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RESEARCH METHODOLOGY: INSTRUMENT DEVELOPMENT

The development and psychometric validation of the self-efficacy and performance in self-management support (SEPSS) Instrument

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continued on page 1382

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Abstract

Aim. To develop and psychometrically test the self-efficacy and performance in self-management support (SEPSS) instrument.

Background. Facilitating persons with a chronic condition to take an active role in the management of their condition, implicates that nurses acquire new competencies. An instrument that can validly and reliably measure nurses' performance and their perceived capacity to perform self-management support is needed to evaluate current practice and training in self-management support.

Design. Instrument development and psychometric testing of the content and construct validity, factor structure and reliability.

Methods. A literature review and expert consultation ($N = 17$) identified the content. The items were structured according to the Five-A's model and an overarching category of 'overall' competencies. The initial instrument was tested in a sample of 472 nurses and 51 nursing students from Belgium and the Netherlands, between June 2014–January 2015.

Results. Confirmatory factor analyses revealed satisfactory fit indices for the six-factor structure. Discriminating power was demonstrated for subgroups. The overall internal consistency (Cronbach's alpha) was high both for the self-efficacy and the performance items. The test–retest intra-class correlation coefficients were good.

Conclusion. The SEPSS instrument is a 36-item, Likert-scaled self-reporting instrument with good content and construct validity, and good internal consistency reliability and good test–retest reliability. Therefore, it is a promising instrument to measure self-efficacy and performance with regard to self-management support.

Keywords: competencies, instrument development, nursing, psychometric, reliability, self-management support, validity

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Why is this instrument needed?

- To support their patients' self-management, nurses must assume a new role and acquire new competencies.
- A valid and reliable instrument is needed to measure the current practice, the educational needs and the effectiveness of training in self-management support.
- So far no attention has been given to the assessment of nurses' self-efficacy, which is a strong predictor of behaviour, in the context of self-management support.

What are the key findings?

- Competencies acquired for self-management support can be categorized according to the phases of the Five A's model, but also a sixth overarching category of competencies was identified, including, for example, partnership.
- The Self-Efficacy and Performance in Self-management Support instrument has good content and construct validity, and good internal consistency reliability.

How should the findings be used to influence practice and education?

- The Self-Efficacy and Performance in Self-management Support instrument is suitable to measure nurses' self-efficacy and performance with regard to self-management support.
- The self-reported results should serve as an outcome measure of self-management support practices in clinical and research settings, to identify educational needs and to evaluate personal growth.

Introduction

Chronic conditions account for more than half of the global disease burden (WHO 2014). The steadily increasing prevalence of people with chronic conditions poses new challenges for patients, healthcare providers and healthcare systems all over the world (Alwan *et al.* 2010, WHO 2014). The provision of self-management support (SMS) is internationally recognized as a core component of chronic care (Wagner *et al.* 2001, Nolte & McKee 2008, WHO 2014). Self-management can be defined as: 'the individual's ability to manage symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition and to affect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life. Thus, a dynamic and continuous process of self-regulation is established' (Barlow *et al.* 2002, p. 178). This definition would imply that patients are expected to take an active role in their treatment, for which they will need specific competencies. To support their patients' self-management, healthcare providers as well must assume a new role and acquire new competencies. In many countries, nurses are the ones who provide SMS (Alleyne *et al.* 2011). This new role, however, is not easily integrated in practice (Wilson *et al.* 2006, Hibbard *et al.* 2010, Elissen *et al.* 2013). Self-management support is based on a partnership between patients and nurses, which requires nurses to drop the nurse-expert role (Thorne *et al.* 2000, Hook 2006, McDonald *et al.* 2008) and expressions of control inpatient interactions (Lawn *et al.* 2013). Self-management support demands a set of competencies on educational, supportive and communicational level in all phases of the support process (Nolte & McKee 2008, Alleyne *et al.* 2011, Elissen *et al.* 2013). One of the leading models in organizing the process of SMS is the Five A's model describing five key activities (Assess, Advise, Agree, Assist and Arrange) (Glasgow *et al.* 2003). This model provides a framework for professional behaviour in SMS and thereby facilitates the necessary steps in the provision of SMS. In the *Assess* phase, nurses must be capable of not only exploring patients' beliefs and motivation about living with the chronic condition but also of personalizing the support offered (Glasgow *et al.* 2006, Lawn *et al.* 2009). In the *Advise* phase, providing information about the disease and its symptoms is an important feature. Education is a precondition for informed decision-making – and consequently for self-management as well (Udlis 2011). The *Agree* phase requires skills for collaborative goal setting, during which process the nurse and patient together must agree on the goals to aim for, guided by previous positive experiences (Stacey *et al.* 2008, Schulman-Green *et al.* 2012). In the *Assist* phase, nurses need competencies to enable patients adapt their daily activities, which may include stimulating patients to seek professional help

(Schulman-Green *et al.* 2012, Dwarswaard *et al.* 2015). The *Arrange* phase refers to organizing follow-up care. Self-management support is a multidisciplinary approach which relies on effective information sharing and effective coordination of care (Pols 2009). Importantly, arrangements must be made to evaluate the progress in goal achievement (Glasgow *et al.* 2003). In addition, nurses need to possess overall competencies for a partnership attitude in each phase of the support process. This includes respecting patients' autonomy in shared decision-making, building a sustainable partnership and being able to reflect on one's own actions and recognize ethical dilemmas (Hostick & McClelland 2002, Pols 2009, Sandman *et al.* 2012, Kayser *et al.* 2014).

