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Detection of high psychological frail community dwelling older people using socioeconomic indicators

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ABSTRACT

Aim: Population aging is a worldwide fact. Moreover, people prefer "aging in place." Thereby, detection of frail community dwelling older people is a challenge. Previous research showed that psychological frailty contributes most to the overall feelings of frailty, pointing toward the necessity of detection. The main purpose of this study is to explore socioeconomic risk factors of psychological frailty in later life.

Methods: A cross-sectional study (N = 28,245) using data collected by the Belgian Aging Studies was executed. Psychological frailty was measured using the Comprehensive Frailty Assessment Instrument, more specifically, mood disorders and emotional loneliness. Chi-square tests were used to investigate the relation between psychological frailty and socioeconomic indicators. In order to get an insight into the hierarchical order of the variables associated with high psychological frailty, a Chi-squared Automatic Interaction Detector (CHAID)-analysis was applied.

Results: The risk factors for high psychological frailty were female, low education, and inadequate financial resources. Concerning gender, high psychologically frail women were more often widowed and had a lower educational and income level than high psychologically frail men.

Conclusion: Results of CHAID analyses showed that being divorced or widow(ed), having difficulties to make ends meet, and being a woman were the most important variables associated with high psychological frailty in community dwelling older people. Referring to socioeconomic risk factors associated with psychological frailty in later life, asking whether the older person has difficulties to make ends meet, may point to psychological frailty.

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Introduction

Most peoples' life expectancy is 60 years and older [1]. In less developed countries, this longevity is merely on the account of lower mortality rates at young age. While in high-income countries, a continuous increasing longevity is due to rising life expectancy. However, the latter might conceal inequalities within countries [2]. Furthermore, reduced fertility rates in combination with increased life expectancy have led to population aging all over the world [1]. A longer life is a valuable resource if these added years are lived in good physical and mental health [1]. Population aging is also associated with rising costs of health and social care. Therefore, many Western countries have changed their policies from institutionalization toward aging in place, which is defined as: "*meeting the desire and ability of people, through the provision of appropriate services and assistance, to remain living relatively independently in the community in his or her current home or an appropriate level of housing. Aging in place is designed to prevent or delay more traumatic moves to a dependent facility, such as a nursing home* [3]." Older people prefer to "aging in place"

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[4,5]. Thus, enabling older frail people to remain at home is a challenge [6]. Frailty and its early detection is one of the most challenging issues in aging population [7].

Some scholars describe differences in the prevalence of frailty due to socioeconomic inequalities, in particular education, female gender, and material possessions [8–12].

There is no consensus of an operational definition of frailty [6]. Often, frailty is described as a "clinically" recognizable state, resulting from age-associated declines in physiologic reserve and functions. For example, the frailty phenotype [13] and the Rockwood Frailty Index [14]. This approach endorses the medicalization paradigm and is criticized because it overlooks psychological and social problems [15].

In response to this, some scholars assess frailty by including psychological and social indicators beside physical ones. Some pay more attention to psychological markers such as cognition, mastery, and depression [16] or introduce anxiety, sadness, cognitive deficiency, and management capacities [17]. Others introduced social support as a social indicator [18]. Lately, a more integral approach of frailty is observed, including physical, psychological, and social components [19]. In line with this, the Comprehensive Frailty Assessment Instrument (CFAI) was developed. In this 23-item self-report instrument, four domains of frailty are assessed; the psychological, physical, social, and environmental domains. Analyses showed higher factor loading for the psychological domain compared to the other domains [20]. However, in literature, psychological frailty is understudied. In order to fill this gap, this study aims to explore the socioeconomic profile of psychologically frail older individuals aging in place.

Methods

Data collection and participants

Data from the Belgian Aging Studies (BAS), an ongoing research project, which started in 2004, was used. In the BAS, a highly structured questionnaire is used to collect information on various aspects related to the quality of life of community dwelling older people aged 60 and over. In each of participating municipality, a proportionally stratified sample based on gender and age was used. Addresses were randomly selected from the population registers. A full description of the methodology can be found elsewhere [21]. The study was approved by the ethical committee of the Vrije Universiteit Brussel (B.U.N. 143201111521). The same dataset (N = 28,245) on which the CFAI [22] was validated was used for these analyses.

