Frontiers of Nursing • 10(4) • 2023
DOI: 10.2478/FON-2023-0042

sciendo

Frontiers of **Nursing**

Cognitive frailty in the elderly: a concept analysis

Review

Yi-Yin Hu[a], Ronnell D. Dela Rosa[b,*]

[a]*Department of Nursing, The Affiliated Hospital of Guizhou Medical University, Guiyang, Guizhou 550000, China*
[b]*School of Nursing, Philippine Women's University, Malate, Manila 1004, Philippines*

Received: 19 January 2023; Accepted: 23 March 2023; Published: 20 December 2023

Abstract: Frailty is a recession of age-related reserves caused by a variety of causes and is becoming the most important clinical syndrome that affects the health of the elderly. In the elderly, frailty and cognitive dysfunction often exist, and some people have proposed cognitive frailty. Cognitive frailty is an elderly syndrome that increases the risk of dementia, in the same time, and can independently predict the adverse health outcomes of the patient and affect the quality of the patient's survival. This paper, under the guidance of Walker and Avant method, provides theoretical basis for early recognition and intervention of cognitive weakness in the elderly.

Keywords: *antecedents • cognition • concept analysis • consequences • defining attributes • empirical referents • frailty*

© Shanxi Medical Periodical Press Co., Ltd.

1. Introduction

With the increase in life expectancy, frailty and cognitive impairment have become an important determinant of the poor health consequences of the elderly.[1] Frailty is defined as a variety of factors that are associated with age and the decline of the multi-system storage capacity, and the adverse health results of falling, depression, disability, and death rate are related to the disease, which has become a clinical syndrome that affects the health of the elderly.[2,3] The incidence of cognitive dysfunction is increasing in the elderly, which greatly reduces the patients' quality of life and brings serious mental and economic pressure to the family and society. In the past, frailty and cognitive impairment were often studied as separate concepts. However, a growing body of research suggests a strong link between frailty and cognitive impairment or dementia. The concept of cognitive frailty combines the two and emphasizes the simultaneous occurrence of physical frailty and cognitive impairment,[4] thus becoming a new target for healthy aging[5] and secondary prevention of dementia.[6] The incidence of cognitive frailty ranged from 1.0% to 50.1%,[7–10] and its high incidence predicted adverse outcomes in the elderly and increased the risk of adverse outcomes, such as falls,[11] disability,[12] dementia,[13,14] and death.[15,16] Therefore, screening and early recognition of cognitive frailty can reduce adverse health outcomes and improve patients' quality of life. Currently, cognitive frailty is a new concept in the field of geriatrics. Concept

How to cite this article: Hu YY, Dela Rosa RD. Cognitive frailty in the elderly: a concept analysis. *Front Nurs*. 2023;4:393–398.

**Corresponding author.*
E-mail: ronnell.delarosa2020@gmail.com (R. -D. Dela Rosa).

Open Access. © 2023 Hu and Rosa, published by Sciendo. This work is licensed under the Creative Commons Attribution 4.0 License.

analysis can clarify the concept of cognitive frailty and its significance. In this paper, the concept analysis was carried out by using the Walker and the Avant method.[17] The definition attributes of cognitive frailty were extracted from the literature, and then, a model case and a contrary case were given to further explain this definition. The antecedents and consequences of cognitive frailty are explained, and the empirical referents of cognitive frailty are introduced at the end. The aim is to improve the medical staff's understanding of cognitive frailty, promote the in-depth study of cognitive frailty in the elderly, and improve the comprehensive concept of frailty in the elderly.

2. Concept analysis

2.1. Cognitive frailty in the literature

Advanced search strategy was used to locate relevant literature in the PubMed database. Keywords are 'cognitive' and 'frailty' in title field and 'concept' and 'definition' in all text fields, respectively. Combined with Boolean value, 126 full-text English articles were found from 2001 to 2021. After sifting through these articles, more information is needed. So, we also google for 'cognitive' and 'frailty,' choosing the latest and most relevant resources. In addition, references are considered in these articles to add information.

Cognitive frailty was first used in a 2001 study using the clock plotting test by Paganini-Hill et al.[18] In 2006, Panza et al.[19] under the title of 'cognitive decline,' discussed the role of vascular risk factors in regulating the risk of age-related cognitive decline and put forward the view of cognitive decline.

