ORIGINAL RESEARCH

DOI: 10.4274/ejgg.galenos.2023.2023-9-7
Eur J Geriatr Gerontol

Self-efficacy and Optimism in Frail Older Men Without Functional Disability Attending Geriatric Outpatient Clinic: a Case-control Study

Doaa Ageez[1,2], Heba Shereif El-Sobky[2], Nessma Hussein Mohammed[1], Doha Rasheedy Aly[1], Heba Mohamed Hamed Shaltoot[1]

[1]Ain Shams University Faculty of Medicine, Department of Geriatrics, Cairo, Egypt
[2]Mansoura University Faculty of Medicine, Department of Geriatrics, Mansoura, Egypt

Abstract

Objective: Psychological frailty, including cognitive, mood, and motivational components, is an important predictor of overall well-being. Therefore, there is an increasing scientific interest in studying different determinants of psychological frailty. Unfortunately, the psychological components of frailty are not fully evaluated and currently, there is currently no consensus on the proper assessment or intervention. This study evaluated optimism and self-efficacy among frail older men without functional disability.

Materials and Methods: A case-control study. Seventy older men ≥60 years were divided into frail and non-frail groups. The self-efficacy scale (SES) and revised life orientation test (R-LOT) were applied for all participants, in addition to the comprehensive geriatric assessment, to determine other factors affecting physical frailty.

Results: Those with physical frailty had lower self-efficacy and optimism scores. R-LOT and SES had moderate diagnostic accuracy in predicting frailty; the area under the curve for both tools were 0.75 and 0.71, respectively.

Conclusion: There is an association between poor general self-efficacy, low optimism, and frailty among older men. Thus, the importance of addressing the psychological determinants of frailty is on par with that of addressing the physical components. Integrating the SES and R-LOT scales into the comprehensive assessment of older men with physical frailty can improve the assessment of psychological resilience, ultimately promoting their well-being and quality of life.

Keywords: Frailty, optimism, revised life orientation test, self-efficacy, self-efficacy scale

Introduction

Frailty is a growing global health challenge that affects healthcare systems worldwide. The prevalence of frailty is exponentially rising due to graying of the population (1).

Frailty is a condition of reduced resilience due to dysregulated homeostasis that increases vulnerability to stressors and delays recovery (2), leading to many adverse outcomes, including dependence, falls, long-term institutionalization, hospitalization, and increased mortality (3).

Frailty is a multifaceted concept that extends beyond physical decline, encompassing a spectrum of deficits in cognitive, social, and psychological domains (4). Recently, psychological frailty was described as a multi-component concept that includes mood, cognitive, mental, and fatigue-associated problems (5).

Psychological resilience, optimism, and self-efficacy are interrelated constructs that play a crucial role in the ability to positively adapt to stressors (4,5).

Address for Correspondence: Doaa Ageez, Ain Shams University Faculty of Medicine; Mansoura University Faculty of Medicine, Department of Geriatrics, Cairo, Mansoura, Egypt
E-mail: doaaageez1995@hotmail.com **ORCID:** orcid.org/0009-0005-6683-3894
Received: 29.09.2023 **Accepted:** 19.12.2023

Cite this article as: Ageez D, El-Sobky HS, Mohammed NH, Aly DR, Shaltoot HMH. Self-efficacy and Optimism in Frail Older Men Without Functional Disability Attending Geriatric Outpatient Clinic: a Case-Control Study. Eur J Geriatr Gerontol

Optimism as a cognitive construct is defined as positive expectations regarding future outcomes (6). Older adults with higher levels of optimism have a longer lifespan (7), as they are more likely to embrace healthier lifestyles, such as participating in regular physical activity, eating a healthy diet, and smoking cessation (8).

