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# Risk factors for age-related frailty

Ľubica Poledníková *, Alica Slamková, Miroslava Líšková, Alexandra Archalousová

*Constantine the Philosopher University, Faculty of Social Sciences and Health Care, Department of Nursing, Nitra, Slovak Republic*

**Abstract**

*Goal:* The objective of this study was to identify which risk factors nurses in the Slovak Republic perceive as most significant for validating the nursing diagnosis Risk for Frail Elderly Syndrome (NANDA I 2021–2023) in older patients. The Fehring's Diagnostic Content Validity model was used for validating the potential nursing diagnosis to find out the significance of the risk factors for the nursing diagnosis Risk for Frail Elderly Syndrome. The study included two samples: 126 nurses from healthcare facilities (*n1*) and 51 nurses from social service facilities (*n2*) who met the modified Fehring's criteria for an expert.

*Results:* Out of the total number of 36 items, seven items in the *n1* sample and 12 items in the *n2* sample were identified as major (most frequently present) risk factors that can be predictors of age-related frailty. The samples reached an agreement on six major risk factors: impaired mobility, immobility, chronic illness, history of falls, age >70 years, and social isolation. Most risk factors were rated as minor (they were present less frequently).

*Conclusion:* Due to the findings in the present study, we suggest considering their use as key risk factors in all older adults over 70 years of age to improve and facilitate nurses' assessment and guidance for the selection of interventions that are to be used to prevent frailty.

**Keywords:** Age-related frailty; Potential nursing diagnosis; Risk factors, Validation

## Introduction

There are many definitions of age-related frailty that attempt to explain pathophysiological processes leading to vulnerability of an older organism. Walston et al. (2006) define it as a vulnerable state of an individual associated with an increased risk of adverse health outcomes and/or death when exposed to a stressor. According to Morley et al. (2013), frailty is either physical or psychological, or a combination of both; it is a dynamic state that can improve or deteriorate over time. There are two basic approaches to defining frailty. The first approach presents frailty as a deficit accumulation. The functional deficit is reflected in the physical or psychological area and increases the risk of complications, hospitalisation, or death (Rockwood and Mitnitski, 2011). The second approach was introduced by Fried et al. (2004). It states five basic frailty criteria in older adults, including weight loss, exhaustion, weakness, slowing, and low physical activity. Both approaches are used to define frailty and prefrailty. An older adult who has at least three frailty criteria is considered frail. If an older adult has one or two criteria, this represents a state of prefrailty, which is significant for prevention of total frailty and dependence on others (Hoozová, 2014; Rockwood and Mitnitski, 2011).

Nursing perceives frailty as a category that determines a degree of disability and dependency on others to perform activities of daily living. Disability reflects a degree of dependency in common daily activities, or lacking ability of independent existence without assistance from others (Krajčík, 2010). In nursing terminology, frailty, and risk for frailty (prefrailty) that leads to frailty are expressed in the nursing diagnoses – 00257 – Frail Elderly Syndrome and 00231 – Risk for Frail Elderly Syndrome, according to the NANDA International Nursing Diagnoses... (2021). Oliveira et al. (2021), who conducted clinical validation in hospitalised older adults in Brazil, dealt with the issue of nursing diagnostics using the NANDA classification system in validating nursing diagnoses associated with frailty. In the European context, Roldán-Chicano et al. (2023) identified the most significant clinical characteristics of the nursing diagnosis Frail Elderly Syndrome in hospitalised patients aged 65 and older and analysed their influence on mortality and hospitalisation.

The nursing diagnosis Risk for Frail Elderly Syndrome was included in the system of nursing diagnoses in 2000. According to the NANDA International Nursing Diagnoses... (2021, p. 195), it is in Domain 1 – Health Promotion, Class 2 – Health Management, as a potential nursing diagnosis and defined as: "Vulnerable to a dynamic state of unstable equilibrium that affects the older individual experiencing deterioration in one or more domain of health (physical, functional, psychological, or social) and leads to increased susceptibility to adverse health effects, in particular disability." The nursing diagnosis can be accepted based on present risk factors (hereinafter referred to as RF) that are an important diagnostic element. The classification system states 38 RF (NANDA International Nursing Diagnoses..., 2021, p. 195).

