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Validation of a quality of life questionnaire measuring the subjective fear of falling in nursing home residents

Validierung eines Fragebogens zur Messung der subjektiven Lebensqualität in Bezug auf Sturzangst bei Bewohnern von Alten- und Pflegeheimen

■ **Summary** A quality of life scale was developed to measure the subjective fear of falling in nursing home residents. We assessed the dimensions fear of falling, daily living and social life within a randomized controlled trial of hip

protector use. The Nottingham Health Profile (NHP) was used for validation. Statistical analysis covered factor analysis, internal consistency of subscales, construct and discriminant validity. Factor analysis revealed three reliable components (Cronbach's Alpha): fear of falling (0.92), social restriction due to limited mobility (0.74) and restriction by clothes due to the hip protector (0.72). The subscales fear of falling and social restriction were significantly intercorrelated with all subscales of the NHP. The new tool is a reliable and valid measure of fear of falling in nursing home residents. However, generalizability and applicability are limited by the small proportion of subjects able to complete the tests.

■ **Key words** Quality of life – fear psychology – aged 80 and older – nursing homes – accidental fall

■ **Zusammenfassung** Es wurde ein Instrument zur Erhebung der subjektiven gesundheitsbezogenen Lebensqualität in Bezug auf Sturzangst bei Alten- und Pflegeheimbewohnern entwickelt. Erfasst wurden die Dimensionen Sturzangst, tägliches Leben und

soziales Leben innerhalb einer randomisiert-kontrollierten Studie zur Prävention von Hüftfrakturen durch Hüftprotektion. Zur Validierung wurde das Nottingham Health Profile (NHP) herangezogen. Die statistische Analyse umfasste die faktorielle Validität und Reliabilität sowie die konvergente und diskriminante Validität. Die Faktorenanalyse ergab drei Komponenten mit hoher Reliabilität (Cronbach's Alpha): Sturzangst (0,92), soziale Einschränkungen durch limitierte Mobilität (0,74) und Einschränkungen durch die Bekleidung in Bezug auf Hüftprotektion (0,72). Insgesamt waren für die Subskalen Sturzangst und soziale Einschränkungen alle Korrelationen mit den Skalen des NHP statistisch signifikant. Für das neu entwickelte Instrument zur Messung der Sturzangst bei Altenheimbewohnern konnte eine angemessene Validität und Reliabilität nachgewiesen werden. Generalisierbarkeit und Übertragbarkeit sind jedoch limitiert auf Grund der geringen Anzahl der Personen, die in der Lage waren, den Fragebogen zu beantworten.

■ **Schlüsselwörter** Lebensqualität – Angst – Stürze – Altenheim – Hüftfraktur

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Introduction

Measurement of quality of life is an important consideration in medical and health care decisions for the geriatric age group [9, 19]. Quality of life has been shown to be an essential outcome for studies attempting to reduce falls and fall-related injuries [3, 22].

There is no agreed use of the term 'quality of life'. Many investigators seem to substitute the concept 'quality of life' for other concepts such as 'health status' and 'functional status' [7, 10, 14]. However, subjective patient's appraisal of wellbeing and assessment of objective functioning status convey different information [14]. Quality of life can be suitably measured only by assessing the subjective opinions, reactions and perceptions of people [2, 7].

Until recently, fear of falling has been measured as a dichotomous entity (ask people directly whether or not they are afraid of falling) or by scales like the Falls Efficacy Scale (FES) based on the concept of 'self-efficacy' (ask people about their self-confidence to perform a specific activity and operationalize 'fear of falling' as low perceived self-efficacy) [3, 11, 12, 15, 27, 28]. However, a dichotomous fear-of-falling classification does not measure actual behavior and self-efficacy measurements will not identify people without activity restriction despite fear of falling.

Fear of falling as a dimension of health-related quality of life interferes with mobility and participation in daily social life activities. At present, no disease-specific instrument addressing subjective fear of falling has been developed.

Therefore, we have developed and validated a health-related quality of life measure regarding fear of falling. The newly constructed instrument was assessed in the framework of a cluster randomized controlled trial targeting prevention of hip fractures by external hip protectors.

