

Testing two self-care-related instruments among older home-dwelling people in Norway

Solveig T. Tomstad MSc, RN

PhD Student, Department of Social Work and Health Science, Faculty of Social Sciences and Technology Management, NTNU, Trondheim, Norway and Department of Health and Nursing Sciences and Centre for Caring Research – Southern Norway, Faculty of Health and Sport Sciences, University of Agder, Grimstad, Norway

Ulrika Söderhamn PhD, RN

Senior Lecturer, Department of Health and Nursing Sciences and Centre for Caring Research – Southern Norway, Faculty of Health and Sport Sciences, University of Agder, Grimstad, Norway

Geir A. Espnes PhD, RN

Professor, Department of Social Work and Health Science and Research Centre for Health Promotion and Resources HiST-NTNU, Faculty of Social Sciences and Technology Management, NTNU, Trondheim, Norway

Olle Söderhamn PhD, RNT

Professor, Department of Health and Nursing Sciences and Centre for Caring Research – Southern Norway, Faculty of Health and Sport Sciences, University of Agder, Grimstad, Norway

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Correspondence:

Solveig T. Tomstad

Department of Health and Nursing Sciences
and Centre for Caring Research – Southern
Norway

Faculty of Health and Sport Sciences

University of Agder

PO Box 509

NO-4898 Grimstad

Norway

Telephone: +4737233762

E-mail: solveig.t.tomstad@uia.no

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Background. Older persons' ability and agency for self-care is an important issue. Therefore, the development of reliable and valid instruments to measure self-care with regard to both clinical nursing practice and personal health is important for nursing research and practice.

Aim and objective. To test reliability and validity of the Norwegian versions of the two self-care-related instruments, the Self-care Ability Scale for the Elderly (SASE) and the Nutritional Form For the Elderly (NUFFE) among older home-dwelling individuals.

Methods. A postal questionnaire that contained these instruments, background variables, health-related questions and two other self-care-related instruments was completed by a randomised sample of 158 older persons in southern Norway. Reliability was assessed as internal consistency and validity as concurrent and construct validity.

Results. SASE reached a Cronbach's alpha coefficient of 0.85 and significant Spearman's rank correlations for 16 of 17 items. For NUFFE, a Cronbach's alpha coefficient of 0.64 was obtained and significant correlations for 13 of 15 items. Validity was supported for both instruments. An appropriate cut-off was found for SASE. For NUFFE, a low cut-off point was obtained.

Conclusions. SASE was shown to have sufficient psychometric properties and can be used in research and clinical practice among older persons.

Implications for practice. The psychometric properties of NUFFE can be assessed as sufficient, but further studies are needed regarding the cut-off point.

Key words: nursing, reliability, sensitivity, specificity, undernutrition, validity

Introduction

Nursing older people is an important issue in today's society. In the Nordic countries, the main responsibility for older peoples' care rests with the welfare state, and the family is often viewed as a source of support. However, important demographic changes have taken place regarding life expectancy and the number of older individuals is increasing. The effects of increased level of prosperity and changes in family structures may have resulted in most people living in their own residences, and collective housekeeping including several generations is less usual. The number of people who live alone has increased and many older persons are living in single households (Daatland & Herlofson, 2006). It has also been shown that older persons who live alone have a higher risk of institutionalisation than older persons living with their spouses (Nihtilä & Martikainen, 2008).

An increasing number of diseases and functional impairment are associated with older age. Most older persons want to live in their own homes for as long as possible, whether they have more or less chronic health problems or not (Lorensen, 1998; Daatland & Herlofson, 2005). The challenges may not be the number of ailments and diseases that the older persons experience, but rather the impact and problems that these cause in the persons' daily life (Paunonen & Häggman-Laitila, 1990).