* **Corresponding author:** Ľubica Poledníková, Constantine the Philosopher University, Faculty of Social Sciences and Health Care, Department of Nursing, Kraskova 1, 949 74 Nitra, Slovak Republik; e-mail: lpolednikova@ukf.sk
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Frailty is a multidimensional syndrome that manifests as a decrease in energy, physical abilities, and cognition. It can be potentially prevented and reversed in its early stages if the RF for age-related frailty are eliminated early enough. Recognising significant RF for the nursing diagnosis (Risk for Frail Elderly Syndrome), nurses can contribute to the early detection of frailty and prevent its serious consequences with a suitable intervention.

The objective of this study was to identify which risk factors nurses in the Slovak Republic perceive as most significant for validating the nursing diagnosis Risk for Frail Elderly Syndrome (NANDA International Nursing Diagnoses..., 2021) in older patients.

## Materials and methods

A retrospective study focused on validation of the potential nursing diagnosis using the Fehring's Diagnostic Content Validity model. The study included two samples created by purposive sampling that was performed based on defined criteria. The first sample (*n1*) consisted of 126 nurses-experts working in healthcare facilities (hereinafter referred to as HCF). The second sample (*n2*) consisted of 51 nurses-experts working in social service facilities (hereinafter referred to as SSF). The nurses were considered experts if they obtained a minimum of four points according to the modified Fehring's criteria (Zeleníková et al., 2010). The *n1* sample consisted of 126 nurses from the Faculty Hospital Nitra, the Specialised Hospital of St. Svorad Zobor, the Faculty Hospital Nové Zámky, the Agel Hospital Zlaté Moravce, and the Town Hospital Topoľčany. The *n2* sample consisted of 51 nurses working in 13 social service facilities in the Nitra Region. The sample characteristics include gender, education, workplace, specialty, age, clinical practice duration in years, score according to the modified criteria, and other (Table 1).

The Fehring's Diagnostic Content Validity (DCV) model (Fehring, 1986) was used for validating the nursing diagnosis to discover the significance of the RF for the nursing diagnosis Risk for Frail Elderly Syndrome (NANDA I 2021–2023). The data collection was performed using an assessment tool that included 38 RF for the nursing diagnosis and demographic data. We excluded two of them (decrease in serum, 25-hydroxyvitamin D concentration) due to unavailability of data. The nurses retrospectively rated the occurrence of 36 items on a Likert scale from 1 to 5 (1 – RF was not present at all – no significance; 2 – present very little – little significance; 3 – present little – moderate significance; 4 – present often – great significance; 5 – present very often – the greatest significance). The study was performed from September 2022 to March 2023. The assessment tool was distributed to nurses both through direct contact with the study authors and indirectly via an authorised representative.

The procedures of descriptive statistics were used for statistical analysis of the data. Arithmetic mean (x), standard deviation (SD), and weighted score (WS) were calculated for each RF. Weighted scores were calculated by summing the values assigned to each response and dividing it by the number of responses. The values were assigned to the responses as follows: 5 = 1; 4 = 0.75; 3 = 0.5; 2 = 0.25; 1 = 0 (Fehring, 1986). The major (characteristic) RF had WS > 0.75, minor (moderately significant) had WS from 0.5 to 0.75. Those with WS ≤ 0.5 were considered insignificant for the nursing diagnosis. The strength of the mutual relationship between the RF was determined using Pearson's correlation coefficient (*r*), followed by the determination of the level of critical statistical significance of this correlation (*p*).

## Results

The study included 177 respondents in two samples. The *n1* sample consisted of 126 nurses from the HCF; 95.24% were females; 57.93% with bachelor's degree; 51.59% had a specialty; and 63.48% had worked in the field for more than 10 years. The average modified score for an expert was 6.13. The *n2* sample consisted of 51 nurses, females working in the SSF; 60.78% with secondary or higher vocational education; 35.29% had a specialty; and 84.31% had worked in the field for more than 10 years. The average modified score for an expert was 5.21 (Table 1).