We hypothesized that wearing the hip protector is instrumental to reduce fear of falling. Reduced fear of falling might also improve mobility and participation in social life activities. We based our hypothesis on the conceptual approach that fear of falling by itself is not a problem unless it leads to sedentary behavior or restriction of important activities [11, 15].

For validation of the newly constructed tool we used the Nottingham Health Profile (NHP) which is one of the most commonly used generic measures of health-related quality of life [6]. The NHP is a reliable and valid instrument in elderly populations [1, 4, 17, 23].

Abbreviations

FES	Falls Efficacy Scale
Max.	Maximum value
Min.	Minimum value
NHP	Nottingham Health Profile
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences

Abkürzungen

FES	Falls Efficacy Scale
Max.	Höchstwert
Min.	Mindestwert
NHP	Nottingham Health Profile
SD	Standardabweichung
SPSS	Statistical Package for the Social Sciences

Methods

■ Participants and data collection

The objective of the main study was to evaluate the effects of an intervention program aimed to increase adherence to the use of external hip protectors and thereby to reduce hip fractures. A detailed description of the study protocol has been published [29]. In short, 49 nursing home clusters in Hamburg, Germany, including 942 residents (intervention group, 25 clusters with 459 residents; control group 24 clusters with 483 residents) participated in a randomized controlled trial with an 18-month follow-up. A cluster was defined as a nursing home by itself or an independently operating ward of a large nursing home. Each cluster was to select residents according to the following inclusion criteria: 70 years and older; not bedridden and living in the nursing home for more than three months. Intervention comprised structured education of nurses and residents and provision of hip protectors for free. The main results of the study are published elsewhere [13]. In short, increasing adherence to the use of hip protectors by the intervention resulted in a reduction of hip fractures by approximately 40%.

For the present study a sub-sample of the original population was recruited. This included the first 10 randomized nursing home clusters (intervention group, 5 clusters; control group, 5 clusters). All 218 residents of these 10 clusters were approached to participate in a baseline assessment of quality of life. Follow-up assessment at 3 months was pre-planned for the 83 residents of the first 4 nursing home clusters (intervention group, 2 clusters; control group 2 clusters).

Two investigators (A.W. and G.M.) delivered the interviews between March and June 1999. The two assessment tools were administered as self-reported questionnaires. The statements and the rating scales of both instruments were shown. In addition, statements and scales were read to the participants by the investigators. The length of the interviews was not limited. The investigators were allowed to explain the statements and the rating scales if necessary.

In addition, nursing staff were asked to rate fear of falling of the participants. These proxies estimated if the residents were afraid of falling, and if this fear resulted in activity restrictions (five-point scale with choices from 'very severe' to 'not at all').

■ Questionnaire

A databased literature search (Medline/SilverPlatter 1966–1999) and consulting experts failed to identify a validated instrument specifically addressing the study question of fear of falling. The review of existing instruments and available literature addressing hip fracture prevention by external hip protectors guided the composition and content of the new tool. Experts in quality of life research and a pedagogue (U.B.) reviewed the questionnaire and helped to improve wording and item selection. A first version was tested as a self-administered questionnaire in a population of 20 patients with a history of falls or hip fractures in two geriatric hospitals. As a result the measure was modified in two items. The final self-constructed instrument comprised 15 items on three a priori defined dimensions. The items were to be rated on a three-point Likert-scale (perfect, moderate, not at all):

- Fear (5 items)
- Daily living (5 items)
- Social life (5 items)

Items were negatively formulated statements related to mobility and falls regarding the last four weeks. The German questionnaire has been translated to English (Appendix I). Validation of the translation included re-translation to German. The original German version of the questionnaire is available from the authors on request.

The NHP was used for validation purposes. This generic measure includes 38 items in six dimensions (physical mobility, pain, sleep, social isolation, emotional reaction, energy level).