Consequently, there may be important demands on older individuals in exercising their potential for self-care for maintaining health and well-being in everyday life. Self-care can be defined as the practice of activities that individuals initiate on their own behalf in maintaining health and well-being (Orem, 2001). It refers to, among other things, activities of daily living and forms an important part of a person's daily life, including areas such as eating, grooming, hygiene, dressing, toileting etc. (Cohen-Mansfield & Jensen, 2007a). However, self-care also refers to social and psychological issues (Backman & Hentinen, 1999).

In an integrative review of the concept of self-care, it was claimed that self-care can help older persons to stay in their own homes and become active participants and managers of their own health conditions (Høy *et al.*, 2007). It has also been shown that self-care supports one's own personal health

in old age (Söderhamn *et al.*, 2008). Self-care practices may also be considered to mirror the older person's individual lifestyle and adjustments according to his or her history, actual circumstances and views of the future (Backman & Hentinen, 1999).

When older persons need assistance to manage daily activities, it may be important to incorporate the persons' self-care routines and preferences into the environment, because doing that may adhere to a sense of continuity in an older person's life. It may ease a change to a possible new living environment and help the old person to recreate a life as similar as possible to their previous life (Cohen-Mansfield & Jensen, 2007a). It can also be claimed that as far as possible, the functional competence and ability for self-care are significant issues for independent living, whether the persons live in their own homes or in institutional care (Söderhamn *et al.*, 2000). To strengthen self-care ability among older people, both strengths and limitations of the persons have to be made conscious (Söderhamn, 1998), and this knowledge is of significance for nurses to plan sufficient care for vulnerable groups of older persons both at individual and societal levels (Söderhamn *et al.*, 2000). Therefore, it is important to focus on older persons' ability and agency for self-care, and to develop reliable and valid instruments measuring self-care with regard to both clinical nursing practice and personal health.

The Exercise of Self-care Agency scale (ESCA) was one of the first published operational measures of self-care agency (Kearney & Fleischer, 1979). The Appraisal of Self-care Agency (ASA) scale, which is developed in accordance with Orem's theory of self-care, is another instrument to measure self-care agency (Evers, 1989). The ASA-scale is translated into a number of languages, for example Norwegian (Lorensen *et al.*, 1993), Swedish (Söderhamn *et al.*, 1996a) and Finnish (Sonninen, 1997). Self-maintenance Habits and Preferences in Elderly (SHAPE) is another recently developed instrument for providing information about self-care preferences (Cohen-Mansfield & Jensen, 2007b). These instruments measure different aspects of self-care.

It may be claimed that a self-care assessment scale ought to provide information that helps to understand why persons have problems in performing self-care actions. The Self-care

Ability Scale for the Elderly (SASE) that is closely connected to Pörn's (1993) theory of health and adaptedness is an instrument for measurement of perceived self-care ability among older persons. A person's self-care ability is the capacity to care for oneself and may be considered as the power or the potential for self-care actions, that is a necessary condition for these actions (Söderhamn *et al.*, 1996b,c).

The Self-care Ability Scale for the Elderly has been developed and tested in Sweden among older patients and home-dwelling older persons regarding reliability and validity, and has been found to be a reliable and valid instrument (Söderhamn *et al.*, 1996b,c). SASE has been translated from Swedish into Norwegian in accordance with procedures recommended by Streiner and Norman (2008), but it has not been tested regarding reliability and validity in a Norwegian sample.

The nursing literature describes a number of universal self-care needs, among others, sufficient intake of food and fluid (Orem, 2001). However, nutrition may also include psychological, social and cultural factors, and meals may also symbolise care, love, friendship, concern and security (Kaysner-Jones, 2002; Sydner & Fjellström, 2005; Persenius, 2008). Older persons, in all parts of the world are at risk of undernutrition (Visvanathan, 2003), and it is important that nutritional screening instruments deal with the specific risk factors relevant to older persons (Söderhamn & Söderhamn, 2001; Green & Watson, 2006). Nutritional screening of older persons may help nurses be aware of risk factors and early signs of undernutrition, and give persons at risk further attention and investigation (Söderhamn, 2006).

