ORIGINAL RESEARCH

Effects of frailty and chronic diseases on quality of life in Dutch community-dwelling older adults: a cross-sectional study

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Objective: The aim of this cross-sectional study was to determine the associations between frailty and multimorbidity on the one hand and quality of life on the other in community-dwelling older people.

Methods: A questionnaire was sent to all people aged 70 years and older belonging to a general practice in the Netherlands; 241 persons completed the questionnaire (response rate 47.5%). For determining multimorbidity, nine chronic diseases were examined by self-report. Frailty was assessed by the Tilburg Frailty Indicator, and quality of life was assessed by the World Health Organization Quality of Life Instrument—Older Adults Module.

Results: Multimorbidity, physical, psychological, as well as social frailty components were negatively associated with quality of life. Multimorbidity and all 15 frailty components together explained 11.6% and 36.5% of the variance of the score on quality of life, respectively.

Conclusion: Health care professionals should focus their interventions on the physical, psychological, and social domains of human functioning. Interprofessional cooperation between health care professionals and welfare professionals seems necessary to be able to meet the needs of frail older people.

Keywords: older people, frailty, quality of life, multimorbidity

Introduction

It is estimated that by 2050 33.2% of the population in the Netherlands will be aged 60 years and older.[1] Frailty is considered one of the most complex and important issues associated with human aging, which has significant implications for the patient and the health care system.[2] The relationship between frailty and a higher risk of falling, loss of functional independence, reduced quality of life, institutionalization, and mortality is clearly demonstrated.[3–8]

There are two different approaches to the assessment of frailty: one defines frailty as a physical phenotype[2] and the other considers frailty more as a multidimensional concept, which not only refers to physical functioning, but also to psychological and social functioning. These two different approaches are also reflected in the instruments that have been developed for assessing frailty. The phenotype of frailty is a good example of the first approach.[2] Examples of instruments based on a multidimensional approach to frailty are: the Groningen Frailty Indicator,[9] the Frailty Index,[10] EASY-Care Two step Older people Screening,[11] and the Tilburg Frailty Indicator (TFI).[12] Recently, a systematic review concluded that the latter instrument has the most evidence of reliability and validity of 38 frailty assessment instruments.[13]

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In addition to frailty, the number of Dutch people with chronic diseases is also increasing. Almost half of the total population has at least one chronic disease; this concerns 8.2 million people in the Netherlands.[14] Among the most common chronic diseases in this population are arthritis, diabetes mellitus, heart disease, cancer, and stroke. Multimorbidity, having two or more chronic diseases at the same time, is present in more than two-thirds of Dutch people aged 65 years or older.[15] Multimorbidity is associated with hospital admissions, emergency department visits, and a reduction in quality of life.[16–22] It is also known that multimorbidity is more common in women than men.

Previous studies have shown that both frailty and multimorbidity are associated with lower quality of life in older people.[6,23–28] Quality of life is defined by the World Health Organization (WHO) as "an individual's perception of their own position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (p. 1405).[29] Most of these studies have used the World Health Organization Quality of Life Instrument (WHOQOL-BREF) or the 36-Item Short Form Survey (SF-36) to assess quality of life.[6,24,25,30–32] However, the WHOQOL-BREF and the SF-36 are not particularly developed for assessing quality of life in older people. Recently, the World Health Organization Quality of Life Instrument—Older Adults Module (WHOQOL-OLD), an instrument containing specific quality of life facets important for older people (eg, items related to death and dying),[33] has been validated among Dutch older people and its psychometric properties were satisfactory.[34]

Dutch policy is aimed at older people staying in their own home, living independently, even if they are frail and multimorbidity is present. The general practitioner has a central role in identifying complex problems in older people. In consultation with other health care professionals, interventions should be planned and carried out so older people have the possibility to continue to live at home and admission to a nursing home is prevented or delayed. However, a general practitioner does not always know which of their patients are frail; in particular, psychological and social problems (eg loneliness) relating to psychological and social frailty are not always known, and their major impact on quality of life has been shown in previous studies.[24,31]

The aim of this study was to determine the associations between frailty and multimorbidity on the one hand and quality of life assessed with the WHOQOL-OLD on the other in community-dwelling older people linked to a general practice. It should be noted that our study has similarities with a previous study;[35] in both studies, frailty and quality of life were measured with the TFI and the WHOQOL-OLD, respectively. Also, both studies included a sample of Dutch community-dwelling older people aged 70 years or older. However, there are some differences between the two studies. In our study the sample contained people connected to one general practice, versus people distributed throughout the Netherlands in the previous study. In addition, multimorbidity was assessed by adding up the presence of nine chronic diseases instead of one question, and the number of participants was lower (241 vs 466). Nevertheless, it offers a unique opportunity to compare and to discuss in detail the results of both studies in the last section.