Self-efficacy is defined as having the confidence of being able to accomplish a specific behavior to achieve specific performance expectations (9). Self-efficacy is flexible and responsive to change; thus, it can be effectively targeted in healthcare-related interventions. Augmenting self-efficacy promotes health behaviors such as physical exercise and maintaining a healthy diet (10). The impact of physical frailty on optimism and self-efficacy remains an area of limited research. These psychological factors should be examined for their potential role in patient-centered interventions. Therefore, this study quantified the effect of frailty on self-efficacy and optimism in older men.

Materials and Methods

A case-control study was conducted on 70 older men aged 60 years, and above recruited from the geriatric outpatient clinic at Mansoura University Hospital, Mansoura, Egypt, between August 2022 and March 2023. A sample size of 35 cases and 35 controls achieves a power of 80% according to Doba et al. (11). We used a purposive random sampling. The frailty status was rated according to the modifications of Fried criteria adopted by Avila-Funes et al. (12). The score ≥3 was considered frail. Those who scored 0 were non-frail (Robust) individuals. Exclusion criteria: individuals categorized as pre-frail, patients with acute or chronic conditions that could interfere with the initial assessment or communication, patients with functional disabilities who need aid in one or more of the basic activities of daily living (ADL) (13), and patients with a diagnosis of dementia or depression.

Data Collection and Assessment Tools

The older men attending the clinic underwent comprehensive geriatric assessment and were assessed for eligibility through the following:

- Proper history taking.
- Mini nutritional assessment (MNA) (14) to evaluate the risk of malnutrition. The participants were rated malnourished if scored less than 17, at risk of malnutrition with scores between 17 and 23.5, and well-nourished with scores ≥24.
- The Arabic version of the mini-mental state examination (15,16): excludes patients with dementia. The interpretation of results was performed according to the normal reference values adjusted for age and education (17).
- The Arabic version of the geriatric depression scale (GDS) (18,19): Those who scored five or more indicated potential depression, and accordingly, they were excluded from the study (20).
- ADL (21), and instrumental activities of daily living (IADL) (22): Those with ADL <6 were excluded based on the presence of physical disability.

The participants were assigned to either the frail group or the non-frail group using the physical frailty phenotype (PFP) (23), according to the modifications made by Avila-Funes et al. (12). The PFP includes five criteria: slowness, unintentional weight loss, weakness, low physical activity, and exhaustion.

Both groups underwent: optimism assessment using the Arabic version of the revised life orientation test (R-LOT) (24). The R-LOT is a self-report measure that assesses motivation and the participant's expectations regarding future outcomes. This is a 10-item questionnaire consisting of direct-scored, reverse-scored, and filler items. Scores ranging from 0 to 13 indicated low optimism, 14 to 18 indicated moderate optimism, and 19 to 24 indicated high optimism.

Self-efficacy was assessed using the Arabic version (25) of the general efficacy scale (26). It is a self-report tool that assesses confidence in the ability to face challenges. It consists of 10 items rated according to a 4-point Likert scale ranging from 1 "not at all true" to 4 "exactly true". The overall score ranges from 10 to 40. Higher scores (≥29) indicate high self-efficacy, whereas lower scores (<29) indicate low self-efficacy.

The study methodology was revised and approved by the Ethical Committee of Ain Shams University Hospitals (approval number: 490/2022, date: 9.8.2022). All study participants were interviewed during clinic visits. We respected confidentiality and obtained their informed written consent for participation.

Statistics

Collected data were encoded, tabulated, and statistically analysed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0 (IBM Corp., Chicago, USA, 2021. Quantitative data were described as mean ± standard deviation and compared using an independent t-test for two independent groups and an ANOVA test for three independent groups. Qualitative data were described as numbers and percentages and compared using the chi-square test or Fisher's exact test. The receiver operating characteristic curve was used to evaluate the performance of self-efficacy scale (SES) and R-LOT for diagnosing physical frailty. A $p<0.050$ was considered significant.

Results

Seventy older men were enrolled in this study; they were evenly divided between the frail and non-frail groups. The

sociodemographic variables were matched between the two groups.

