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Development and psychometric evaluation of a Caregiver Self-Efficacy Scale for informal caregivers of bedridden patients: a study in Türkiye

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Abstract

Background Existing instruments measuring self-efficacy are generally developed for specific populations or health conditions and may not adequately capture the caregiving challenges faced by caregivers of bedridden patients. Therefore, a valid and reliable scale is needed to assess the self-efficacy levels of caregivers of bedridden patients.

Methods This methodological study was conducted with informal caregivers of bedridden patients registered in home health care services in Trabzon and Rize, Türkiye. An initial item pool consisting of 66 items was generated based on the literature. The draft scale was pilot tested with 33 caregivers. Data were collected from 571 caregivers. Exploratory Factor Analysis (EFA) was conducted with 314 participants, and Confirmatory Factor Analysis (CFA) was performed with a different sample of 257 participants. Reliability analyses included Cronbach's alpha and test–retest analysis.

Results The content validity index of the draft Caregiver Self-Efficacy Scale was 0.705. The Kaiser–Meyer–Olkin value for EFA was 0.913 and Bartlett's test of sphericity was significant ($\chi^2 = 5377.750$, $p < 0.001$). Following content validity, exploratory factor analysis and reliability analysis, the number of items was reduced from 51 to 29. The final scale consisted of four factors: caregiving, disease knowledge, stress management, and social support. Confirmatory factor analysis indicated acceptable model fit (RMSEA = 0.07, CFI = 0.90). The Cronbach's alpha coefficient for the total scale was 0.939.

Conclusions The Caregiver Self-Efficacy Scale is a valid and reliable instrument that can be used to assess the self-efficacy levels of caregivers of bedridden patients.

Keywords Bedridden patient, Caregiver, Scale, Self-efficacy

1 Background

The increasing lifespan and the accompanying chronic diseases lead individuals to become fully or partially dependent. According to Orem's self-care theory, patients who cannot meet their individual care needs require the care of another person. Professional

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care is provided by nurses during hospitalization for individuals who have become fully or partially dependent. When individuals transition to a home environment, there is also a need to continue this care. Integrated services are offered in our country and around the world to maintain the care of dependent patients in the home environment.

In addition to all the services provided during the process of dependency leading to home care, there are primary caregivers for dependent individuals. Primary caregivers are responsible persons who carry out all treatment and care for the patient. For primary caregivers to provide adequate care, they must possess sufficient knowledge, skills, and motivation related to the subject. The caregiver must be knowledgeable about the patient's illness and treatment process, care process, and the procedures to be followed in emergencies, as well as feeling competent. Here, the concept of caregiver self-efficacy comes into play. Self-efficacy can be defined as an individual's belief in their ability to carry out a task correctly and completely, based on the knowledge, skills, and determination they possess [1, 2]. Various sources define self-efficacy as the belief that a person can perform health-promoting behaviors. In the context of bedridden patient care, caregiver self-efficacy refers to caregivers' confidence in their ability to perform caregiving tasks, manage disease-related information, cope with caregiving stress, and effectively utilize available social support [3, 4].

Health policies supporting the home environment for the long-term care of dependent patients and studies demonstrating the advantages of home care have accelerated the delivery of this service. In traditional societies, patients who are bedridden or in need of care tend to spend their final stages of life in their home environments rather than being placed in institutions [5–7]. Bedridden patients frequently encounter numerous problems such as bedsores, respiratory issues, infections, lack of personal hygiene, deterioration in chewing and swallowing abilities, nutritional deficiencies, sleep problems, elimination issues, communication problems, aspiration risk, embolism risk, information deficiency, decreased activity level, contractures, atrophy, and stress-related psychiatric disorders. Based on these common issues, it is evident that the care of dependent patients is a complex process. Therefore, individuals providing care to dependent patients at home need to be equipped and competent. These complex care needs require caregivers not only to perform practical caregiving tasks but also to possess adequate knowledge about the disease process, manage the stress associated with long-term caregiving, and utilize available social support resources. Therefore, evaluating caregiver self-efficacy in domains such as caregiving practices, disease knowledge, stress management, and social support is essential [5, 8].

Studies have examined the self-efficacy of caregivers or patients with different diseases, determining that self-efficacy affects the quality of care, the patient's quality of life, and the burden on caregivers [4, 9–20]. Particularly, the burden created by the long-term home care of bedridden patients is evident. Caregivers plan, implement, and supervise patients' daily lives. The caregiver must integrate the patient's care process into their own life. In this challenging situation, the feeling of adequacy is of great importance [8]. Evaluating self-efficacy from the perspective of caregivers and supporting caregivers in identified areas of deficiency will enhance the quality of the care process.