Methods

Design

A cross-sectional design was used.

Study population and data collection

In October 2016 a questionnaire was sent to all people aged 70 years and older belonging to a general practice situated in an area of small villages close to Amsterdam, the capital of the Netherlands. In total, 507 people aged 70 years and older were contacted, of whom 241 completed the questionnaire (response rate 47.5%).

Measures

Frailty

Frailty was assessed by Part B of the TFI, a user-friendly self-report questionnaire.[12] Part B consists of 15 components of frailty, subdivided into three domains: physical (eight components, range 0–8 points), psychological (four components, range 0–4 points), and social (three items, range 0–3 points). Table 1 presents these 15 components of frailty. The maximum score for total frailty is 15 points. Higher scores correspond to a more serious frailty status; scores ≥5 indicate that the assessed individual is frail. The TFI has shown good psychometric properties in Dutch community-dwelling older people.[12,36] In the present study, the reliability expressed by Cronbach's alpha for frailty total and the physical, psychological, and social domains is 0.80, 0.74, 0.61, and 0.51, respectively.

Quality of life

Quality of life was assessed by the WHOQOL-OLD.[33] This questionnaire is derived from the WHOQOL-100 and is

Table 1 Participant characteristics (N=241), regarding sociodemographic characteristics, chronic diseases, and quality of life

Characteristic	n (%)
Sociodemographic characteristics	
Age, mean (SD), range	76.5 (5.1), 70–90
Sex (men)	125 (51.9)
Marital status	
Married or cohabiting	171 (71)
Divorced	5 (2.1)
Not married	11 (4.6)
Widowed	54 (22.4)
Education	
None or primary	54 (22.4)
Secondary	144 (59.8)
Higher	43 (17.8)
Chronic diseases	
Number of chronic diseases, mean (SD), range	1.1 (1.1), 0–5
Diabetes mellitus	48 (19.9)
COPD	26 (10.8)
Cardiac disease	58 (24.1)
Arthrosis	96 (39.8)
Cerebrovascular accidents	6 (2.5)
Cancer	25 (10.4)
Dementia	4 (1.7)
Depression	7 (2.9)
Parkinson's disease	6 (2.5)
Multimorbidity	73 (30.3)
Frailty	
Total frailty, mean (SD), range	3.4 (3.1), 0–13
Physical domain, mean (SD), range	1.9 (2.0), 0–7
Physically unhealthy	40 (16.6)
Unexplained weight loss	18 (7.5)
Difficulty in walking	86 (35.7)
Difficulty in maintaining balance	60 (24.9)
Poor hearing	67 (27.8)
Poor vision	42 (17.4)
Lack of strength in the hands	62 (25.7)
Physical tiredness	76 (31.5)
Psychological domain, mean (SD), range	0.7 (1.0), 0–4
Problems with memory	11 (4.6)
Feeling down	74 (30.7)
Feeling nervous or anxious	52 (21.6)
Unable to cope with problems	34 (28.6)
Social domain, mean (SD), range	0.8 (0.9), 0–3
Living alone	69 (28.6)
Lack of social relations	95 (39.4)
Lack of social support	27 (11.2)
Quality of life, mean (SD), range	
Total quality of life	92.2 (10.9), 59–119
Sensory abilities	16.4 (2.9), 7–20
Autonomy	14.8 (2.6), 5–20
Past, present, and future activities	15.4 (2.4), 8–20
Social participation	15.4 (2.8), 5–20
Death and dying	14.9 (2.9), 5–20
Intimacy	15.3 (2.6), 5–20

specifically developed to measure quality of life in older people. It consists of 24 items being equally distributed over six facets: sensory abilities; autonomy; past, present, and future abilities; social participation; death and dying; and intimacy. Reponses were rated on a 5-point Likert scale (1–5), with higher scores indicating better quality of life. Facet and total scores range from 4 to 20 and from 24 to 120 points, respectively. In this study, Cronbach's alpha values for quality of life total and the facets of sensory abilities, autonomy, past, present, and future abilities, social participation, death and dying, and intimacy were 0.89, 0.82, 0.70, 0.78, 0.86, 0.79, and 0.87, respectively.

