

An abbreviated German version of the Sense of Competence Questionnaire among informal caregivers of relatives who had a stroke: development and validation

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Abstract Caregiver burden is a main outcome domain in caregiver intervention research. A recommended instrument for measuring burden is the Sense of Competence Questionnaire (SCQ). In this study, we evaluated the psychometric properties of the German version of the SCQ with informal caregivers of stroke patients. Baseline data of a randomized controlled trial ($n = 122$) and survey data ($n = 76$) of caregivers of stroke patients were used. Data were collected at the caregiver's or the care receiver's home or over the telephone. We evaluated the homogeneity, the construct validity, and the clinical validity of the German version and the homogeneity of a new abbreviated version. The homogeneity of the SCQ indicates good reliability (Cronbach's alpha: 0.89). The three-factor structure of the SCQ was mostly confirmed through principal components analyses using oblimin rotation. Clinical validity was supported through correlations between sense of competence and burden ($r = -0.51$), depression ($r = -0.52$), and care recipient's cognitive function ($r = 0.36$). Sixteen items with consistent factor loadings were extracted and proposed as a new abbreviated version of the SCQ (Cronbach's alpha: 0.84). The abbreviated German rendition of the SCQ version that was validated in this study offers a consistent version that can be applied across

different languages and among caregivers of stroke survivors or people with dementia.

Keywords Questionnaire · Validation · Caregivers · Stroke · Competence

Introduction

Stroke is a major cause of adult disability. Speech, movement, coordination, and cognition can all be affected (Wolfe and Rudd 2007). Consequently, it is common for stroke survivors to experience depression (Hackett and Anderson 2005). Stroke often has an effect on the relatives as well. The required care for the patient after stroke commences suddenly. Caregivers are at risk of decreased psychosocial functioning in domains such as burden, depressive symptoms, harmony in the relationship, and social relations (Visser-Meily et al. 2009).

In caregiver research, an often evaluated domain is caregiver burden. One internationally utilized questionnaire to assess such burden is the Sense of Competence Questionnaire (SCQ) developed by Vernooij-Dassen (1993). The uniqueness of the SCQ is that it measures burden from the perspective of the caregiver's own competence belief. Thus, instead of focusing on matters that relate to the care recipient, the SCQ refers to the caregiver's individual perception of the specific care situation and of his or her perceived capability to care for the patient (Vernooij-Dassen et al. 1996). The developers of the SCQ saw caregiver's sense of competence as a major determinant in managing both care requirements and individually perceived burden.

The original SCQ is a 27-item questionnaire that includes three subscales (Vernooij-Dassen 1993). A shorter

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7-item version was later produced for clinical practice (Vernooij-Dassen et al. 1999). To date, four validation studies of the long SCQ have been published (Table 1), three of which used the original Dutch version of the instrument and one examined a French version (Vernooij-Dassen et al. 2003). The original validation study (Vernooij-Dassen 1993) and the French study (Vernooij-Dassen et al. 2003) investigated informal caregivers of patients with diagnosed dementia, whereas Jansen et al. (2007) validated the SCQ among older adults with dementia symptoms. Scholte op Reimer et al. (1998) conducted the first SCQ validation among partners of patients who had a stroke. Comparing these four validation studies, it is obvious that they partially differ in regard to the cultural background, the type of patients' disease, and the type of the relationship between caregiver and recipient of care. In addition, the response categories, the coding directions, the order of items, and the presentation of the items (paper-pencil, face to face, and telephone) were also dissimilar (Table 1).

Notwithstanding the mentioned differences, the psychometric properties in the validation studies were good. The factor structures of the SCQ, measured with explorative principal component analyses, were similar, though not identical. As described in Table 1, subscale analysis of the internal consistencies of the SCQ produced Cronbach's alpha values between 0.68 and 0.77 within the population of caregivers of stroke patients and between 0.73 and 0.85 with regard to dementia care. Only poor internal consistencies (0.50–0.63) were reported for the subscales in the original study described by Jansen et al. (2007). Moreover, different methods were chosen in the respective studies to examine the validity of the instrument. Scholte op Reimer et al. (1998) measured the extent to which patients' impaired functional health and cognition were reflected in total SCQ scores. Jansen et al. (2007) examined how the concept "sense of competence" correlates with burden, mental quality of life, depressive symptoms, and mastery.

