of a cancer diagnosis as death or punishment may negatively affect family members/caregivers. The thought of having cancer or the fear of death in the family members themselves may cause them to distance themselves from the patient, not knowing how to treat the patient, and develop stigmatizing attitudes as a result of inconsistent and destructive behaviors (Kavas et al., 2014; Kyung et al., 2018).

Manifestations of cancer stigma in Turkey range from social isolation within the home or community, gossip and verbal abuse, reduced marriage prospects, and physical separation within the home — such as distinct eating spaces and washing utensils, clothes, and living spaces (Yıldırım and Kocabiyik, 2010). To reduce the stigma toward cancer patients, it is necessary to change the negative thoughts and perceptions in society. To prevent stigma, raising awareness on this issue will be a step forward for a change. Hence, it is important to measure the stigma tendency to raise public awareness about stigma. Most of the scales studied in Turkey were focused on measuring the stigmatization of mental illnesses, AIDS, and tuberculosis (Ersoy and Varan, 2007; Özpınar et al., 2013; Sezer and Kezer, 2013; Yaman and Güngör, 2013). This study aims to evaluate the validity and reliability of the Cancer Stigma Scale (CASS) for the Turkish population made up of individuals without a cancer diagnosis.

## Methods

### *Translation of the scale*

Permission was obtained from Laura AV Marlow and Jane Wardle, the person who developed the CASS (Marlow and Wardle, 2014). Three academics translated the English version into Turkish. A language expert translated the Turkish version of the scale back to English. The back-translated version of the scale was also sent to the authors who developed the original scale and received confirmation regarding the sameness in terms of meaning. For the content validity of the scale, expert opinions were obtained from a group of faculty members from oncology, nursing, sociology, psychology, educational sciences, communication, and health sciences. According to the suggestions of the individuals in this group, the final form of the scale was given.

### *Study population*

This research was a cross-sectional study, which consisted of first-, second-, third-, and fourth-year students of a foundation university who were studying in the spring semester of 2016–2017. Students were included in the study if they (1) were studying in the spring semester of 2016–2017 and (2) were agreed to participate in the study. The sample size of the study was determined as 412 using the systematic sampling method by adding 25% more at a 95% confidence interval. Systematic sampling is a type of probability sampling method in which sample members from a larger population are selected according to a random starting point but with a fixed, periodic interval. This interval, called the sampling interval, is calculated by dividing the population size by the desired sample size. Confidence interval is the degree of closeness of the mean obtained from the sample to the population mean. It is indicated how much probability the value obtained from the sample will be found between the interval which is determined by the researcher (LoBiondo-Wood and Haber, 2014).

A pre-test was performed with 20 students who were out of the sample to test the understandability and applicability of the CSS. Data were collected at two different points in time (three-week intervals). Data collection forms were given by researchers to 412 students at the campus. The researchers were present while the students were responding to the questions. The scale was re-applied to a total of 352 students after the initial application to evaluate the stability over time.

### *Ethical considerations*

Approval was granted from the Ethics Committee before collecting the data (date/no: X.X.X). For the research, permission was obtained from the Social and Human Sciences Scientific Research and Publication Ethics Committee of X University. Besides, the consent of the participants was obtained after a detailed explanation of the research. The students have voluntarily participated in the study.

### *Procedure and measurement*

In the study, data were collected using the socio-demographic form and the CASS.

### *Socio-demographic and information form*

Socio-demographic and information form was obtained by using a survey consisting of 16 questions developed by the researchers (Fujisawa and Hagiwara 2015; Lebel et al., 2016). Seven of these questions were related to socio-demographic characteristics such as gender, age, department of study, graduate high school, the income level of family, class, and place of residence. The remaining questions were related to cancer: knowledge of cancer, the status of relatives diagnosed with cancer of the participants, and willingness to work in an institution that serves individuals with cancer and their families.