Chronic diseases

Nine chronic diseases, frequently present in the older Dutch population, were examined by self-report: diabetes mellitus, COPD, cardiac disease, arthrosis, cerebrovascular accident, cancer, dementia, depression, and Parkinson's disease. The total number of chronic diseases was used for analysis concerning multimorbidity.

Sociodemographic characteristics

The sociodemographic characteristics considered were age, sex, marital status, and highest education attained. See Table 1 for a detailed description of the response categories.

Statistical analyses

First, we determined the characteristics of the participants using descriptive statistics. Second, the quality of life facet scores and total scores for nonfrail and frail participants were compared using Student's *t*-tests assuming unequal population variances. Effect size was assessed with Cohen's *d* (0.2, 0.5, and 0.8 corresponding to small, medium, and large effect size, respectively),[37] assuming equal population variances. Then, we determined the correlations between frailty total, the three domains of frailty (physical, psychological, and social), multimorbidity, and the six quality of life facets and quality of life total. Finally, we used sequential multiple linear regression analyses for assessing the effect of the individual frailty components of the TFI and multimorbidity on the seven quality of life variables of the WHOQOL-OLD. These analyses consisted of three blocks; the first block contained the sociodemographic characteristics of the participants, the second block contained multimorbidity, and the third block contained the 15 frailty components. The second and third blocks enabled testing the effect of multimorbidity and the individual frailty components on quality of life variables,

respectively, after controlling for all the other variables in the model.

For statistical analyses, we used IBM SPSS Statistics 22.0 (IBM Corporation, Armonk, NY, USA). $p<0.05$ was considered statistically significant.

Ethical considerations

The study was conducted according to the ethical guidelines laid down in the Declaration of Helsinki. Medical ethics approval was not necessary as particular treatments or interventions were not offered or withheld from respondents as a consequence of participating in the study, this being the main criterion in medical–ethical procedures in the Netherlands according to the Medical Research Involving Subjects Act (WMO).[38] In addition, the integrity of respondents was not encroached upon as a consequence of participating in the study and the actual burden of completing the questionnaire was very low. Nevertheless, written informed consent for the collection and use of information was obtained from all participants.

Results
Participant characteristics

The mean age of the participants was 76.5 years (SD 5.1; range 70–90). In total, 51.9% were men, 71% were married or cohabiting, and most of them had secondary education level (59.8%). Arthrosis was the most common chronic disease (39.8%). The mean TFI total score was 3.4 (SD 3.1) and the mean WHOQOL-OLD total score was 92.2 (SD 10.9). The prevalence of frailty in the sample was 32.8%. Of the individual frailty components, lack of social relations referring to feelings of loneliness had the highest prevalence (39.4%) and problems with memory had the lowest prevalence (4.6%). Multimorbidity was present for 30.3% of the participants. Detailed information is presented in Table 1.

Differences between nonfrail and frail participants on quality of life facets and total

Table 2 presents the results of the *t*-tests aimed at testing the differences in the scores of the nonfrail group and the frail group on quality of life facets and quality of life total of the WHOQOL-OLD. Frail participants scored lower on all quality of life variables (all $p<0.001$), with effect sizes varying from 0.50 (death and dying) to 1.56 (quality of life total).

Correlations between frailty domains, multimorbidity, and quality of life facets and total

All negative correlations between frailty domains and the six quality of life facets and quality of life total were significant (see Table 3). Of the quality of life facets, both physical and psychological frailty had the strongest correlations with social participation (−0.528 and −0.519, respectively); social frailty had the strongest correlation with intimacy (−0.562). Multimorbidity was significantly negatively correlated with five out of six quality of life facets and quality of life total. Multimorbidity had the strongest correlation with social participation (−0.381), and was only not correlated with the quality of life facet death and dying (−0.118), although the sign of the effect was as expected.