■ Statistical analysis

All statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS) [19]. Exploratory factor analysis was performed to derive independent subscales out of the 15 items dealing with fear of falling, daily living and social life. Internal reliability was computed for all subscales using Cronbach's alpha coefficient. Convergent validity was assessed by correlational analysis (Pearson's product-moment correlation, Spearman's rank correlation). For group comparisons, *t*-tests were performed. Kruskal-Wallis analysis of variance (ANOVA) was performed to explore the intervention effect.

■ Ethical approval

Informed consent was obtained from all participating nursing home clusters. The protocol was approved by the ethics committee of the Hamburg chamber of physicians and by the regional data protection officer.

Results

■ Study population

Table 1 shows the demographic and disease-specific details of the present study population and the entire hip protector study group. Baseline characteristics were comparable between both groups.

■ Response

Of the 218 residents 62% could not complete the baseline assessment of quality of life because of cognitive or physical impairment, 7% declined to participate. At follow-up 18% were able and willing to participate (Table 2). Among the subgroup of patients who were able and willing to reply degrees of disablement were lower than in the remaining study participants (Table 1). The degrees of disablement (Pflegestufe) describe the functional and cognitive status of people as assessed by expert raters of the medical service of the German statutory health insurance system.

For validation of the newly constructed measure the study population consisted of 68 residents. Factor analysis was based on a sample of 65 residents. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.83 (meritorious) indicating that the sample size was sufficient for factor analysis.

Table 1 Baseline characteristics

Characteristic	Main hip-protector study-group (n=942)	Quality of life total study-group (n=218)	Quality of life validation subgroup (n=68)
Demographic			
Women	813 (86)	189 (87)	57 (84)
Age, years	87 ± 6	87 ± 6	86 ± 6
Degrees of disablement			
None	32 (3)	6 (3)	5 (7)
Considerable	334 (36)	76 (35)	35 (52)
Severe	460 (49)	100 (46)	17 (25)
Most severe	102 (11)	26 (12)	1 (1)
Not available	14 (2)	10 (5)	10 (15)
Use of walking aid			
	691 (73)	174 (80)	54 (79)
Falls and fractures			
Falls during preceding 12 months	691 (73)	158 (73)	43 (63)
Not available	27 (3)	3 (1)	–
Falls during preceding 4 weeks	291 (31)	67 (30)	15 (22)
History of hip fracture	223 (24)	53 (24)	19 (28)
Not available	22 (3)	7 (3)	2 (3)

Values are numbers (percentages) or means ± SD
SD Standard deviation

Table 2 Participation rate in health-related quality of life assessment at baseline and at the 3-month follow-up

	Baseline Cluster 1–10 (n=218)	Baseline Cluster 1–4 (n=83)	Follow-up Cluster 1–4 (n=83)
Participated	68 (31)	36 (43)	15 (18)
Not able to participate*	134 (62)	44 (53)	47 (57)
Declined	16 (7)	3 (4)	20 (24)
Deceased	–	–	1 (1)

Values are numbers (percentages)
* Severe mental or physical impairment

Factor analysis

To explore the structure of the new tool, factor analysis (principal components) was performed including the 15 items dealing with mobility- and fear of falling-specific restrictions and burdens. A varimax-rotation revealed four factors with eigenvalues > 1 explaining 70% of the total variance. A three-factor solution was preferred according to the a priori model and the expected structure. The three-factor solution explains 63% of the total variance. One item revealed high loadings on two factors (fear of falling;

Table 3 Psychometric properties of the subscales of the disease-specific quality of life questionnaire

	n	Mean	± SD	Min.	Max.	Cronbach's alpha
1. Fear of falling (7 items)	67	14.8	± 5.1	7	21	0.92
2. Social restriction (6 items)	68	13.8	± 2.9	6	18	0.74
3. Restriction by clothes (2 items)	68	5.8	± 0.6	2	6	0.72

Min. minimum value; Max. maximum value

social restriction). The highest factor loading (fear of falling) was considered for the aggregation of subscales.