Measures and statistical strategy

Measures

The CFAI was used to measure frailty. This instrument has been validated in a second-order confirmatory factor analysis and good fit indices [20] and was cross-validated with the Tilburg Frailty Indicator [22]. The CFAI measures the physical, psychological, social, and environmental domains of frailty. The psychological domain is captured using mood-disorders and emotional loneliness. A five item Mood Disorder Index is used to detect distress. Participants were asked to what extent they agreed with: "Feeling unhappy," "Losing self-confidence," "Unable to cope with problems," "Feeling pressure," and "Feeling worth nothing anymore." Next, emotional loneliness is assessed using three propositions of the shortened Loneliness Scale [23]. Participants were asked to which extent they agreed with "I experience a general sense of emptiness," "I miss having people around me," and "I often feel rejected" [23].

The CFAI's total score and domain scores were calculated and divided into classes (low-mild-high) using the instructions of De Witte et al. [24]. In the validation study of the CFAI, each of the four domains individually showed good psychometric properties [22]. Therefore, as this manuscript focuses on psychological frailty, only the psychological domain of the CFAI was used.

Socioeconomic variables that were found to be associated with frailty like gender, age categories (60–69, 70–79, and 80+ years), marital status [married, never married, divorced, living together, and widow(er)], level of education (no degree or primary education; lower secondary; higher secondary; and higher education), monthly household income ($579–$1737, $1738–$2316, and >$2317), and finally, "make ends meet" (yes or no) were included in this study [25].

Data analyses

The relationship between socioeconomic characteristics and psychological frailty was explored using Chi-square tests. First, psychological frailty was analyzed in relation to socioeconomic variables and afterward analyzed for gender and age categories. Performed data analyses are presented in Figure 1.

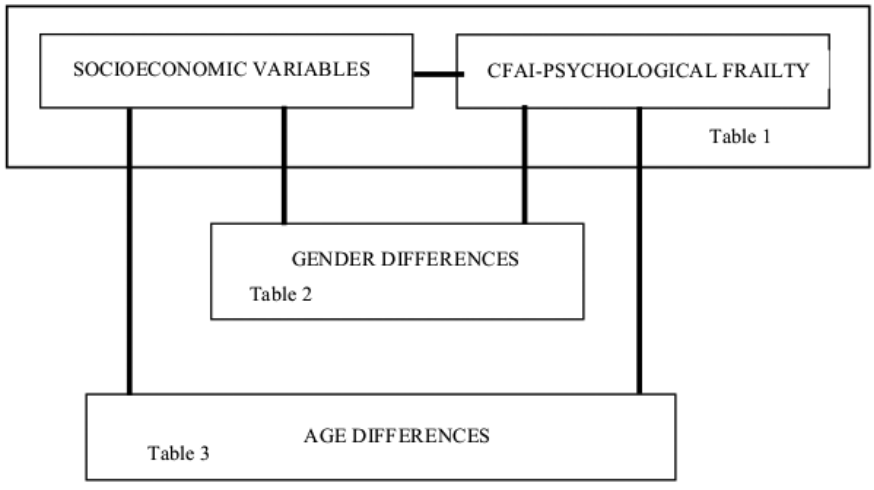

Figure 1. Analytic schema.

Given the large sample size, statistical significance was set on $p = 0.000$. Finally, a Chi-squared Automatic Interaction Detector (CHAID)-analysis was applied in order to get an insight into the hierarchical order of the predictors of high psychological frailty. CHAID is a stepwise process. First, the software chooses the most significant predictor to partition the entire sample in subgroups. Second, the analysis is performed on each sub-group using the second best predictor. The software continues analyzing until no more significant predictors remain [26,27]. Both bivariate and CHAID analyses were performed using SPSS (IBM SPSS Statistics 20.0 Released 2011 Armonk, NY: IBM Corp.).

Results

The studied sample consisted of 28,245 psychologically frail older people. The summary of the characteristics shows that the group consisted of 47.9% men and 52.1% women; 48.5% aged 60–69 years, 34.2% aged 70–79 years, and 17.3% aged 80 years and older. Concerning marital status, 70.9% was married, and regarding the level of education, 61.8% was less educated. Finally, almost half of the group had a low income (48.4%) and 37.5% perceived difficulties to make ends meet.