When the literature is examined, numerous scales have been developed to measure self-efficacy in different contexts. However, these instruments are generally designed for specific topics or particular patient groups. Some scales focus on parental competence,

some on health-related behaviors or chronic disease management, and others on general self-efficacy perceptions [19, 21–30]. Although these tools provide valuable information about individuals' perceived competence, they do not fully address the complex and multidimensional caregiving responsibilities associated with long-term care situations. In particular, instruments specifically developed to evaluate the self-efficacy of caregivers providing care for bedridden patients are limited. Therefore, there is a need for a measurement tool that specifically assesses the self-efficacy levels of caregivers responsible for the long-term care of bedridden patients. These complex caregiving tasks require caregivers to possess not only practical caregiving skills but also confidence in managing patient care, disease-related information, stress, and available social support.

This research aims to develop a self-efficacy scale for caregivers of bedridden patients, along with determining the validity and reliability of the scale.

2 Methods

2.1 Type of research

The research was conducted methodologically.

2.2 Population and sample

The study was conducted between April 2020 and January 2022 with caregivers of bedridden patients registered in the home health care services of the Provincial Health Directorates in Trabzon and Rize, Türkiye. The study population consisted of 981 caregivers of bedridden patients registered in the Trabzon Home Health Coordination Center ($n = 578$) and the Rize Home Health Services Unit ($n = 403$).

The inclusion criteria were that the caregiver provides unpaid care to a bedridden patient, is over 18 years of age, and has no communication barriers. Participants who met the inclusion criteria and agreed to participate voluntarily were included in the study.

The exploratory factor analysis (EFA) sample consisted of 314 caregivers of bedridden patients living in the Ortahisar district of Trabzon and registered in the Trabzon Home Health Coordination Center. The confirmatory factor analysis (CFA) sample consisted of 257 caregivers of bedridden patients living in the city center of Rize and registered in the Rize Home Health Services Unit. Thus, the total study sample consisted of 571 caregivers.

In addition, test–retest analysis was conducted with 55 caregivers of bedridden patients living in the Ortahisar district of Trabzon who were not included in the EFA or CFA samples.

2.3 Data collection tools

The data collection process utilized the "Personal Information Form" and the Draft "Caregiver Self-Efficacy Scale (CSES)".

2.3.1 Personal information form

The personal information form developed by the researchers consists of 10 questions inquiring about the caregiver's age, gender, and education level.

2.3.2 Draft caregiver self-efficacy scale

The Draft CSES was developed by researchers based on the literature to determine the self-efficacy levels of caregivers for bedridden patients [5, 23, 24, 27, 29–38]. The draft scale consists of 66 items across four subdimensions: "caregiving, disease knowledge, stress management, and social support." The scale is rated on a five-point Likert scale: "1 = strongly disagree," "2 = disagree," "3 = undecided," "4 = agree," and "5 = strongly agree." Higher scores on the scale and subdimensions indicate an increased perceived self-efficacy level.

2.4 Scale development process

During the scale development process, a literature review was conducted to identify the dimensions of caregiver self-efficacy related to bedridden patient care. Relevant studies focusing on caregiver self-efficacy and caregiving in chronic illness and long-term care were reviewed, and articles were searched in databases such as PubMed, Scopus, and Google Scholar using keywords including "caregiver," "self-efficacy," "bedridden patients," and "home care." The reporting of the measurement properties of the scale was guided by the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) recommendations for studies on measurement instruments. Based on the findings from the literature and expert opinions, an initial item pool consisting of 66 items was generated. Content validity analysis using the Lawshe technique resulted in the removal of 15 items, reducing the scale to 51 items. Exploratory Factor Analysis further removed 14 items due to low factor loadings or cross-loadings, reducing the number of items to 37. Subsequently, reliability analysis was performed and 8 items with item–total correlation coefficients below 0.30 were removed to improve internal consistency. Consequently, the final version of the scale consisted of 29 items organized under four factors: caregiving, disease knowledge, stress management, and social support.