The following components were derived from factor analysis considering item-component loadings of > 0.40 as significant:

1. Fear of falling (7 items; e.g. *I'm afraid I might sustain a fracture. My fear of falling stops me going out more often.*)
2. Social restriction due to limited mobility (6 Items; e.g. *I sometimes feel alone or lonely because of my difficulties in getting around.*)
3. Restriction by clothes due to the hip protector (2 items; e.g. *I have the feeling that my clothes limit my freedom of movement.*)

Table 3 shows the psychometric properties of the subscales indicating that they achieved good reliability coefficients (Cronbach's alpha). In computing subscale scores, item responses were averaged (range: 1 = perfect to 3 = not at all), with higher scale scores indicating a good quality of life.

Convergent validity

The three subscales derived from factor analysis were correlated with each other and in addition with the generic quality of life instrument NHP and the age of the residents (Table 4). The subscale fear of falling was significantly intercorrelated with the subscales social restriction ($r=0.64$) and restriction by clothes ($r=0.33$). The subscale social restriction was not significantly correlated with restriction by clothes ($r=0.23$).

There were high correlations between the subscale fear of falling and the NHP scales energy ($r=0.52$), sleep ($r=0.47$) and physical mobility ($r=0.64$). Social restriction showed the highest correlation with the NHP subscale physical mobility ($r=0.63$). The subscales fear of falling and social restriction were significantly intercorrelated and associated with all sub-

Table 4 Intercorrelations of the subscales of the disease-specific quality of life questionnaire and the Nottingham Health Profile (NHP)

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Fear of falling									
2. Social restriction	0.64 [†]								
3. Restriction by clothes	0.33 [†]	0.23							
4. NHP-Energy	-0.52 [†]	-0.39 [†]	-0.27*						
5. NHP-Pain	-0.40 [†]	-0.44 [†]	-0.15	0.55 [†]					
6. NHP-Emotional Reaction	-0.41 [†]	-0.30*	-0.54 [†]	0.48 [†]	0.38 [†]				
7. NHP-Sleep	-0.47 [†]	-0.42 [†]	-0.20	0.29*	0.36 [†]	0.57*			
8. NHP-Social Isolation	-0.32*	-0.40 [†]	-0.29*	0.38 [†]	0.33 [†]	0.64 [†]	0.32 [†]		
9. NHP-Physical Mobility	-0.64 [†]	-0.63 [†]	-0.23	0.51 [†]	0.55 [†]	0.38 [†]	0.34 [†]	0.28*	
10. Age	0.08	0.17	-0.05	0.16	-0.03	0.05	-0.09	-0.04	0.01

n = 62–68; *p < 0.05, [†]p < 0.01

Table 5 Group comparisons between the subscales of the disease-specific quality of life questionnaire and baseline characteristics

	Fear of falling	Social restriction	Restriction by clothes
History of hip fracture (n = 64)			
Yes (19)	12.6 (4.7)	12.0 (3.0)	5.7 (1.0)
No (45)	15.4 (5.1)*	14.5 (2.6) [†]	5.9 (0.4)
Use of a walking aid (n = 65)			
Yes (53)	14.0 (4.9)	13.0 (2.7)	5.8 (0.7)
No (12)	16.5 (5.3)	16.6 (1.7) [†]	6.0 (0.0)

Values (±SD), by scorings of the subscales
t-test; *p < 0.05, [†]p < 0.01

scales of the NHP which indicates the validity of the newly constructed tool. Age was neither correlated with the NHP scales nor with the subscales of the newly constructed tool.

Using Spearman's rank correlation coefficient the proxy rating of fear of falling by nursing staff was significantly correlated (p < 0.01) with the subscales fear of falling (r = 0.36) and social restriction (r = 0.43). Whereas the estimated activity restrictions as a result of the fear of falling were not significantly correlated with the subscales fear of falling (r = 0.16) and social restriction (r = 0.19).

■ Discriminant validity

T-tests were performed examining possible associations between quality of life and history of hip fracture or use of a walking aid (Table 5). History of hip fracture was clearly associated with a loss in quality of life. Residents using a walking aid achieved lower scores in the subscale social restriction and with that, limitations in quality of life. Falls during the preceding twelve months or four weeks, respectively, did not affect quality of life.