**Table 1. Characteristics of the sample of nurses-experts (*n1* = 126, *n2* = 51)**

| Characteristics | Nurses from HCF (*n1*) | | Nurses from SSF (*n2*) | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| Gender of the sample | | | | |
| Female | 120 | 95.24 | 51 | 100 |
| Male | 6 | 4.76 | 0 | 0 |
| Education in nursing | | | | |
| Master/PhDr./PhD. | 30 | 23.81 | 8 | 15.69 |
| Bachelor | 73 | 57.93 | 12 | 23.53 |
| Secondary/Higher vocational | 23 | 18.26 | 31 | 60.78 |
| The area of the nursing diagnosis Risk for Frail Elderly Syndrome | | | | |
| Diploma/Rigorous thesis | 27 | 21.43 | 5 | 9.8 |
| Published article | 22 | 17.46 | 1 | 1.96 |
| Doctoral thesis | 3 | 2.38 | 0 | 0 |
| Clinical practice (min. 1 year) | 126 | 100 | 51 | 100 |
| Certification/Specialty | 65 | 51.59 | 18 | 35.29 |
| Duration of work experience as a nurse in years | | | | |
| 1–4 years | 23 | 18.26 | 1 | 1.96 |
| 5–9 years | 23 | 18.26 | 7 | 13.73 |
| 10 and more years | 80 | 63.48 | 43 | 84.31 |
| Average duration of work experience as a nurse | 19.68 years | | 25.64 years | |
| | *n* | % | *n* | % |
| Workplace | | | | |
| Social service facility | | | 51 | 100 |
| Internal medicine workplace | 43 | 34.13 | | |
| Cardiology workplace | 15 | 11.9 | | |
| Orthopaedics and trauma surgery clinic | 6 | 4.76 | | |
| Physiotherapy and therapeutic rehabilitation clinic | 6 | 4.76 | | |
| Oncology clinic | 10 | 7.94 | | |
| Home care agency | 10 | 7.94 | | |
| Geriatrics and long-stay department | 36 | 28.57 | | |
| | x | SD | x | SD |
| Nurse's age | | | | |
| | 42.9 | 13.16 | 51.24 | 9.87 |
| minimum/maximum | 24 | 69 | 27 | 66 |
| Modified score for an expert | | | | |
| | 6.13 | 1.86 | 5.21 | 1.54 |
| minimum/maximum points | 4 | 12 | 4 | 9 |

*Note:* x – arithmetic mean, SD – standard deviation.

Based on the analysis of the responses of the nurses from the HCF (*n1*) and SSF (*n2*), tables were compiled in which the RF for the validated nursing diagnosis are listed according to their significance. The classifications of the RF as major (WS > 0.75), minor (WS > 0.5 to 0.75), and non-significant (WS ≤ 0.5) in the samples are also compared.

Out of the total number of 36 items, the nurses from the HCF (*n1*) rated seven items as major risk factors, while the nurses from the SSF rated 12 items. The samples reached an agreement on six items rated as major: impaired mobility, immobility, chronic illness, history of falls, age >70, and social isolation (Table 2).

**Table 2. Factors identified as major by the experts**

| Risk factor | Nurses from healthcare facilities (*n1*) | | | Nurses from SSF (*n2*) | | |
|---|---|---|---|---|---|---|
| | Mean | SD | WS | Mean | SD | WS |
| Age > 70 years | 4.02 | 0.89 | 0.76 | 4.22 | 0.54 | 0.8 |
| Chronic illness | 4.25 | 0.82 | 0.81 | 4.57 | 0.61 | 0.89 |
| Decrease in energy | | | | 4.04 | 0.49 | 0.76 |
| Decrease in muscle strength | | | | 4.16 | 0.37 | 0.79 |
| Fear of falling | | | | 4.18 | 0.62 | 0.79 |
| Female gender | | | | 4.2 | 0.72 | 0.8 |
| History of falls | 4.17 | 0.83 | 0.79 | 4.22 | 0.54 | 0.8 |
| Immobility | 4.3 | 0.79 | 0.83 | 4.45 | 0.5 | 0.86 |
| Impaired mobility | 4.41 | 0.79 | 0.85 | 4.45 | 0.7 | 0.86 |
| Muscle weakness | | | | 4.16 | 0.42 | 0.79 |
| Obesity | | | | 4.04 | 0.53 | 0.76 |
| Social isolation | 4.04 | 0.76 | 0.76 | 4.08 | 0.66 | 0.77 |
| Social vulnerability | 4.22 | 0.75 | 0.81 | | | |

*Note:* SD – standard deviation, WS – weighted score.