Although validated thus far in only two European languages, the potential of this relatively new scale for psychosocial outcomes in caregiving intervention research is considerable. The European INTERDEM group (Moniz-Cook et al. 2008) recommended the SCQ as well as the Zarit Burden Interview (ZBI; Zarit et al. 1980) among the available assessments used to measure family caregiver burden in their consensus on pan-European outcome measurements for psychosocial intervention research. Although they recommended the ZBI, which has been the most widely used questionnaire so far, the expert group noted that the way family burden is measured in that instrument may require refining. One reason is that the ZBI has demonstrated only limited sensitivity to change (Brodaty et al. 2003). In comparison, the SCQ which measures

Table 1 Short overview of published SCQ validation studies

	N	Target group	Presentation/ (missing)	Response categories	Item-total correlation	Cronbach's α total (subscales)	Principal components analysis
Vernooij-Dassen (1993)	141	Informal caregivers of patients with diagnosed dementia	–	5 + 2 (6 = do not know; 7 = unknown)	–	0.79 (0.50–0.63)	–
Vernooij-Dassen et al. (2003)	164	Informal caregivers of patients with diagnosed dementia (N = 51 living in institutional settings)	Face to face/ telephone (N = 25)	3	>0.20 (except item 16, 21)	0.87 (0.73–0.81)	Oblique rotation, eigenvalue minimum 2.0
Scholte op Reimer et al. (1998)	174 (only group A)	Partners of stroke patients	Paper-pencil (N = 8)	4	–	0.83 (0.68–0.77)	Obliquin rotation, eigenvalue minimum 2.0
Jansen et al. (2007)	99	Informal caregivers of older adults with dementia symptoms	Face to face (N = 6)	5	0.16–0.76	– (0.83–0.85)	Obliquin rotation, eigenvalue minimum 2.0

– not available data

factors associated with caregiver burden has shown promising results in terms of sensitivity to change (Pfeiffer et al. 2014; Graff et al. 2006).

The first goal of the current study, therefore, was the translation and validation of the German version of the SCQ within a population of caregivers of stroke patients. The second aim was to identify the scale items that maintained consistent factor loadings across all published validation studies of the SCQ, as a means to develop a consistent and abbreviated version of the SCQ for psychosocial intervention research.

Methods

In order to conduct the psychometric evaluation of the German SCQ, data from two different study groups were used (Fig. 1). First, we included the data (group A) of the baseline measurements of informal caregivers of stroke patients who participated in a randomized controlled trial of a telephone-based problem-solving intervention (Pfeiffer et al. 2014). The protocol of this study was approved by the ethics committee of the University of Tuebingen. For further details of the sample selection, see Pfeiffer et al. (2014). Second, we added survey data of informal caregivers of stroke patients who were members of self-help groups (group B).

A total of 198 caregivers participated. The mean age of the caregivers (147 women and 51 men) was 64.93 years and of the care recipients (64 women and 134 men) 70.77 years. The caregivers were spouses and partners ($n = 176$) or children and grandchildren ($n = 22$) of the

care recipient. The sample contained 176 native Germans, ten ethnic German repatriates from Eastern European states, and 12 individuals with several European migration backgrounds.

Recruitment and data collection

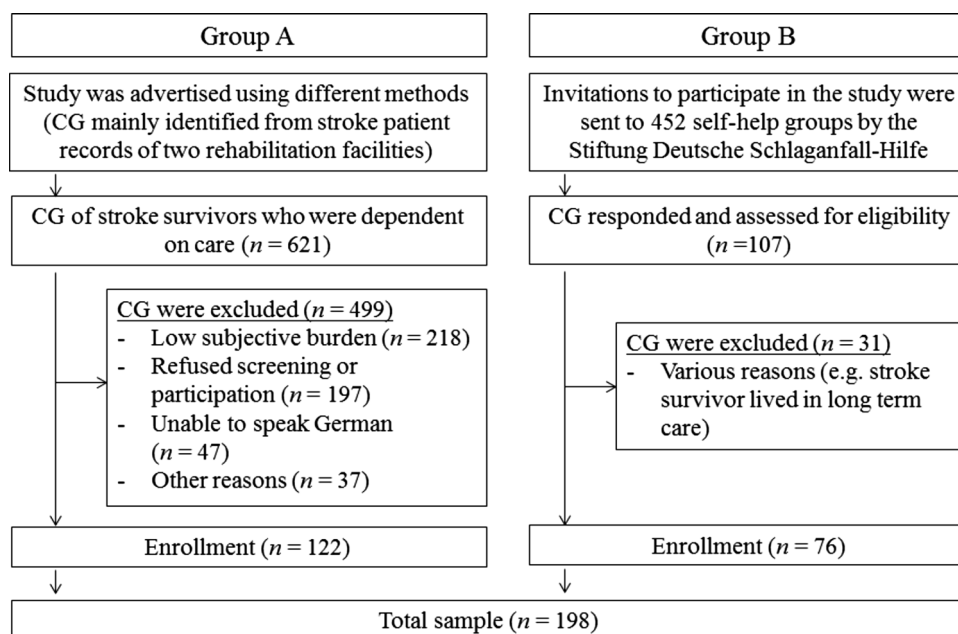
Inclusion and exclusion criteria

The inclusion criteria for the participants in both study groups were (1) primary family caregiver of a stroke survivor aged 60 years or more, (2) providing care or supervision at home for on average at least 10.5 h per week over the last 6 months, and (3) over the age of 18 years. The exclusion criteria were inappropriate auditory skills for communicating on a phone, terminal illness of the care receiver, currently receiving psychotherapy, and an insufficient ability to speak German. Participants in group A also needed to report distress associated with caregiving. The criteria for distress (e.g., caregiver felt overwhelmed, needed to cry, was angry or frustrated, or felt isolated) were derived from the eligibility criteria used in an American caregiver intervention study (Belle et al. 2006).