Table 6 Effect of the intervention on health-related quality of life

	Control group		Intervention group	
	Baseline	Follow-up	Baseline	Follow-up
Fear of falling	16.13 [†] ± 5.22 (n = 15)	12.67 ± 5.36 (n = 9)	10.68 ± 3.77 (n = 19)	17.20* ± 4.32 (n = 5)
Social restriction	14.19 ± 3.80 (n = 16)	13.20 ± 3.01 (n = 10)	12.68 ± 2.65 (n = 19)	14.40 ± 2.41 (n = 5)
Restriction by clothes	6.00 ± 0 (n = 16)	6.00 ± 0 (n = 10)	5.63 ± 1.01 (n = 19)	5.60 ± 0.89 (n = 5)

Values are means ± SD by the scorings of the subscales
t-test; *p < 0.05, [†]p < 0.01

■ Effect of the intervention on quality of life

To measure the sensitiveness of the new instrument the three subscales were compared between intervention group and control group based on a small sample size (Table 6). Residents of the control group achieved better scores indicating a higher quality of life at baseline. After adjustment for different baseline results of the two study groups ANOVA revealed an intervention effect by a reduction in fear of falling in the intervention group (p = 0.042).

Discussion

The present study describes the validation of a disease-specific quality of life measure comprising 15 items on fear of falling, social restriction due to limited mobility and restriction by clothes due to the hip protector. Assessment was carried out in a subsample of nursing home residents participating in a randomized controlled trial on prevention of hip fractures by external hip protectors.

Factor analysis revealed three subscales, which adequately reflect the theoretical concept of fear of falling comprising psychological and social burdens

as well as limitations in mobility. Of these items, none had to be eliminated. The three newly developed subscales had high degrees of internal consistency. Statistical correlations with the NHP supported the validity of the newly generated subscales. Using this new questionnaire, a history of hip fracture was clearly associated, whereas a history of falls was not associated with reduction in health-related quality of life. The intervention effect of hip protector use could be shown by a reduction in fear of falling. However, generalizability and applicability are limited by the small proportion of nursing home residents able to complete the tests.

Unlike in our study, other investigators pre-selected the sample of nursing home residents (aged below 85 years, no diagnosis of dementia) or used samples drawn from the community [8, 11, 15, 17, 23].

The present study used self-reported questionnaires supported by reading it to the participants, because many older adults are not able to elaborate paper and pencil tests because of poor vision and lack of concentration. In contrast, Noro et al. [17] used the NHP as self-administered questionnaire in a population of nursing home residents, but in 90% of cases supportive assistance of nursing home staff was necessary completing the questionnaire.

On average, the two questionnaires took about 30 minutes to complete. However, some interviews took about one hour, because the participants wanted to prolong the interview by telling about their lives.

Although the NHP has already been used in nursing home residents and is widely recommended for frail elderly [16, 23], we observed that some items in the dimension social isolation triggered strong emotional reactions. Other items appeared to be inadequate for nursing homes (*I have trouble getting up and down stairs or steps*). Especially items regarding the dimension pain seemed to be difficult to understand (*I find it painful to change position*).

In the framework of the self-constructed questionnaire the item participation in social events was inadequate for some residents.

The most favorable number of response choices is controversial in studies including older adults. Some researchers suggest dichotomous rating scales, others have found that more than two response choices were favorable in samples of older adults [11, 21, 25, 30]. In our study several residents had difficulties using the three-point scale of the self-constructed questionnaire. Instead they simply answered with yes or no. Therefore, the investigators routinely had to give further instructions.

In the framework of a community hip protector study in Australia Salkeld et al. [22] assessed the quality of life of women aged 75 years and older using the time trade off technique. Overall, 80% of

the participants placed a high marginal value on their quality of life and independence, with preferring death only to a 'bad' hip fracture that would result in an admission into a nursing home. In accordance to our study these findings indicate that suffering a hip fracture is linked with a profound effect on quality of life. Cameron et al. [3] investigated the effect of hip protector use on falls self-efficacy in a population of community living old aged women. After 4 months follow-up falls self-efficacy was significantly improved in the intervention group. Their results confirm our findings indicating that wearing the hip protector reduces fear of falling.