Sequential multiple linear regression analyses

Table 4 presents the results of the sequential multiple linear regression analyses, showing one model with all of the variables included. The rows ΔR^2 indicate how much of the variance in the quality of life scores (facets, total) was explained by the variables belonging to the three blocks (background characteristics, multimorbidity, frailty components), and whether (the increase in) explained variance was statistically significant. The second block containing multimorbidity

Table 2 Comparison of quality of life between frail and nonfrail participants

	Nonfrail n=162, mean (SD)	Frail n=79, mean (SD)	Results of Student *t*-test[a]	Effect size Cohen's d[b]
Sensory abilities	17.22 (2.57)	14.82 (2.81)	$t(143.07) = 6.39, p<0.001$	0.90
Autonomy	15.41 (2.41)	13.48 (2.43)	$t(153.79) = 5.82, p<0.001$	0.80
Past, present, and future activities	16.24 (1.87)	13.61 (2.26)	$t(131.48) = 8.97, p<0.001$	1.31
Social participation	16.42 (2.05)	13.37 (2.96)	$t(115.80) = 8.24, p<0.001$	1.28
Death and dying	15.36 (2.73)	13.96 (2.98)	$t(143.35) = 3.52, p<0.001$	0.50
Intimacy	16.07 (2.15)	13.75 (2.78)	$t(124.63) = 6.54, p<0.001$	0.98
Total quality of life	96.73 (8.32)	82.99 (9.67)	$t(136.00) = 10.83, p<0.001$	1.56

Notes: [a]Assuming unequal population variances. [b]Assuming equal population variances.

Table 3 Correlations between frailty domains, multimorbidity, and quality of life facets and total

	Sensory abilities	Autonomy	Past, present, and future activities	Social participation	Death and dying	Intimacy	Total
Frailty total	−0.442***	−0.435***	−0.589***	−0.601***	−0.257***	−0.480***	−0.684***
Frailty physical	−0.462***	−0.403***	−0.501***	−0.528***	−0.188**	−0.331***	−0.589***
Frailty psychological	−0.289***	−0.352***	−0.485***	−0.519***	−0.257***	−0.328***	−0.544***
Frailty social	−0.189**	−0.223***	−0.391***	−0.335***	−0.189**	−0.562***	−0.457***
Multimorbidity	−0.316***	−0.257***	−0.319***	−0.381***	−0.118	−0.162*	−0.381***

Notes: *$p<0.05$; **$p<0.01$; ***$p<0.001$.

explained a significant part of five quality of life facets and quality of life total, ranging from 2.5% (intimacy) to 12.0% (social participation), after controlling for the background characteristics and the frailty components; the exception was quality of life facet death and dying. The third block containing the 15 frailty components explained a significant part of all quality of life facets and total, ranging from 4.5% (death and dying) to 36.5% (total quality of life), after controlling for the variables of the first and second block. The last row (R^2 *total*) shows that all of the predictors together explained 17.8% of quality of life facet death and dying to 55.6% of quality of life total.

Of the 15 frailty components, the physical frailty components physically unhealthy, difficulty in walking, and poor hearing were negatively associated with at least two quality of life variables. The components feeling down and unable to cope with problems relating to psychological frailty were negatively associated with three and four quality of life variables, respectively. These were the only predictors of quality of life facet death and dying. Finally, the social frailty components lack of social relations and lack of social support were negatively associated with five and three quality of life variables, respectively. These two frailty components were the only predictors of quality of life facet intimacy.

Discussion

This study showed that multimorbidity as well as frailty were associated with quality of life total, measured with the WHOQOL-OLD in Dutch community-dwelling older people aged 70 years and older related to a general practice. In addition, multimorbidity and the total of the individual physical, psychological, and social frailty components of the TFI were associated with five and all six quality of life facets of the WHOQOL-OLD, respectively.

The finding that multimorbidity was associated with lower quality of life in older people is confirmed by many other quantitative studies, as mentioned in the Introduction,[18–21] independent of the amount of the included chronic diseases, ranging from 14[17] to 45 conditions.[20] Only a study by

Yamada et al[39] used the WHOQOL-OLD for assessing quality of life. This study concluded that the negative impact of the existence of multiple conditions on quality of life might be mitigated by promoting a positive self-perception of aging in older people.[39] Duguay et al[40] suggest that inquiring about what multimorbidity means to older adults might be an efficient method for nurses and other health care professionals in primary care settings to assess coping processes and enhance the relationships between the health care professionals and the older individual with multimorbidity.