The experts from the HCF rated 27 items as minor (moderately significant), while the nurses from the SSF rated 20 items as minor RF (Table 3).

All the statistically significant correlations between the selected RF, rated as major by both samples, are positive and range from 0.2 to 0.5, which corresponds to a weak and moderate association. The strongest associations were found between immobility and impaired mobility ($r$ = 0.5439), and history of falls and immobility ($r$ = 0.3434). Weak associations were found between history of falls and impaired mobility, and impaired mobility and social isolation. The identified correlations may indicate a relationship between the individual RF (Table 4).

**Table 3. Factors identified as minor by the experts**

| Risk factor | Nurses from healthcare facilities (*n1*) | | | Nurses from SSF (*n2*) | | |
|---|---|---|---|---|---|---|
| | Mean | SD | WS | Mean | SD | WS |
| Activity intolerance | 3.71 | 0.82 | 0.68 | 3.41 | 0.64 | 0.60 |
| Alteration in cognitive functioning | 3.89 | 0.79 | 0.72 | 3.98 | 0.58 | 0.75 |
| Altered clotting process | 3.38 | 0.82 | 0.60 | | | |
| Anorexia | 3.40 | 1.15 | 0.60 | 3.12 | 0.82 | 0.53 |
| Anxiety | 3.37 | 1.02 | 0.59 | 3.65 | 0.72 | 0.66 |
| Decreased daily physical activity | 3.88 | 0.84 | 0.72 | 3.57 | 0.61 | 0.73 |
| Constricted life space | 3.64 | 1.07 | 0.66 | 3.35 | 0.84 | 0.59 |
| Decrease in energy | 3.77 | 0.90 | 0.69 | | | |
| Decrease in muscle strength | 3.75 | 0.91 | 0.69 | | | |
| Depression | 3.79 | 0.88 | 0.70 | 3.92 | 0.72 | 0.73 |
| Economically disadvantaged | 3.32 | 0.92 | 0.58 | 3.71 | 0.58 | 0.68 |
| Endocrine regulatory dysfunction | 3.07 | 1.04 | 0.52 | | | |
| Exhaustion | 3.56 | 0.98 | 0.64 | 3.80 | 0.49 | 0.70 |
| Fear of falling | 3.48 | 0.99 | 0.62 | | | |
| Female gender | 3.74 | 0.97 | 0.69 | | | |

**Table 3.** ***(continued)***

| Risk factor | Nurses from healthcare facilities (*n1*) | | | Nurses from SSF (*n2*) | | |
|---|---|---|---|---|---|---|
| | Mean | SD | WS | Mean | SD | WS |
| Insufficient social support | 3.68 | 0.91 | 0.67 | 3.39 | 0.67 | 0.60 |
| Living alone | 4.00 | 0.74 | 0.75 | 3.75 | 0.52 | 0.69 |
| Malnutrition | 3.83 | 0.84 | 0.71 | 3.67 | 0.68 | 0.67 |
| Muscle weakness | 3.83 | 0.86 | 0.71 | | | |
| Obesity | 3.79 | 0.77 | 0.70 | | | |
| Prolonged hospitalisation | 3.74 | 0.85 | 0.69 | 3.31 | 1.12 | 0.58 |
| Sadness | 3.65 | 1.03 | 0.66 | 3.41 | 0.67 | 0.60 |
| Sarcopenia | 3.30 | 0.96 | 0.58 | 3.24 | 0.51 | 0.56 |
| Sarcopenic obesity | 3.35 | 0.96 | 0.59 | 3.63 | 0.53 | 0.66 |
| Sedentary lifestyle | 3.95 | 0.73 | 0.74 | 3.75 | 0.77 | 0.69 |
| Sensory deficit | 3.65 | 0.82 | 0.66 | 3.88 | 0.48 | 0.72 |
| Suppressed inflammatory response | 3.63 | 1.04 | 0.66 | | | |
| Low educational level | | | | 3.47 | 0.70 | 0.62 |
| Social vulnerability | | | | 4.00 | 0.53 | 0.75 |

*Note:* SD – standard deviation, WS – weighted score.