Study group A

Study group A consisted of 122 caregivers who were identified by patient records in two large rehabilitation facilities in the Stuttgart area. Participants were informed about the study and their eligibility was assessed via telephone. From 621 screened dyads, 302 were excluded and 197 refused to participate. Main reasons for exclusion were

Fig. 1 Participant flow until reaching the final study sample. CG caregiver



low subjective caregiver burden ($n = 218$), insufficient knowledge of German ($n = 47$), and a terminal or severely progressive disease of a stroke survivor ($n = 13$). Caregivers in this group were interviewed by trained research assistants. Assessments were conducted in the caregiver's or care recipient's home. The duration of the interview was between 60 and 120 min. The data were collected as part of a randomized controlled trial that included additional measures not relevant to the current validation study (see Pfeiffer et al. 2014). Parts of the interview were also conducted with the care recipient. The collection of the baseline data was between March 2007 and November 2009.

Study group B

Study group B included 76 caregivers who were members of self-help groups. The German Stroke Foundation (Stiftung Deutsche-Schlaganfall Hilfe) informed the potential participants about this study by sending flyers to 452 self-help groups located throughout Germany. One hundred and seven caregivers expressed interest in the study, with 76 caregivers meeting the inclusion criteria. The main reasons for exclusion of 31 caregivers were that the stroke patient was in a retirement home or had recovered from the ailment to a large extent. Caregivers in this group were interviewed over the phone by supervised masters' students. The interview lasted for between 40 and 115 min. Data were collected from February 2008 until September 2008.

Measures

Caregiver's competence

The SCQ was based on the family-crisis model (Bengtson and Kuypers 1985) and derived from the ZBI. It measures caregiver competence in three related care domains: "satisfaction with the care recipient," "satisfaction of one's own performance," and "consequences of involvement in care." These subscales were identified through factor analysis in a population of caregivers of dementia patients and classified by an expert panel, involving clinical researchers and professional caregivers (Jansen et al. 2007). The first subscale refers to the caregiver's perception of the care recipient's behavior. It consists of four items from the ZBI, two items from the crises model, and one newly developed item. The second subscale is comparable with the domain adequate role performance of Bengtson and Kuypers (1985) and contains eight items from the ZBI, two items from the crises model, and two new items. The third subscale relates to constraints or inhibitions caused by the caregiver's role according to the burden scale by Greene

and Monahan (1987). It includes six items of the ZBI and two newly developed items. Every item is rated on a five-point scale (agree, agree slightly, neither agree nor disagree, disagree slightly, and disagree). Total scores range from 27 to 135, whereas higher scores indicate higher competence and a lower burden. Two items ("I feel useful in my interactions with my..." and "I feel pleased about my interactions with my...") are positively phrased.

SCQ: translation process

To avoid non-equivalences in the translation, we used a committee and back-translation method for translating this questionnaire into the German language (Brislin 1970). Firstly, two translations from the English version and one from the original Dutch version into German were conducted by three bilingual speakers, who were familiar with the involved cultures. The three target translations were compared and critically discussed with the original author of the test in regard to the vocabulary and the idiomatic, grammatical-syntactical, experiential, and conceptual equivalences (Sechrest et al. 1972). Another bilingual native English speaker blindly translated back the final target German version into English. A panel with three bilingual German native speakers who were experts in caregiver research decided on the final German version (available upon request).

Caregiver's depression

Depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale (CES-D-20; Radloff 1977; Hautzinger et al. 2012). The 20 items are rated on a four-point scale ranging from "rarely or none of the time" to "most of the time" regarding the caregiver's feelings during the past week. Total scores of 16 or higher have been used as a cut-off score for indicating a risk of clinical depression in international studies (Hautzinger et al. 2012). The total scores range from 0 to 60. Cronbach's alpha is 0.87 in a population with caregivers.

Caregiver's strain

The Caregiver Strain Index (CSI; Robinson 1983) is a 13-item questionnaire which measures the strain related to providing care. The tool contains at least one item with regard to mental, physical, financial, psychosocial, and time management stressors. Items were rated on a yes-no scale. Scores range from 0 to 13 with scores over seven representing higher level of strain. The reliability coefficient alpha is 0.86.