In 2013, an expert consensus group formed by the International Society of Nutrition and Aging (IANA) and the International Society of Geriatrics (IAGG) in Toulouse, France, reached a consensus on the definition of cognitive frailty for the first time. The group defined cognitive frailty as a heterogeneous clinical syndrome in the elderly, characterized by the presence of both physical frailty and cognitive impairment (Clinical Dementia Rating [CDR] Scale = 0.5 point), without a clinical diagnosis of Alzheimer's disease or other dementias.[4] The consensus points out that cognitive impairment is caused by physical factors, excluding the cognitive impairment caused by neurodegenerative diseases.

Ruan et al.[20] further improved the definition framework of cognitive frailty, suggesting that cognitive frailty should be defined as a clinical syndrome of cognitive impairment in elderly individuals (CDR ≤ 0.5 points), which is caused by physical factors (including frailty and pre-frailty stage), and Alzheimer's disease and other dementias should be excluded. At the same time, cognitive frailty includes two subtypes: reversible cognitive frailty and potentially reversible cognitive frailty. The cognitive impairment of reversible cognitive decline is subjective cognitive decline (SCD) and/or positive biomarkers; the memory impairment of potentially reversible cognitive frailty was mild cognitive impairment.

2.2. Defining attributes

Frailty is a gradual and holistic physiological decline of the organism's reserve, which is manifested by a decrease in the body's adaptive response and ability to maintain homeostasis.[21] Frailty can be divided into physical frailty, cognitive frailty, and psychosocial frailty.

Physical frailty, defined as a reduction in physical strength, strength, and physical function that leads to an increased likelihood of disability and death, is widely agreed upon. Frailty can be diagnosed when three or more of the following five criteria are present (fatigue, reduced grip strength, slow pace, reduced energy, and unexplained weight loss), and pre-frailty can be diagnosed when one or two of the five criteria are present.

Cognitive frailty is a clinical syndrome in which both physical frailty and cognitive impairment exist but are not diagnosed as Alzheimer's disease or other dementias. The diagnostic criteria of cognitive frailty should meet the following points: reduced cognitive reserve, dementia was excluded, CDR score: 0.5 (i.e., mild cognitive impairment), and there is also evidence of physical frailty.

2.3. Operational definition

Cognitive frailty is a heterogeneous clinical syndrome with cognitive dysfunction (CDR ≤ 0.5 points) in elderly individuals, whose cognitive impairment is caused by somatic factors (including physical frailty and early physical frailty), while Alzheimer's Disease (AD) or other types of dementia are excluded.

2.4. Model case

Mary was a 75-year-old woman, who was diagnosed with stroke and diabetes. She went to hospital due to physical frailty and poor memory. The doctors used the FRIAL assessment scale and the Chinese version of the Montreal cognitive assessment scale to evaluate Mary, and frailty score was 3 with moderate cognitive impairment.

Non-adaptive physical and cognitive reactions included the following: (1) physical frailty: She felt tired and exhausted most of the time. It was difficult to climb a flight of stairs and walk 500 m. She had lost weight in the

last week. (2) Cognitive impairment: she often lost track of things, forgot things, and was not able to find her way around. Also, she found it difficult to concentrate on one thing. Her cognitive memory was declining.

2.5. Contrary case

Bob was a 78-year-old man who was diagnosed with stroke and diabetes about 6 years ago. Recently, he had been experiencing physical fatigue and memory loss. When he was hospitalized, he was diagnosed with mild cognitive weakness frailty. He was optimistic and lucky to have caught the problem early. He actively cooperated with doctors and nurses and prepared for functional exercise. He got along well with his fellow patients (no non-adaptive physical and cognitive reactions).

2.6. Antecedents

Cognitive frailty can occur for many reasons.

The first reason is demographic characteristics. Kim et al.[9] conducted a study on 1,192 community elderly aged over 70 years in Japan, and the results showed that those with cognitive decline were older. A study of older adults in Malaysia showed that age and education were observably associated with the incidence of cognitive decline.[22] Kim et al.[8] showed that the incidence of cognitive weakness in males (2.8%) was lower than that in females (3.8%). However, a Malaysian study of 815 adults aged 60 years and older found no association between gender and the occurrence of cognitive decline.[22]

The second reason is chronic disease. Studies have shown that chronic disease is an influential factor of cognitive decline.[9] Liu et al.[23] analyzed the data of 678 elderly people aged 65 years and above and found that elderly people with cognitive frailty were more likely to develop diabetes than those without cognitive frailty. A prospective study of people aged 55 years and older found a significant increase in mortality in patients with diabetes who had both physical frailty and cognitive impairment. Years of diabetes were a risk factor for cognitive frailty. [24] In addition, hypoglycemia plays an important role in the pathogenesis of cognitive frailty.[25]

The third reason is nutrition and body mass index (BMI). Kwan et al. [26] found that cognitive decline is associated with malnutrition in 185 adults aged 65 years and older. Lina et al. [17] found in a study of 5708 community elderly that the incidence of cognitive decline was higher in the elderly with low BMI.