The Nutritional Form for the Elderly (NUFFE) is a nutritional screening instrument developed as a self-report measure, and it can also be easily used by nurses. It was developed in Sweden and has been tested regarding reliability and validity in Swedish samples of patients in geriatric rehabilitation (Söderhamn & Söderhamn, 2001, 2002). NUFFE has also been translated into Hungarian, and this version is tested regarding reliability and validity in an in-hospital group (Gombos *et al.*, 2008). Recently, a Norwegian version of NUFFE has been developed (Söderhamn *et al.*, 2009) in accordance with the principles outlined by Streiner and Norman (2008). In a sample of older hospital patients in Norway, NUFFE was found to be a reliable and valid instrument for testing risk of undernutrition (Söderhamn *et al.*, 2009).

However, the Norwegian versions of SASE and NUFFE have not been tested among older home-dwelling people. It is therefore necessary to perform a study, as a part of the evaluation of the applicability of these instruments in such groups of Norwegians.

Aim and objective

The overall aim was to identify suitable instruments to use in nursing research and practice. The specific objective was to test reliability and validity of the Norwegian versions of the two self-care-related instruments, the SASE and the NUFFE among older home-dwelling individuals.

Methods

Study design and sample

The study utilised a cross-sectional design among older home-dwelling persons. The inclusion criteria were to be 65+ years of age and to live in one's own home located in one of two counties in southern Norway. A sample of 450 randomised persons was selected from a national register by the Norwegian Tax Administration. A postal questionnaire was sent to the selected individuals (180 men and 270 women), and after 2 months, a reminder was sent to those persons who had not responded.

The questionnaire

The postal questionnaire included background variables (age, sex, former/present occupation, residence and civil status), height, weight and a number of health-related questions, for example questions on need for help, experiences of helplessness and on receiving home nursing. The questionnaire also included SASE (Söderhamn *et al.*, 1996b), the ASA-scale (Lorensen *et al.*, 1993), NUFFE (Söderhamn & Söderhamn, 2001, 2002) and the short form of the Mini Nutritional Assessment (MNA-SF) (Rubenstein *et al.*, 2001).

The SASE was designed to measure perceived self-care ability among older people. It adopts the format of an attitude scale in accordance with self-reported perceived self-care ability viewed as an attitude with cognitive, affective and behavioural components (Söderhamn, 1998). SASE consists of 17 items that mirror intentions and repertoire of capacity for care in given circumstances. The instrument is operationalised to highlight aspects that concern older people, and the items emphasise activities of daily living, well-being, mastery, volition, determination, loneliness and dressing (Söderhamn *et al.*, 1996b,c). SASE is a Likert scale in which each item ranges from 1 to 5 between 'totally disagree' and 'totally agree'. Four items are negatively expressed and have to be reversed in the summation of scores. The maximum possible score is 85, and a higher total score indicates higher self-care ability (Söderhamn *et al.*, 1996b). A neutral score of 3 was given for missing values in

this study in accordance with other similar research (Söderhamn *et al.*, 1996c, 2000).

The ASA scale measures engagement and activation of power in self-care actions. The scale was developed in the 1980s in an American and Dutch research collaboration. The instrument includes 24 items, and it is a summated ordinal, bipolar Likert-type scale in which there are five response categories for each item. The categories range from 1 'totally disagree' to 5 'totally agree'. The highest possible score is 120. Four items need to be reversed in the summation because they are negatively stated (Evers, 1989; Söderhamn *et al.*, 1996a). A neutral score of 3 was assigned for missing values in this study in accordance with other similar research (Evers, 1989; Söderhamn *et al.*, 1996a).

The NUFFE was developed for identifying older persons at nutritional risk, focusing on risk factors for undernutrition. It is an ordinal scale, consisting of 15 three-point items. The items deal with dietary history, dietary assessment and assessment of obtaining food products, company at meals, activity, and number of drugs (Söderhamn & Söderhamn, 2001, 2002). The most advantageous option gives a score of 0, and the most disadvantageous option gives a score of 2. The maximum possible score is 30, and a higher score indicates a higher degree of risk of undernutrition (Söderhamn & Söderhamn, 2001, 2002). For missing values in this study, median values were given for that particular item in the study group.