Care recipient's impairment

The severity of the care recipient's functional disabilities was assessed with the Barthel Index (BI; Mahoney and Barthel 1965). The BI is composed of 10 items. Scores range from 0 to 100 with higher scores indicating better activities of daily living (ADL) performance. Shah et al. (1989) reported Cronbach's alphas of 0.87–0.93 for different scoring systems among stroke patients. Four additional items from the German Extended Barthel Index (EBI; Prosiegel et al. 1996) referring to cognitive functions were administered: comprehension, verbal expression, social interaction, and memory/learning/orientation. Total scores of the EBI range from 0 to 60.

Statistical and psychometric analysis

To evaluate the reliability of the SCQ, Cronbach's alpha coefficients were calculated for the total score and for the three subscales. We also assessed item–item correlations, item–subscale correlations, item–total scale correlations, subscale–subscale correlations, and subscale–total scale correlations. Homogeneity is considered to be good if Cronbach's alpha is above 0.70 and if the different correlations are within the range of 0.20 and 0.80 (Streiner and Norman 2003; Field 2013).

Floor or ceiling effects were considered to exist when 15 % of the caregivers had the minimum or the maximum score on the subscale (McHorney and Tarlov 1995). Mean item scores and their standard deviations were also calculated.

For construct validity, principal components analysis was conducted. We employed oblique rotation (direct oblimin), because previous validation studies used it as well. This made comparisons between the respective factor loadings of each study more consistent (Scholte op Reimer et al. 1998; Jansen et al. 2007). It was assumed that the factor structure of the German SCQ is similar to the factor structure of the original study (Vernooij-Dassen 1993). In accordance with the previous SCQ validation studies, the construct validity was also evaluated through a minimum of 2.0 for eigenvalues.

To study the concurrent validity of the SCQ, correlations were calculated between the SCQ and depressive symptoms (CES-D), caregiver burden (CSI), cognitive functions (EBI), and functional disabilities (BI). Taking the results of the former SCQ validation studies into account, we hypothesized a priori as follows:

- (1) A moderate-to-strong negative correlation [−0.40, −0.80] between the SCQ and the CES-D.
- (2) A moderate-to-strong negative correlation [−0.40, −0.80] between the total SCQ score and caregiver

strain (CSI) (the strongest correlations between CSI and the third subscale).

- (3) A mild-to-moderate negative correlation [−0.20, −0.60] between SCQ and cognitive functioning (EBI).
- (4) No correlation or a mild correlation [0.00, 0.20] between SCQ and stroke survivor's functional disabilities (BI).

Abbreviated version of the SCQ

To identify items with the same factor loadings, we compared the loadings in the five existing validation studies of the SCQ (the four previous studies and the current one). The data reflect the answers of 776 informal caregivers of dementia and stroke patients in three different European countries (The Netherlands, France, and Germany). The criteria for the item selection were (1) a minimum of four out of five validation studies must have the highest item-factor loading on the relevant factor; (2) the average of the four highest item-factor loadings must be >0.50; and (3) at least one item-factor loading from a dementia validation study and at least one factor loading from a stroke validation study must be >0.50. In regard to reliability, Cronbach's alpha should exceed 0.70 and item–total correlations should exceed 0.20. Construct validity, calculated with Spearman-Rho correlation, should indicate a high correlation between the long version of the SCQ and the abbreviated version.

Data analysis

IBM SPSS version 16 (IBM® SPSS® Statistics, Chicago, IL, USA) was used to analyze the data in this study. To assess the normal distribution of the variables ($p < 0.05$), we used the Kolmogorov–Smirnov test. Spearman-Rho was used to analyze correlations. Group differences were assessed with Mann–Whitney U test or χ^2 test. The statistical analysis was conducted at a 95 % confidence level. p value < 0.05 was considered statistically significant.

Results

All 198 participating caregivers in the current validation study completed all measurements. The mean scores of the SCQ total was 95.34 (SD = 16.37) and for the first subscale 28.88 (SD = 5.89), for the second subscale 48.69 (SD = 8.12), and for the third subscale 17.77 (SD = 6.58). Groups A and B did not differ by caregivers' and care recipients' gender, relationship, stroke survivor's activities of daily living, or cognitive functioning. However, participants in group A were older, showed more depressive

Table 2 Caregiver and care recipient characteristics ($N = 198$)