### *Cancer Stigma Scale*

The CASS was developed by Marlow and Wardle in 2014 to measure the multiple dimensions of cancer stigma in a non-patient population. It has six distinct domains: three factors relating to people's perceptions of cancer and three factors encompassing social aspects and anticipated behavior toward cancer patients. The CASS consists of 25 items, which is divided into six domains including Awkwardness (5-items), Severity (5-items), Avoidance (5-items), Personal Responsibility (4-items), Policy Opposition (4-items), and Financial Discrimination (3-items). Responses are rated using a six-point Likert scale ranging from 1 to 6 (1: strongly disagree/not; 2: disagree/probably not; 3: slightly disagree/possibly not; 4: slightly agree: yes, possibly; 5: agree moderately/yes, probably; 6: agree strongly/yes, definitely) The total score of the scale is calculated by averaging the subgroup item scores. Items 10, 11, 21, 22, and 23 in the scale include reverse scored. The total score ranges from 25 to 130 with higher scores indicating higher levels of stigma. The internal reliability value of the scale is 0.73–0.87 (Marlow and Wardle, 2014).

### *Test-retest reliability*

The CASS, which was applied to 412 students in this study, was applied again to 412 students through a three-week interval. A total of 350 students from this group were volunteered to evaluate the questionnaires (85.4%). The scores obtained from the

**Table 1.** Socio-demographic characteristics of participants ( $n=412$ )

	N	%
Age (Mean $\pm$ SD): 21.35 $\pm$ 2.31 (min: 18–max: 33)		
<i>Gender</i>		
Female	296	71.8
Male	116	28.2
<i>Place of residence</i>		
Country	315	76.5
Province	85	20.6
Town/Village	12	2.9
<i>Income level of your family</i>		
Revenue less than expenditure	36	8.7
Revenue equal to expenditure	198	48.1
Revenue more than expenditure	178	43.2
<i>Faculties</i>		
Engineering faculty	62	15.0
Faculty of Economics and Administrative Sciences	57	13.8
Faculty of Health Sciences	56	13.6
Faculty of Education	47	11.4
Faculty of Commercial Sciences	38	9.2
Faculty of Law	35	8.5
Faculty of Fine Arts	32	7.8
Faculty of Science	25	6.1
Faculty of Medicine	24	5.8
Faculty of Communication	21	5.1
Faculty of Dentistry	11	2.7
State Conservatory	4	1.0
<i>Class</i>		
First year	148	35.9
Second year	105	25.5
Third year	80	19.4
Fourth year	79	19.2
<i>Having knowledge about cancer</i>		
Yes	338	82
No	74	18
<i>Perceived sufficiency of knowledge on cancer</i>		
Enough	37	9.0
Partially enough	230	55.8
Not enough	145	35.2
<i>Having a relative who has cancer</i>		
Yes	234	56.8
No	178	43.2
<i>Loss of a relative due to cancer</i>		
Yes	208	50.5
No	204	49.5

(Continued)

**Table 1.** (Continued.)

	N	%
<i>Willingness to work in an institution that serves individuals with cancer and their families</i>		
Yes	151	36.7
No	89	21.6
Hesitant	172	41.7

SD: standard deviation.

importance and fulfillment sub-dimensions of the scale in the test–retest application were examined using the intraclass correlation coefficient (ICC), and the answers were found to show good fit ( $p < 0.01$ ). This fit suggested that the scale had good test–retest reliability.

### Statistical analysis

The data were analyzed with the Statistical Package (SPSS — IBM) Version 24.0. Content validity, construct validity, and internal consistent reliability were evaluated with the obtained data. For the confirmatory factor analysis (CFA), the SPSS AMOS 22 (IBM®) was used. While arithmetic means and minimum and maximum values were used to determine the numerical data, numbers and percentages were used to determine the categorical data. For the reliability analysis, the internal consistency analysis methods were used. These methods are item–total correlations to determine item reliability, Cronbach's alpha to determine homogeneity, and test–retest and Pearson product–moment correlation coefficient to determine the stability of the scale over time. The value  $\geq 0.30$  was used as the criterion for the item–total correlation (Büyüköztürk, 2014). The content validity index (CVI) used for content validity and exploratory factor analysis (EFA) was used for factor construct validity. To determine the types of analysis that is the Kolmogorov–Smirnov test of normality was used on scale scores, and the scale scores were determined to exhibit normal distribution. For this reason, parametric tests were used to compare scale scores. The level of statistical significance was taken as  $p < 0.05$ .

## Results

### Sample description

The study included 412 university students. The mean age of the students was  $21.35 \pm 2.31$  years. Of them, 71.8% were female, 76.5% were residing in a city, 48.1% income is equal to its expense, 15% were studying in the faculty of engineering, and 35.9% are in the first year. 82% of the students had information about cancer (Table 1).