Socioeconomic differences in psychologically frail older people are presented in Table 1. High psychologically frail women were more predominant (65.1%). Focusing on age groups, 25.8% of high psychologically frail were 80+, 33.5% were between 70 and 79 years, and 40.7% w ere between 60 and 69 years old. Second, concerning marital status, 35.4% were widowed in the high psychologically frail group and 7.6% stated they were divorced.

Concerning education and income, within the high psychologically frail older people, 42.6% achieved primary education; whereas concerning income level and making ends meet, 64.8% had an income less than $1,737 a month. When it comes to make ends meet, about 1 out of 2 (52.9%) in this group perceived difficulties.

The results of the analyses focusing on gender differences of psychologically frail in relation to socioeconomic variables can be found in Table 2.

Regarding age, within the high psychologically frail females, 28.0% is 80+, whereas for men this was 21.7%. Concerning marital status, the proportion of widowed in the high psychologically frail group was higher for women (35.5%) than for men (19.5%).

In the high psychologically frail group, 47.3% of women achieved primary education, whereas in men this was 34.0%. Within high frail men, 13.4% achieved university, and for women, this was 8.6%.

The lower the income, the more prevalent older people were in the high psychologically frail group, which was for both sexes; 69.7% of women in the high psychological frail group reported an income of less than $1,737, and for men, this was 56.2%. Those having difficulties to make ends meet were predominant in the high psychological frail group. The differences between both sexes were small (52.9% for men and 53.1% for women).

The analysis focusing on age group differences concerning socioeconomic variables within psychological frailty can be found in Table 3.

In the high psychologically frail age group of 60–69 years, 61.7% were married, 13.2% were divorced, and 18.1% were widow(ed). For the mild and low psychologically frail people within

this age group, the percentages descend for divorced and widowed and increased for married people. In the age group of 70–79 years and high psychologically frail, 52.6% were married and 37.2% were widowed. In the 80+ group and high psychologically frail, 61.0% were widowed. Concerning education, in the 60–69 age group, 27.6% of the high psychologically frail were low educated; whereas in the age group 70–79 and 80+ of the high psychologically frail, this was 49.3% and 58.3%, respectively.

The lowest income class was predominant in each age group for the high psychologically frail with percentages of 55.3% for the lowest to 79.0% in the highest age group. For subjective income, there is a reversed trend. In the age group 60–69 years high psychologically frail, 56.5% were having difficulties to make ends meet. For the high psychological frail in the age group 70–79 years, this percentage was 53.1% and in the 80+ age group, this was 47.7%.

Next, we performed a CHAID analysis of which the tree diagram is shown in Figure 2. All sociodemographic variables, except partnership, were included. Overall, 9% (node 0) of the sample was high psychologically frail and the most important variable associated with psychological frailty was marital status. In older people married or living together, 6.6% (node 1) is high psychologically frail. In never married, this percentage is 10.9% (node 3). High psychological frail older people are the most prevalent within divorced (14.9%, node 4) and within widow(ers) (16.1%, node 2). The second most important variable is making ends meet. Within divorced older people, the prevalence raises from 14.9% (node 4) to 19.2% (node 11). Moreover, within divorced, being women and experiencing

Table 1. Socioeconomic differences in psychologically frail older people.

	CFAI-psychologically frail					
	Low (%)	**Mild (%)**	**High (%)**	**Total sample (%)**	***N***	**Total (*N*)**
Gender						28,178
Male	51.0	45.2	34.9	47.9	13,508	
Female	49.0	54.8	65.1	52,1	14,670	
Age						28,096
60–69	51.7	43.8	40.7	48.5	13,631	
70–79	33.6	35.6	33.5	34.2	9,600	
80+	14.6	20.5	25.8	17.3	4,865	
Marital status						27,925
Married	76.6	64.3	51.3	70.9	19.793	
Never married	3.2	3.9	4.0	3.5	967	
Divorced	3.7	4.4	7.6	4.3	1,189	
Living together	2.2	1.9	1.7	2.0	566	
Widow(er)	14.4	25.4	35.4	19.4	5,410	
Education						27,700
Primary	30.6	36.6	42.6	33.4	9,252	
Lower secondary	28.2	29.0	28.4	28.4	7,879	
Higher secondary	21.8	19.9	18.7	21.0	5,818	
College/University	19.3	14.5	10.3	17.2	4,751	
Income						24,499
$579–$1737	43.7	53.5	64.8	48.4	11,867	
$1738–$2316	23.9	23.2	18.3	23.2	5,679	
≥$2317	32.4	23.3	17.0	28.4	6,953	
Difficult to make ends meet						25,977
Yes	32.8	43.1	52.9	37.5	9,744	
No	67.2	56.9	47.1	62.5	16,233	