Compared with the robust group, the frail group reported an increased prevalence of sleep problems, social inactivity, and higher chronic pain levels. In addition, MNA and IADL scores were notably lower, malnutrition was more prevalent, GDS scores were significantly higher, and there was a significantly higher number of comorbid conditions. Moreover, body mass index (BMI) was significantly lower in the frail group (Table 1).

Self-efficacy, measured by SES, had a mean score of 25.3±5 among frail group and 28.1±4.6% in the robust group, whereas optimism, measured by R-LOT, had a mean score of 12.7±3.3 in

Table 1. Sociodemographic and clinical characteristics of the study groups

Variables		Frail group (Total=35)	Control group (Total =35)	p-value
Age (years)	Mean ± SD	69.1±5.1	67.7±4.0	^0.195
Education	Educated	13 (37.1%)	13 (37.1%)	#0.999
	Illiterate	22 (62.9%)	22 (62.9%)	
Caregiver	Family	35 (100.0%)	33 (94.3%)	§0.493
	Paid	0 (0.0%)	2 (5.7%)	
Marital status	Married	28 (80.0%)	31 (88.6%)	#0.324
	Unmarried	7 (20.0%)	4 (11.4%)	
Living arrangement	Alone	3 (8.6%)	4 (11.4%)	§0.999
	With spouse	32 (91.4%)	31 (88.6%)	
Presence of social events in the last 6 months		14 (40.0%)	9 (25.7%)	#0.203
Presence of economic problems		25 (71.4%)	21 (60.0%)	#0.314
Smoking	None	9 (25.7%)	14 (40.0%)	#0.203
	Current/Ex	26 (74.3%)	21 (60.0%)	
BMI (kg/m²)		19.4±3.7	21.5±2.8	^0.010
Sleep problems		28 (80.0%)	12 (34.3%)	#<0.001
Lack of social activities		25 (71.4%)	12 (34.3%)	#0.002
Pain	None	12 (34.3%)[a]	20 (57.1%)[a]	#0.015
	Mild	14 (40.0%)[a]	14 (40.0%)[a]	
	Moderate	8 (25.7%)[a]	1 (2.9%)[b]	
MNA	Mean ± SD	20.9±3.5	23.9±3.0	^<0.001
Nutritional status	Normal	11 (31.4%)	27 (77.1%)	#<0.001
	At risk/Malnourished	24 (68.6%)	8 (22.9%)	
MMSE		26.5±2.2	27.1±2.0	^0.230
GDS		3.4±0.8	1.6±1.3	^<0.001
IADL		4.7±0.9	7.7±0.7	^<0.001
DM		20 (57.1%)	10 (28.6%)	#0.016
Hypertension		16 (45.7%)	12 (34.3%)	#0.329
IHD		14 (40.0%)	14 (40.0%)	#0.999
Stroke		3 (8.6%)	1 (2.9%)	§0.614
CKD		6 (17.1%)	5 (14.3%)	#0.743
CLD		16 (45.7%)	11 (31.4%)	#0.220
COPD		10 (28.6%)	5 (14.3%)	#0.145
Anaemia		9 (25.7%)	6 (17.1%)	#0.382
Thyroid		2 (5.7%)	2 (5.7%)	#0.999
Number of comorbidities		2.7±1.4	1.9±1.1	^0.004*
Number of medications		5.1±3.0	4.8±1.8	^0.56

^:Independent t-test, #:Chi-square test, §:Fisher's exact test, SD: Standard deviation MNA: Mini nutritional assessment, MMSE: Mini-mental state examination, GDS: Geriatric depression score, IADL: Instrumental activities of daily living, COPD: Chronic obstructive pulmonary disease, CLD: Chronic liver disease, CKD: Chronic kidney disease, IHD: Ischemic heart disease, DM: Diabetes mellitus, BMI: Body mass index

the frail group compared with 16.6±4.4 in the robust group. Both SES and R-LOT scores were significantly lower in the frail group (Table 2). Both R-LOT and SES demonstrated moderate diagnostic accuracy in predicting frailty, with an area under the curve of 0.75 for R-LOT ≤17 and 0.71 for SES ≤30 (refer to Figure 1).