Studies reveal a discrepancy between the expected proficiency of nurses and their actual performance on SMS (Elissen *et al.* 2013, Yank *et al.* 2013). One of the ways to improve the provision of SMS in chronic care is the training of healthcare providers (Zwar *et al.* 2006, Kosmala-Anderson *et al.* 2010a,b). Training is also likely to improve self-efficacy and thus performance of SMS as self-efficacy is a strong predictor of behaviour (Bandura 1991) and thereby an important precursor of SMS performance. To the best of our knowledge, there is no instrument to evaluate the confidence nurses have in their own SMS abilities.

A valid and reliable instrument assessing both performance and self-efficacy is useful to guide and measure the current practice, to identify educational needs and to assess the effectiveness of training programs.

Background

Several instruments are available to measure healthcare professionals' performance in SMS. These only address specific aspects, however. The Clinician Support-Patient Activation Measure (CS-PAM) measures beliefs about the importance of activating patients and of SMS (Hibbard *et al.* 2010). Decision support can be addressed with instruments such as the Observing Patient Involvement (OPTION) scale (Elwyn *et al.* 2013), the Shared Decision Making Questionnaire physician version (SDM-Q-Doc) (Scholl *et al.* 2012) and the Decision Support Analysis Tool (DSAT-10) (Stacey *et al.* 2008). Therapeutic alliance can be measured with the Kim Alliance Scale (KAS) (Kim *et al.* 2001); and skills in motivational interviewing with, for example, the Motivational Interviewing Treatment Integrity (MITI) (Moyers *et al.* 2005) or the Behavior Change Counselling Scale (BCCS) (Vallis 2013). To our knowledge, only the Practices in SMS (PSMS) covers the broad aspect of SMS (Kosmala-Anderson *et al.* 2011). This 25-item instrument has three subscales: clinician SMS, organization of services to support self-management and patient centeredness, which all showed good internal consistency. However, nursing competencies to stimulate patients to take the lead in their self-management are not addressed in detail.

These existing instruments typically focus on performance in SMS. It may be the case, however, that healthcare professionals have the required skills, but lack self-efficacy to effectively apply these skills (Bandura 1991, Kosmala-Anderson *et al.* 2010a,b). Self-efficacy refers to a person's confidence in the ability to perform a specific behaviour in a specific situation (Bandura 1991). Self-efficacy is known to affect behaviour by influencing the choices individuals make and the course of actions they pursue; it determines their level of effort, persistence and resilience (Bandura 2006).

The current evidence demonstrates that other factors than self-efficacy might affect a nurse's performance in SMS (Harris *et al.* 2008, Elissen *et al.* 2013), creating the potential risk of a discrepancy between self-efficacy and performance. Therefore, it is appropriate to develop an instrument that measures not only nurses' actual performance but also self-efficacy to perform SMS for people with chronic conditions.

The study

Aim

To develop and psychometrically test the Self-efficacy and Performance in Self-Management Support (SEPSS) instrument.

Methodology

A psychometric instrument validation study was conducted in two phases. Phase one included instrument development and the process of content validation by a panel of experts. Phase two entailed the psychometric evaluation in a sample of nurses and nursing students (Figure 1).

Phase 1 Instrument development & content validation
First, a literature and concept search in scientific and grey literature was performed (March–November 2013) to identify relevant competencies for SMS. We searched in the PubMed, CINAHL and Cochrane databases for scientific articles about the concept of self-management and the required competencies for SMS, using the keywords 'self-care', 'chronic disease', nurs* and competenc*. We also retrieved information from (inter)national policy documents on self-management. The processes of self-management in patients with chronic conditions, consisting of patient tasks and skills as described by Schulman-Green *et al.* (2012), formed the basis for a draft list. These processes were con-

verted into competencies for SMS. Additionally, competencies such as partnership (Hostick & McClelland 2000, Leisen & Hyman 2001, Keatinge *et al.* 2002, Lorig & Holman 2003, Visse *et al.* 2010), shared decision-making, collaborative goal setting (Lorig & Holman 2003, Stacey *et al.* 2008, Kriston *et al.* 2010) and self-efficacy of the patient (Krichbaum *et al.* 2003, Lorig & Holman 2003, Yank *et al.* 2013) were obtained from literature. The items in the list were structured according to the Five A's model described above (Glasgow *et al.* 2003). An overarching sixth category was added to cover 'overall' competencies for SMS that could not be related to one single step of the Five A's model (Leisen & Hyman 2001, Hostick & McClelland 2002, Glasgow *et al.* 2003, Pols 2009, Kriston *et al.* 2010, Visse *et al.* 2010). In the end, the draft list contained 37 competencies, grouped into six subscales: (1) Assess – assess the needs and beliefs of the patient, (2) Advise – give the patient information he needs, (3) Agree – set goals together with the patient, (4) Assist – assist the patient to overcome barriers, (5) Arrange – arrange follow-up care and (6) Overall competencies - a supportive attitude (Table 2).

This draft list was discussed by a convenience sample of experts in SMS ($N = 10$) during a 3-hour meeting. Given that the instrument should be appropriate for all healthcare settings and for educational purposes, the experts represented nurse education, hospital care, older people care and psychiatric care. During the meeting the relevance, appropriateness and exhaustiveness of the item pool were discussed. Following on from the qualitative comments of the experts, three competencies were excluded, three competencies were reformulated and six competencies were added. This resulted in a 40-item draft instrument. The grouping into the six subscales was approved by the experts. In the next step, the researchers split broad competencies into sub-competencies to allow detailed assessment, which increased the number of items to 53.