$p < 0.001$.

Table 2. Socioeconomic differences for gender in psychological frail older people.

	Male							Female							
	Low (%)	*N*	Mild (%)	*N*	High (%)	*N*	Total *N* (M)	Low (%)	*N*	Mild (%)	*N*	High (%)	*N*	Total *N* (F)	Total (*N*)
Age							13,433							14,613	28046
60–69	54.4	4,884	48.7	1,745	45.2	399	7,028	49.0	4,223	39.8	1,731	38.4	630	6,584	
70–79	33.9	3,038	34.9	1,250	33.1	292	4,580	33.3	2,872	36.2	1,577	33.6	552	5,001	
80+	11.7	1,049	16.3	585	21.7	191	1,825	17.7	1,525	24.0	1,044	28.0	459	3,028	
Marital status							13,391							12,228	25,619
Married	85.0	7,611	75.2	2,679	66.2	576	10,866	67.9	5,791	55.4	2,390	43.3	704	8,885	
Never married	3.2	285	4.6	163	5.9	51	499	3.2	273	3.4	146	3.0	48	467	
Divorced	3.1	276	4.7	168	5.9	51	495	4.3	371	4.2	180	8.6	139	690	
Living together	2.5	220	2.4	86	2.5	22	328	1.7	148	1.5	65	1.3	21	234	
Widow(er)	6.3	565	13.1	468	19.5	170	1,203	22.9	1,952	35.5	1,532	43.9	713	1,952	
Education							13,290							14,357	27,647
Primary	26.1	2,317	30.9	1,092	34.0	296	3,705	35.4	3,005	41.3	1,762	47.3	764	5,531	
Lower secondary	27.7	2,464	29.3	1,036	31.6	275	3,775	28.8	2,438	28.7	1,222	26.7	431	4,091	
Higher secondary	23.2	2,058	21.6	764	20.9	182	3,004	20.4	1,727	18.5	790	17.3	280	2,797	
College/University	23.0	2,046	18.2	642	13.4	117	2,806	15.4	1,308	11.5	491	8.6	139	1,938	
Income							11,911							12,532	24,443
$579–$1,737	37.8	2,984	45.7	1,359	56.2	455	4,898	50.2	3,689	60.2	2,245	69.7	1,010	6,944	
$1,738–$2,316	25.6	2,028	26.4	845	22.0	178	3,051	22.0	1,618	20.4	761	16.3	236	2,615	
≥$2,317	36.6	2,895	27.9	891	21.8	176	3,962	27.8	2,046	19.4	723	14.1	204	2,973	
Difficult to make ends meet							12,517							13,401	25,918
Yes	31.2	2,608	41.6	1,383	52.9	435	4,426	34.5	2,721	44.3	1,761	53.1	813	5,295	
No	68.8	5,761	58.4	1,942	47.1	388	8,091	65.5	5,170	55.7	2,217	46,9	719	8,106	

$p < 0.001$.

Table 3. Socioeconomic differences for age in psychological frail older people.