2.5 Pilot application

The 51-item draft scale was shared with 33 caregivers to evaluate the clarity, comprehensibility, and applicability of the scale items before the main data collection. Participants were asked to indicate any questions they found unclear or difficult to answer. Based on the feedback from participants, minor changes were made to a few items for clarity. Participants in the pilot study were not included in the data collection phase.

2.6 Data collection

The data collection process was completed through home visits conducted between April 2020 and January 2022. Before data collection, caregivers were informed about the study and their voluntary participation was obtained. Caregivers who were able to read and complete the questionnaire independently were asked to complete the scale themselves. For caregivers who had difficulty reading or recording their responses, the researcher read the questions and recorded the responses on the form. To minimize interviewer bias, the same standardized instructions were provided to all participants. The safety and confidentiality of the data obtained during the study were ensured. The average time required to complete the scale was approximately 10–15 min.

2.7 Data analysis

For the data analysis, Exploratory Factor Analysis (EFA) was conducted using SPSS 22.0, while Confirmatory Factor Analysis (CFA) was performed using AMOS 21. The dataset was examined for missing values prior to the analyses and no missing data were identified. The methods used in the analysis are listed as follows:

- Analysis of Individual Characteristics: Frequency, Percentage, Mean, Standard Deviation.
- Kurtosis and Skewness Analysis.
- Reliability Analysis: Cronbach's alpha, Spearman-Brown Coefficient, Guttman Split-Half Coefficient, Test-Retest Analysis, ICC.
- Item Analysis: For EFA, KMO, Bartlett, Principal Component Analysis, Promax Rotation Method, Anti-Image, Scree Plot, Variance, and Eigenvalue.
  For Confirmatory Factor Analysis (CFA), Goodness of Fit (χ^2/df, GFI: Goodness Fit Index, AGFI: Adjusted Chi-Square Statistic, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, RMR: Root Mean Square Residual, NFI: Normed Fit Index), and Significance of Factor Loadings.

3 Results

3.1 Demographic findings

The sample consisted of 571 caregivers with a mean age of 40.96 ± 13.20 years. The majority of participants were female (69.2%), married (64.3%), and unemployed (58.8%). In terms of education, most caregivers had primary–secondary school education (32.6%), followed by high school (24.3%) and university education (24.7%). Most participants reported that their income was equal to their expenses (60.8%). Regarding their relationship to the patient, the largest group was children of the patient (33.6%), followed by daughters-in-law (18.0%) and spouses (13.5%). Additionally, 78.3% of the caregivers reported having social security, while 41.7% stated that they had a current health problem. Concerning caregiving duration, the largest proportion of caregivers had been providing care for 1–3 years (38.2%), followed by less than 1 year (28.0%).

3.2 Validity findings

3.2.1 Face validity

For face validity, an initial item pool was created based on the literature, and peer, field expert, and Turkish language expert opinions were obtained. Based on peer feedback, formal corrections were made to 7 items, and based on expert feedback, wording revisions were made to 15 items without altering their meaning. Following these revisions, the draft version of the CSES consisted of 66 items.The scale is a five-point Likert type: "1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree." (Figure 1).

3.2.2 Content validity

For content validity, the number of experts and item ratings were decided to be evaluated using the Lawshe technique. The draft scale was sent to 52 experts, and responses were received from 20 experts. Twenty experts, including specialists in public health nursing with experience in caregiving research, responded and evaluated the items for