The characteristics of the students regarding their cancer experience are presented in Table 1. Of them, 82% of the participants are knowledgeable about cancer. More than half of the students (55.8%) have partially sufficient knowledge about cancer, have relatives diagnosed with cancer (56.8%), and have relatives who died due to cancer (50.5%). Of them, 41.7% of the participants stated that they were hesitant to work in an institution that gives service to cancer individuals and their families.

### Structure of the CASS

To confirm the scale structure of the Turkish CASS, factor analysis was conducted using the 25 items. The factor analysis results in factor loading are shown in Table 2. The lowest factor in factor analysis is item 17 with a score of 0.40, while the greatest factor is item 10 with a score of 0.91. The original version of the CASS consists of six domains: avoidance (5 items), severity (5 items), responsibility (4 items), policy opposition (3 items), awkwardness (5 items), and discrimination (3 items). The contribution of the six factors of the CASS to the variance is 69%. The variance value explained in the research is higher than 30% and the internal consistency coefficient is at a very good level, supporting the usability of the scale (Henson and Roberts, 2006). After the EFA, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 items represented the original CASS and were included in the original sub-dimensions of the scale.

CFA was used to test the structure of the scale defined by the EFA using the AMOS package program. The scale's six-dimensional structure was confirmed as a result of the factor analysis. Figure 1 demonstrates that the fit indices of the scale's 25 items and six sub-factors are significant ( $\chi^2/df$  ratio of less than 3 indicates a perfect fit, while less than 5 indicates an acceptable fit; Büyükoztürk, 2014). RMSEA = 0.065, RMR = 0.211, CFI = 0.84, GFI = 0.88, and AGFI = 0.856 were the fit index values (Table 3).

The KMO coefficient was found to be 0.81. It was concluded that the sample size was suitable for factor analysis because the coefficient was over 0.60. The Bartlett globality test result was found to be statistically significant at ( $\chi^2 = 3339.3$ ,  $p < 0.001$ ). These results show that the answers given to the scale items are suitable for factor analysis.

### Reliability

The Cronbach alpha value of the CASS-T was found to be 0.82. Cronbach's alpha reliability coefficients were found to be 0.79 for Avoidance; 0.71 for Severity; 0.67 for Personal Responsibility; 0.80 for Policy opposition; 0.71 for Awkwardness; and 0.50 for Financial Discrimination (Table 4).

The CASS was administered again to 412 students after three weeks and 352 of them were responded. The scores obtained from the sub-dimensions of the scale in the test-retest application were examined using the ICC, and the answers were found to show good fit ( $p < 0.01$ ). This fit suggested that the scale had good test-retest reliability. The ICC scores of the CASS-T were found to be 0.78 (Table 5). The ICC scores were found to be 0.70 for Avoidance; 0.72 for Severity; 0.64 for Personal Responsibility; 0.70 for Policy opposition; 0.70 for Awkwardness; and 0.66 for Financial Discrimination (all  $p$ -values are  $> 0.001$ ). The ICC values all remained in the range that indicates the reliability of the conformity with the standard which assumes 0.64–0.72 to be substantial (Polit and Beck, 2017).

### Validity

The CVI was used to determine item validity. In this study, the item-content index was found to be 0.97 in terms of language expression.

Convergent validity was used to Spearman Pearson moments and is correlations between the subscales of the CASS and between the subscales and the CASS were examined (Table 4).