	Group A $N = 122$	Group B $N = 76$	Group differences (U)	Total $N = 198$
<i>Demographics caregiver</i>				
Age, $M \pm SD$ (range)	66.15 \pm 9.97 (30–87)	62.98 \pm 9.02 (27–80)	$p = 0.016$	64.93 \pm 9.71 (27–87)†
Female, N (%)	95 (77.9)	52 (68.4)	$p = 0.140$ (χ^2)	147 (74.2)
CES-D, $M \pm SD$	20.96 (\pm 8.95)	14.03 (\pm 8.86)	$p < 0.001$	18.30 (\pm 9.51)
CSI, $M \pm SD$	9.31 (\pm 9.47)†	9.00 (\pm 2.57)†	$p = 0.058$	9.19 (\pm 7.59)†
SCQ total, $M \pm SD$	93.04 (\pm 16.10)	99.03 (\pm 16.23)	$p = 0.007$	95.34 (\pm 16.37)
SCQ subscale 1, $M \pm SD$	28.61 (\pm 5.62)†	29.30 (\pm 6.32)†	$p = 0.145$	28.88 (\pm 5.89)†
SCQ subscale 2, $M \pm SD$	47.52 (\pm 8.32)	50.53 (\pm 7.46)	$p = 0.005$	48.69 (\pm 8.12)†
SCQ subscale 3, $M \pm SD$	16.91 (\pm 5.88)	19.16 (\pm 7.42)	$p = 0.055$	17.77 (\pm 6.58)†
<i>Relationship</i>				
Spouse, N (%)	105 (86.1)	71 (93.4)	$p = 0.109$ (χ^2)	176 (88)
(Grand-) Children, N (%)	17 (13.9)	5 (6.6)		22 (12)
<i>Demographics care recipient</i>				
Age, $M \pm SD$ (range)	73.15 \pm 7.47 (60–89)	66.97 \pm 7.25 (52–92)	$p < 0.001$	70.77 \pm 7.96 (52–92)
Female, N (%)	38 (31.1)	26 (34.2)	$p = 0.65$ (χ^2)	64 (32.3)
BI, $M \pm SD$	55.37 \pm 29.22	59.80 \pm 25.57	$p = 0.367$	57.07 (\pm 27.89)†
EBI, $M \pm SD$	43.98 \pm 11.46†	42.17 \pm 13.05	$p = 0.36$	43.28 (\pm 12.09)†

M mean, SD standard deviation, † no normal distribution, χ^2 test (χ^2), Mann–Whitney U test (U), *CES-D* Center for Epidemiological Studies Depression Scale, *CSI* Caregiver Strain Index, *SCQ* Sense of Competence Questionnaire, *subscale 1* “satisfaction with care recipient,” *subscale 2* “satisfaction with one’s own performance,” *subscale 3* “consequences of involvement in care,” *BI* Barthel Index, *EBI* Extended Barthel Index

symptoms, felt less competent in relation to the general care situation, and less satisfied with their own care performance (Table 2).

Reliability

The homogeneity of the German SCQ indicates good reliability. Cronbach’s alpha was 0.89 for the entire scale. On a subscale level, the alpha was between 0.82 and 0.85. All

items have item–subscale correlations above 0.30. The internal consistency assessed by item–item correlations showed that there was no item redundancy in any of the three subscales. However, items 12, 16, 19, and 24 of the second subscale had a minimum of two very low correlations with other items of this subscale. On the third subscale, item 8 correlated weakly with item 1 and item 3 correlated weakly with item 14. The range of item–total correlations was between 0.45 and 0.64 for the first factor,

Table 3 Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Age caregiver	1									
(2) Sex caregiver	−0.18*	1								
(3) CES-D	0.00	0.22**	1							
(4) SCQ	−0.01	−0.14*	−0.52**	1						
(5) SCQ subscale 1	0.08	0.21**	−0.27**	0.80**	1					
(6) SCQ subscale 2	0.14	−0.09	−0.50**	0.84**	0.64**	1				
(7) SCQ subscale 3	−0.21**	−0.05	−0.46**	0.68**	0.36**	0.31**	1			
(8) BI	−0.03	0.02	0.03	−0.07	−0.12	−0.19**	0.13	1		
(9) EBI	0.09	−0.23**	−0.17*	0.36**	0.35**	0.30**	0.20**	−0.01	1	
(10) CSI	−0.09	0.15*	0.29**	−0.51**	−0.37**	−0.35**	−0.55**	−0.19**	−0.25**	1

r Spearman-Rho, * $p < 0.05$, ** $p < 0.01$

CES-D Center for Epidemiological Studies Depression Scale, sex (0 = M , 1 = F), *SCQ* Sense of Competence Questionnaire, *subscale 1* “satisfaction with care recipient,” *subscale 2* “satisfaction with one’s own performance” *subscale 3* “consequences of involvement in care,” *BI* Barthel Index, *EBI* Extended Barthel Index, *CSI* Caregiver Strain Index

0.20–0.67 for the second factor, and 0.28–0.53 for the third factor.

As shown in Table 3, there were significant relationships between the total score of the SCQ and the first factor ($r = 0.80$; $p < 0.01$), the second factor ($r = 0.84$; $p < 0.01$), and the third factor ($r = 0.68$; $p < 0.01$). The first factor was positively correlated with the second factor ($r = 0.64$; $p < 0.01$) and the third factor ($r = 0.36$; $p < 0.01$), while the second factor was also related with the third factor ($r = 0.31$; $p < 0.01$).