Self-efficacy was significantly lowest in patients with low optimism as measured by R-LOT, with no significant difference between moderate and high grades (Table 3).

There was a positive correlation between SES and R-LOT scores, with (r=0.611, p<0.0001). After adjusting for the following confounding factors (MNA score, presence of chronic pain, sleep problems, and the number of comorbidities), the correlation analysis between SES and R-LOT score was (r=0.518, p=0.003) in the frail group and (r=0.568, p<0.001) in the robust group (Table 4).

Discussion

In this study, health-related factors affecting frailty were evaluated, and the effect of frailty on optimism and self-efficacy was assessed. Both SES and R-LOT scores were significantly lower in the frail group. Moreover, there was a positive correlation between the R-LOT and SES scores. The SES score was significantly lower in patients with low optimism; however, there was no significant difference between moderate and high levels of optimism regarding SES scores. The impact of physical frailty on self-efficacy has attracted increasing attention in the past few years. In addition to its impact on emotional, behavioral, and cognitive performance, self-efficacy also affects the biological responses to stressors, playing an essential role in both mental and physical well-being (27). There was a direct effect of general self-efficacy on frailty in 327 hospitalized older patients aged ≥60 years with chronic medical conditions. However, loneliness played a mediating role in this relationship (27).

Hladek et al. (10), in their study, reported that high self-efficacy was negatively correlated with pre-frailty and frailty. The odds

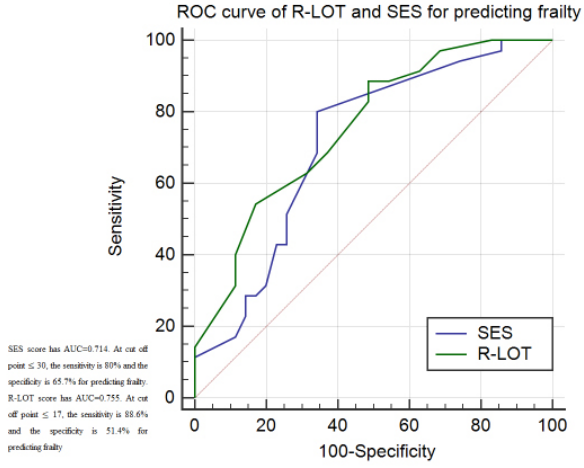

Figure 1. ROC curve for R-LOT and SES in predicting frailty. R-LOT and SES demonstrated moderate diagnostic accuracy in predicting frailty, with an AUC of 0.75 for R-LOT ≤17 with a sensitivity of 88.6% and a specificity of 51.4%, and an AUC of 0.71 for SES ≤30 with a sensitivity of 80% and a specificity of 65.7% for predicting frailty.

ROC: Receiver operating characteristics, R-LOT: Revised life orientation test, SES: Self-efficacy scale, AUC: Area under the curve

Table 2. Optimism and self-efficacy among the study groups

Variables		Frail group (Total=35)	Control group (Total =35)	p-value
R-LOT score		12.7±3.3	16.6±4.4	ˆ<0.001*
R-LOT interpretation	Low optimism	22 (62.9%)	11 (31.4%)	#0.007*
	Moderate optimism	10 (28.6%)	11 (31.4%)	
	High optimism	3 (8.6%)	13 (37.2%)	
SES score		25.3±5.0	28.1±4.6	ˆ0.015*
SES interpretation	Low	24 (68.6%)	12 (34.3%)	#0.004*
	High	11 (31.4%)	23 (65.7%)	

ˆ: Independent t-test, #: Chi-square test, R-LOT: Revised life orientation test, SES: Self-efficacy scale