The finding that frailty was associated with lower quality of life is also supported by other studies. Previous studies have shown that frail older people experience a lower quality of life, regardless of how both frailty and quality of life are measured, eg phenotype of frailty and the SF-36,[6,25,30,32] or the TFI and the WHOQOL-BREF.[24,31] Both studies using the TFI and WHOQOL-BREF were conducted in the Netherlands. The first study demonstrated that the prediction of all quality of life domains (physical health, psychological, social relations, environmental) by eight physical frailty components was improved after adding four psychological and three social frailty components; only the frailty component feeling down predicted all four quality of life domains.[24] The second study showed that the frailty components difficulty in maintaining balance, physical tiredness, physical unhealthy, difficulty in walking, feeling down, and lack of social support predicted future scores on the domains of the WHOQOL-BREF.[31] The latter four components predicted in our study at least two quality of life variables.

Only one previous study has used the same instruments for measuring frailty and quality of life as we did, the TFI and the WHOQOL-OLD, respectively.[35] Therefore, as mentioned in the Introduction, we will compare our findings regarding the associations between frailty and quality of life in particular with this previous study. In most cases, the correlations between the three frailty domains and the six quality of life facets were stronger in our study. This is especially true for the correlations between physical, psychological, and social frailty and the quality of life facets autonomy and

Table 4 Effect of background characteristics, multimorbidity, and frailty components on WHOQOL-OLD facets: regression analysis

| | Sensory abilities | | | | | | Autonomy | | | | | | Past, present, and future activities | | | | | |
| | Bivariate | | | Multiple | | | Bivariate | | | Multiple | | | Bivariate | | | Multiple | | |
	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Background characteristics																		
Sex (women)	−0.059	0.372	0.874	0.248	0.341	0.468	−0.191	0.333	0.566	0.092	0.323	0.776	−0.047	0.304	0.878	0.360	0.265	0.175
Age	−0.162	0.035	**<0.001**	−0.068	0.033	**0.041**	−0.090	0.032	**0.006**	−0.035	0.031	0.271	−0.108	0.029	**<0.001**	−0.060	0.026	**0.020**
Marital status (married)	0.352	0.409	0.390	−1.432	1.376	0.299	−0.209	0.366	0.568	−2.348	1.303	0.073	0.331	0.334	0.323	0.466	1.066	0.662
Education	0.951	0.287	**0.001**	0.373	0.254	0.144	0.690	0.259	**0.008**	0.457	0.241	0.059	0.364	0.239	0.129	−0.101	0.197	0.609
ΔR²				0.103		**<0.001**				0.058		**0.007**				0.056		**0.009**
Multimorbidity	−0.831	0.161	**<0.001**	−0.386	0.178	**0.031**	−0.605	0.147	**<0.001**	0.118	0.168	0.483	−0.685	0.132	**<0.001**	0.120	0.138	0.385
R²				0.069		**0.010**				0.051		**<0.001**				0.076		**<0.001**
Frailty components																		
Physically unhealthy	−1.601	0.489	**0.001**	−0.434	0.521	0.406	−2.374	0.420	**<0.001**	−1.278	0.494	**0.010**	−2.551	0.373	**<0.001**	−1.296	0.404	**0.002**
Unexplained weight loss	−1.311	0.702	0.063	0.104	0.632	0.870	−1.383	0.626	**0.028**	−0.344	0.599	0.566	−2.029	0.563	**<0.001**	−0.958	0.490	0.052
Difficulty in walking	−1.618	0.374	**<0.001**	−0.035	0.433	0.936	−2.008	0.322	**<0.001**	−0.572	0.410	0.164	−1.907	0.292	**<0.001**	−0.419	0.335	0.213
Difficulty maintaining balance	−1.889	0.412	**<0.001**	−0.335	0.455	0.463	−1.993	0.362	**<0.001**	−0.619	0.431	0.152	−1.834	0.331	**<0.001**	−0.311	0.353	0.359
Poor hearing	−3.208	0.359	**<0.001**	−2.328	0.377	**<0.001**	−0.398	0.370	0.283	0.382	0.357	0.286	−1.060	0.332	**0.002**	−0.197	0.292	0.501
Poor vision	−2.806	0.455	**<0.001**	−1.127	0.460	**0.015**	−0.570	0.437	0.193	0.484	0.436	0.267	−1.438	0.389	**<0.001**	−0.150	0.356	0.675
Lack of strength in the hands	−1.412	0.415	**<0.001**	−0.786	0.419	0.062	−1.485	0.368	**<0.001**	−0.347	0.397	0.382	−1.420	0.335	**<0.001**	−0.317	0.325	0.329
Physical tiredness	−1.232	0.392	**0.002**	0.763	0.424	0.073	−1.581	0.343	**<0.001**	0.114	0.401	0.776	−1.647	0.309	**<0.001**	0.148	0.328	0.653
Problems with memory	−1.885	0.882	**0.034**	−0.103	0.814	0.899	−2.627	0.779	**<0.001**	−1.369	0.771	0.077	−2.110	0.715	**0.003**	−0.250	0.630	0.692
Feeling down	−1.565	0.390	**<0.001**	−0.455	0.412	0.270	−1.652	0.344	**<0.001**	−0.773	0.390	**0.049**	−2.359	0.292	**<0.001**	−1.234	0.319	**<0.001**
Feeling nervous or anxious	−1.046	0.447	**0.020**	0.259	0.471	0.582	−1.583	0.391	**<0.001**	0.158	0.446	0.723	−1.977	0.346	**<0.001**	−0.086	0.365	0.814
Unable to cope with problems	−1.980	0.518	**<0.001**	−1.079	0.473	**0.023**	−1.422	0.469	**0.003**	−0.826	0.448	0.067	−1.741	0.422	**<0.001**	−0.742	0.366	**0.044**
Living alone	−0.428	0.410	0.298	−0.639	1.395	0.648	0.105	0.368	0.775	−0.993	1.322	0.453	−0.367	0.335	0.275	0.252	1.081	0.816
Lack of social relations	−1.432	0.369	**<0.001**	−0.441	0.412	0.286	−1.826	0.319	**<0.001**	−1.561	0.391	**<0.001**	−2.065	0.281	**<0.001**	−0.927	0.319	**0.004**
Lack of social support	−0.616	0.588	0.296	0.428	0.525	0.416	−1.045	0.523	**0.047**	0.519	0.498	0.298	−2.636	0.450	**<0.001**	−1.324	0.407	**0.001**
ΔR²				0.244		**<0.001**				0.237		**<0.001**				0.343		**<0.001**
R² total				0.416		**<0.001**				0.346		**<0.001**				0.475		**<0.001**