Opposite to former studies investigating fear of falling by using the FES or the dichotomous fear of falling question [3, 5, 9, 15, 20, 26] we tried to assess subjective quality of life. Evaluating treatment options and care strategies (hip protector use; fall and fracture prevention) quality of life assessment must take into account subjective perceptions of burdens (fear of falling; activity restriction) in different life domains in order to achieve effective treatment strategies [2, 7]. A limitation of our study is that the questionnaire can not be administered to older people with strong cognitive and physical impairment. Proxy rating by relatives or nurses might be an alternative if subjective perceptions can not be assessed. Although it is well known that proxy rating often leads to an underestimating of quality of life [24, 25], we have tested the rating of fear of falling by the nursing staff. Our findings indicate that it seemed to be possible for nurses to estimate the degree of fear but not the consequences there of, resulting in restrictions of activities.

Given the low participation rate our study results may not be representative for all nursing home residents. In addition, the investigators presented the questionnaires and were therefore not blinded to the study population.

In conclusion, the newly constructed tool is a reliable and valid measure of fear of falling in nursing home residents. However, the applicability may be limited to nursing home residents without severe cognitive impairment. Assessment of subjective fear of falling may have important implications for the implementation of interventions aimed to reduce falls and fall-related hip fractures.

Competing interests

AW was formerly an employee and is at present a consultant of Rölke Pharma, the German trade company of Safehip®. AW and GM have received travel grants from Rölke Pharma.