Table 3. Comparison between cases with low, moderate, and high optimism as measured by R-LOT regarding self-efficacy

Variables		Low Optimism (Total=22)	Moderate Optimism (Total=10)	High Optimism (Total=3)	p-value
SES score		23.6±5.5[a]	28.3±1.8[b]	27.3±2.9[b]	ˆ0.031*
SES interpretation	Low	16 (72.7%)	7 (70.0%)	1 (33.3%)	§0.459
	High	6 (27.3%)	3 (30.0%)	2 (66.7%)	

ˆ: Independent t-test, #: Chi-square test, §: Fisher's exact test, R-LOT: Revised life orientation test, SES: Self-efficacy scale

of frailty decreased by 91% after adjusting for confounding factors (age, comorbidities, and life events). Furthermore, low self-efficacy was an independent predictor of frailty in a linear regression model (11).

In their prospective cohort study, Hladek et al. (28) reported that low general self-efficacy predicted incident frailty during seven years of follow-up. The risk of incident frailty increased by 41% in older adults with low self-efficacy after adjustment for other confounding variables.

Optimism as a psychological construct was associated with the adoption of healthy behaviors. Studies have shown that optimistic adults tend to have enhanced health status and that optimism can benefit those with various chronic medical conditions, including cancer, diabetes, cardiovascular, and neurological diseases (29). In this study, 62.9% of frail men had low optimism levels, whereas only 31.4% of those in the robust group exhibited low levels of optimism. It is well established that optimistic people tend to adapt more effectively to the challenges of aging and life stressors by using coping strategies such as problem-solving, seeking support from others, and reevaluating situations to find more positive views (30).

Similar findings were reported by Kim and Won (31), who found that individuals with frailty exhibited lower levels of optimism than those without frailty. This association persisted after accounting for age, malnutrition, cognitive function, and physical activity. However, this association between frailty and optimism was partially attributed to depression.

Wang et al. (32) reported that a higher level of optimism decreased the odds of frailty. However, after adjusting for age, gender, social factors, self-rated health, smoking, dietary factors, and physical activity, optimism was no longer associated with frailty.

The SES score was significantly lowest in cases with low optimism. This association was anticipated, given the shared conceptual underpinnings of self-efficacy and optimism and their established role in predicting overall well-being (6).

The association between the two constructs was evaluated in relation to academic performance (33), psychological health (34), and inflammatory bowel disease activity (35). However, to date, no study has examined this relationship in frail men. 51.4% of our frail patients were underweight. Our result aligns with the observation made by Xu et al. (36) who found that those with low BMI were more at risk of frailty. Similarly, Wu et al. (37) showed that the incidence of sarcopenia increases with low BMI. According to the Fried criteria of PFP, unintentional weight loss and/or BMI <18 kg/m^2 were addressed as a component of physical frailty (23).

There was an increased prevalence of higher chronic pain among patients. This agrees with other studies in which the prevalence of both frailty and chronic pain was related (38-40).

Sleep problems are another important determinant of frailty. Our study is consistent with Pourmotabbed et al. (41), who found that experiencing daytime sleepiness, breathing sleep

Table 4. Correlations of frailty, LOT, and SES scores between the frail and control groups

		Among the frail group			Among the control group	
Variables		**Frailty score**	**LOT score**	**SES score**	**LOT score**	**SES score**
LOT	**r**	-0.315				
	p-value	0.084				
SES	**r**	-0.358	0.518		0.568	
	p-value	0.048	0.003		0.001	
Age	**r**	-0.146	0.017	-0.097	0.085	0.181
	p-value	0.433	0.927	0.604	0.649	0.329
Medications number	**r**	-0.096	-0.327	-0.223	-0.115	-0.293
	p-value	0.606	0.073	0.227	0.539	0.110
BMI	**r**	0.041	0.026	0.124	-0.123	-0.008
	p-value	0.829	0.890	0.506	0.510	0.965
MMSE	**r**	-0.182	0.276	0.467	0.177	-0.156
	p-value	0.327	0.133	0.008	0.341	0.403
GDS	**r**	-0.044	0.183	-0.232	-0.139	-0.303
	p-value	0.816	0.324	0.209	0.456	0.098
IADL	**r**	-0.311	0.053	0.134	0.030	0.120
	p-value	0.089	0.776	0.472	0.872	0.520