| | Social participation | | | | | | Death and dying | | | | | | Intimacy | | | | | |
| | Bivariate | | | Multiple | | | Bivariate | | | Multiple | | | Bivariate | | | Multiple | | |
	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Background characteristics																		
Sex (women)	0.056	0.360	0.876	0.380	0.299	0.205	−0.481	0.372	0.197	−0.166	0.406	0.683	−0.417	0.336	0.216	0.546	0.317	0.086
Age	−0.106	0.035	**0.003**	−0.038	0.029	0.188	−0.007	0.037	0.842	0.025	0.039	0.533	−0.047	0.033	0.159	0.031	0.031	0.311
Marital status (married)	0.208	0.395	0.599	−0.210	1.204	0.862	0.651	0.408	0.112	1.582	1.637	0.335	2.271	0.341	**<0.001**	−0.082	1.276	0.949
Education	0.307	0.283	0.280	−0.192	0.222	0.389	0.010	0.294	0.973	−0.381	0.303	0.209	0.274	0.266	0.304	−0.082	0.236	0.730
ΔR²				0.039		0.053				0.014		0.503				0.159		**<0.001**
Multimorbidity	−0.968	0.152	**<0.001**	−0.045	0.156	0.772	−0.311	0.169	0.067	−0.084	0.212	0.691	−0.385	0.152	**0.012**	0.102	0.165	0.535
R²				0.120		**<0.001**				0.015		0.061				0.025		**0.007**
Frailty components																		
Physically unhealthy	−3.470	0.427	**<0.001**	−1.819	0.456	**<0.001**	−0.845	0.498	0.091	−0.272	0.620	0.662	−1.033	0.448	**0.022**	−0.103	0.484	0.832
Unexplained weight loss	−2.975	0.656	**<0.001**	−1.473	0.553	**0.008**	−0.197	0.708	0.781	0.331	0.752	0.661	0.504	0.640	0.431	0.972	0.587	0.099
Difficulty in walking	−2.568	0.336	**<0.001**	−1.046	0.378	**0.006**	−1.171	0.381	**0.002**	−0.837	0.515	0.105	−1.532	0.337	**<0.001**	−0.419	0.401	0.298
Difficulty maintaining balance	−2.178	0.391	**<0.001**	−0.283	0.398	0.478	−1.049	0.425	**0.014**	−0.492	0.542	0.364	−1.701	0.374	**<0.001**	−0.298	0.422	0.481