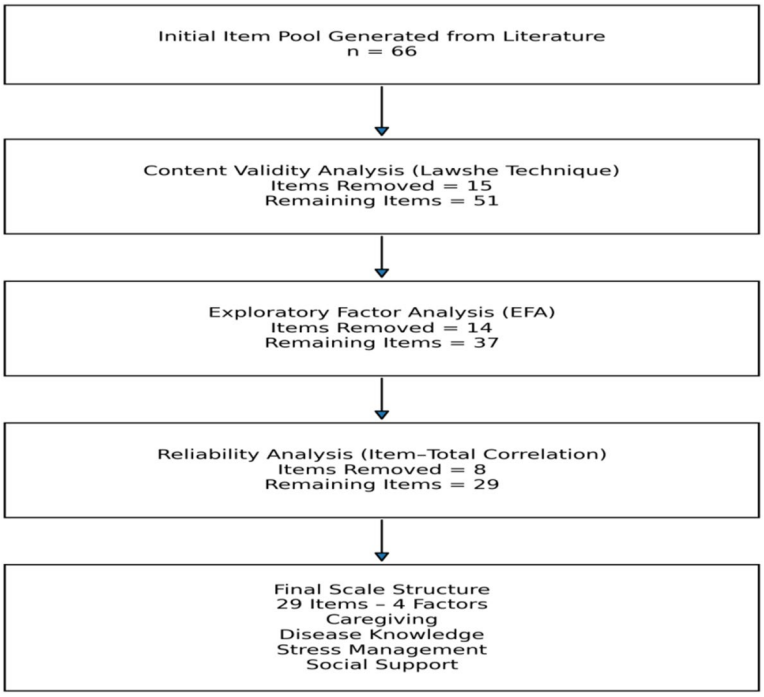


Fig. 1 Scale development and item reduction process of the Caregiver Self-Efficacy Scale (CSES)

content validity.Based on the feedback received, the calculation formula appropriate for the Lawshe technique was used, and the Content Validity Ratio (CVR) was calculated for each item. According to the Lawshe technique, items with a CVR value below 0.42 need to be removed from the scale. As a result of content validity, 15 items were removed from the scale, and 21 items were corrected in terms of language, expression, and punctuation, updating the draft Scale to 51 items. In the final version of the draft scale, there are 19 items in the caregiving dimension, 6 items in the disease knowledge dimension, 19 items in the stress management sub-dimension, and 7 items in the social support sub-dimension. The Content Validity Index of the scale was found to be 0.705. Before conducting validity and reliability analyses, the distribution of the scale items was examined by looking at Kurtosis and Skewness values. It was observed that these values were within the desired range, indicating that the scale items exhibited a normal distribution.

3.2.3 Construct validity

Exploratory Factor Analysis

To determine the construct validity of the scale, the Exploratory Factor Analysis (EFA) method was used. To test the applicability of the EFA, preliminary assumption tests such as Kaiser-Meyer-Olkin (KMO) and Bartlett tests were applied. The results of the tests indicated that the sample size was sufficient for factor analysis (KMO = 0.913 > 0.60). The Bartlett test (Chi-square = 5377.750; $p < 0.01$) showed that there was a relationship among the variables included in the factor analysis.

In exploratory factor analysis, the Promax rotation method was used. Items with factor loadings below 0.60 were removed. In addition, items showing cross-loadings with a difference of less than 0.10 between factor loadings were excluded. Factors with eigenvalues greater than 1 were retained. As a result of the factor analysis, in the first rotation, 6 items (14, 18, 24, 30, 45, 51) were removed; in the second rotation, 7 items (3, 9, 17, 16,

8, 15, 25) were removed; and in the third rotation, 1 item (4) was removed. As a result of the final rotation, the variables were grouped into 4 factors that explained a total variance of 59.246%. The slope graph of the scale is presented in Fig. 2.

The high factor loadings and explained variance ratios of the factors constituting the scale indicate that the scale has a strong factor structure. The items in the first factor were considered as "Social Support." The items in the second factor were considered as "Caregiving." The items in the third factor were considered as "Stress Management." The items in the fourth factor were considered as "Disease Knowledge," and Table 1 shows the items and factor loadings under the sub-dimensions. Following the item reduction process, the final scale consisted of 29 items grouped under four factors.

Confirmatory Factor Analysis (CFA)

The diagram related to the confirmatory factor analysis is provided in Fig. 3.

Covariances were defined between the error terms of items 33 and 34, 39 and 40, 1 and 2, and 12 and 13, resulting in a total of four modifications. These modifications were theoretically justified because the related items have similar wording and measure closely related aspects of the same construct. Therefore, allowing covariance between their error terms improved the model fit.

The goodness of fit criteria related to the confirmatory factor analysis and the obtained values are specified in Table 2.

Another preferred method for item analysis is to determine the significant (important) difference between the lower 27% and upper 27% groups of the total score of the scale. It was determined that there is a significant difference between the lower 27% and upper 27% groups of the scale ($p < 0.01$). According to these results, the scale has been determined to measure discriminative sensitivity (Table 3).