The relevance and clarity of the 53-item instrument were pilot-tested in a new group of experts in SMS ($N = 4$), nurses ($N = 8$) and researchers ($N = 5$). This resulted in some minor adjustments that entailed mainly wording ambiguities and in a reduction by seven items due to overlap in content or meaning. To cover the content of each subscale and to allow for items to be deleted during the psychometric testing and refinement of the instrument, at least six items were included for each subscale. Phase one resulted in an initial 46-item instrument with established content validity, grouped into 6 subscales (Figure 1).

Instrument

The items were formulated to be measured on a five-point Likert rating scale. As the aim of the instrument was to assess both self-efficacy and performance in SMS, each item was assessed by two questions (additional File S1). Self-efficacy was measured by requesting participants to consider 'I think I can do this', with ratings from 'Not at all'(0), 'Not sufficient'(1), 'More or less'(2), 'Sufficient'(3), 'Good'(4). Actual performance was measured by requesting participants to consider 'I do this', with ratings from 'Never'(0), 'Rarely'(1), 'Occasionally'(2), 'Frequently'(3)-'Always'(4).

Phase 2 Psychometric evaluation

The psychometric evaluation (Figure 1) included the testing of the construct validity (confirmatory factor analysis, discriminating power) and reliability (internal consistency and stability) of the SEPSS instrument.

Sample

The 46-item instrument was tested in a sample of nurses and nursing students in Belgium and the Netherlands. The sample size aimed for was based on the recommended 10 respondents per item as a minimum to support the factor analysis for stable covariates (Polit & Beck 2008). A total sample approach was used. In Belgium, 122 final-year nursing students were invited (response 51/122; 42%) and 58 nurses combining their employment with attending an additional Master of Science in Nursing program (response 37/58; 64%) participated. In the Netherlands, we invited 2054 nurses from an academic hospital and 107 nurses from a psychiatric institution. Respectively 345 (17%) and 32 (30%) participated in the validation study. Furthermore, 800 nurses employed in different healthcare settings and participating in a Dutch national panel of nurse professionals were invited (response 58/800; 7%). This resulted in a total of 523 participants.

Procedure

Data were collected between June 2014 – January 2015. The nursing students completed a paper form of the self-reporting instrument. The nurses completed the questionnaire in an online format. Next to the items of the SEPSS, participants were asked for demographic variables and their perception of the importance of SMS, on a scale ranging from 1 ('not important at all')-10 ('very important'). To increase the response rate, for the online procedure, two reminders were sent and small rewards (e.g. movie tickets) were raffled among the participants. As the instrument can be used to measure current practice in SMS, its stability was evaluated using the test–retest procedure. For this purpose, a group of nursing students ($N = 26$) completed the instrument twice, with a 2-hour interval. This short interval was chosen to minimize the possible effect of confounding