Additional facet results (B, SE, p):

	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Poor hearing	−1.325	0.392	<0.001	−0.668	0.448	0.138	−0.596	0.374	0.112	0.360	0.350	0.305
Poor vision	−1.776	0.459	<0.001	0.202	0.547	0.712	−1.588	0.432	<0.001	−0.742	0.427	0.084
Lack of strength in the hands	−1.433	0.400	<0.001	−0.331	0.498	0.507	−1.288	0.376	<0.001	−0.230	0.389	0.554
Physical tiredness	−1.919	0.366	<0.001	0.929	0.504	0.067	−1.512	0.349	<0.001	−0.383	0.393	0.331
Problems with memory	−2.725	0.842	0.001	2.808	0.968	0.004	−1.562	0.801	0.052	−0.054	0.755	0.943
Feeling down	−2.769	0.346	<0.001	−0.703	0.490	0.153	−1.756	0.347	<0.001	−0.127	0.382	0.741
Feeling nervous or anxious	−2.570	0.404	<0.001	−1.283	0.560	0.023	−1.451	0.399	<0.001	0.060	0.437	0.891
Unable to cope with problems	−2.474	0.491	<0.001	−1.058	0.563	0.061	−1.390	0.475	0.004	−0.611	0.439	0.165
Living alone	−0.222	0.397	0.577	1.348	1.660	0.418	−2.345	0.340	<0.001	−1.885	1.294	0.147
Lack of social relations	−2.273	0.337	<0.001	0.313	0.490	0.524	−2.321	0.310	<0.001	−1.088	0.382	0.005
Lack of social support	−2.557	0.545	<0.001	−0.865	0.625	0.168	−2.936	0.499	<0.001	−1.980	0.487	<0.001
ΔR²	0.363			0.149			0.204					<0.001
R² total	0.522			0.178			0.388					<0.001

WHOQOL-OLD

	Bivariate			Multiple		
	B	SE	p	B	SE	p
Background characteristics						
Sex (women)	−1.138	1.405	0.419	1.460	1.127	0.196
Age	−0.519	0.134	<0.001	−0.145	0.109	0.185
Marital status (married)	3.603	1.531	0.019	−2.956	4.540	0.516
Education	2.596	1.099	0.019	0.074	0.839	0.929
ΔR²				0.075		0.001
Multimorbidity	−3.786	0.595	<0.001	−0.175	0.587	0.766
R²				0.116		<0.001
Frailty components						
Physically unhealthy	−11.874	1.727	<0.001	−5.202	1.720	0.003
Unexplained weight loss	−7.391	2.632	0.005	−1.370	2.087	0.512
Difficulty in walking	−10.805	1.291	<0.001	−3.328	1.427	0.021
Difficulty maintaining balance	−10.645	1.473	<0.001	−2.339	1.502	0.121
Poor hearing	−7.324	1.496	<0.001	−2.782	1.244	0.026
Poor vision	−8.725	1.766	<0.001	−1.509	1.517	0.321
Lack of strength in the hands	−7.973	1.524	<0.001	−1.908	1.382	0.169
Physical tiredness	−8.194	1.418	<0.001	2.045	1.398	0.145
Problems with memory	−10.051	3.306	0.003	0.895	2.684	0.739
Feeling down	−11.582	1.328	<0.001	−4.720	1.360	<0.001
Feeling nervous or anxious	−10.198	1.577	<0.001	−1.287	1.554	0.408
Unable to cope with problems	−10.641	1.899	<0.001	−5.575	1.560	<0.001
Living alone	−3.833	1.536	0.013	−1.221	4.603	0.791
Lack of social relations	−10.819	1.257	<0.001	−4.588	1.360	<0.001
Lack of social support	−11.394	2.104	<0.001	−4.104	1.734	0.019
ΔR²				0.365		<0.001
R² total				0.556		<0.001