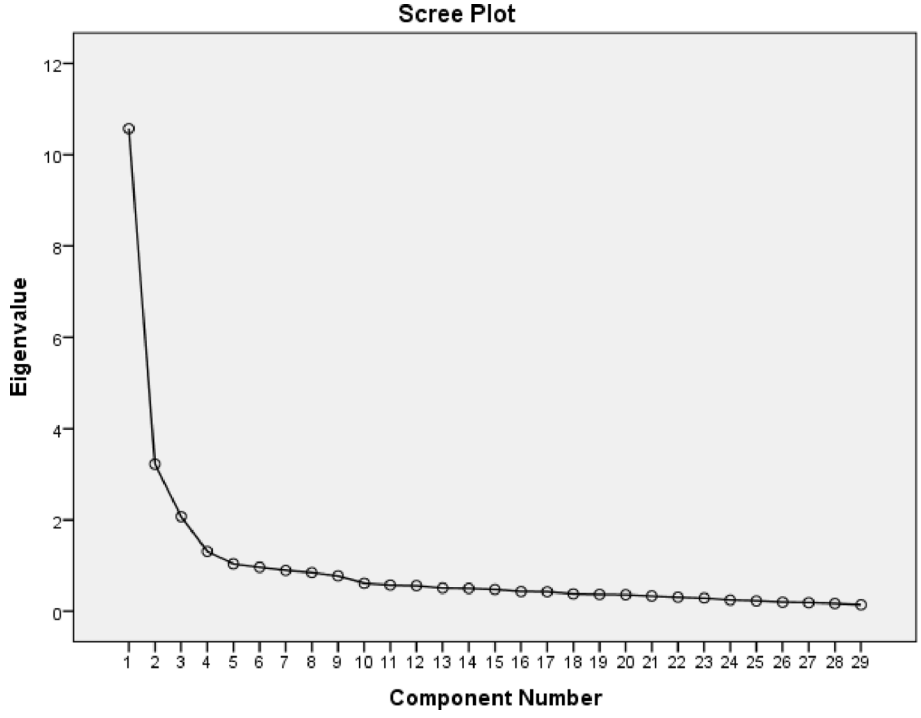


Fig. 2 Scree plot of the caregiver self-efficacy scale

Table 1 Scale items and factor loading values of the caregiver self-efficacy scale according to its sub-dimensions

Dimension	Item	Factor Loading	Explained Variance	Cronbach's Alpha
Social support (Eigenvalue = 10.572)	33	0.840	36.456	0.902
	34	0.840		
	32	0.812		
	37	0.806		
	36	0.788		
	35	0.786		
	42	0.696		
	38	0.670		
	31	0.644		
Caregiving (Eigenvalue = 3.224)	12	0.826	11.117	0.898
	6	0.771		
	11	0.767		
	1	0.713		
	10	0.711		
	5	0.680		
	2	0.674		
	13	0.671		
	7	0.651		
	19	0.638		
Stress management (Eigenvalue = 2.074)	47	0.762	7.152	0.842
	49	0.762		
	39	0.754		
	50	0.750		
	46	0.727		
	40	0.722		
Disease Knowledge (Eigenvalue = 1.311)	20	0.769	4.520	0.786
	23	0.713		
	22	0.701		
	21	0.699		
Total Variance %59.246; Cronbach's alpha = 0.939				

As shown in Table 3, the final version of the scale consisted of 29 items under four factors.

3.3 Reliability findings

To determine the reliability of the scale, Cronbach's alpha, Spearman Brown, and Guttman Split-Half tests were conducted. Findings related to the tests are indicated in Table 4.

Reliability analyses were subsequently performed, and items with low item–total correlations were removed. Items with an item–total correlation coefficient below 0.30 (items 26, 27, 28, 29, 41, 43, 44, and 48) were excluded from the scale because they negatively affected internal consistency. As a result, the final version of the scale consisted of 29 items. The item–total correlation values ranged between 0.426 and 0.657 for the EFA sample and between 0.356 and 0.689 for the CFA sample, and all values were statistically significant.

Correlation analyses between the total and sub-dimensions of the CSES were examined and are specified in Table 5.

The agreement between the test–retest measurements was evaluated using the Intraclass Correlation Coefficient (ICC) and test–retest correlation values, both of which