Age	60–69							70–79							80+							
	Low (%)	*N*	Mild (%)	*N*	High (%)	*N*	Total *N* (60–69)	Low (%)	*N*	Mild (%)	*N*	High (%)	*N*	Total *N* (70–79)	Low (%)	*N*	Mild (%)	*N*	High (%)	*N*	Total *N* (80+)	Total (*N*)
Marital status							13,530							9,475							4,781	27,786
Married	83.0	7,515	76.1	2,634	61.7	628	10,777	77.1	4,510	64.5	1,802	52.6	437	6,749	52.5	1,330	38.7	622	32.9	210	2,162	
Never married	2.8	257	3.6	125	4.6	47	429	3.2	189	3.9	110	3.2	27	326	4.1	104	4.5	72	3.6	23	199	
Divorced	5.0	453	6.9	239	13.2	134	826	2.8	161	2.9	82	5.4	45	288	1.3	33	1.6	26	1.7	11	70	
Living together	2.7	242	2.7	93	2.5	25	360	1.7	98	1.2	33	1.6	13	144	1.1	28	1.5	24	0.8	5	57	
Widow(er)	6.4	582	10.7	372	18.1	184	1,138	15.3	893	27.4	766	37.2	309	1,968	41.0	1,039	53.8	865	61.0	389	2,293	
Education							13,407							9,414							4,742	27,647
Primary	21.8	1,956	24.6	840	27.6	280	3,076	36.3	2,111	41.5	1,153	49.3	405	3,669	49.3	1,237	54.1	859	58.3	374	2,470	
Lower secondary	28.8	2,586	29.7	1,016	32.4	328	3,930	29.0	1,686	30.1	835	25.1	206	2,729	24.6	617	25.2	401	25.5	164	1,182	
Higher secondary	25.2	2,264	24.7	844	24.3	246	3,354	18.9	1,101	17.5	486	17.5	144	1,731	16.2	408	14.0	222	11.4	73	703	
College/ University	24.2	2,170	21.0	718	15.7	159	3,047	15.7	916	10.9	302	8.2	67	1,285	9.9	249	6.7	107	4.8	31	387	
Income							11,887							8,304							4,194	24,385
$579–$1,737	33.6	2,263	41.2	1,257	55.3	511	4,431	50.2	2,556	58.8	1,445	65.8	498	4,499	64.4	1,428	71.6	1,002	79.0	453	2,883	
$1,738–$2,316	25.1	1,985	25.7	784	20.9	193	2,962	24.2	1,231	24.0	591	19.9	151	1,973	19.1	423	15.9	223	11.8	68	714	
≥$2,317	41.2	3,261	33.2	1,013	23.8	220	4,494	25.6	1,302	17.2	422	14.3	108	1,832	16.6	369	12.5	175	9.2	53	597	
Difficult to make ends meet							12,571							8,823							4,457	25,851
Yes	31.4	2,640	41.7	1,338	56.5	537	4,515	34.2	1,859	44.8	1,165	53.1	423	3,447	34.2	811	42.7	635	47.7	287	1,733	
No	68.6	5,775	58.3	1,867	43.5	414	8,056	65.8	3,569	55.2	1,434	46.9	373	5,376	65.8	1,558	57.3	851	52.3	315	2,724	

$p < 0.001$.