Notes: ΔR^2 indicates how much of the variance in the quality of life scores (facets, total) was explained by the variables belonging to the three blocks (background characteristics, multimorbidity, frailty components), and whether (the increase in) explained variance was statistically significant. R^2 total shows all of the predictors together. p-values <0.05 are printed in bold.
Abbreviation: WHOQOL-OLD, World Health Organization Quality of Life Instrument–Older Adults Module.

past, present, and future activities. Most striking is that we found an association between social frailty and quality of life autonomy and the previous study found no association. A possible explanation for these differences in findings may be found in the characteristics of the samples. In our sample the percentage of men was 51.9%, vs 69.4% in the other study. The sequential regression analyses in the previous study showed that being a woman was positively associated with autonomy; that was not the case in the current study. In addition, the average score on social frailty was lower (0.8 vs 0.95); our analyses showed that in our study fewer people had a lack of social relations (feelings of loneliness), 39.4% vs 53.1%.

The 15 frailty components together explained 36.5% of the variance of the score on quality of life total; this percentage was higher comparable with the previous study (31.8%).[35] This also applies for the explained variances of the scores on five of the six quality of life facets. The differences in explained variances range from 5.1% (death and dying) to 1.2% (social participation). The exception is quality of life facet sensory abilities, for which the explained variances were 24.4% and 43.4% for the current and previous study, respectively. Our findings are remarkable because the number in our study is lower (241 vs 466), so the study by Gobbens and van Assen[35] had more power and could more easily find effects of frailty on quality of life. An explanation for our findings should also be sought in differences in the samples. Differences not only exist in sex, but also in level of education; in the present study 40.9% were highly educated, while this percentage was 17.8% in the previous study.[35] In the latter study, a Web-based questionnaire was used for collecting the data. As the authors have indicated, using this questionnaire has probably led to selection bias.

The scores on three quality of life facets (autonomy, past, present, and future activities, social participation) were explained by components belonging to physical, psychological, and social frailty. Scores on sensory abilities were only explained by physical and psychological frailty components. Scores on quality of life facet death and dying were only explained by psychological frailty components and scores on quality of life facet intimacy were only explained by social frailty components. Similar to other studies, our study underlines the importance of a multidimensional assessment of frailty aiming to explain quality of life in older adults.[24,31] In particular, our study shows that social frailty, which is too often ignored in definitions of frailty, eg the phenotype of frailty,[2] is essential in explaining quality of life.

This study has several limitations to mention. First, the effect of the frailty components on quality of life facet sensory abilities is influenced by the overlap between two physical frailty components, poor hearing and poor vision, and the four items of this WHOQOL-OLD facet. Second, we used a cross-sectional design for determining the effect of frailty on quality of life; because of this design, strict cause–effect interpretations are not possible. Third, the sample is not representative; 51.9% of the participants were men, while in the Dutch population aged 70 years and older only 43.5% are men.[41] Moreover, in our sample 71% of the participants were married or cohabiting and 11.4% were widowed, versus percentages of 55.2% and 31.4%, respectively, for the Dutch population.[41] These differences in percentages can be explained by the fact that no people older than 90 years participated in our study.

Conclusion

Multimorbidity and frailty were negatively associated with quality of life in community-dwelling older people. Our findings regarding frailty, measured with the TFI, a multidimensional frailty questionnaire, have many similarities with the findings in the previous study by Gobbens and van Assen.[35] In both studies, physical, psychological, as well as social frailty components were negatively associated with quality of life. This means that health care professionals should focus their interventions on all three domains of human functioning (physical, psychological, and social). According to the present study, health care professionals should in particular pay attention to physically unhealthy, lack of social relations, lack of social support, feeling down, and unable to cope with problems because these frailty components have the biggest impact on quality of life in older people. Interprofessional cooperation between health care professionals and welfare professionals seems necessary to be able to meet the needs of frail older people. This cooperation should lead to a tailor-made plan for each individual, which is not only focused on deficits, but also on the strengths and resources that older people may have.

Acknowledgments

Disclosure

The authors report no conflicts of interest in this work.

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