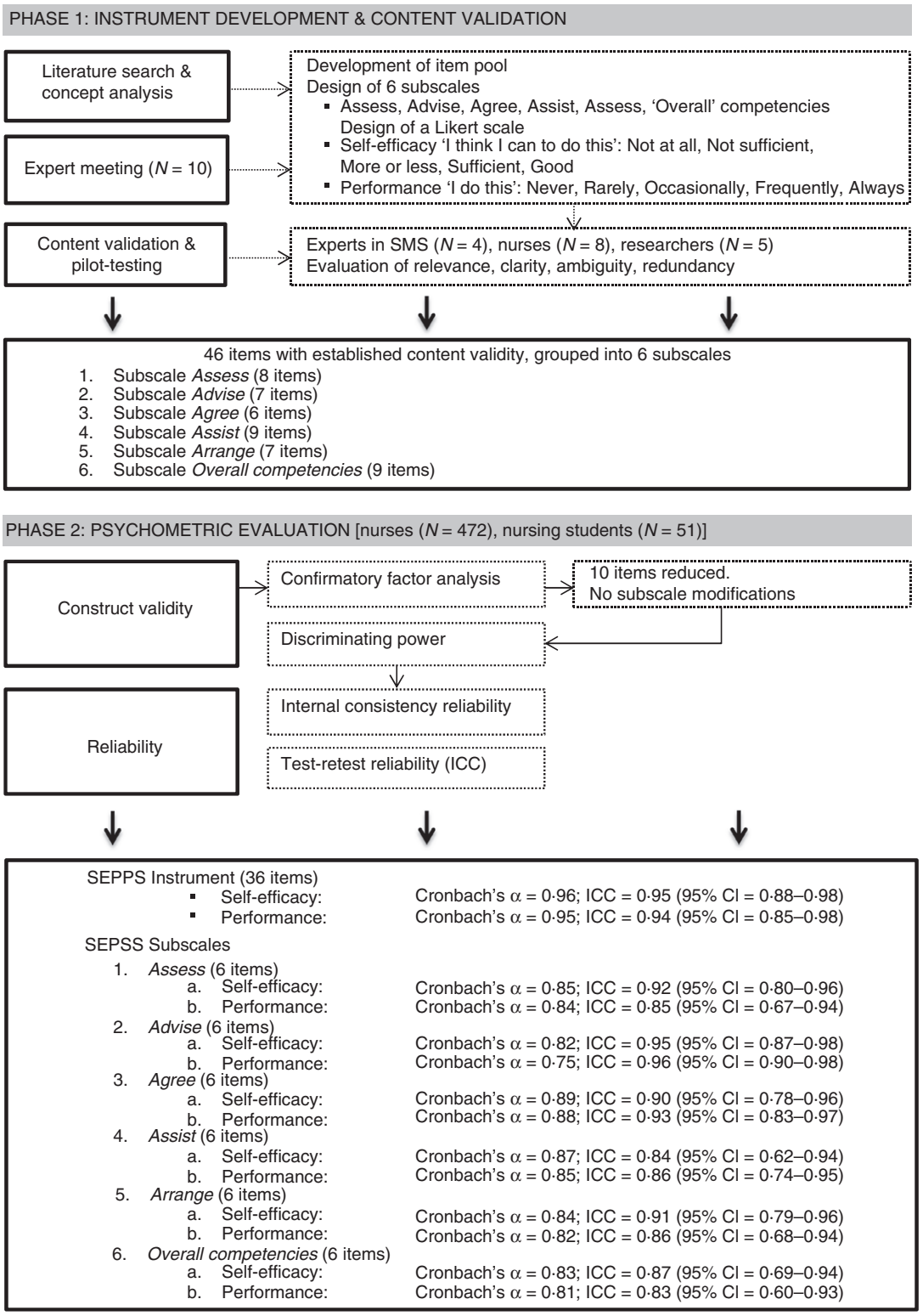

Figure 1 Developmental and validation process of the SEPSS – Instrument.

factors, such as learning by lectures or experiences on clinical placement and by spontaneous growth (Polit & Beck 2008). The participants were not informed in advance about the test–retest procedure, making the procedure less sensitive to memory bias. The conditions were the same for both parts of the procedure.

Statistical analyses

Statistical analyses were performed using SPSS21 (SPSS Inc., Chicago, IL, USA) and LISREL (version 8·8). A significance level of 0·05 was applied. Questionnaires with response patterns indicating a haphazard completion, that is, with a repetitive response pattern of at least 42 out of the 46 items, were excluded ($N = 4$). Mean scores were calculated at subscale level (range 0-4). The total score was calculated by summing the mean scores of the subscales for self-efficacy (range 0-24) and for performance (range 0-24) in SMS. Subscale scores were considered as missing when more than 10% of the items of that subscale were left open. These questionnaires were excluded from further calculations. The variables assessing self-efficacy and performance in SMS were normally distributed.

As the reliability testing of the total scale and subscales of the initial 46-item instrument yielded Cronbach's alphas between 0·79 and 0·97, further validation was justified. Construct validity of the instrument was assessed by a confirmatory factor analysis and discriminating power (known-group technique). To verify the factor structure of the questionnaire and to test whether the relationship between observed variables and their underlying latent constructs exists, confirmatory factor analysis was executed using the LISREL program. No correlation errors either within or across sets of items were allowed in the model. Based on the Five A's model, each subset of items was allowed to load only on its corresponding latent construct. The 'overall' competence items only were allowed to load on a separate second order overarching latent construct. To improve the model fit and reduce the number of items in the instrument, items were removed from the original pool following three criteria: (1) items were excluded one by one following modification indices provided by LISREL and the strength of the loadings; (2) eliminating items was stopped when reliability of each subscale dropped below 0·80; and (3) there should be as few items as possible with a minimum of six, without loss of content and psychometric quality. Four indices of model fit were used. The cut-off criteria for these four indices were those proposed by Hu and Bentler (1999). First, the overall test of goodness-of-fit assesses the discrepancy between the model implied and the sample covariance matrix by means of a normal-theory weighted least squares test. A plausible model has low, preferably non-significant χ^2 values. However, Chi-square is overly sensitive when the sample size is large (anything over 200), leading to difficulty in obtaining desired non-significant levels (Hayduk 1988). Second, the Root Means Square Error of Approximation (RMSEA) reflects the estimation error divided by the degrees of freedom as a penalty function. Values on RMSEA below 0·06 indicate small differences between the estimated and observed model. Third, we used the Standardized Root Means square Residual (SRMR), which is a scale invariant index for global fit that ranges between 0 and 1. Values on SRMR lower than 0·08 indicate a good fit. As a fourth index of model fit, the Incremental Fit Index (IFI) was calculated. This index compares the independence model (i.e. observed variables are unrelated) to the estimated model. Preferably, values on IFI should be larger than 0·95. Exclusion of items was not solely based on modification indices. As the instrument heavily relies on literature and theoretical conceptualization, these considerations were taken into account when interpreting the statistical measures and were essential for decisions on exclusion of items.

Sample adequacy was tested by performing the Kaiser–Meyer–Olkin (KMO) measure over 0·50 and the Bartlett's test of sphericity. Further analyses were determined on the modified instrument (36 items). To study the discriminating power of the instrument, four subgroups with a theoretically expected difference in self-efficacy and performance in SMS were predefined: (1) nurses providing consultations in outpatients clinics vs. nurses working in inpatients units; (2) nurses vs. nursing students; (3) nurses with a master degree vs. those without a master degree; and (4) nurses perceiving SMS as highly important (≥9) vs. nurses perceiving SMS of little or no importance (≤6). Independent sample t-tests were used to calculate differences between the mean scores of these predefined groups guided by a Levene's test for equality of variances.

The reliability of the instrument was assessed by internal consistency analysis and by test-rest reliability (intraclass correlation). Inter-item correlations were calculated at subscale and at scale level, to determine the internal consistency of the instrument. A Cronbach's alpha higher than 0·80 was considered as satisfactory (Polit & Beck 2008). The intraclass correlation (ICC) of the test–retest was calculated for each subscale and for the total score on self-efficacy and on performance by using a two-way random effects model with absolute agreement. Reliability coefficients of ≥0·70 were considered as satisfactory (Polit & Beck 2008).