**Table 4. Correlations between selected major risk factors**

| | Age > 70 | Chronic illness | History of falls | Immobility | Impaired mobility | Social isolation |
|---|---|---|---|---|---|---|
| Age >70 | *r* 1 | *r* 0.1203 | *r* 0.1908 | *r* 0.0893 | *r* 0.1725 | *r* 0.0603 |
| | *p* 0 | *p* 0.0554 | *p* * 0.0055 | *p* 0.1187 | *p* ** 0.0108 | *p* 0.2125 |
| Chronic illness | | *r* 1 | *r* 0.0598 | *r* 0.0033 | *r* 0.1852 | *r* 0.0895 |
| | | *p* 0 | *p* 0.4292 | *p* 0.9656 | *p* ** 0.0136 | *p* 0.2359 |
| History of falls | | | *r* 1 | ***r* 0.3434** | ***r* 0.2212** | *r* 0.1271 |
| | | | *p* 0 | ***p* * 0.0000** | ***p* * 0.0031** | *p* 0.0918 |
| Immobility | | | | *r* 1 | ***r* 0.5439** | *r* 0.1598 |
| | | | | *p* 0 | ***p* * 0.0000** | ***p* ** 0.0337** |
| Impaired mobility | | | | | *r* 1 | ***r* 0.2472** |
| | | | | | *p* 0 | ***p* * 0.0009** |
| Social isolation | | | | | | *r* 1 |
| | | | | | | *p* 0 |

*Note:* * Correlation is at the 1% significance level; ** Correlation is at the 5% significance level.

The nurses from the HCF rated two RF as the least significant: ethnicity other than Caucasian (0.25) and low educational level (0.49). The nurses from the SSF rated four RF as non-significant: ethnicity other than Caucasian (0.16), altered clotting process (0.46), endocrine regulatory dysfunction (0.47), and supressed inflammatory response (0.44). The samples reached an agreement on one non-significant RF – ethnicity other than Caucasian.

## Discussion

The present study aims to confirm the validity of the potential nursing diagnosis Risk for Frail Elderly Syndrome based on the findings of which RF (according to NANDA International Nursing Diagnoses..., 2021) the nurses in the Slovak Republic consider major for the studied diagnosis. There are several simple screening tools used to detect persons with physical weakness or persons at risk of frailty. The well-known and validated tools include: the 5-item scale FRAIL (fatigue, resistance, ambulation, illnesses, and loss of weight) (Morley et al., 2012); the Cardiovascular Health Study Frailty Screening Measure that assesses five indicators – weight loss, exhaustion, low physical activity, slowing, and weakness (Fried et al., 2001); and the Gérontopôle Frailty Screening Tool, which identifies factors such as living alone, weight loss, fatigue, mobility difficulties, and complaints of memory problems and slow gait (Subra et al., 2012). The stated indicators, the factors for age-related frailty and prefrailty, are included also among the RF for the NANDA nursing diagnosis Risk for Frail Elderly Syndrome. To confirm the validity of the nursing diagnosis, we used the DCV model to find out the significance of the RF for the diagnosis. Due to the different duration of nursing care for older adults during hospitalisation in HCF and stays in SSF,

we compared the RF ratings between the nurses-experts from these two settings.

The selected samples of the Slovak nurses-experts from the HCF and SSF – who met the modified Fehring's criteria based on their previous work experience as a nurse and dealing with age-related frailty – rated seven items (*n1*) and 12 items (*n2*) as major (Table 2). The samples reached an agreement on including six items among the major ones: impaired mobility, immobility, chronic illness, history of falls, age >70 years, and social isolation.