**Table 2.** Factor structure of the CASS-T

Items	Factor loading
<i>Avoidance</i>	
19 If a colleague had cancer, I would try to avoid them	0.78
18 I would distance myself physically from someone with cancer	0.73
12 I would try to avoid a person with cancer	0.70
16 I would feel irritated by someone with cancer	0.68
13 I would feel angered by someone with cancer	0.58
<i>Severity</i>	
7 Cancer devastates the lives of those it touches	0.82
4 Having cancer usually ruins a person's career	0.70
6 Cancer usually ruins close personal relationships	0.65
2 Getting cancer means having to mentally prepare oneself for death	0.55
1 Once you've had cancer you can never be "normal" again	0.45
<i>Personal responsibility</i>	
5 A person with cancer is accountable for their condition	0.82
9 If a person a cancer, it is probably their fault	0.80
3 A person with cancer is to blame for their condition	0.72
8 A person with cancer is liable for their condition	0.44
<i>Policy opposition</i>	
22 More government funding should be spent on the care and treatment of those with cancer	0.86
23 We have a responsibility to provide the best possible care for people with cancer	0.85
21 The needs of people with cancer should be given top priority	0.79
<i>Awkwardness</i>	
10 I would feel at ease around someone with cancer	0.91
11 I would feel comfortable around someone with cancer	0.91
15 I would find it hard to talk to someone with cancer	0.52
14 I would find it difficult being around someone with cancer	0.52
17 I would feel embarrassed discussing cancer with someone who had it	0.40
<i>Discrimination</i>	
24 Bank should be allowed to refuse mortgage applications for cancer-related reasons	0.78
25 It is acceptable for insurance companies to reconsider a policy if someone has cancer	0.75
20 It is acceptable for banks to refuse to make loans to people with cancer	0.41

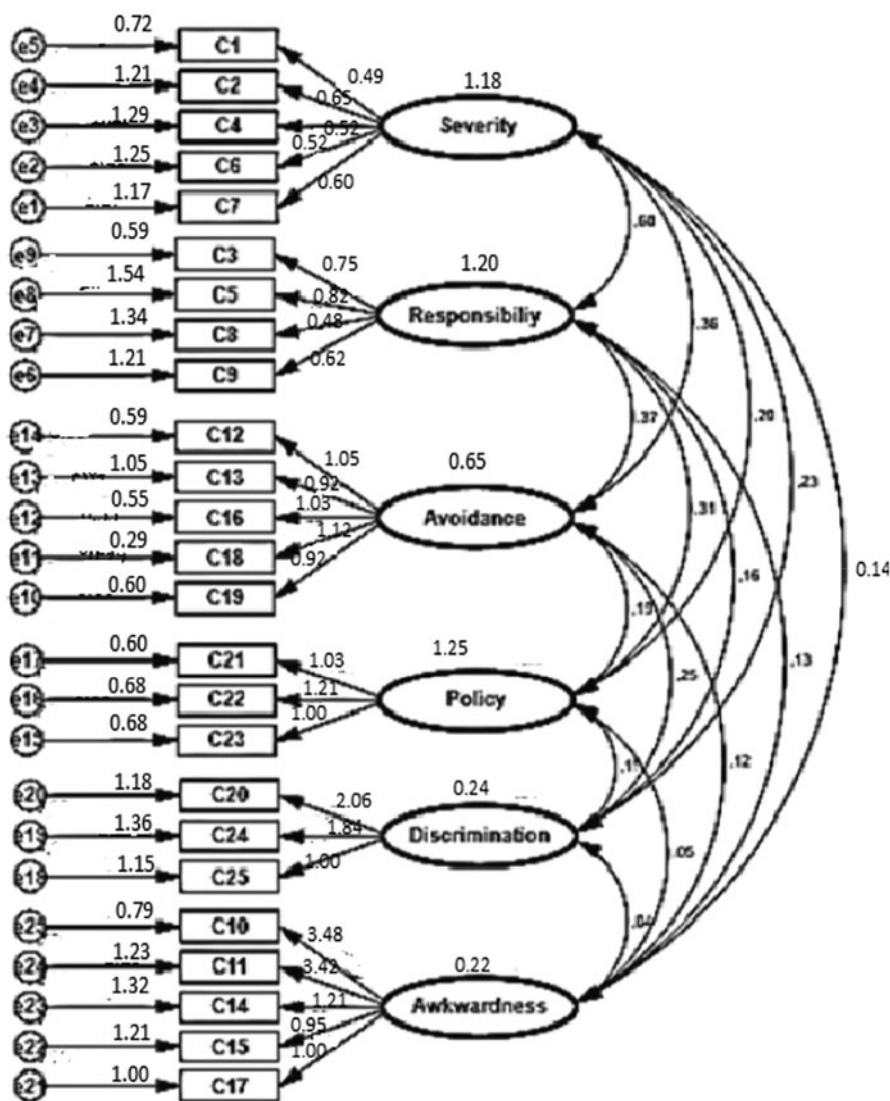


Fig. 1. Confirmatory factor analysis of the CASS-T. \*RMSEA = 0.065, RMR = 0.211, CFI = 0.86, GFI = 0.88.