The MNA-SF (Rubenstein *et al.*, 2001), a shorter version of the MNA (Guigoz *et al.*, 1996), is a screening instrument for nutritional problems. The full form is a summated scale consisting of 18 items (Guigoz *et al.*, 1996). This instrument has been translated into more than 20 languages, including Norwegian, and the Norwegian version has been tested for reliability and validity in a small sample of older persons in a nursing home (Fossum *et al.*, 2009). The MNA-SF uses six items from the full form, which deal with appetite, weight loss during the previous 3 months, mobility, psychological stress or acute disease in the previous 3 months, neuropsychological problems and Body Mass Index (BMI). The items are ranged on nominal and ordinal levels. The total possible score is 14 (Rubenstein *et al.*, 2001). For nutritional screening, the MNA-SF is claimed to be as effective as the full MNA (Guigoz *et al.*, 2002). Both instruments are considered to be sensitive, specific and accurate in identifying nutritional risk (Guigoz, 2006).

Statistical analyses

Differences in age and sex between participants and dropouts were analysed with *t*-test for independent samples (two-tailed

probability) and chi-square (two-tailed probability), respectively.

Reliability of SASE and NUFFE was measured through Cronbach's alpha coefficient (Cronbach, 1951) and item-to-total correlations by Spearman's rank correlations (two-tailed probability). The correlation between each single item and the total scale was calculated when the particular item was omitted from the total scale (Streiner & Norman, 2008). These measure the homogeneity or the internal consistency of a scale, which means the degree the items of the scale reflect the same aspects of the attribute that is measured (Streiner & Norman, 2008).

A bivariate correlation test with Spearman's rank correlation (two-tailed probability) between SASE and ASA was performed to determine concurrent validity (Streiner & Norman, 2008). The same procedure was used between NUFFE and MNA-SF.

Construct validity was assessed by the 'known groups technique' (Polit & Beck, 2006; Streiner & Norman, 2008). It was hypothesised that persons who received help, persons who experienced helplessness and persons who received home nursing had lower scores on the SASE scale and higher scores on the NUFFE scale, than persons who did not receive help, who did not experience helplessness or who did not receive home nursing. Score differences between the groups were tested with Mann-Whitney *U*-test (two-tailed probability).

Sensitivity, specificity, positive and negative predictive values for SASE were estimated (Fletcher & Fletcher, 2005; Streiner & Norman, 2008) regarding a cut-off point between high and low scores, with experienced helplessness as a criterion. It was suggested that persons who experienced helplessness had lower self-care ability than persons who did not experience helplessness. Sensitivity, specificity and positive and negative predictive values were estimated for different cut-off points of SASE. A Receiver Operating Characteristic (ROC) curve (Fletcher & Fletcher, 2005) was also investigated for determining a suitable cut-off point.

Sensitivity, specificity, positive and negative predictive values were estimated (Fletcher & Fletcher, 2005; Streiner & Norman, 2008) regarding a cut-off point for identifying individuals at risk for undernutrition using NUFFE, with MNA-SF as a criterion. To identify persons at risk for undernutrition, the MNA-SF score of 11 (Rubenstein *et al.*, 2001) or lower was used. Sensitivity, specificity, and positive and negative predictive values were estimated for each cut-off point of NUFFE, and a ROC curve (Fletcher & Fletcher, 2005) was also constructed to determine a suitable cut-off point.

Ethical considerations

The research in this study was designed and implemented according to the Declaration of Helsinki (WMA, 2008) and common principles used in clinical research. It adhered to the principles of respect for autonomy, beneficence, non-maleficence and justice (Beauchamp & Childress, 2009). The study was approved by the Regional Committee for Medical Research Ethics in southern Norway (REK Sør-Øst D, registration number S-09075d, 2009/933 and by the Norwegian Social Science Data Services (project number 21031). A randomised sample of 450 names and addresses of persons, 65+ years of age, was approved and given by the Norwegian Tax Administration in southern Norway (Ref. 2009/78628). A letter was sent to the sample, consisting of the questionnaire and information about the study participation. If no response was received, a reminder letter and questionnaire was sent. The returned questionnaires were anonymous and coded.