Floor and ceiling effects refer to the proportions of individuals scoring near the bottom or the top respectively. A high floor or ceiling effect hampers to distinguish individuals from each other and to measure changes after intervention (Terwee *et al.* 2007). There is no consensus on the mathematical definition of floor and ceiling effects (Terwee *et al.* 2007). We determined *a priori* that floor or ceiling

effects were present if >15% of the nurses achieved values in the 12·5% lower and upper bound, respectively, of (sub) scale values.

Translation

For international publication and presentation purposes the initial 46-item instrument was translated from Dutch into English by an independent native speaker. Another independent professional translator re-translated the items in Dutch. The re-translated version was compared with the original wordings, to confirm the accuracy of the English translation. Discrepancies between the translations were resolved by consensus.

Ethical considerations

In Belgium, the study protocol was approved by the Ethical Review Committee of Ghent University Hospital (B670201422154 and B670201422381). While in the Netherlands no Research Ethics Committee approval was required, permission was obtained from the executive boards of all participating institutions. All participants received detailed information about the aim and procedures and were informed of confidentiality. The nursing students gave their written informed consent before completing the instrument. For the other participants, completing the online survey was considered as consent.

Results

Sample characteristics

The sample included 472 nurses and 51 nursing students. The nurses worked in different settings, more than half of them (56%) on inpatient units in a general or academic hospital. About one sixth of the nurses (16·6%) worked on an outpatient clinic providing consultations with chronically ill on a daily basis. For further details see Table 1.

Table 1 Demographic characteristics of the sample.

Characteristics (N = 523)	N	(%)
Gender		
Female	409	(78·2)
Male	110	(21·0)
Missing	4	(0·8)
Age (years)		
<23	43	(8·2)
23–29	144	(27·5)
30–39	104	(19·9)
40–49	96	(18·4)
>49	132	(25·2)
Missing	4	(0·8)
Setting		
Student nurses	51	(9·7)
Academic hospital		
Inpatient units	269	(51·4)
Outpatient clinics	87	(16·6)
General hospital		
Inpatient units	24	(4·6)
Psychiatric institution	33	(6·4)
Primary & elderly care nursing	9	(1·7)
Other (not specified)	50	(9·6)
Work experience (years)		
0–5	124	(23·7)
6–10	97	(18·5)
11–15	58	(11·1)
>15	171	(32·7)
Missing	73	(14·0)
Educational degree		
Student nurses, vocational educational level	51	(9·7)
Vocational education level*	100	(19·1)
Bachelor degree	268	(51·3)
Master degree†	59	(11·3)
Missing	45	(8·6)

*Vocational educational level is a three years nurse training education at qualification level 5 of the European Higher Education Area.

†Both academic and professional Master degrees.

Construct validity

Factor analysis

The confirmatory factor analysis on the self-efficacy items yielded the following results: χ^2 was 12086; RMSEA 0·13; SRMR 0·11 and IFI 0·90 all indicating that the model was not yet sufficient. Factor loadings of this initial 46-item model ranged from 0·44-0·87 (Table 2). Following the factor loadings, modification indices and an internal consistency check of each subscale, the stepwise procedure, as described in the method section, resulted in the elimination of 10 items (bold in Table 2). The final model consisted of 36 items with six items for each subscale. This final model resulted in a better fit of the model, although the fit indices still showed room for improvement; χ^2 decreased to 7238; RMSEA decreased to 0·12; SRMR decreased to 0·10 and IFI increased to 0·93. A similar procedure was done for the performance items, resulting in a similar fit of the model for both the initial and the final model. Also, the exact same items were removed following the procedure for improving the model. Sample adequacy was confirmed by the KMO test (0·95) and Bartlett's test of sphericity

Table 2 Factor loadings of the initial 46 items model.