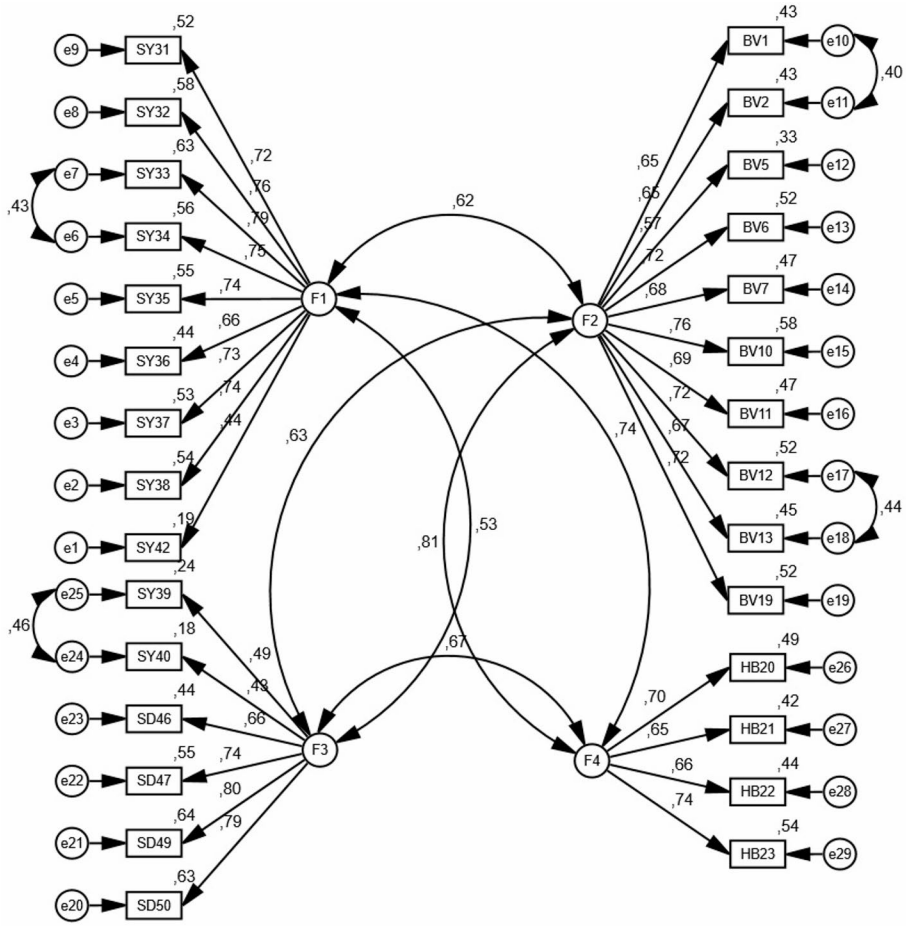


Fig. 3 Path diagram related to confirmatory factor analysis

Table 2 Confirmatory factor analysis index values

Index	Normal Value	Acceptable value*	Value
χ2/sd	< 2	< 5	3.10 (1137.609/367)
GFI	> 0.95	> 0.90	0.91
AGFI	> 0.95	> 0.90	0.90
CFI	> 0.95	> 0.90	0.90
NFI	> 0.95	> 0.90	0.90
RMSEA	< 0.05	< 0.08	0.07
RMR	< 0.05	< 0.08	0.06

*X2/Sd, AGFI: Adjusted Chi−Square Statistic, GFI: Goodness Fit Index, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, RMR: Root Mean Square Residual NFI: Normed Fit Index

Table 3 Final factor structure and item distribution of the Caregiver Self-Efficacy Scale (CSES)

Factor	Item numbers	Number of items
Social support	31, 32, 33, 34, 35, 36, 37, 38, 42	9
Caregiving	1, 2, 5, 6, 7, 10, 11, 12, 13, 19	10
Stress management	39, 40, 46, 47, 49, 50	6
Disease knowledge	20, 21, 22, 23	4

Table 4 Findings of the reliability analysis of the Caregiver Self-Efficacy Scale

Subdimension	EFA			CFA		
	Cronbach's alpha	SBC*	GSHC*	Cronbach's alpha	SBC	GSHC
CSES General	0.943	0.754	0.753	0.939	0.837	0.836
Social Support	0.902	0.837	0.837	0.894	0.831	0.819
Caregiving	0.898	0.847	0.841	0.900	0.853	0.846
Stress Management	0.842	0.759	0.749	0.819	0.722	0.721
Disease Knowledge	0.786	0.731	0.728	0.778	0.724	0.713

*SBC: Spearman-Brown Coefficient; GSHC: Guttman Split-Half Coefficient

Table 5 Correlation values between the total and sub-dimensions of the Caregiver Self-Efficacy Scale