The fourth reason is functional status. Lina et al.[17] found in their study that the elderly with disability, slow walking speed, visual impairment, and hearing impairment had a higher incidence of cognitive frailty. Results of a study of 1192 elderly people in the community showed that those with cognitive frailty had weaker grip strength and slower walking speed.[27]

The fifth reason is daily habits. Shimada et al.[28] found in the study that smoking, drinking, and regular exercise can affect the level of cognitive weakness in the elderly. Esteban-Cornejo et al.[15] emphasized that participation in physical activity can improve the survival rate of the elderly with cognitive frailty. In addition, a cross-sectional study in Malaysia found that depression and social support are influencing factors of cognitive decline.[22]

2.7. Consequences

Multisystem dysfunction in frailty older adults reduces their ability to respond to stimuli and increases their susceptibility to adverse health outcomes.[29,30] Studies have shown that frailty is a good predictor of falls, fractures, death, dysfunction, poor quality of life, and institutionalization in older adults. Cognitive impairment significantly increased the predictive effect of frailty on adverse outcomes.[31]

The influence of cognitive frailty on the dysfunction of the elderly is mainly reflected in activities of daily living (ADL) and instrumental activities of daily living (IADL). Roppolo et al.[32] conducted a cross-sectional survey of 594 community elderly in Italy and found that cognitive impairment and fadiness had an interactive effect on disability in the elderly, and the disability level of the elderly with cognitive fadiness was higher than that of the general elderly, with a statistically significant difference ($P < 0.05$).

At present, domestic and foreign research results on the impact of cognitive frailty on hospitalization of the elderly are inconsistent. Liu et al.[33] conducted a study on the elderly aged 70 years and above in the community and showed that compared with the non-cognitive frailty group, the risk of hospitalization in the cognitive frailty group was increased, but there was no statistically significant difference in the risk of hospitalization among the elderly with different levels of cognitive frailty ($P > 0.05$), which was consistent with the research results of Feng et al.[12]

The health level of the elderly is an important factor affecting their quality of life. Studies have pointed out that the recognition of frailty is closely related to the quality of life of the elderly. Yu et al. [34] conducted a prospective cohort study to investigate the impact of pre-frailty with cognitive dysfunction on adverse outcomes in the elderly. The results showed that the risk of low quality of life in pre-frailty elderly with cognitive impairment was significantly increased during the fourth year of follow-up compared with non-frailty elderly with

normal cognition, suggesting that cognitive impairment improves the predictive effect of pre-frailty on low quality of life.

Death is the most common outcome in adverse clinical events. Many studies at home and abroad have shown that cognitive weakness is an independent predictor of death in the elderly.[23,16] Liu et al.[23] followed up 678 elderly patients aged ≥65 years and pointed out that after adjusting the influence of age and gender, cognitive frailty had a good predictive value for the occurrence of death in the elderly. Thein et al.[24] conducted a follow-up investigation on 486 diabetes patients for 11 years, and the results showed that patients with physical frailty combined with cognitive dysfunction had the highest risk of death (HR = 8.41, 95% CI [3. 95, 17.9], $P < 0.001$). Death is the most important outcome variable in bedside outcome, and the predictive effect of cognitive frailty on death may increase the attention of medical staff and their families on cognitive frailty, and medical staff may consider cognitive frailty as a factor in life expectancy assessment to improve the quality of health care for the elderly.

2.8. Empirical referents

Effective screening and diagnostic tools for cognitive frailty can help healthcare providers identify the causes of cognitive frailty and explore possible future health paths for elderly patients, thus providing individualized prevention or intervention measures.[35] The assessment of cognitive decline is divided into two parts.

Assessment of frailty: Fried phenotype is the most commonly used tool for assessing frailty at present. Throughout the relevant studies on cognitive frailty, different operational definitions of cognitive frailty were used, but the assessment of physical frailty was almost all Fried phenotypic assessment tools; Ma et al.[36] only used the frailty index method to assess physical frailty in the assessment of cognitive frailty in China.