Item*	Self-efficacy†			Performance†			
	N Valid	Mean	SD	N Valid	Mean	SD	λ
Subscale Assess							
1. Asking the patient what he expects from living with a (chronic) condition in the near future	520	2·89	0·86	520	1·81	1·03	0·73
2. Asking the patient about his own experiences with his (chronic) condition	**520**	**3·15**	**0·77**	**519**	**2·31**	**0·99**	**0·63**
3. Asking the patient what he knows about his (chronic) condition	520	3·16	0·75	520	2·31	1·06	0·75
4. Asking the patient about how he can share his emotions about the (chronic) condition with important others	521	3·00	0·83	519	2·14	1·07	0·70
5. Asking the patient about the available motivation and discipline to integrate the chronic condition in his life	521	2·70	0·92	518	1·72	1·06	0·72
6. Asking the patient how much confidence he has in his own abilities	520	2·82	0·88	517	1·83	1·01	0·66
7. Asking the patient what he can and will do in his daily health care	520	3·20	0·78	517	2·52	1·08	0·72
8. Asking the patient which fundamental values (e.g. religious, cultural, independence) are of influence of his perception of the condition	**519**	**2·51**	**1·00**	**520**	**1·44**	**1·03**	**0·62**
Subscale Advise							
9. During each contact, asking the patient what information he needs	484	3·03	0·79	483	2·27	1·03	0·79
10. Asking the patient for permission before giving information or advice	483	2·76	0·92	480	1·68	1·14	0·69
11. Letting the patient restate the information that I gave	482	2·84	0·84	480	1·82	1·01	0·81
12. Giving the patient information and instruction about the (chronic) condition	481	3·16	0·80	479	2·50	1·03	0·67
13. Helping the patient to formulate questions to discuss with other healthcare professionals	483	2·70	0·93	480	1·61	1·01	0·66
14. Informing the patient of the choices he has (which he can discuss with other healthcare professionals)	**482**	**2·75**	**0·90**	**479**	**1·78**	**1·05**	**0·55**
15. Involving the family when providing information and instruction	479	3·20	0·76	479	2·40	1·11	0·66
Subscale Agree							
16. Helping the patient to identify earlier positive experiences with achieving goals	452	2·64	0·89	447	1·56	1·02	0·48
17. Allowing the patient to determine his own priorities when developing goals	451	2·68	0·86	448	1·56	1·06	0·74
18. Jointly with the patient, developing a plan of action to achieve the goals	452	2·52	0·98	446	1·34	1·09	0·55
19. Documenting the goals and agreements in the patient's record	452	2·82	1·00	448	2·00	1·31	0·79
20. Helping the patient to make decisions concerning his treatment jointly with me and/or the other healthcare professionals	451	2·57	0·94	448	1·53	1·04	0·56
21. Recognizing the patient's anxiety about making a treatment decision	452	2·92	0·84	446	1·94	1·03	0·68
Subscale Assist							
22. Inviting the patient to talk about deteriorating health and changes in his life	**423**	**2·77**	**0·91**	**424**	**1·88**	**1·08**	**0·52**
23. Discussing with the patient who he will inform about his chronic condition	423	2·58	0·97	420	1·34	1·12	0·67
24. Stimulating the patient's self-confidence so that he can integrate the chronic condition in his life	**426**	**2·83**	**0·85**	**422**	**1·95**	**1·08**	**0·61**
25. Encouraging the patient to perform as many daily living activities as possible	425	3·16	0·74	423	2·59	0·99	0·73
26. Helping the patient to choose the activities that he can realistically perform	423	2·98	0·74	421	2·23	1·01	0·62
27. Discussing with the patient who (i.e. family, friends, network) can provide daily support	421	3·00	0·78	420	2·16	1·08	0·81

Table 2 (*Continued*).

Item*	Self-efficacy†			Performance†			
	N Valid	Mean	SD	N Valid	Mean	SD	λ
28. Discussing with the patient how he can make use of self-management assistive devices (i.e. diary) in his daily activities	421	2·48	1·05	420	1·38	1·15	0·73
29. Assisting the patient to monitor his own health and physical reactions	420	2·68	0·89	419	1·71	1·12	0·63
30. Supporting the important others in dealing with the chronic condition	**422**	**2·92**	**0·86**	**421**	**2·11**	**1·14**	**0·44**
Subscale Arrange							
31. Asking the patient about a suitable moment and a suitable approach for follow-up care	409	2·71	0·95	406	1·65	1·17	0·78
32. Referring the patient to the appropriate healthcare professional, healthcare facility or source of information that conforms to the patient's values	**409**	**2·82**	**0·84**	**407**	**1·86**	**1·04**	**0·62**
33. Consulting and making mutual plans with other healthcare professionals	409	3·05	0·83	405	2·21	1·14	0·86
34. Using assistive devices and technology (i.e. e-health) to provide remote guidance to the patient	409	1·53	1·27	404	0·50	0·89	0·70
35. Facilitating the patient to easily stay in contact between appointments	409	2·86	1·02	404	2·08	1·39	0·87
36. Initiating contact between appointments with the patient, to discuss his health and to solve possible difficulties	407	2·44	1·21	405	1·16	1·23	0·72
37. Together with the patient, examining progress of the care plan actions	408	2·51	1·04	405	1·34	1·16	0·72
Subscale Overall Competencies							
38. Valuing and respecting the patient as a partner in his care	**402**	**3·30**	**0·75**	**399**	**2·97**	**1·00**	**0·54**
39. Acknowledging the patient's experiential knowledge as valuable information concerning my own care delivery	402	3·28	0·68	399	2·83	0·92	0·79
40. Considering the (cultural) background of the patient	401	3·17	0·70	400	2·87	0·95	0·66
41. Together with the patient, determining how much of the care coordination I take over for him	399	2·97	0·81	399	2·40	1·11	0·74
42. Using the patient's choice as the basis for care, even if it is not ideal from a medical perspective	399	2·74	0·86	399	1·96	1·08	0·64
43. Showing understanding when the patient does not succeed in achieving the established goals	400	3·05	0·80	398	2·36	1·09	0·74
44. Deviating from protocols when necessary	**401**	**3·01**	**0·85**	**398**	**1·76**	**1·04**	**0·61**
45. Reflecting on my own management (of care)	400	3·26	0·70	398	2·73	0·92	0·77
46. Applying principles of negotiation and conflict-management	**400**	**2·77**	**0·87**	**398**	**1·93**	**0·98**	**0·58**

*Items in bold were excluded in 36-item SEPSS instrument.

†Item scores range from 0–4.

(χ^2 = 7654·23, d.f. = 630, P < 0·001) indicating that correlations between items did not occur by chance.