Table 3. EFA of the CASS-T

	$\chi^2/df$ ratio	GFI	CFI	RMSEA
	$\leq 3$ (good)	$\geq 0.90$ (good)	$\geq 0.85$ (good)	$\leq 0.05$ (good)
	$\leq 5$ acceptable	$\geq 0.85$ (acceptable)	$\geq 0.80$ (acceptable)	$\leq 0.08$ (acceptable)
CASS-T	2.156	0.89	0.864	0.053

A moderate positive and significant relationship was found between a personal responsibility subgroup of the CASS and the policy opposition subgroups. ( $r = 0.44$ ;  $r = 0.34$ ). A statistically strong positive relationship was determined between awkwardness ( $r = 0.559$ ), severity ( $r = 0.508$ ), and avoidance ( $r = 0.521$ ) subgroups of the CASS. A weak positive relation was found between the Avoidance subgroup and Severity ( $r = 0.281$ ), and Personal Responsibility subgroup ( $r = 0.230$ ) of the CASS, and a moderately positive significant relationship with the Awkwardness subgroup ( $r = 0.433$ ). A moderate positive relationship was determined with the responsibility subgroup ( $r = 0.345$ ) of the severity subgroup and a weak positive and significant relationship with the Awkwardness ( $r = 0.202$ ) subgroup. A weak positive

significant relationship was found between the Policy opposition sub-dimension of the CASS and the Financial discrimination sub-dimension ( $r = 0.181$ ).

Differences in mean scores for each component by “gender, class, information status about cancer, loss of a relative due to cancer, willingness to work in an institution that serves individuals with cancer and their families” were determined (Table 6). While females had a higher mean for Awkwardness, males had a higher mean for severity and personal responsibility ( $p < 0.05$ ). Students who had no Information about cancer scored higher on avoidance and financial discrimination. The Awkwardness and financial discrimination scale mean scores of the fourth-year students were significantly low. The awkwardness

**Table 4.** Correlation, internal consistency, and test–retest reliability of each factor

Factors	F1	F2	F3	F4	F5	F6	CASS
<i>Correlation</i>							
F1: Avoidance	1.00	0.281**	0.230**	0.019	0.433**	0.229*	
F2: Severity		1.00	0.345**	0.017	0.202**	0.228**	
F3: Personal Responsibility			1.00	0.024	0.135**	0.207*	
F4: Policy opposition				1.00	−0.009	0.181*	
F5: Awkwardness					1.00	0.219**	
F6: Financial discrimination						1.00	
Internal consistency <sup>a</sup>	0.79	0.71	0.67	0.80	0.71	0.51	0.82

<sup>a</sup>Cronbach's alpha.

\* $p < 0.05$ .

\*\* $p < 0.01$ .

**Table 5.** The ICCs between the test–retest mean scores of the CASS-T and their level of significance

CASS and subscale	Test ( $n = 412$ )	Retest ( $n = 350$ )	ICC	$P$
	Mean $\pm$ SD	Mean $\pm$ SD		
Avoidance	8.71 $\pm$ 3.78	8.41 $\pm$ 3.62	0.70	0.000*
Severity	11.9 $\pm$ 4.67	11.1 $\pm$ 4.73	0.72	0.000*
Personal Responsibility	7.60 $\pm$ 3.63	7.80 $\pm$ 3.47	0.64	0.000*
Policy opposition	5.40 $\pm$ 3.50	12.8 $\pm$ 4.51	0.70	0.000*
Awkwardness	12.8 $\pm$ 5.32	14.8 $\pm$ 5.27	0.70	0.000*
Financial discrimination	7.04 $\pm$ 3.52	7.17 $\pm$ 3.69	0.66	0.000*
CASS	52.6 $\pm$ 0.73	63.14 $\pm$ 0.75	0.78	0.000*

ICC, intraclass correlation coefficient;  $p$ , level of significance.

\* $p < 0.001$ .

score averages of the participants whose relatives died due to cancer were significantly high.