Results

Sample

The final sample consisted of 158 individuals (35.1%). The mean age of the participants ($n = 158$) was 73.2 years ($SD = 6.9$ years). The mean age of the women ($n = 92$) was 73.8 years ($SD = 7.2$ years) and of the men ($n = 66$) 72.2 years ($SD = 6.3$). The mean age (76.7 years, $SD = 7.9$ years) of the non-participants ($n = 292$) was higher ($P < 0.001$) than the mean age of the participants. There was no difference in the proportion of men and women between participants and non-participants.

Reliability

Reliability of SASE assessed as internal consistency (homogeneity) reached a Cronbach's alpha coefficient of 0.85 and significant correlations for 16 of 17 items in the item-to-total correlations (Table 1).

Reliability of NUFFE reached a Cronbach's alpha coefficient of 0.64 and significant correlations for 13 of 15 items in the item-to-total correlations (Table 2).

Validity

Concurrent validity was shown with a significant Spearman's rank correlation of $r_s = 0.59$ ($P < 0.001$) between the total scores of SASE and ASA.

Concurrent validity was reflected with a significant correlation of $r_s = -0.26$ ($P = 0.001$) between the total scores of NUFFE and MNA-SF.

Table 1 Item-to-total correlations (Spearman's rank) of SASE ($n = 158$)

Item number	Item content	r_s	P -value
1	Transfer	0.60	<0.001
2	Hygiene	0.46	<0.001
3	Oral hygiene	0.38	<0.001
4	Housekeeping	0.49	<0.001
5	Shopping	0.54	<0.001
6	Safety	0.33	<0.001
7	Health enhancement	0.07	0.385
8	Physical well-being	0.60	<0.001
9	Safety	0.48	<0.001
10	Satisfaction	0.35	<0.001
11	Shopping	0.61	<0.001
12	Loneliness	0.53	<0.001
13	Housekeeping	0.52	<0.001
14	Strength	0.48	<0.001
15	Influence	0.51	<0.001
16	Loneliness	0.45	<0.001
17	Dressing	0.27	0.001

SASE, the Self-care Ability Scale for the Elderly.

Table 2 Item-to-total correlations (Spearman's rank) of NUFFE ($n = 158$)

Item number	Item content	r_s	P -value
1	Weight loss	0.24	0.003
2	Changes in dietary intake	0.38	<0.001
3	Appetite	0.27	0.001
4	Intake of cooked food	0.25	0.001
5	Portion size	0.32	<0.001
6	Intake of fruit and vegetables	0.28	<0.001
7	Possibility to obtain food products	0.26	0.001
8	Company at meals	0.30	<0.001
9	Activity	0.36	<0.001
10	Tooth/mouth and swallowing difficulties	0.17	0.038
11	Fluid intake	0.24	0.002
12	Gastrointestinal problems	0.18	0.024
13	Help with eating	-0.01	0.912
14	Number of drugs	0.27	0.001
15	Health state	0.13	0.095

NUFFE, the Nutritional Form for the Elderly.

Construct validity was supported for SASE and NUFFE as shown in Table 3, where significant differences in scores are displayed between known groups.

Sensitivity and specificity

The cut-off point of SASE was assessed to be ≤ 71 , indicating lower self-care ability. This was based on the values for

Table 3 SASE and NUFFE scores for known groups

Group	<i>n</i>	SASE	<i>P</i> -value	<i>n</i>	NUFFE	<i>P</i> -value
		Max scores: 85 Mean (SD)			Max scores: 30 Mean (SD)	
Help	23	64.65 (11.99)	<0.001	23	5.96 (2.95)	<0.001
No help	133	76.65 (7.19)		133	3.24 (2.37)	
Helplessness	17	63.76 (8.70)	<0.001	17	6.46 (2.76)	<0.001
No helplessness	137	76.27 (7.19)		137	3.24 (2.38)	
Home nursing	5	59.00 (15.64)	0.007	5	7.20 (2.17)	0.003
No home nursing	150	75.35 (8.37)		150	3.52 (2.55)	

SASE, the Self-care Ability Scale for the Elderly; NUFFE, the Nutritional Form for the Elderly.