The basic causes of frailty are involutional changes that are related to the aging of an organism, the result of which is dysregulation in the functioning of the organism and reduction of compensatory and adaptation mechanisms, which worsens the functional state of health, eliminates independence, and increases the incidence of death (Hoozová, 2014). Thus, the development of frailty is primarily expected in older adults. In the present study, both samples identified age over 70 years as a major risk factor. In a systematic review that included 31 studies, Morley et al. (2013) found that the prevalence of frailty increases significantly in persons older than 80 years, while women (9.6%) were almost twice as likely as men (5.2%) to be frail. In the study by Jazbar et al. (2021), age was significantly associated with prefrailty and weakness, with the likelihood of frailty increasing significantly in the ≥85-year age group. Higher chances of frailty and prefrailty with increasing age are also stated by other studies (Kendhapedi and Devasenapathy, 2019; Melo Filho et al., 2020). However, some authors have stated that a measure of frailty that includes a diverse range of deficits such as functional limitations, morbidity, psychosocial status, and cognitive abilities is a better predictor of the decreased ability to make decisions about self, institutionalisation, and mortality than chronological age alone (Rockwood and Mitnitski, 2011; Schuurmans et al., 2004).

The nurses from the HCF rated female gender as a major RF for frailty; the nurses from the SSF rated it as minor (Table 3). Internationally, the findings are both similar and different. In their observational study on older adults, Melo Filho et al. (2020) found a higher prevalence of frailty in women, mainly due to decrease in strength. In the study by Jazbar et al. (2021), female gender and low educational level were significantly associated with prefrailty but not frailty, with the prevalence of frailty higher in women than in men. Other authors have also identified a higher prevalence of frailty among females (Collard et al., 2012; Morley et al., 2013).

In the present study, both samples rated the following physical RF as major: impaired mobility, immobility, and chronic illness. The *n2* sample also included decrease in muscle strength, decrease in energy, and obesity (Table 2). Decreased daily physical activity, exhaustion, and sedentary lifestyle were rated as minor (Table 3). According to Fried et al. (2001), frailty is considered a synonym for disability, comorbidity, and other characteristics; however, it can be a different clinical syndrome. To operationalise a genotype of frailty, the authors used data from the Cardiovascular Health Study, which found an association between frailty and poorer health, higher rates of comorbid chronic illnesses, and disability. In their study, Jazbar et al. (2021) discovered that the prevalence of frailty in older adults with polypharmacy or multiple chronic illnesses was twice to three times higher than in older adults without these characteristics. The findings of Andrade et al. (2018) confirmed an association between frailty and the presence of disability and chronic illnesses, but also indicated that a significant proportion (26.7%) of individuals with frailty did not have multimorbidity nor limitations in performing activities of daily living. Frailty can potentiate the development or progression of chronic illnesses, and the presence of concomitant diseases can contribute to the development of frailty (Vieira et al., 2013).

In the present study, impaired mobility and immobility had the highest weighted scores (Table 2). Impaired mobility is often a result of decreased muscle strength or energy, and exhaustion, which may lead to limitations in physical activity or even immobility. Roldán-Chicano et al. (2023) identified the mobility-related defining characteristics of the actual nursing diagnosis (Frail Elderly Syndrome) as the most prevalent – decreased activity tolerance, fatigue, impaired physical mobility, and ambulation impairment. According to Melo Filho et al. (2020), the most frequent criterion of frailty was weakness, followed by exhaustion. The risk of older adults being weak and frail was higher among those who were older and had more health issues, higher body mass index and reduced lower extremity strength. Kendhapedi and Devasenapathy (2019) found an association between minimum physical activity in routine work and frailty. Furthermore, Papiol et al. (2016) concluded that poor muscle strength was the most prevalent component of frailty and was closely related to physical activity.

The RF for frailty related to nutrition include items such as malnutrition, obesity, sarcopenia, and sarcopenic obesity. In the present study, only obesity was rated as a major RF in the *n2* sample; the others were rated as minor (Tables 2, 3). Cruz-Jentoft et al. (2017) found that the risk of malnutrition was one of the RF associated with frailty because weight loss, reduced calorie intake, and a specific diet may increase the risk of frailty. According to Blaum et al. (2005), in some people weight gain is related to losing muscle and this being replaced by body fat. A prospective study by Zulfiqar et al. (2022) found that, according to the Fried frailty scale, obesity did not significantly correlate with frailty. Yuan et al. (2021), the authors of a systematic review, concluded that obesity and underweight were associated with an increased risk of frailty in older adults living in a community.