Discriminating power

The results on discriminating power demonstrated significant differences between most of the predefined groups, as shown in Table 3. Nurses providing outpatient consultations had higher scores than nurses in inpatients units at all subscales and at the total scale level for self-efficacy (respectively 18·71 vs. 16·75, t = 3·70, d.f. = 78·90, P < 0·001) and for performance (respectively 13·99 vs. 11·47, t = 4·17, d.f. = 78·58, P < 0·001). Nurses had higher scores than nursing students at all subscales and at the total scale level for self-efficacy (total scores respectively 17·22 vs. 16·06, t = 2·21, d.f. = 394, P < 0·05) and for performance (respectively 12·02 vs. 9·39, t = 4·23, d.f. = 391, P < 0·001). Nurses who perceived SMS as highly important had higher scores for self-efficacy than nurses believing SMS of little or no importance for chronic care, (total scores respectively 17·75 vs. 16·24, t = 2·10, d.f. = 108, P < 0·05) and for performance (total scores respectively 12·60 vs. 11·33, t = 1·73, d.f. = 108, P < 0·05). Nurses with a master degree had higher levels of performance than those without such a degree (total scores respectively 13·00 vs. 11·54, t = 2·38, d.f. = 74·16, P < 0·05), but self-efficacy did not significantly differ between these groups (17·48 vs. 17·07, t = 0·94, d.f. = 366, P = 0·35).

Reliability

Internal consistency

Cronbach's alpha was 0·96 for the total self-efficacy scale. For the subscales of self-efficacy and performance, Cronbach's alpha values are displayed in Figure 1.

Test–retest stability

A group of 26 final-year nursing students completed the questionnaire twice. On the first occasion the mean total score for self-efficacy was 16·84 (SD 3·65) and for performance in SMS 10·45 (SD 4·28). At retest, the corresponding figures were 15·51 (SD 5·51) and 9·78 (SD 4·97). The overall intra-class correlation coefficient was 0·95 (95% CI = 0·88-0·98) for the self-efficacy items and 0·94 (95% CI = 0·85-0·98) for the performance items. The intra-class correlation coefficients for the subscales are displayed in Figure 1.

Floor and ceiling effects

Table 4 presents the proportions of nurses scoring in the 12·5% lower and upper bound, respectively, of (sub)scale values. Floor or ceiling effects were not found, apart from a ceiling effect for the Overall Competence scale concerning self-efficacy.

Discussion

As self-management has become the leading paradigm for chronic care in many countries, it is essential to develop SMS training programs for nurses and to measure the effectiveness of these programs. In this regard, the SEPSS instrument provides for accurate assessment of a nurse's performance and self-efficacy in applying SMS. Other than the PSMS instrument (Kosmala-Anderson *et al.* 2011), the SEPSS places an emphasis on competencies needed to stimulate patients to take the lead in self-managing their chronic condition.

The SEPSS instrument assesses the performance and the self-efficacy of essential competencies for SMS derived from literature and expert advice, complemented with competencies reflecting key attitudes, such as partnership and patient centred-care. It relies on a broad holistic perspective on SMS, based on what patients need to take the lead in self-managing their chronic condition (Schulman-Green *et al.* 2012). Although the instrument uses the framework of the Five A's model, familiarity with this model is not a prerequisite for using the SEPSS. The underlying competencies are feasible for all professionals supporting self-management.

Regarding construct validity of the SEPSS, the confirmatory factor analysis yielded satisfactory fit with the 36-item SEPSS instrument, wherein the 'overall' competencies can be considered as overarching for the other five subscales according to the Five A's model. By removing 10 items, we aimed to develop a brief instrument that still has enough sensitivity to measure what it is supposed to measure. For that reason, we did not allow α <0·80 and maintained at least six items in each subscale. Although the fit indices showed room for improvement, factor loadings were high and sample adequacy to perform the factor analysis was confirmed by the KMO test and Bartlett's test of sphericity. The results of the known-group technique analysis supported the discriminating properties of the instrument, with expected higher levels of self-efficacy and performance in SMS. Discriminating properties at self-efficacy level were not provided for masters educated nurses; yet they demonstrated a markedly higher performance than non-master-educated nurses. Master-educated nurses are supposed to possess the reflective and critical thinking abilities needed in more complex care settings (ter Maten-Speksnijder *et al.* 2012). A more reflective attitude on professional performance is desirable, but can make persons more stringent in judging their self-efficacy (Desmedt 2004, Koole *et al.*

Table 3 Discriminating power of the SEPSS instrument (known groups).

Group	*N*	Mean (max. 30) (*SD*) Group with theoretically expected higher score (A)	Group with theoretically expected lower score (B)	*t*	d.f.	*P* values
Self-efficacy items						
Nurses providing consultations (A)	60	18·71 (*3·81*)	16·75 (*2·92*)	3·70	78·90	<0·001
vs. Nurses on hospital units (B)	219					
Nurses (A)	352	17·22 (*3·22*)	16·06 (*3·83*)	2·21	394	0·03
vs. Nursing students (B)	44					
Nurses with a master degree (A)	59	17·48 (*3·68*)	17·07 (*3·26*)	0·94	366	0·35
vs. nurses without master degree (B)	309					
Nurses perceiving SMS highly important* (A)	87	17·75 (*3·05*)	16·24 (*3·09*)	2·10	108	0·04
vs. nurses perceiving SMS of little to no importance† (B)	23					
Performance items						
Nurses providing consultations (A)	60	13·99 (*4·36*)	11·47 (*3·31*)	4·17	78·58	<0·001
vs. Nurses on hospital units (B)	219					
Nurses (A)	352	12·02 (*3·74*)	9·39 (*3·97*)	4·23	391	<0·001
vs. Nursing students (B)	41					
Nurses with a master degree (A)	59	13·00 (*4·43*)	11·54 (*3·70*)	2·38	74·16	0·02
vs. nurses without master degree (B)	306					
Nurses perceiving SMS highly important* (A)	87	12·60 (*3·26*)	11·33 (*2·67*)	1·73	108	0·02
vs. nurses perceiving SMS of little to no importance† (B)	23					

*Score ≥ 9.
†Score ≤ 6.
t, value independent sample *t*-test; d.f., degrees of freedom.