Table 4 Sensitivity and specificity for SASE with experienced helplessness as a criterion (*n* = 154)

Cut-off points SASE (scores)	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
85	100	10	12	100
80	94	36	16	98
75	94	99	32	99
74	88	79	34	98
73	88	80	36	98
72	88	83	39	98
71	82	87	44	96
70	82	87	44	98
65	47	92	42	93
60	29	96	45	92
55	12	97	33	90
50	6	99	33	89
45	0	99	0	89
40	0	100	0	89

SASE, the Self-care Ability Scale for the Elderly.

sensitivity, specificity, positive and negative values and the ROC curve. Sensitivity and specificity values according to this cut-off point were 82% and 87%, respectively (Table 4). The area under the ROC curve for the cut-off point was 0.86 (95% CI, 0.76–0.95).

The cut-off point of NUFFE was assessed to be ≥ 4 , indicating risk of undernutrition based on the values for sensitivity, specificity, positive and negative predictive values and the ROC curve. Sensitivity and specificity values according to this cut-off point were 79% and 75%, respectively (Table 5). The area under the ROC curve for the cut-off point was 0.77 (95% CI, 0.64–0.90).

Discussion

The overall aim was to identify suitable instruments to use in nursing research and practice. The specific objective was to

Table 5 Sensitivity and specificity for NUFFE with MNA-SF as a criterion (*n* = 144)

Cut-off points NUFFE (scores)	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
0	100	7	10	100
1	93	25	12	97
2	86	44	14	97
3	86	62	20	98
4	79	75	26	97
5	64	85	31	96
6	50	91	33	94
7	36	92	33	93
8	36	95	42	93
9	29	98	67	93
10	14	100	100	92
11	7	100	100	91
12	7	100	100	91
13	7	100	100	91
14	–	100	–	90

NUFFE, the Nutritional Form for the Elderly; MNA-SF, the Mini Nutritional Assessment-Short Form.

test reliability and validity of the Norwegian versions of the two self-care-related instruments, the SASE and the NUFFE among older home-dwelling individuals.

The results showed that the Norwegian version of SASE can be considered to be a reliable instrument. A Cronbach's alpha coefficient of the total scale of 0.85 reflected a sufficient homogeneity in this translated version. The recommended interval is 0.70–0.90 (Terwee *et al.*, 2007). A high alpha coefficient reflects a high degree of homogeneity or internal consistency regarding the items. An excessively high value, however, may be an indication that some of the items are unnecessary (Streiner & Norman, 2008). The value reached in this study is almost similar with the internal consistency value of 0.88 in a Swedish study among older, home-dwelling persons (Söderhamn *et al.*, 1996c) and higher than the

internal consistency value of 0.68 that was found in a Swedish study among older patients (Söderhamn *et al.*, 1996b). In the item-to-total correlations, 16 of 17 items ranged between 0.27 and 0.61 in statistically significant correlations. The usual guide is that an item should correlate above 0.20 with the total score (Streiner & Norman, 2008). Compared with the original Swedish version of SASE (Söderhamn *et al.*, 1996c), the Norwegian version reached a higher number of significant item-to-total correlations. However, item 7 ('I can change things in my life in order to enhance my state of health') showed a non-significant item-to-total correlation in this study. A possible explanation is that this assertion may be interpreted as an abstraction that may attract different personal interpretations and probably place this item in a different position compared with the other items that may appear more concrete.