	CSES general	Social support	Caregiving	Stress management	Disease knowledge
CSES general					
r	1.000				
p	< 0.001				
Social support					
r	0.780**	1.000			
p	< 0.001	< 0.001			
Caregiving					
r	0.843**	0.432**	1.000		
p	< 0.001	< 0.001	< 0.001		
Stress management					
r	0.784**	0.516**	0.511**	1.000	
p	< 0.001	< 0.001	< 0.001	< 0.001	
Disease knowledge					
r	0.748**	0.519**	0.622**	0.456**	1.000
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

*<0.01; **<0.01; Pearson Corelation Analyze

Table 6 Test–retest score correlations and comparison of the CSES

Scale dimensions	Test		Retest		*N*	t	p^a	ICC^b	r^c
	M	SD	M	SD					
CSES total	3.963	0.658	3.898	0.750	55	0.897	0.374	0.842	0.735*
Social support	4.183	0.805	4.307	0.820	55	−1.669	0.101	0.833	0.787*
Caregiving	3.947	0.902	4.039	0.878	55	−1.270	0.210	0.816	0.832*
Stress management	3.435	0.910	3.530	0.916	55	−1.317	0.194	0.827	0.839*
Disease knowledge	4.299	0.783	4.395	0.673	55	−1.333	0.188	0.839	0.760*

a: Paired samples t–test; b: Intraclass correlation coefficient; c: Pearson correlation coefficient. *$p < 0.001$

were found to be high. No significant difference was observed between the test and retest measurements ($p > 0.01$) (Table 6). These findings indicate that the scale provides reliable measurements over a short period of time.

4 Discussion

The first step in the scale development process is to make a theoretical and conceptual definition of the characteristic to be measured [34]. The initial 66-item, five-point Likert scale draft of the CSES was subjected to peer review, Turkish language expert evaluation, and field expert consultations based on the current literature.

In content validity, it is determined how well each scale item measures the target concept. The Lawshe technique was used to evaluate expert opinions. The expert

opinion form was sent to scale field experts via e-mail, and feedback was received from 20 experts. According to the Lawshe technique, an item is removed from the scale if its Content Validity Ratio (CVR) value is below the critical value of 0.42 for 20 experts [34]. As a result of the content validity evaluation, 15 items were removed and the draft scale was reduced to 51 items.

The content validity index of the scale was found to be 0.705. Although this value may be considered borderline, previous studies indicate that CVI values above 0.70 can be considered acceptable when the number of experts is adequate. In this study, the evaluations of 20 experts were included, which strengthens the content validity assessment.

After establishing Face and content validity, factor analysis was conducted to test the construct validity of the draft CSES. In determining the sample size required for factor analysis, the literature indicates that a sample size of 50 is very poor, 100 is poor, 200 is adequate, 300 is good, 500 is very good, and 1000 and above is excellent [35]. The sample size of the study, with 571 participants, is therefore considered very good according to this classification.

For construct validity, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed. To avoid overfitting and strengthen methodological rigor, different datasets collected from different samples were used for EFA and CFA. EFA was conducted with 314 participants, whereas CFA was conducted with a different sample of 257 participants.

The aim of conducting EFA is to determine the factor structure created by the data. The KMO value should be above 0.5, and the Bartlett test significance value should be less than 0.01 [36]. In this study, the KMO value was found to be 0.913, and Bartlett's Test of Sphericity was statistically significant ($p < 0.001$). Items with anti-image correlation values below 0.50 should be removed from the scale. The anti-image correlation values of the draft CSES were above 0.50. Since the KMO value, Bartlett significance value, and anti-image correlation values were found to be appropriate, the dataset was considered suitable for exploratory factor analysis.

During the scale development process, the number of items was reduced from 66 to 29 through content validity analysis, exploratory factor analysis, and reliability analysis.

In the study, the slope graph shows a break in the 4th factor. The scale has a four-factor structure, has sub-dimensions of Social Support, Caregiving, Stress Management, and Disease Knowledge. The four-factor structure obtained in this study reflects different but related dimensions of caregiver self-efficacy in the context of bedridden patient care. The caregiving dimension represents caregivers' perceived competence in performing daily care activities, whereas the disease knowledge dimension reflects their understanding of the patient's condition and care requirements. The stress management and social support dimensions highlight the psychological and social aspects of caregiving. Previous studies measuring caregiver self-efficacy have often focused on disease-specific caregiving tasks or general caregiving competence [18, 37, 38]. In contrast, the present scale was designed to capture the multidimensional nature of caregiving for bedridden patients, including practical care skills, knowledge related to disease management, emotional coping, and social support resources.