Assessment of cognitive function: there is obvious heterogeneity in the assessment of cognitive function and the definition of cognitive impairment; the panel of experts from the International Society for Nutrition and Aging and the International Society of Geriatrics (IANA-IAGG) recommended that all frailty patients should undergo a comprehensive cognitive function assessment to effectively identify cognitive weakness, such as Montreal Cognitive Assessment Quantity (MoCA), MMSE, CDR, and Alzheimer's Disease Assessment Scale (ADAS-Cog).[3] The clinical criteria of pre-MCI SCD and the features of subjective cognitive decline (SCD) are recommended as preliminary screening tools for cognitive impairment with reversible cognitive frailty.

At present, there is no unified cognitive frailty assessment tool; researchers mostly use the physical frailty combined with the cognitive function assessment scale to screen the elderly with cognitive frailty. Therefore, the assessment of cognitive frailty in the elderly still needs to be selected according to the characteristics of each assessment tool and the actual situation of the study.

3. Conclusions

In this article, we emphasized that cognitive frailty is the simultaneous occurrence of physical frailty and cognitive impairment, which is reversible and potentially reversible. Besides, it has many antecedents and different consequences. The predictive value of cognitive weakness on adverse events such as disability, depression, death, and hospitalization in the elderly suggests that medical staff should pay enough attention to cognitive frailty. In the future, nursing staff should strengthen the early recognition and intervention of cognitive frailty in the elderly, so as to achieve healthy aging.

Ethical approval

Ethical issues are not involved in this paper.

Conflicts of interest

All contributing authors declare no conflicts of interest.

References

1. Sink KE, Espeland MA, Castro CM, et al. Effect of a 24-month physical activity intervention vs health education on cognitive outcomes in sedentary older adults: the life randomized trial. *JAMA*. 2015;314:781–790.
2. Strandberg TE, Pitkala KH. Frailty in elderly people. *Lancet*. 2007;369:1328–1329.
3. Meng L, Yu PL. The interpretation of practice guidelines for the management of frailty by British Geriatrics Society. *Chin J Geriatrics*. 2015;34:1300–1302.
4. Kelaiditi E, Cesari M, Canevelli M, et al. Cognitive frailty: rational and definition from an (IANA/IAGG)-international consensus group. *J Nutrition Health Aging*. 2013;17:726–734.