Falls in older adults are among the main geriatric syndromes and are indicators of frailty with serious consequences, leading to increased disability, institutionalisation, and death (Vaňo and Králová, 2008). A history of falls is an important predictor of future falls, and also causes the fear of another fall, which limits physical activity and potentiates the tendency to frailty (Alcolea-Ruiz et al., 2021). In the present study, the RF history of falls was rated as a major factor in both samples (Table 2). The risk factor, fear of falling, was rated as major by the nurses from the SSF; the nurses from the HCF rated it as a minor RF (Tables 2, 3). Malini et al. (2016) concluded that prevalence of fear of falling was high in the population of older adults and was associated with history of falls. Using regression analysis, Qin et al. (2021) found that older adults with a fear of falling were 7.2 times more likely to be frail. The association between frailty syndrome and falls, muscle strength, and performing activities of daily living was also identified by Guedes et al. (2020) in their regression analysis.

In the present study, the psychological risk factors for frailty that were rated as minor by the experts from the HCF and SSF include alteration in cognitive functioning, depression, sadness, and anxiety (Table 3). Some epidemiologic studies state that frailty increases the risk of future cognitive decline, and that cognitive impairment increases the risk of frailty, which suggests that cognition and frailty interact within a cycle of decline associated with ageing (Robertson et al., 2013). In their meta-analysis, Xu et al. (2021) found that cognitive

impairments and depressive syndromes were potential RF associated with frailty in older adults in rural areas. The authors of a Belgian study state the findings from the study on the geriatric department where they proved correlation between physical frailty and decline in cognitive functions in patients (Hammami et al., 2020). Cognitive deficit as a factor associated with frailty was also confirmed by Llano et al. (2019). Feng et al. (2017) found the presence of depressive symptoms to be significant psychological factors for frailty, while Vaughan et al. (2015) have indicated that mood disorders, such as depression, were both RF for and consequences of frailty.

Frailty is affected by lifestyle, and physical, psychological and social factors (Ding et al. 2017). Therefore, the multidimensional approach to frailty, which also includes psychosocial dimensions of frailty, explains the complexity of care needs necessary for the prevention and management of frailty (Lim et al., 2019). The RF for the nursing diagnosis Risk for Frail Elderly Syndrome (NANDA International Nursing Diagnoses..., 2021) associated with social functioning of an older adult were mostly rated as minor in the samples of experts in the present study. The experts from the HCF and SSF reached an agreement on including the item social isolation in the major RF, while the item social vulnerability was rated as major in the *n1* sample and as minor in the *n2* sample, but with the value of the weighted score on the borderline (0.75) (Tables 2, 3). The RF insufficient social support, living alone, economically disadvantaged, and constricted life space were rated as minor by both samples. The experts did not reach an agreement on rating the item low educational level; the nurses from the HCF rated it as non-significant and the nurses from the SSF rated it as minor (Table 3). These different ratings may be explained by the fact that the experts from the SSF had more extensive information about their clients' socio-economic status than the experts from the HCF, due to the significantly longer contact with them. The issue of social factors as frailty determinants has been relatively unstudied nor presented in the international studies, which might relate to the difficulty of studying various aspects of social interactions. In the area of social health in older adults living at home, Chong et al. (2022) found a significant association between frailty and lower level of community integration, or smaller social networks with friends. The association between loneliness and frailty was higher than with other social factors. At the multivariate level, the authors discovered that only loneliness was an independent predictor of frailty. Among others, Pengpid and Peltzer (2019) have identified several sociodemographic RF for frailty: older age, being single, being separated, being divorced, being widowed, and loneliness. In the cross-sectional study by Kendhapedi and Devasenapathy (2019), social factors lower educational level and lower socioeconomic status were independently associated with frailty regardless of the definitions of frailty.

The RF for the nursing diagnosis Risk for Frail Elderly Syndrome (NANDA International Nursing Diagnoses..., 2021) include biological factors such as supressed inflammatory response, altered clotting process, and endocrine regulatory dysfunction. In the present study, these were rated by the experts in the samples differently. The respondents from the HCF rated them as minor (Table 3) and the experts from the SSF rated them as non-significant for validation of the studied diagnosis. This result can be explained by the fact that the nurses from the HCF have better assess to laboratory results and examination reports, and thus also to diagnostic conclusions than the nurses from the SSF. Furthermore, the stated biological factors are rather of the nature of criteria assessed by physicians, and cannot be affected by nursing care, nor are nursing-sensitive factors.