## Discussion

In this study, the psychometric characteristics and factor structures of the CASS were evaluated. The validity and reliability of the CASS are shown to be a suitable scale for use in research. Six sub-dimensions were obtained on the scale adapted to Turkish. It proved to have adequate internal consistency and good test–retest reliability. Recently, “Attitudes towards Cancer (Cancer Stigma) Measurement Questionnaire-Community Version” has been validated in Turkish by Yilmaz et al. (2017). Apart from this questionnaire, to the best of our knowledge, CASS-T is the only validated scale evaluating cancer stigma in the Turkish population.

Translation and back translation of the CASS were done while remaining true to the meaning of the original items. No specific adjustments were necessary for cultural adaptation and the back translation was approved by the original author. This analysis showed that the factor of the CASS-T and the number of items in each factor have a similar construct to the original CAS scale. However, the factor load of four items

(items 1, 8, 17, and 20) was found to be low on the CASS-T. Since our sample size is over 300 in our study, the correlation matrix value should be above at least 0.29 (Henson and Roberts, 2006). Because the correlation matrix value of these four items in this study are being above 0.40, the items were considered reliable.

In this study, the scored responses for each item followed a normal distribution, and all items had a good item-total correlation. Therefore, no items were deleted from the original CASS-T and there was no significant overlapping of the subscales. Satisfactory internal consistency (0.82) was noted in the CASS-T. The original scale had a higher internal consistency ( $\alpha = 0.90$ ), with alpha coefficients for the six subscales ranging from 0.71 to 0.91 (Marlow and Wardle, 2014). The Cronbach alpha values of our study were found slightly lower than the Cronbach alpha values of the original study. According to the Cronbach's alpha and ICC values of the scale (ICC.0.79), we can say that the Turkish version of the scale is good. In literature, Takeuchi et al. (2020) found in the study of the validity of the CAS scale to Japanese. The Cronbach alpha value of J-CASS was 0.85, and the ICC value was 0.84. Ye et al. (2019) found the Cronbach alpha value of C-CASS as 0.88 in the study of adapting the CASS to Chinese culture. These results suggest that CASS is a reliable tool that can be used in different cultures.

Recent research has shown that gender has an impact on cancer-related stigma (Fujisawa and Hagiwara, 2015; Vrinten et al., 2019). This study is determined that the severity and personal responsibility scale scores of female students are lower than male students. Also, female students' awkwardness scale mean scores were found to be higher than male students. In the original CASS, the severity, personal responsibility, and avoidance scale scores of female students were found to be lower than male students. Another study similar to our study showed that the observers' gender had an impact on cancer-related stigma (Mosher and Danoff-Berg, 2007). Vrinten, Gallagher, Waller, and Marlow (2019) stated in their study that the average CASS score of men was higher than that of women. In another study conducted in China, it was stated that there was no significant relationship between gender and C-CAS scale and scale sub-groups. In another study conducted with the Japanese population, no significant relationship was found between gender and the J-CAS scale (Takeuchi et al., 2020). We think that further studies