Concurrent validity was confirmed by a moderately strong Spearman's rank correlation between the Norwegian versions of SASE and ASA. This is in accordance with the results of the earlier Swedish study (Söderhamn *et al.*, 1996c). It also confirms that SASE and ASA measure related concepts, although they are not identical. SASE reflects the self-care ability as the potential for self-care (Söderhamn *et al.*, 1996b). Self-care agency measured by the ASA-scale reflects both capacity and activity (Evers, 1989; Orem, 2001).

Construct validity of SASE was supported by testing obtained scores for known groups. The mean score of the group that received help was significantly lower than the score of the group that did not receive such help. In a Swedish study among older home-dwelling persons (Söderhamn *et al.*, 2000), it was shown that receiving help had negative influence on the SASE scores. However, it can be claimed that received help from other persons may be both a result of and a reason for low self-care ability among older people (Chang, 2009). The individuals who experienced helplessness had also a lower mean SASE score than the group that did not experience helplessness. This is similar to the results of the Swedish study (Söderhamn *et al.*, 2000). The mean score for the group who received home nursing in the present study was lower than the group who did not receive such assistance. It may be claimed that low self-care ability may be a reason for receiving professional help. However, it should also be considered that in the professional performance of health care, there may be barriers regarding strengthening self-care ability (Chang, 2009).

The cut-off point of SASE in this study was assessed to be ≤ 71 , that is a slightly higher value than the cut-off value (< 69) obtained in a Swedish study (Söderhamn *et al.*, 1996c). The cut-off value was determined using an interpretation of the best estimated values for sensitivity, specificity, and positive and

negative values with reported experienced helplessness as a criterion. The cut-off value was also confirmed by the performed ROC curve. Reported experienced helplessness was chosen as a criterion because of its negative influence on the SASE scores shown both in this study and in the previous Swedish study (Söderhamn *et al.*, 2000).

The Norwegian version of NUFFE obtained a Cronbach's alpha coefficient of the total scale of 0.64 as a measure of homogeneity. This is lower than the values of 0.72 and 0.70 obtained in two earlier Swedish studies among older patients (Söderhamn & Söderhamn, 2001, 2002), and it is also lower than the value of 0.77 obtained in the Norwegian study among older patients (Söderhamn *et al.*, 2009). However, it is a slightly higher value than the reached value of 0.62 in the Hungarian study among older patients (Gombos *et al.*, 2008). Streiner and Norman (2008) argue that there is no demand that the Cronbach's alpha coefficient should be very high if the instrument consists of items that have a causal effect on the phenomenon studied. NUFFE may be assessed to consist of items based on known risk factors for undernutrition regarding older persons (Söderhamn & Söderhamn, 2001).

The item-to-total correlations of NUFFE were significant for 13 of 15 items. This was an increased number of significant correlations compared with studies in Sweden (Söderhamn & Söderhamn, 2001, 2002) and Hungary (Gombos *et al.*, 2008). It was also similar to the results from the Norwegian study among older patients (Söderhamn *et al.*, 2009). However, the items that had low correlations with the total scale in this study were items 13 (eating assistance) and 15 (health state). Few of the participants needed help with eating, and most of them reported that they did not have problems with eating based on reduced state of health. There is a possibility that persons who needed assistance to eat and experienced problems with eating lacked strength or ability to fill out the questionnaire for this study and could have been excluded. It is important to point out that items 10 and 12 are on the borderline regarding the item-to-total correlations. The *P*-values, however, were significant. NUFFE may be considered as reflecting a complex clinical phenomenon (Söderhamn & Söderhamn, 2001), and several items may be considered as causal indicators (Söderhamn, 2006). The demand for high homogeneity is not as important for causal variables as it is for effect variables that have to mirror the underlying construct (Streiner & Norman, 2008).