Floor and ceiling effects

There were no floor or ceiling effects in the subscales except for one, a ceiling effect occurred on the first factor (16.2 % of the caregivers had the maximum score of 35). The mean item scores were between 3.81 and 4.51 on the first subscale, between 3.17 and 4.66 on the second subscale, and between 1.92 and 2.93 on the third subscale. The mean item scores and their standard deviation are depicted in Table 4.

Construct validity

A forced three-factor explorative principal components analysis confirmed that the factor structure of the German SCQ was similar to the factor structure of the original study (Table 4). Six of the 27 items (items 8, 10, 18, 22, 24, and 26) have their highest loadings on a different factor than in the reported factor analysis of the original study. Only the second subscale “satisfaction with one’s own performance” did not exactly reach the eigenvalue of 2.0. The explained total variance was (48 %). Items that were loaded on the first factor “satisfaction with the care recipient” explained the most variance (29 %). The second factor displayed the most inconsistencies compared to the original questionnaire, explaining only 7 % of the variance. The third factor “consequences of involvement in care for the caregiver’s life” explained 12 % of the total variance.

Clinical validity

The SCQ results relating to the clinical validity of the German version confirmed the hypothesized correlations. As presented in Table 3, higher SCQ total scores were moderately and negatively associated with CES-D ($r = -0.52$, $p < 0.01$). The correlation of the total score of the SCQ and CSI was $r = -0.51$, $p < 0.01$. There was no significant relationship between the SCQ total score and the BI ($r = -0.07$), but a significant mild correlation with EBI ($r = 0.36$, $p < 0.01$), which implies that the cognitive functioning of the patients has more effects on the SCQ

total scores than the patient’s need of assistance with the activities of daily living.

Analysis on the subscale level showed that the patients’ cognitive functioning has the largest impact on the first subscale “satisfaction with the care recipient” in our study ($r = 0.35$; $p < 0.01$). The caregivers’ depressive symptoms were particularly associated with the second subscale ($r = -0.50$; $p < 0.01$) and the third subscale ($r = -0.46$; $p < 0.01$). The caregiver strain index had the highest correlation with the third subscale ($r = -0.55$; $p < 0.01$).

Abbreviated version of the SCQ

Comparing the item-factor loadings of the different validation studies to those of the original study, four (Jansen et al. 2007) and eight (Vernooij-Dassen et al. 2003) items have their highest loadings on a different factor within the dementia populations, whereas six (our study) and ten (Scholte op Reimer et al. 1998) items have their highest loadings on different factors in the stroke populations (Table 4).

When the items with consistent factor loadings across languages and populations were examined, 16 items of the SCQ met the criteria for the abbreviated version. As presented in Table 5, four items of the first subscale (items 4, 6, 9, and 13), five items of the second subscale (items 2, 7, 11, 12, and 16), and seven items of the third subscale (items 1, 3, 5, 8, 10, 14, and 15) were included. According to the data of this German population, the items of the abbreviated version showed good psychometric properties. The item–total correlations ranged from 0.19 to 0.59. The correlation between the long and the abbreviated version was $r = 0.94$ ($p < 0.01$). Cronbach’s alpha of the total shorter version was 0.84 (first subscale: 0.82; second subscale: 0.67; and third subscale: 0.82). All items have item–subscale correlations above 0.30, except for item 7 ($r = 0.29$). If this item was deleted, the Cronbach’s alpha value of the second subscale would increase (0.69) in the German abbreviated version. There were strong relationships between the total score and all subscales ($r = 0.69$ – 0.80 ; $p < 0.01$).

Discussion

The first aim of this study was the translation and validation of the German version of the SCQ. In general, the results showed that the psychometric properties of the German SCQ meet the criteria of reliability and validity. Similar to the validation study of Jansen et al. (2007), we could not reproduce the identical factor structure compared to the factor structure of Vernooij-Dassen’s original study with caregivers of patients with diagnosed dementia

Table 4 Principal component analysis: overview of the factor loading of published SCQ validation