Table 4 Subscale and scale scores, including floor and ceiling effects (%).

	Self-efficacy				Performance			
	Mean	SD	% Min	% Max	Mean	SD	% Min	% Max
Subscale Assess*	2·96	0·63	0·40	11·90	2·05	0·78	1·60	2·50
Subscale Advise	2·94	0·61	0·20	12·70	2·05	0·71	1·00	1·50
Subscale Agree	2·69	0·74	1·10	6·20	1·66	0·86	7·20	1·30
Subscale Assist	2·81	0·67	0·00	11·20	1·90	0·82	2·60	2·10
Subscale Arrange	2·51	0·79	0·20	7·60	1·49	0·85	10·90	1·00
Subscale Overall Competencies	3·08	0·56	0·00	16·00	2·53	0·73	0·00	4·50
Total scale†	17·09	3·31	0·00	11·10	11·75	3·84	0·00	1·00

*Subscale scores range from 0–4.
†Scale scores range from 0–24.

2012). This might explain why masters educated nurses performed better, while being more prudent in the confidence of their own capacities. The small proportion of master-educated nurses, whereby equal variance between groups could not be assumed at performance level, may also explain these unexpected results. Nevertheless, some between-group differences could be the result of insufficient variation in professional status (nurses vs. students) between the country samples and thereby reflect differences in conceptualization and implementation about SMS between both countries, rather than predefined group differences.

The evidence to support the internal consistency of the instrument and its sub-scales was strong. The high Cronbach's alpha values, ranging from 0·75-0·96, indicate a good to very good internal consistency or homogeneity for the instrument and for the subscales. The results of the test–retest procedure indicate that the stability of the instrument was good, as the intra-class correlations reached the recommended values ≥0·70. Hardly any floor

or ceiling effects were found, indicating the possibility to distinguish between individuals and to measure changes after intervention. Attention is needed on the estimation of self-efficacy for the Overall Competencies, reflecting the self-efficacy towards having a partnership attitude, as an effect might be missed due to a possible ceiling effect.

The SEPSS is an instrument that captures nurses' performance and self-efficacy in performing SMS. Given the importance of self-efficacy as a precursor for behaviour (Bandura 1991), we strongly recommend to assess the performance and self-efficacy items in an integrated way, so as to make it feasible to work simultaneously on both areas where needed. The division in the six subscales enables to measure outcomes on subscale level and to focus on a particular aspect of the SMS-process, while the total score presents a more overall view of how SMS is provided. Scores range from 0-4 for the subscales and from 0-24 at total scale level. Higher scores on the SEPSS instrument reflect a higher level of self-efficacy or performance in SMS.

As the format of the SEPSS instrument requires nurses' to rate both self-efficacy and performance on the same set of items, a high correlation between both was not unimaginable in view of the possibility of maintaining some coherence and consistency in responses. However, the response patterns for self-efficacy and performance differed markedly, as evidenced by the moderate correlation ($r = 0{\cdot}63$, $P < 0{\cdot}001$) found.

The instrument has several potential applications for healthcare settings shifting towards SMS. First, the assessment of current SMS practice from a self-reported perspective, which may bring to light competencies that require training at an individual or department level. Second, this assessment can help trainers in tailoring the content and teaching strategies of training courses. Third, but this is a more reflective application, making nurses aware of possible discrepancies between their confidence and their performance and the causes of these discrepancies. Fourth, training effectiveness and personal growth through training can be evaluated, and the effectiveness of other interventions aimed at improving SMS competencies. However, the instrument's sensitivity to change has not yet been established. Fifth, the total scale score could be useful to monitor fidelity of SMS implementation.

Considering that SMS is the responsibility of a multidisciplinary team whose members are expected to possess the same competencies (Wagner *et al.* 2001), it is recommended to investigate the psychometric characteristics in groups of other healthcare professionals than the nurses and nursing students in this study. To ensure international validity we encourage initiatives to translate the SEPSS instrument into other languages and to validate it for use in the respective countries.

Limitations

The study had some limitations. First, the low response rate in some subsamples and the lack of knowledge on the reasons for drop-out during the online completion of the questionnaire, might limit the generalizability of the findings. Nevertheless, we were able to recruit a heterogeneous sample from different settings, representing nurses with and without experience in SMS and from two different countries, each having a different history about self-management. This heterogeneity may have enhanced the representativeness of the sample. Second, the test–retest procedure was performed in a small group and the intensive procedure may have adversely affected attention during completion of the retest. Besides, the short time interval could have inflated the ICC values by the recall of the statements, although this seems not so obvious for a comprehensive tool. Therefore, the results of the stability tests should be considered an initial trend. Further stability testing in a larger sample is recommended. Third, by measuring at one point in time, we were not yet able to establish the instruments' sensitivity to change in competence development, which is one of the proposed applications. In the future, we intend to use the SEPSS to measure the effect of SMS training.

Conclusion

In view of its good psychometric properties, the new SEPSS instrument is a promising instrument to measure nurses' self-efficacy and performance with regard to SMS. The self-reported results could serve as an outcome measure of SMS practices in clinical and research settings, to identify educational needs and to evaluate personal growth and to assess the effectiveness of training or other interventions to improve SMS.

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Conflict of interest

The authors declare that they have no competing interests.

Author contributions

Study design: VD, SvH, MS, JD, AvS, AVH. Data collection & -analysis: VD, SvH, MS. Manuscript preparation: VD, SvH, MS, JD, AvS, AVH.

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site.

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