The respondents in the present study reached an agreement on removing one risk factor – ethnicity other than Caucasian. This rating is probably related to the respondents' minimal or lack of professional contact with older adults of an ethnicity other than Caucasian. The conclusions of international studies, however, state higher prevalence of frailty among African Americans (Fried et al., 2001) or non-white individuals (Washington et al., 2019).

In the present study, using the DCV model, seven major (most frequently present) RF were identified in the sample of the nurses from the HCF (*n1*), and 12 major predictive factors were identified in the sample of the nurses from the SSF (*n2*); they can be used for prediction of an onset of frailty in patients/clients of older age and early use of preventive measures. The samples reached an agreement on including six items among the major risk factors: impaired mobility, immobility, chronic illness, history of falls, age >70 years, and social isolation. The findings in the present study and studies by other authors (Jazbar et al., 2021; Melo Filho et al., 2020) emphasise the association between frailty, increasing age, and disability (chronic illnesses), the consequence of which is physical decline manifested by weakness, dependency, falls, and restricted mobility. The fact that the respondents rated social isolation and social vulnerability as major RF suggests holistic perception of individuals. Lacking informal support system (family, friends) causes a feeling of loneliness, and potentiates weakness that can become a barrier when overcoming obstacles. The nurses in both samples rated the psychological risk factors for age-related frailty as minor, with the highest ratings in two items – alteration in cognitive functioning, and depression. Some of the above-mentioned authors state the association between cognition, frailty, and decline caused by ageing, and between cognitive impairments and depressive conditions. The nurses rated most RF as minor, which may be explained by difficulties in objectifying them (decrease in energy, decrease in muscle strength, exhaustion, muscle weakness), nurses' workload, or older adults' non-cooperation in detecting them (economically disadvantaged, sedentary lifestyle, low educational level). We assume that the nurses from SSF rating a higher number of RF as major is associated with a longer stay of clients in such facilities, and thus deeper knowledge of their health issues, psychosocial problems, and personal preferences in all areas of life.

In the study, we were limited by the sample size and the focus on only one region of the Slovak Republic. The smaller size of the *n2* sample is associated with the fact that only some facilities can perform nursing interventions, and only few nurses working in social service facilities met the criteria to be considered experts in nursing diagnostics (mainly bachelor's or master's education). In future research, it is necessary to focus on detection and the comparison of major RF in various regions of Slovakia. We also recommend further validations of the studied diagnosis with a focus on the elderly population in the European and non-European areas.

## Conclusion

Age-related frailty, known in nursing terminology as Risk for Frail Elderly Syndrome or Frail Elderly Syndrome, is a frequently discussed issue which relates both to geriatrics and geriatric nursing care. Therefore, the priority role of nurses is to prevent age-related frailty by the early prediction of an

existing risk and effective prevention. There are multiple risk factors and several tools aimed at identifying them, with varying degrees of validity and reliability. With the use of the DCV model in two samples of experts, the sample of nurses from the HCF identified seven major risk factors that can be predictors of age-related frailty, while the sample of nurses from the SSF identified 12 major risk factors. The samples reached an agreement on six risk factors: impaired mobility, immobility, chronic illness, history of falls, age >70 years, and social isolation. Due to the findings in the present study, we suggest considering their use as key risk factors in all older adults over 70 years of age to improve and facilitate nurses' assessment and guidance for the selection of interventions that are to be used to prevent frailty to make healthcare purposeful and efficient. Confirmation of the validity of the potential nursing diagnosis Risk for Frail Elderly Syndrome based on reliable indicators, its early detection, and intervention will help reduce morbidity, mortality, and healthcare costs.

### *Authors' contributions*

Conception and design (*ĽP, AS*), data analysis and interpretation (*ĽP, AS, ML, AA*), manuscript draft processing (*ĽP, AS, ML, AA*), critical revision of the manuscript (*ĽP, AS, ML, AA*), finalisation of the paper (*ĽP*).

### *Ethical aspects and conflict of interest*

The authors declare that the study has no conflict of interest and ethical aspects of research were followed in processing it. All the respondents were informed of the purpose of the study and agreed to be included in the sample.

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