5. Cano A. Cognitive frailty, a new target for healthy ageing. *Maturitas*. 2015;82:139–140.
6. Panza F, Lozupone M, Solfrizzi V, et al. Cognitive frailty: a potential target for secondary prevention of dementia. *Expert Opin Drug Metab Toxicol*. 2017;13:1023–1027.
7. Solfrizzi V, Scafato E, Lozupone M, et al. Additive role of a potentially reversible cognitive frailty model and inflammatory state on the risk of disability: the Italian longitudinal study on aging. *Am J Geriatr Psychiatry*. 2017;25:1236–1248.
8. Kim M, Jeong MJ, Yoo J, Song DY, Won CW. Calf circumference as a screening tool for cognitive frailty in community-dwelling older adults: the Korean frailty and aging cohort study (KFACS). *J Clin Med*. 2018;7:332.
9. Kim H, Awata S, Watanabe Y, et al. Cognitive frailty in community-dwelling older Japanese people: prevalence and its association with falls. *Geriatr Gerontol Int*. 2019;19:647–653.
10. Hao Q, Dong B, Yang M, Dong B, Wei Y. Frailty and cognitive impairment in predicting mortality among oldest-old people. *Front Aging Neurosci*. 2018;10:295.
11. Tsutsumimoto K, Doi T, Makizako H, et al. Cognitive frailty is associated with fall-related fracture among older people. *J Nutr Health Aging*. 2018;22:1216–1220.
12. Feng L, Zin Nyunt MS, Gao Q, Feng L, Yap KB, Ng TP. Cognitive frailty and adverse health outcomes: findings from the Singapore longitudinal ageing studies (SLAS). *J Am Med Dir Assoc*. 2017;18:252–258.
13. Solfrizzi V, Scafato E, Seripa D, et al. Reversible cognitive frailty, dementia, and all-cause mortality. The Italian longitudinal study on aging. *J Am Med Dir Assoc*. 2017;18:89.e1-89.e8.
14. Shimada H, Makizako H, Tsutsumimoto K, Doi T, Lee S, Suzuki T. Cognitive frailty and incidence of dementia in older persons. *J Prev Alzheimers Dis*. 2018;5:42–48.
15. Esteban-Cornejo I, Cabanas-Sánchez V, Higueras-fresnillo S, et al. Cognitive frailty and mortality in a national cohort of older adults: the role of physical activity. *Mayo Clin Proc*. 2019;94:1180–1189.
16. Lee WJ, Peng LN, Liang CK, Loh CH, Chen LK. Cognitive frailty predicting all-cause mortality among community-living older adults in Taiwan, China: a 4-year nationwide population-based cohort study. *PLoS One*. 2018;13:e0200447.
17. Walker L, Avant KC. Strategies for Theory Construction in Nursing. 3rd ed. Norwalk: Appleton and Lange;1994.
18. Paganini-hill A, Clark LJ, Henderson VW, Birge SJ. Clock drawing: analysis in a retirement community. *J Am Geriatr Soc*. 2010;49:941–947.
19. Panza F, D'Introno A, Colacicco AM, et al. Cognitive frailty: predementia syndrome and vascular risk factors. *Neurobiol Aging*. 2006;27:933–940.
20. Ruan Q, Yu Z, Chen M, Bao Z, Li J, He W. Cognitive frailty, a novel target for the prevention of elderly dependency. *Ageing Res Rev*. 2015;20:1–10.
21. Malmstrom TK, Morley JE. Frailty and cognition: linking two common syndromes in older persons. *J Nutr Health Aging*. 2013;17:723–725.
22. Malek RNF, Shanar S, Rajab NF, et al. Cognitive frailty among Malaysian older adults: baseline findings from the LRGS TUA cohort study. *Clin Interv Aging*. 2019;14:1343–1352.
23. Liu LK, Chen CH, Lee WJ, et al. Cognitive frailty and its association with all-cause mortality among community-dwelling older adults in Taiwan, China: results from I-Lan longitudinal aging study. *Rejuvenation Res*. 2018;21:510–517.
24. Thein FS, Li Y, Nyunt MSZ, Gao Q, Wee SL, Ng TP. Physical frailty and cognitive impairment is associated with diabetes and adversely impact functional status and mortality. *Postgrad Med*. 2018;130:561–567.
25. Abdelhafiz AH, Sinclair AJ. Cognitive frailty in older people with type 2 diabetes mellitus: the central role of hypoglycaemia and the need for prevention. *Curr Diab Rep*. 2019;19:15.
26. Kwan RYC, Leung AYM, Yee A, Lau LT, Xu XY, Dai DLK. Cognitive frailty and its association with nutrition and depression in community dwelling older people. *J Nutr Health Aging*. 2019;23:943–948.
27. Chye L, Wei K, Nyunt MSZ, Gao Q, Wee SL, Ng TP. Strong relationship between malnutrition and cognitive frailty in the Singapore longitudinal ageing studies (SLAS-1 and SLAS-2). *J Prev Alzheimers Dis*. 2018;5:142–148.
28. Shimada H, Doi T, Lee S, Makizako H, Chen LK, Arai H. Cognitive frailty predicts incident dementia among community-dwelling older people. *J Clin Med*. 2018;7:250.
29. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *Lancet*. 2013;381:752–762.
30. Ensrud KE, Ewing SK, Cawthon PM, et al. A comparison of frailty indexes for the prediction of falls, disability, fractures, and mortality in older men. *J Am Geriatr Soc*. 2009;57:492–498.
31. Avila-funes JA, Amieva H, Barberger-gateau P, et al. Cognitive impairment improves the predictive validity of the phenotype of frailty for adverse health outcomes: the three-city study. *J Am Geriatr Soc*. 2009;57:453–461.

32. Roppolo M, Mulasso A, Rabaglietti E. Cognitive frailty in Italian community-dwelling older adults: prevalence rate and its association with disability. *J Nutr Health Aging*. 2017;21:631–636.
33. Liu Z, Han L, Gahbauer EA, Allore HG, Gill TM. Joint trajectories of cognition and frailty and associated burden of patient-reported outcomes. *J Am Med Dir Assoc*. 2018;19:304–309.
34. Yu R, Morley JE, Kwork T, Leung J, Cheung O, Woo J. The effects of combinations of cognitive impairment and pre-frailty on adverse outcomes from a prospective community-based cohort study of older Chinese people. *Front Med (Lausanne)*. 2018; 5:50.
35. Fougère B, Delrieu J, Del Campo N, Soriano G, Sourdet S, Vellas B. Cognitive frailty: mechanisms, tools to measure, prevention and controversy. *Clin Geriatr Med*. 2017;33:339–355.
36. Ma L, Zhang L, Zhang Y, Li Y, Tang Z, Chan P. Cognitive frailty in China: results from China comprehensive geriatric assessment study. *Front Med (Lausanne)*. 2017;4:174.