**Table 6.** CASS-T and subgroup mean scores according to the descriptive characteristics of the participants

	Awkwardness M ± SD	Severity M ± SD	Avoidance M ± SD	Policy opposition M ± SD	Personal responsibility M ± SD	Financial discrimination M ± SD	CASS-T M ± SD
<i>Gender</i>							
Female	14.6 ± 5.89	12.0 ± 4.93	8.45 ± 4.58	6.45 ± 3.97	8.25 ± 3.77	8.54 ± 4.02	54.5 ± 14.1
Male	13.3 ± 6.15	13.1 ± 4.86	8.46 ± 4.40	6.12 ± 3.85	9.86 ± 4.97	8.12 ± 3.95	55.6 ± 13.9
<i>p</i>	0.040*	0.049*	0.990	0.480	0.002*	0.336	0.504
<i>Class</i>							
1st Class	13.7 ± 5.99	12.0 ± 4.79	8.00 ± 3.99	6.82 ± 3.85	8.75 ± 4.35	9.36 ± 3.92	56.1 ± 14.6
2nd Class	15.0 ± 5.88	12.1 ± 4.48	8.49 ± 4.08	6.10 ± 4.17	8.70 ± 3.23	8.98 ± 3.91	55.9 ± 11.8
3rd Class	15.4 ± 6.36	12.5 ± 5.07	8.87 ± 4.91	5.59 ± 3.09	9.48 ± 4.97	7.96 ± 3.76	55.4 ± 15.3
4th Class	13.1 ± 5.49	13.0 ± 5.58	8.84 ± 5.54	6.68 ± 4.45	8.50 ± 4.16	7.69 ± 4.41	54.4 ± 13.9
<i>p</i>	0.019*	0.737	0.784	0.083	0.627	0.044*	0.042*
<i>Information status about cancer</i>							
Yes	14.0 ± 5.84	12.3 ± 4.99	8.22 ± 4.10	6.35 ± 3.91	8.70 ± 4.25	8.31 ± 3.92	54.6 ± 13.6
No	15.4 ± 6.57	12.4 ± 4.66	9.55 ± 6.01	6.38 ± 4.09	8.71 ± 3.99	9.75 ± 4.30	55.5 ± 15.4
<i>p</i>	0.081	0.914	0.022*	0.954	0.098	0.010*	0.709
<i>Loss of a relative due to cancer</i>							
Yes	15.0 ± 6.29	12.8 ± 4.97	8.47 ± 4.48	6.16 ± 3.84	8.50 ± 4.17	8.36 ± 4.16	59.3 ± 17.3
No	13.6 ± 5.58	11.9 ± 4.86	8.44 ± 4.59	6.59 ± 4.03	8.90 ± 4.23	8.48 ± 3.84	57.3 ± 17.0
<i>p</i>	0.012*	0.096	0.947	0.351	0.338	0.752	0.255
<i>Willingness to work in an institution that serves individuals with cancer and their families</i>							
Yes	14.2 ± 6.26	11.9 ± 5.05	8.00 ± 4.67	6.02 ± 4.07	8.11 ± 4.22	8.05 ± 3.99	55.9 ± 17.2
No	14.8 ± 5.81	13.0 ± 4.76	9.17 ± 5.05	5.69 ± 3.36	9.38 ± 4.39	8.97 ± 4.41	62.2 ± 18.3
Hesitant	14.0 ± 5.85	12.3 ± 4.90	8.44 ± 4.07	7.00 ± 4.03	8.86 ± 4.04	8.46 ± 3.76	58.4 ± 16.2
<i>p</i>	0.603	0.182	0.060	0.031*	0.021*	0.322	0.020*

\*Independent sample *t*-testing, ANOVA, *p* < 0.05.

are needed to provide an idea of the effect of gender on cancer stigma perception. Another finding in our study was that students who knew about cancer had higher avoidance mean scores and lower financial discrimination mean scores.

In this study, fourth-year students' perception of cancer stigma is lower than other classes, which confirms that as the level of education increases, the perception of stigma related to cancer may decrease (Hamann et al., 2014; Vrinten et al., 2019). This result shows that education and the campaigns that university students can participate in or organize for cancer awareness are effective in reducing cancer-related stigma. Also, students who know about cancer have significantly lower cancer avoidance and financial discrimination scale scores.

The loss of a relative or friend due to cancer increases the cancer-related stigma. Cancer disease in the literature is seen as an incurable, difficult, or non-treatable disease that symbolizes death. All these factors reveal the stigma related to cancer disease (Ndukwe et al., 2013; Moser et al., 2014; Fujisawa and Hagiwara, 2015). It is stated in the literature that one of the most important factors of cancer-related stigma may be fear of the disease itself and fear of death (Mosher and Danoff-Berg, 2007; Cataldo et al., 2012). In this study, the Awkwardness score averages of the participants whose relatives died due to cancer were found significantly higher (Table 6).

## Limitations

The findings of this study were based on data gathered from a single university and the sample of the students which may limit generalizability owing to their age and education level are not reflective of the general population.

## Conclusion

The validity and reliability of the Turkish version of the CASS was confirmed in this sample of students. Internal consistency was good, supporting the reliability of the scale. The results of CFA confirmed that the 25-item Turkish version is consistent with the six-factor structure model of the original English version. Therefore, the CASS-T is thought to be a feasible instrument for assessing cancer stigma in Turkey. CASS, which is used to measure cancer-related stigma, will also help in measuring cancer-related stigma in Turkish society and will increase the awareness of cancer patients and their relatives about the stigma they are exposed to. By measuring attitudes toward cancer, focusing on cancer as a treatable disease will contribute to positive developments in early diagnosis and participation in treatment.

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