Item	Item	Dementia			Stroke		
		<i>M</i> ± <i>SD</i>	<i>D</i> ¹	<i>D</i> ²	<i>D</i> ³	<i>S</i> ¹	<i>S</i> ²
Factor 1: Satisfaction with the care recipient							
23	I feel that my... behaves the way s/he does to have her/his own way	4.09 ± 1.20	0.89	0.71	0.82	0.78	0.80
13	I feel that my... behaves the way s/he does to annoy me	4.38 ± 1.06	0.72	0.71	0.83	0.78	0.76
07	I feel that may... tries to manipulate me	3.80 ± 1.34	0.68	0.86	0.90	0.84	0.76
09	My... appreciates my constant care less than the care others give him/her	3.98 ± 1.38	0.60	0.08	0.61	–	0.61
25	I feel that my... makes requests, which I perceive to be over and above what s/he needs	4.30 ± 1.02	0.59	0.30	0.50	0.58	0.72
11	I feel resentful about my interactions with my...	3.81 ± 1.05	0.49	0.11	0.35	–	0.58
27	I feel embarrassed over my... behavior	4.51 ± 0.97	0.40	0.13	0.24	0.66	0.74
	Variance explained (%)		–	12	31	9	29
	Eigenvalue		–	2.08	8.39	4.20	7.84
Factor 2: Satisfaction with one’s own performance							
10	I feel pleased about my interactions with my...	4.26 ± 1.08	0.79	0.43	0.20	0.59	0.24
16	I don’t feel capable to care for my...	4.66 ± 0.83	0.63	0.10	0.27	0.39	0.33
26	I wish that my... and I had a better relationship	4.16 ± 1.28	0.56	0.72	0.53	–	0.23
20	I feel guilty about my interactions with my...	4.34 ± 1.06	0.50	0.32	0.68	–	0.50
24	I feel strained in my interactions with my...	3.17 ± 1.14	0.50	0.53	0.48	–	0.24
19	I feel that in the past, I haven’t done as much for my... as I could have/should have	4.51 ± 1.00	0.49	0.20	0.72	–	0.78
15	It is not clear to me how much care I should give to my...	3.56 ± 1.44	0.40	0.27	0.74	0.59	0.31
22	I feel that my... doesn’t benefit from what I do for him/her	4.09 ± 1.21	0.37	0.45	0.77	0.50	0.33
21	I feel nervous or depressed about my interactions with my...	3.32 ± 1.28	0.34	0.75	0.44	–	0.50
18	I feel angry about my interactions with my...	3.84 ± 1.13	0.32	0.47	0.33	–	0.39
17	I feel that I don’t do as much for my... as I should do	4.39 ± 0.96	0.31	0.16	0.25	0.36	0.74
12	I feel useful in my interactions with my...	4.41 ± 0.86	0.28	0.25	0.32	0.60	0.39
	Variance explained (%)		–	17	7	9	7
	Eigenvalue		–	3.84	2.02	2.57	1.90
Factor 3: Consequences of involvement in care for the caregiver’ life							
06	I feel that my present situation with my... doesn’t allow me as much privacy as I’d like	1.92 ± 1.08	0.67	0.58	0.68	0.66	0.82
04	Because of my involvement with my... I don’t have enough time for myself	1.99 ± 1.11	0.69	0.82	0.85	0.56	0.82
14	I feel that my social life has suffered because of my involvement with my...	2.93 ± 1.46	0.57	0.76	0.76	0.60	0.51
02	I feel that I cannot leave my... alone, he/she needs me continuously	2.10 ± 1.20	0.52	0.67	0.70	0.42	0.70
01	I feel stressed between trying to give to my... as well as to other family responsibilities, etc.	2.06 ± 1.20	0.49	0.41	0.63	0.63	0.66
05	I feel that my health has suffered because of my involvement with my...	2.48 ± 1.39	0.46	0.32	0.66	0.57	0.64
03	I worry all the time about my...	1.92 ± 1.13	0.44	0.27	0.71	–	0.73
08	I feel that my... seems to expect me to take care of him/her as if I were only one s/he could depend on	2.37 ± 1.34	0.37	0.48	0.66	–	0.28
	Variance explained (%)		–	19	11	42	12
	Eigenvalue		–	3.16	3.03	4.49	3.34

*D*¹ Vernooij-Dassen 1993, *D*² Vernooij-Dassen et al. 2003, *D*³ Jansen et al. 2007, *S*¹ Scholte op Reimer et al. 1998, *S*² our study, – not available data, emboldened entries signal the highest factor loading, *M* mean, *SD* standard deviation of the item in *S*²

(1993). There may be several reasons for this inconsistency. One explanation in the cross-cultural use of psychological tests is related to the limitations of translation (Sechrest et al. 1972). While finding the right balance between linguistic equivalence, functional equivalence, and cultural equivalence, important nuances of the original

statement may get lost from one language to another. These changes of meaning could be one of the reasons why some items had different factor loadings or why some of the relationships between items of the same subscale were low. Similar translational issues might have occurred in the French validation study, although no information about the

Table 5 Suggested short version

	Item	Factor	Item–total correlation
1	Because of my involvement with my.... I don't have enough time for myself	3	0.52
2	I feel that my.... doesn't benefit from what I do for him/her	2	0.45
3	I feel that I cannot leave my.... alone, he/she needs me continuously	3	0.34
4	I feel that my.... behaves the way s/he does to have her/his own way	1	0.48
5	I feel that my present situation with my.... doesn't allow me as much privacy as I'd like	3	0.59
6	I feel that my.... behaves the way s/he does to annoy me	1	0.53
7	It is not clear to me how much care I should give to my...	2	0.37
8	I feel that my social life has suffered because of my involvement with my...	3	0.49
9	I feel that may.... tries to manipulate me	1	0.54
10	I feel stressed between trying to give to my.... as well as to other family responsibilities, etc.	3	0.55
11	I feel guilty about my interactions with my...	2	0.41
12	I feel nervous or depressed about my interactions with my	2	0.57
13	I feel that my.... makes requests, which I perceive to be over and above what s/he needs	1	0.47
14	I feel that my health has suffered because of my involvement with my...	3	0.53
15	I worry all the time about my...	3	0.40
16	I feel that in the past, I haven't done as much for my... as I could have/should have	2	0.19