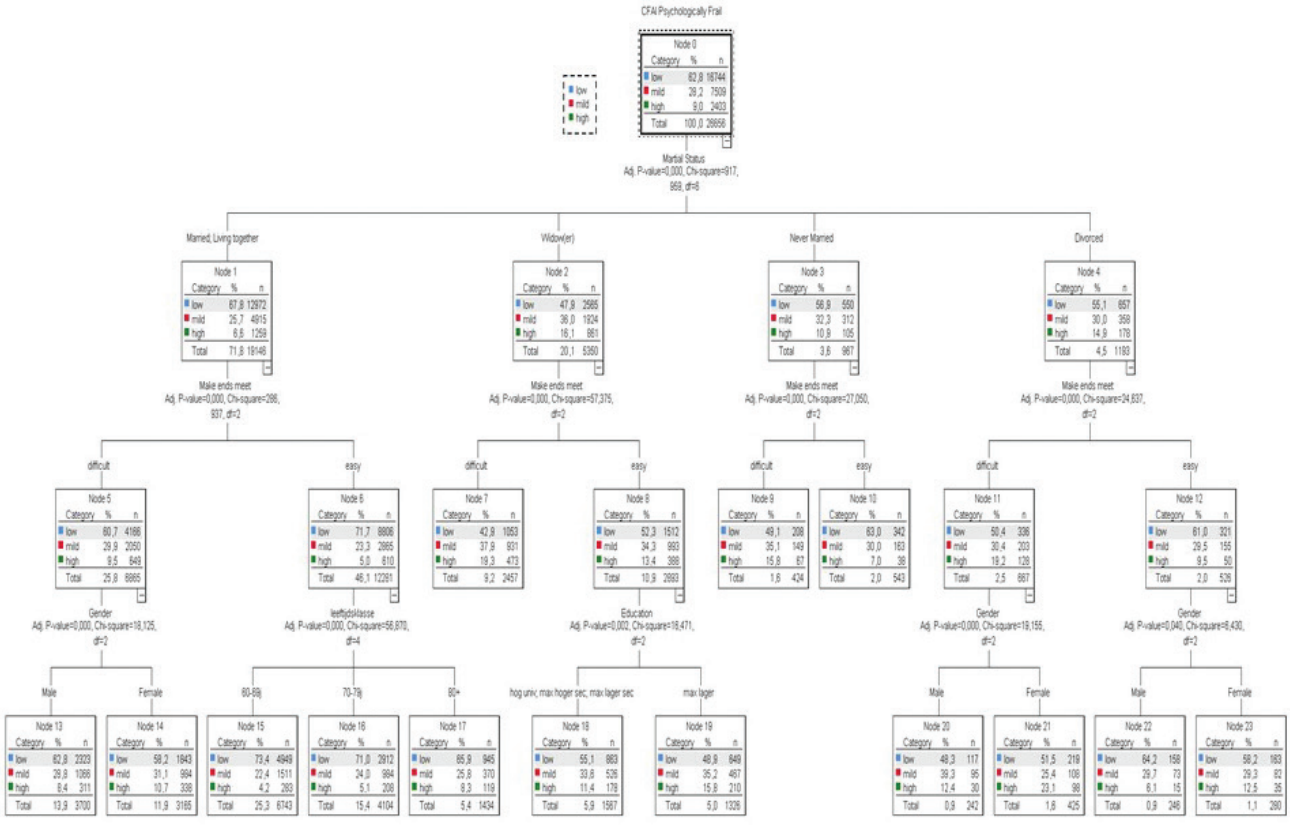

Figure 2. Predictors of psychological frailty using CHAID analyses.

difficulties to make ends meet, 23.1% (node 21) is highly psychologically frail, making this the group where high psychological frailty is most prevalent. It can be noted that the percentage for divorced men experiencing difficulties to make ends meet is 12.4% (node 20). For widowers who experience difficulties to make ends meet, the prevalence of high psychological frailty is 19.3% (node 7) whereas this percentage is 15.8% for never married (node 9). All other sociodemographic indicators like age, education, and income were not found as being associated with high psychological frailty.

Discussion

The main goal of this study was to explore which socioeconomic characteristics were related to psychological frailty. To the best of our knowledge, this is the first time this is studied in such a large study sample. A key finding of this study is that a significant risk factor for high psychological frailty was female gender. This result is in analogy with findings of previous quantitative meta-analyses where a significant risk factor for psychological well-being was female gender [28]. Concerning age, we found that psychological frailty was most common in age category 60–69 years. A reasonable explanation for this is difficult as for each individual different and multiple causes exist. One of the possible explanations could be retirement, which takes place between 60 and 69 years. Several studies associate a lower income with symptoms of psychological distress [29,30]. The total retirement income is distributed more unequally for women, especially unmarried women, than for men. Enduring financial strain is associated with higher levels of psychological distress among older adults, in particular for women [31,32].

For marital status, those being divorced or widowed were more represented within the psychological frail. This in line with research of Grundy (2003), where marital status and social support were found to have the greatest effect on psychological health [33]. Another explanation could be the fact that experiencing loss can be a psychologically difficult event to deal with [34] and can disrupt their life [35].

Low education and income were significantly more prevalent in the high psychological frail. The stress theory postulates that personal resources like coping style, self-esteem, mastery, and locus of control buffer the impact of stress on mental health problems. In a meta-analysis by Laurent et al. [36],

the relation between depression and socioeconomic status was consistent with this stress theory [37]. The fact that in this study, psychological frail experience more difficulties to make ends meet demonstrates this.