Concurrent validity assessed by the Spearman's rank correlation coefficient between NUFFE and MNA-SF reached the value $r_s = -0.26$ in the present study. In the Norwegian study by Söderhamn *et al.* (2009) among older patients, the correlation coefficient between NUFFE and the full form of MNA was estimated to be $r_s = -0.74$. The correlation

coefficient between NUFFE and MNA-SF is rather low in this study, but it is found to be significant. Although both the MNA-SF and the full-form MNA are assessed to be accurate in identifying nutritional risk (Guigoz, 2006), there is a possibility that the correlation coefficient had turned out to be higher using the full form of MNA. The full form of MNA is not suited for a self-report, mailed questionnaire, because it contains anthropometrical measurements as mid-arm and calf circumferences, which of course would be impossible for the participants to carry out themselves in a reliable way.

In the testing of construct validity, the groups that received help, experienced helplessness and received home nursing had higher mean scores of NUFFE than the groups who did not receive help, experience helplessness or receive home nursing. In the Swedish study among older patients (Söderhamn *et al.*, 2007), persons who experienced helplessness had higher scores of NUFFE, compared with the older patients who did not experience helplessness. In that study, there was also an association between receiving help and higher screening scores of NUFFE.

To identify individuals at risk of undernutrition the cut-off value was estimated to be ≥ 4 regarding sensitivity, specificity, and positive and negative predictive values with MNA-SF as a criterion. The performed ROC curve also confirmed the chosen cut-off value. This value, however, is lower than the cut-off value (≥ 6) that was found in the previous Norwegian study among older patients (Söderhamn *et al.*, 2009) and for the Swedish version of NUFFE (Söderhamn, 2006) in which the full form of MNA was used as a criterion. As this study showed a low cut-off value, it may be argued that MNA-SF did not appear to be a balanced criterion regarding NUFFE. NUFFE consists of 15 items and MNA-SF of six items. It may also be considered that the items of NUFFE focus on several known risk factors for undernutrition in older individuals (Söderhamn, 2006), and it therefore may be reasonable to achieve a high sensitivity regarding risk of undernutrition at a low cut-off point for the participants in this study. With a low cut-off value, there may be a possibility of producing false 'at risk' persons, but it is also important; however, with an early identification of older persons at nutritional risk.

In this study, there were a large number of older persons who did not complete and return the questionnaire. There are a number of possible reasons for that. A necessary qualification for participation was sufficient cognitive ability, and non-lucid persons were not included. Especially among the oldest old, a high rate of dementia has been shown to exist (Poon *et al.*, 2005). It may also be important to mention the significant impact of chronic diseases among older persons, and that health problems increase with age (Molarius & Janson, 2002). These factors may have also influenced the

response rate. The mean age of the non-participants was higher than the mean age of the participants, and it could be argued that this difference impacted on the results of the study. There is a possibility that an age-stratified approach to sampling would have enhanced the amount of data collected from the oldest old.

However, the proportion of women and men did not differ between participants and non-participants, and the random sample included participants with an age range between 65 and 90+ years. In a study such as the one reported here, it is important to have variation regarding age and sex. Furthermore, the sample needs to include people with higher and lower self-care abilities as well as people at risk and not at risk of undernutrition. The sample used in this study met these criteria and therefore can be considered to be sufficiently representative for the study design.

Conclusions

The Norwegian versions of the instruments SASE and NUFFE can be considered to show sufficient psychometric properties regarding reliability and validity. The results support the assertion that the obtained cut-off of SASE is suitable for identifying older people with lower and higher self-care abilities and can be used in research and clinical practice. The obtained cut-off of NUFFE for identifying older people at nutritional risk is lower than in previous studies in Norway and Sweden using MNA full form as a criterion. Our recommendation is, therefore, to conduct further studies to find out whether MNA-SF is a suitable criterion to use to establish a suitable cut-off of NUFFE.

Implications for practice

- SASE can identify older persons with lower or higher perceived self-care ability.
- Before using the obtained cut-off of NUFFE in nursing practice, more research is needed.
- SASE and NUFFE can be used as self-report instruments and are easy to use.

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manuscript. The authors declare that they have no conflict of interest.

Contributions

Study design: STT, OS, GAE; data collection and analysis: STT, OS, GAE, US and manuscript preparation: STT, OS, GAE, US.

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