The eigenvalues for the sub-dimensions of the CSES were as follows: Social Support sub-dimension has an eigenvalue of 10.572, Caregiving sub-dimension has an eigenvalue

of 3.224, Stress Management sub-dimension has an eigenvalue of 2.074, and Disease Knowledge sub-dimension has an eigenvalue of 1.311.

In the study, rotated principal components analysis was utilized. Factor loading values above 0.3 are considered acceptable, above 0.5 are considered significant, and above 0.7 are considered good [39]. Since it is thought that there is a relationship between the factors of the CSES, the promax rotation method was preferred. All factor loading values of the CSES items were found to be above 0.6.

In multi-factor scale structures, it is considered sufficient for the explained total variance to be between 40 and 60% [39]. In this study, the total variance value of the CSES is 59.246%, with the Social Support sub-dimension explaining 36.456% of the scale, the Caregiving sub-dimension explaining 11.117%, the Stress Management sub-dimension explaining 7.152%, and the Disease Knowledge sub-dimension explaining 4.520%.

To examine item discriminability of the CSES, an analysis of the lower and upper 27% quartile groups was conducted. The comparison between the lower and upper 27% groups in the study revealed a significant statistical difference. The CSES distinguishes differences with a wide range of measurement sensitivity.

After testing the exploratory factor analysis, CFA was conducted for the construct validity of the scale. In the study, the X^2/df value was found to be 3.10, and the p value was found to be significant. The RMSEA value was determined to be 0.07. The GFI goodness of fit index of the CSES was found to be 0.910. The AGFI value was found to be 0.90. The CFI and NFI goodness of fit indices of the CSES were found to be 0.90. The RMR fit value was found to be 0.06 in the study. According to commonly accepted model fit criteria in the literature, χ^2/df values below 5, RMSEA values below 0.08, and CFI, GFI, AGFI, and NFI values of 0.90 or above indicate acceptable model fit. Therefore, the fit indices of the model indicate that the four-factor structure of the scale shows an acceptable level of model fit. As a result, it was observed that the fit indices were generally consistent with the structure determined in EFA. The analysis of the internal consistency reliability of the scale was determined using Cronbach's alpha internal consistency coefficient. The overall Cronbach's alpha value of the CSES was found to be 0.939, indicating that the scale is highly reliable. Although the Cronbach's alpha coefficient of the scale was high ($\alpha = 0.939$), this value indicates strong internal consistency. High alpha values may sometimes suggest item redundancy; however, the factor analysis results and the multidimensional structure of the scale support that the items measure related but distinct aspects of caregiver self-efficacy.

To determine the stability of the scale over time, a test–retest analysis was conducted. The scale was re-administered to 55 caregivers who were not included in the EFA and CFA samples after a two-week interval. Pearson correlation coefficients and intraclass correlation coefficients (ICC) were calculated to evaluate the stability of the scale over time. A correlation coefficient greater than 0.70 is generally considered acceptable for test–retest reliability. In the test–retest application of the CSES, a significant correlation of above 0.81 was found between the two measurements. These results indicate that the CSES provides stable and consistent measurements over time.

5 Conclusions

The Caregiver Self-Efficacy Scale is a valid and reliable 29-item scale that can be used to measure the self-efficacy levels of caregivers of bedridden patients. As a newly developed instrument, its use in future research may contribute to a better understanding of caregiver self-efficacy in this population. The scale may help identify areas in which caregivers require additional support by evaluating their perceived competence in caregiving. Although the scale was developed within a specific cultural context, its clear and practical structure may facilitate adaptation for use in different settings; however, further studies are needed to evaluate its cross-cultural validity and applicability in diverse populations.

Abbreviations

CSES	Caregiver Self-Efficacy Scale
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
GFI	Goodness Fit Index
AGFI	Adjusted Chi-Square Statistic
CFI	Comparative Fit Index
RMSEA	Root Mean Square Error of Approximation
RMR	Root Mean Square Residual
NFI	Normed Fit Index
KMO	Kaiser–Meyer–Olkin
CVR	Content Validity Ratio

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Author contributions

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Data availability

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

Declarations

Ethics approval and consent to participate

The study adhered to the Declaration of Helsinki, and the current study was granted ethical approval by Scientific Research Ethics Committee of Karadeniz Technical University (File No: 2020/370). Informed consent was obtained from all caregivers who participated in the study.

Consent for publication

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Competing interests

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