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References

1. Borgquist L, Nilsson LT, Lindelöw G, Wiklund I, Thorngren KG (1992) Perceived health in hip-fracture patients: a prospective follow-up of 100 patients. *Age Ageing* 21:109–116
2. Bott U, Mühlhauser I, Overmann H, Berger M (1998) Validation of a diabetes-specific quality-of-life scale for patients with type 1 diabetes. *Diabetes Care* 21:757–769
3. Cameron ID, Stafford B, Cumming RG, Birks C, Kurrle SE, Lockwood K, Quine S, Finnegan T, Salkeld G (2000) Hip protectors improve falls self-efficacy. *Age Ageing* 29:57–62
4. Ebrahim S, Williams J (1992) Assessing the effects of a health promotion programme for elderly people. *J Public Health Med* 14:199–205
5. Franzoni S, Rozzini R, Boffelli S, Frisoni GB, Trabucchi M (1994) Fear of falling in nursing home patients. *Gerontology* 40:38–44
6. Garratt A, Schmidt L, Mackintosh A, Fitzpatrick R (2002) Quality of life measurement: bibliographic study of patient assessed health outcome measures. *BMJ* 324:1417
7. Gill TM, Feinstein AR (1994) A critical appraisal of the quality of quality-of-life measurements. *JAMA* 272:619–626
8. Grimby A, Wiklund I (1993) Health-related quality of life in old age. A study among 76-year-old Swedish urban citizens. *Scand J Soc Med* 22:7–14
9. Guyatt GH, Eagle DJ, Sackett B, Willan A, Griffith L, McIlroy W, Patterson CJ, Turpie I (1993) Measuring quality of life in the frail elderly. *J Clin Epidemiol* 46:1433–1444
10. Guyatt GH, Feeny DH, Patrick DL (1993) Measuring health-related quality of life. *Ann Intern Med* 118:622–629
11. Lachman ME, Howland J, Tennstedt S, Jette A, Assmann S, Peterson EW (1998) Fear of falling and activity restriction: the Survey of Activities and Fear of Falling in the Elderly (SAFE). *J Gerontol B Psychol Sci Soc Sci* 53: P43–P50
12. Maki BE (1997) Gait changes in older adults: predictors of falls or indicators of fear. *J Am Geriatr Soc* 45:313–320
13. Meyer G, Warnke A, Bender R, Mühlhauser I (2003) Effect on hip fractures of increased use of hip protectors in nursing homes: cluster randomised controlled trial. *BMJ* 326:76
14. Muldoon MF, Barger SD, Flory JD, Manuck SB (1998) What are quality of life measurements measuring? *BMJ* 316:542–545
15. Murphy SL, Williams CS, Gill TM (2002) Characteristics associated with fear of falling and activity restriction in community-living older persons. *J Am Geriatr Soc* 50:516–520
16. Noro A (1998) Long-term institutional care among finnish elderly population: trend and potential discharge. *Stakes, Helsinki*
17. Noro A, Aro S (1996) Health-related quality of life among the least dependent institutional elderly compared with the non-institutional elderly population. *Qual Life Res* 5:355–366
18. Norusis MJ (1994) *SPSS Advanced Statistics TM 6.1*. SPSS, Chicago
19. Pearlman RA, Uhlmann RF (1988) Quality of life in chronic diseases: perceptions of elderly patients. *J Gerontol* 43:M25–M30
20. Powell L, Myers AH (1995) The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol A Biol Sci Med Sci* 50:M28–M34
21. Rodgers WL, Herzog AR, Andrews FM (1988) Interviewing older adults: validity of self-reports of satisfaction. *Psychol Aging* 3:264–272
22. Salkeld G, Cameron ID, Cumming RG, Easter S, Seymour J, Kurrle SE, Quine S (2000) Quality of life related to fear of falling and hip fracture in older women: a time trade off study. *BMJ* 320:341–346
23. Sharples LD, Todd CJ, Caine N, Tait S (2000) Measurement properties of the Nottingham Health Profile and Short Form 36 health status measures in a population sample of elderly people living at home: Results from ELPHS. *Br J Health Psychol* 5:217–233
24. Spangers MA, Aaronson NK (1992) The role of health care providers and significant others in evaluating the quality of life of patients with chronic disease: a review. *J Clin Epidemiol* 45:743–760
25. Stewart A, Sherbourne C, Brod M (1996) Measuring health-related quality of life in older and demented populations. In: Spilker B (ed) *Quality of life and pharmacoeconomics in clinical trials*, 2nd ed. Lippincott-Raven, Philadelphia New York, pp 819–830
26. Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI (1994) Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol* 49:M140–M147
27. Tinetti ME, Powell L (1993) Fear of falling and low self-efficacy: a cause of dependence in elderly persons. *J Gerontol* 48 (Spec No):35–38
28. Walker JE, Howland J (1991) Falls and fear of falling among elderly persons living in the community: occupational therapy interventions. *Am J Occup Ther* 45:119–122
29. Warnke A (2002) *Prävention von Hüftgelenksfrakturen durch externen Hüftschutz: Entwicklung, Evaluation und Implementierung eines strukturierten Interventionsprogramms*. [Prevention of hip joint fractures through external hip protectors. Development, evaluation, and implementation of a structured education program] (PhD dissertation, University of Hamburg). Verlag Hans Jacobs, Lage
30. Yesavage JA, Brink TL (1983) Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 17: 37–49

■ **Appendix I** The quality of life questionnaire measuring the subjective fear of falling of nursing home residents.

Dear Resident,

We're interested in your views on your state of health, especially on how well you can get around. So we'd like to find out if the topic of "falling" plays a role in your daily life.

To find this out, we'd like to ask you to listen to few statements for us. When you think about the statements, could you please say for each of them whether it is *relevant*, or *not relevant* to you.

Thank you very much for your help!

Please say in how far the following statements apply to you within the past 4 weeks

The statement applies to me...

perfect moderate not at all

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| 1. I feel uneasy when I take more than a few steps. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. I feel uncertain when walking without the help of other people or a walking aid, like a Rollator. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. My fear of falling stops me going out more often. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I feel limited in my daily life by my fear of falling. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I worry that I might fall. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I'm afraid I might sustain a fracture. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I often think about the possibility of falling. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. I feel squeezed into my clothes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. I have the feeling that my clothes limit my freedom of movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. It annoys me that I can't move as freely as other people my age. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. If I could get around better, it would be easier to meet my family and friends. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. I sometimes have to refuse invitations because it would be too difficult for me to get there. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. It annoys me that I have to ask someone else to bring me to social events here in the same building. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. If I could get around better, I would widen my circle of friends. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. I sometimes feel alone or lonely because of my difficulties in getting around. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |