



Evaluating self-efficacy for managing chronic disease: psychometric properties of the six-item Self-Efficacy Scale in Germany

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Abstract

Objective Self-efficacy – the confidence to carry out certain behaviour in order to achieve a specific goal – has increasingly been recognized as an essential prerequisite of effective self-management of chronic diseases. Therefore, valid and reliable measures are needed to evaluate self-efficacy in both research and clinical practice. This study explored the psychometric properties of the German version of the Self-Efficacy for Managing Chronic Disease 6-Item Scale (SES6G).

Methods We performed standardized translation and cultural adaptation of the SES6G into German. The SES6G was externally validated with the German General Self-Efficacy Scale (SWE). Cronbach's alpha, descriptive statistics and principal component analysis were used to assess psychometric properties of the SES6G. We assessed the effect of the number of co-occurring chronic diseases on SES6G scores using linear regression modelling by controlling for age, gender and education level.

Results We analysed data of 244 primary care patients in Germany. The SES6G showed good convergent construct validity to the SWE (spearman rank correlation 0.578, $P < 0.001$) and high internal consistency (Cronbach's alpha 0.930). Principal component analysis underlined the one-dimensional structure of the instrument. Adjusted for age and gender, increasing numbers of co-occurring chronic diseases were associated with lower SES6G scores (standardized β -value -0.27 , $P < 0.001$). Education level showed no significant effect.

Conclusions The SES6G is a reliable and valid instrument to assess patients' self-efficacy for managing chronic diseases. It may enhance further research in German-speaking countries and appears to be a valuable measure for clinical practice.

Introduction

Social cognitive theory yielded the concept of self-efficacy as the perceived capability of a person to perform a specific action required to achieve a concrete goal [1]. The concept is competence-based, prospective and action-related [1]. In general, self-efficacy is conceptualized task-specific, for example self-efficacy in managing diabetes self-care tasks like blood sugar testing, keeping to diet and doing physical exercises regularly. Self-efficacy is a prerequisite of effective self-management [2]. Patients with higher self-efficacy levels are more likely to start or maintain a specific task even in face of existing barriers. Several self-management programmes successfully targeted self-efficacy resulting in improved health outcomes [3,4]. Hence, reliable and

valid instruments to measure self-efficacy for both performing and evaluating self-management interventions in chronic care are needed. A couple of instruments have been developed throughout the last two decades [5–7]. Most of them focus on single chronic conditions like arthritis [5], type 2 diabetes [6] or HIV [7].

As a result of long-standing research on self-efficacy in chronic disease management, researchers extracted core domains, which could be generalized among patients with different chronic diseases, ending up with a reliable, valid and economic six-item scale measuring self-efficacy for managing chronic diseases [8]. Core domains include symptom control, role function, emotional functioning and communicating with physicians. This short instrument is less burdensome for patients and can effectively be used in research and clinical practice.

Until now, the Self-Efficacy for Managing Chronic Disease 6-Item Scale (SES6G) has not been available in German. Therefore, this study aims to provide a valid German translation of the scale.

Methods

Study design and setting

We performed an observational study in 11 general practices in Germany (eight located in the Federal State of Baden-Württemberg, three located in the Federal State of Thuringia). All practices were approached as being teaching sites for medical students of either University Hospital of Heidelberg or Schiller University Hospital of Jena. Patients aged 18 years or older, suffering from at least one major chronic condition (defined in accordance with the German social act SGB V §62 [9]) were asked to participate in the survey. Patients with severe cognitive impairment or significant language barriers were excluded from the study. Patients were asked to fill out a depersonalized paper-based questionnaire and to send it back to the Department of General Practice and Health Services Research Heidelberg. We provided a post-free envelope but no further financial incentives. Written informed consent was obtained from each participant. At each practice site a questionnaire was given to 50 participating patients (45 patients in each of the three practice sites in Thuringia). The institutional review boards of University Hospital Heidelberg and Schiller University Jena approved the study.

Translation and cultural adaptation

According to published standards [10], two researchers (TF, CM) independently translated the English version of the SES6G into German. Divergent results were discussed during consensus meetings. Cultural adaptation was performed in a linguistic sense resulting in longer items due to the character of the German language. Two native English-speaking, professional translators without health-professional background independently retranslated the consented German version into English. They achieved consensus during an in-person meeting focusing on wording rather than conceptual issues as they were not informed about the construct of self-efficacy in details. Comparing the retranslated version with the original English version revealed conceptual equivalence.

In a pilot test [11], two multimorbid elderly patients filled out the questionnaire and were asked to think aloud [12]. This revealed substantial problems with the original layout, as the patients had difficulties understanding the long German items. We therefore shortened the questions by extracting the common trunk 'How confident are you . . .' and inserted it after the end of the instructional part of the questionnaire.

Measures

The SES6G consists of six items with a 10-step Likert scale ranging from 1 'not at all confident' to 10 'totally confident'. The scale is interpreted by calculating a mean score over at least four of the six items thus allowing a maximum of two missing item responses. Means range from 1 to 10 with higher values indicating

higher self-efficacy [8]. Additionally to the SES6G, we measured social demographic data with a set of questions from a German standard questionnaire [13]. Patients were also asked to select their chronic conditions from a list of 20 conditions, which has been previously validated in a set of evaluation studies on chronic disease management [14]. We used the German General Self-Efficacy Scale (SWE) to assess convergent construct validity with the SES6G. The SWE has been validated through multiple studies [15]. It comprises 10 four-step Likert-scaled items ranging from 1 'totally disagree' to 4 'totally agree'. Sum scores range between 10 and 40 with higher scores indicating higher general self-efficacy. Although self-efficacy is considered to be task-specific, the concepts of *general* self-efficacy and *generic* self-efficacy for managing chronic disease could be assumed to be at least partly related.

Data analysis

We assessed psychometric properties of the SES6G according to published criteria [16]. Floor and ceiling effects for each item were calculated as percentages of patients rating at lowest or highest level. We determined means, standard deviations of means and missing values on item level to inform about possibly inadequate items. Reliability of the instrument was assessed in terms of internal consistency with Cronbach's alpha values above 0.7 considered as high [17]. We performed principal factor analysis (eigenvalue >1, VARIMAX rotation) and determined the Kaiser–Meyer–Olkin measure of sampling adequacy and the Bartlett's test of sphericity. Convergent construct validity was assessed in terms of a Spearman rank correlation test between SES6G mean and SWE sum scores. In this context, correlations often fall between 0.2 and 0.6, rarely above; correlations between 0.40 and 0.60 are regarded as good correlations [16]. We used multivariate linear regression analysis to model the effect of multiple co-occurring chronic conditions on SES6G scores. Therefore, variance of the SES6G score as an independent variable was modelled with the self-reported number of chronic conditions adjusted for age, gender and education level. An alpha level of $P \leq 0.05$ was used for tests of statistical significance. All statistic analyses were performed using SPSS 18.0 (Chicago, IL, USA).

Results

In total, 263/535 participants (49%) returned a questionnaire and 244/263 (93%) completed the SES6G. Details on socio-demographic characteristics and morbidity are given in Table 1.

Survey participants had a wide age range and most of them were multimorbid suffering from at least two co-occurring chronic conditions ($n = 217$, 89%). Hypertension, osteoarthritis and diabetes were the most frequently reported chronic conditions.

Table 2 displays details on missing values as well as floor and ceiling effects on item level. Overall, we observed non-response rates less than 2% on item level. Whereas floor effects occurred in about 2.5% of the cases, ceiling effects could be observed in 16% (item 2) to 30% (item 5). Factor analysis revealed a one-dimensional structure of the SES6G (Kaiser–Meyer–Olkin 0.851, Bartlett test of sphericity $P < 0.001$). Details on factor loadings are given in Table 3.

The overall mean of the SES6G was 6.69 [standard deviation (SD) 2.32] with values ranging between 1 and 10. Item 2 tended to

be rated lower (6.25) compared to item 5 (7.29) (see Table 3). The SES6G showed an internal consistency reliability of 0.93 (Cronbach's alpha).

Overall sum values of the SWE ranged from 11 to 40 with a mean of 30.24 (SD 6.28). SES6G mean and SWE sum showed a Spearman rank correlation of 0.578 ($P < .001$). In a multivariate regression model the number of co-occurring chronic conditions was negatively associated with SES6G mean scores (standardized β -value -0.27 , $P < .001$) explaining 10% of the variance (cor-

rected R^2 0.096, $P < 0.001$) if adjusted for age and gender. Education level showed no significant association with SES6G scores.

Discussion

The SES6G is a valid and reliable measure of self-efficacy for managing chronic disease. The results of our study approved good external validity and high internal consistency of the one-dimensional scale. Low missing rates on item level, low floor effects and moderate ceiling effects support these results. SES6G scores were negatively associated with increasing numbers of chronic conditions.

Self-efficacy has increasingly been recognized as an essential target for chronic care in Germany as in the USA [2,18]. Ongoing and future research on chronic disease management in German-speaking countries demands for valid self-efficacy instruments that could be included either as intervention elements or evaluation measures. Compared to the original instrument, the German SES6G shows similar psychometric properties [4]. Overall SES6G mean was higher in our sample compared to the original validation sample (5.17, SD 2.22) although patients in our study tended to have more co-occurring chronic conditions (3.4 vs. 2.3). We observed a negative association between increasing numbers of

Table 1 Sociodemographic characteristics and morbidity of survey participants ($n = 244$)

	Mean (SD) range
Age (years)	63.6 (12.5) 21–97
Number of chronic conditions	3.37 (1.78) 1–11
	<i>n</i> (%)
Female gender	121 (50)
German nationality	238 (98)
Married	169 (69)
Employed	67 (28)
Education level	
<8th grade	13 (5)
8th grade	106 (43)
>8th grade	116 (48)
Hypertension	168 (69)
Osteoarthritis	105 (43)
Diabetes (type 1 or type 2)	88 (36)
Ischemic heart disease	48 (20)
Chronic heart failure	48 (20)
Asthma/chronic obstructive pulmonary disease	44 (18)
Depression	45 (18)
Cancer disease	29 (12)

Table 3 Means [standard deviation (SD)] and principal components factor analysis loadings for the items of the Self-Efficacy for Managing Chronic Disease 6-Item Scale ($n = 244$)

Item	Mean (SD)	Factor loading
1	6.58 (2.65)	0.875
2	6.25 (2.67)	0.902
3	6.48 (2.79)	0.873
4	6.47 (2.69)	0.909
5	7.29 (2.68)	0.821
6	7.20 (2.66)	0.786

Table 2 Item response and floor/ceiling effects of the Self-Efficacy for Managing Chronic Disease 6-Item Scale ($n = 244$) (items are retranslated into English)

	Item non-response		Floor effect		Ceiling effect	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1 How confident are you that you can keep the fatigue caused by your disease from interfering with the things you want to do?	3	1.2	6	2.5	48	19.9
2 How confident are you that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?	2	0.8	7	2.9	38	15.7
3 How confident are you that you can keep the emotional distress caused by your disease from interfering with the things you want to do?	1	0.4	6	2.5	53	21.8
4 How confident are you that you can keep any other symptoms or health problems you have from interfering with the things you want to do?	2	0.8	6	2.5	48	19.7
5 How confident are you that you can do the different tasks and activities needed to manage your health condition so as to reduce you need to see a doctor?	3	1.2	5	2.0	72	29.5
6 How confident are you that you can do things others than just taking medication to reduce how much your illness affects your everyday life?	4	1.6	5	2.0	64	26.7

co-occurring chronic conditions and SES6G score. Although it has previously been reported that self-management capabilities decline with increasing numbers of chronic conditions [19], evidence on its influence on self-efficacy remains scarce.

The concepts of *general* self-efficacy and *generic* self-efficacy for managing chronic disease may only be partly related thus explaining the moderate correlation between both scales in the present study. As self-efficacy is deemed task-specific it will for example make a difference to be self-confident in 'keeping the physical discomfort or pain of one's disease from interfering with the things one wants to do' (item 2) if the patient suffers from painful osteoarthritis or has a symptom-free arterial hypertension. However, as multimorbidity is increasingly recognized to be the rule rather than the exception in primary care [20] it is not efficient to use myriads of different disease- and task-specific self-efficacy scales. Therefore, further research is needed to reveal how co-occurring chronic conditions interfere with self-efficacy and in which way this may be targeted by chronic care interventions. The SES6G provides a useful and – due to its shortness – economic measure that may enhance international research in this field.

Strengths and weaknesses

We included a convenient sample of patients from 11 general practices throughout two different regions of Germany. Given the fact that a high proportion of participants did not return the questionnaire, our results have to be interpreted on the background of potential selection bias. Low participation rates in paper-based questionnaires are widely known especially in case of absent (financial) incentives for the participants.

However, a wide range of ages, as well as numbers and types of chronic conditions provide a more or less 'realistic' practice sample. The number of returned valid questionnaires appears to be sufficient for robust equations of the psychometric properties of the SES6G. However, as psychometric properties are known to be population-specific, larger sample sizes from multiple countries may be needed to determine standardized norm values for the self-efficacy scale. Due to the study design, non-responder characteristics, test-retest reliability and responsiveness to change could not be determined and should be targeted by further research.

Conclusions

The SES6G is a valid, reliable and economic instrument to measure self-efficacy for managing chronic disease. Due to its generic nature it may offer the opportunity to be used in multimorbid populations, addressing more than one specific disease. The availability of this instrument encourages further research in this field in German-speaking countries.

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