Factor 1 “satisfaction with the care recipient,” *factor 2* “satisfaction with one’s own performance,” *factor 3* “consequences of involvement in care for the caregiver’ life”

translation method and the related issues is given (Ver-nooij-Dassen et al. 2003).

In addition to the equivalence of translation, the adaptation of a questionnaire from a dementia sample to a stroke sample could also be relevant in regard to the differences of factor loadings. This explanation is already discussed in the another stroke validation study conducted by Scholte op Reimer et al. (1998). The construct validity of both SCQ validation studies with caregivers of stroke survivors shows some similarities. For example, the two following items of the second subscale did not have high factor loadings in any stroke validation study: “I wish my... and I had a better relationship.” and “I feel strained in my interactions with my ...” With regard to the content of these items, both deal with interactional problems between the caregiver and the care recipient which are possibly caused by common behavioral and psychological symptoms of dementia (for example: restlessness, aggression, shouting, delusions, hallucination, depression, and anxiety; see Ballard et al. 2000).

One reason for the European INTERDEM group to recommend the SCQ was that the questionnaire has shown some promising results in terms of the sensitivity to change (Moniz-Cook et al. 2008). Although there were no floor effects in our study, one ceiling effect occurred on the first subscale “satisfaction with the care recipient.” The same ceiling effect was found in the results of Jansen et al.’s SCQ validation study (2007) on caregivers of persons with dementia symptoms. Since the questionnaire was developed with caregivers of patients with diagnosed dementia,

one explanation of the ceiling effect could be that some of the items of this subscale (e.g., “I feel embarrassed over my... behavior.”) refer to problem behavior, which commonly occurs in a later stage of dementia. In comparison to the tendency to have a high sense of competence on the first subscale, on average, caregivers had the least feeling of competence when it came to “consequences of involvement in care for caregiver’s life” in our population. To find this, the score pattern on the third subscale of the SCQ could be explained due to the extra inclusion criteria of group A. The majority of this study sample reported distress associated with caregiving. The criteria of distress included the caregiver’s feelings of being overwhelmed or isolated (Belle et al. 2006), which are related to the content of the items of this subscale.

Limitations of the current study include the evaluation of the SCQ data from two different study groups as well as the diverse methods used for recruiting and data collection. Due to combining distressed caregivers (mainly identified through stroke patient’s records) with caregivers who were members of self-help groups, the study population may not be fully representative of caregivers of older adults after stroke. However, the caregivers’ ages and the proportion of female caregivers were identical to the stroke study population in the study by Scholte op Reimer et al. (1998).

Our second goal of this study was to develop a consistent measure that overcomes specific population characteristics. We found 16 items that showed the same factor loadings across the majority of the five validation studies focusing on caregivers of people who have diagnosed

dementia, dementia symptoms, or have had a stroke. The basic evaluation of the psychometric properties of our recommended 16-item version showed good results. The item selection represents all three subscales and includes most items of the 7-item short SCQ, which was developed for clinical practice (Vernooij-Dassen et al. 1999). However, the evaluation of the psychometric properties of this version was limited by our data. Therefore, further validation studies of this more economical 16-item version, which is supposed to be suitable for use within a range of multicenter psychosocial intervention research across Europe, will be necessary. Furthermore, a consistent version of the SCQ over different samples (dementia, stroke) could also be important for future implementation research, because offers for caregivers, which are regulated by law, are not always specified by the care recipient's diagnosis.

Although this study data support relevant metric qualities of the SCQ, there is still more research needed to evaluate the characteristics of this questionnaire. For example, more needs to be known about the stability of the construct over time. Furthermore, additional studies evaluating the convergent validity of the SCQ in general and especially of the second subscale are needed. Since the SCQ focuses on the caregiver's feeling about his or her competence pertaining to their specific situation of caregiving, comparing the SCQ also with questionnaires which measure dimensions of mastery might be useful for a better understanding of the underlying constructs.

In sum, the present study supports good psychometric properties of the German version of the SCQ and makes a contribution to the development of a consistent and abbreviated version of the instrument. To improve European collaboration, further translation and validations of the abbreviated, and the long version of the SCQ, are needed. Inclusion of SCQ validation studies of caregivers of patients with other types of diseases will extend the possibility of compiling research results in an even wider range.

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