Focusing on gender, it was found that women in the highest age category were more confronted with high psychological frailty. Concerning marital status, a massive difference is measured between high psychologically frail widowed men and women. This is in line with some scholars pointing to the fact that the higher life expectancy of women was associated with a higher probability of negative life events, such as widowhood or loss of a beloved one [38]. Gender differences were also found for education and income, where women proportionally were less educated and had a lower income. This is in line with previous studies confirming that economic status, in particular, education and income, is significantly associated with frailty [39]. Concerning "to make ends meet," there were no differences measured between both genders. Gender differences appeared in some studies on frailty, whereas a progressive decline and more morbidity in women was shown [40]. In particular, women had more functional limitations, were more likely to have poor vision, and considered to be incontinent, low mastery, more depressed, and increase in depressive symptoms [16]. Older women are also more likely to be widowed than older men. Previous research has shown that high social economic status and good health were important predictors of subjective well-being and positive self-concept. Gender-associated disadvantages such as higher rates of being widowed, having poor physical health and, as a consequence, higher morbidity rates and low socioeconomic status made women increasingly difficult to obtain high subjective well-being [41]. The lifetime probability of developing an episode of depression and/or anxiety was significantly higher in women than in men [38]. In this context, a reporting bias can be noted as, according to some scholars, men tend to underreport medical conditions [42], in particular anxiety and depression [43].

Analyses of the relationship between psychological frailty and sociodemographic indicators within age groups showed that the highest prevalence of high psychological frailty was found in the divorced (60–69 years) and in the widowed in the 80+ age category. The latter might be inherent to aspects of the fourth age where the capacity to deal with chronic strain due to multiple physical illnesses, frailty, and social losses might reach his limits and result in psychological challenges [44]. Focusing on education, in age groups 70–79 and 80+, the highly educated showed the lowest percentages on psychological frailty. A similar mechanism was reflected in the results of income. This is in line with prior studies where older people with less than 12-year education and lower income were related to greater odds of frailty [39].

The most important variables related to high psychological frailty, according to the CHAID analyses were being divorced, having difficulties to make ends meet, and female gender. Income, education, and age group were not found to be associated with psychological frailty. Referring to socioeconomic factors associated with psychological frailty in later life, asking whether the older person has difficulties to make ends meet may point to psychological frailty.

Strengths and Limitations of this Study

A major strength of this study is the stratified representative sample (for age and gender) of 28,245 community-dwelling older persons upon which our analyses are based. Second, this allowed to perform CHAID analyses in order to explore the most important variables associated with psychological frailty. Most analytical methods apply regression analyses. However, a classification tree method is more effective than a regression approach for detecting the most important predictors [27] and reflects adequately the nature of everyday care practice.

Because of the cross-sectional nature of this research, causal relationships between socioeconomic characteristics and psychological frailty in older people could not be assessed. Second, some evidence suggests that physical health (number of diseases) is related to psychological well-being. As physical health was included in the modeling of the CFAI, this was not considered. Finally, as this research was done in Belgium, future research could be done in other countries.

Conclusion

Psychological frail older people are difficult to detect in the community. However, in this study, a purposeful detection of psychological frail older community dwelling people is scientifically justified.

Risk factors for high psychological frailty are female gender, widowed, not having a partner and low education and income level. According to CHAID analyses, the most important variables associated with high psychological frailty were divorced,

difficulties to make ends meet, and female gender. When taking care of older people, marital status and gender are often known. As a consequence, only one question (difficult to make ends meet) should be asked in order to accurately detect high psychological frail. With a policy focusing on aging in place and as a consequence, the expectation of an increasing prevalence of frail older people, these results should be considered by policymakers and professional caregivers as they point towards new ways of detecting possible frail older people.

Because of the cross-sectional nature of this study, predicting causal links is impossible. Future research regarding qualitative analyses is needed to reveal insights in mechanism related to psychological frailty in later life, the role of the life span of individuals in relation to psychological frailty, and to provide better insights into how older adults perceive psychological frailty and try to cope with it. As gender differences between men and women were found, a gender-specific approach when researching psychological frailty should be considered.

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Ethical statements

The authors declare that they have no conflicts of interest with respect to the research, authorship, and/or publication of this article. All authors are part of the D-SCOPE consortium and declare to have contributed in a substantial manner.

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