Partial correlation, with control for number of comorbidities, MNA, pain, sleep problems. r: Correlation coefficient, R-LOT: Revised life orientation test, SES: Self-efficacy scale MNA: Mini nutritional assessment, MMSE: Mini-mental state examination, GDS: Geriatric depression score, IADL: Instrumental activities of daily living, BMI: Body mass index

problems, and prolonged sleep latency increased the risk of frailty. In our participants, the lack of social activities was more prevalent among the frail group. This aligns with previous research indicating that the risk of physical frailty was higher in those experiencing social isolation and a sense of loneliness, especially in older men (42,43). We agree with Zhang et al. (44) that malnutrition and high risk of malnutrition were substantially more frequent among the frail group.

Frail were more dependent on IADL compared with the control group. Many researchers have concluded similar results (45,46). Generally, frail older adults are more prone to develop or worsen disabilities in ADL and IADL.

Although older adults with depression (GDS ≥5) were excluded from this study, frail cases scored higher on GDS. Accumulating evidence suggests a reciprocal relationship between depressive symptoms and physical frailty in older adults. They are both common among older adults, and each of them can increase the likelihood of developing the others (47).

The number of comorbidities was higher among frail men. Diabetes mellitus was more prevalent in the frail group (57.1%). This is consistent with previous studies showing an association between multimorbidity and frailty. Indeed, most frail older adults have multiple chronic conditions, but not all multimorbid individuals are frail. Nevertheless, multimorbidity increases the risk of mortality in frail patients (48,49).

Study Limitations

We recognize that our study has certain limitations. The relatively small sample size and the use of a case-control design limit our ability to establish definitive causal relationships. Moreover, the study participants were men and predominantly from the young-old age group; thus, further research is needed to validate these findings in women and older participants. Additionally, inclusion of patients with moderate pain could have biased the results because pain can negatively impact mood and other psychological factors. Future interventional psychological and behavioral studies are needed to determine the potential protective effect of promoting self-efficacy and optimism on frailty.

Conclusion

An association exists between poor general self-efficacy, low optimism, and the presence of frailty among older men. The SES and R-LOT scales were moderately accurate in predicting frailty. Therefore, these scales could be used as part of a comprehensive evaluation of frail older men. Healthcare providers, particularly geriatricians, should address the psychosocial determinants of frailty. Psychological interventions that enhance self-efficacy, optimism, and other aspects of psychological frailty are crucial. These interventions, in addition to managing other factors such as nutrition, physical activity, polypharmacy, depression, sleep problems, social isolation, and traditional medical interventions for physical frailty, could significantly benefit older adults by delaying the onset of frailty and mitigating its negative consequences.

Acknowledgements

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors would like to thank all the seniors who participated in the study for their time and effort.

Ethics

Ethics Committee Approval: The study methodology was revised and approved by the Ethical Committee of Ain Shams University Hospitals (approval number: 490/2022, date: 09.08.2022).

Informed Consent: Informed consent was obtained.

Authorship Contributions

Surgical and Medical Practices: D.A., H.S.E., Concept: D.R.A., H.M.H.S., Design: D.R.A., H.M.H.S., Data Collection or Processing: D.A., Analysis or Interpretation: D.A., D.R.A., N.H.M., H.M.H.S., H.S.E., Literature Search: D.A., D.R.A., N.H.M., H.M.H.S., H.S.E., Writing: D.A., D.R.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Hoogendijk EO, Afilalo J, Ensrud KE, Kowal P, Onder G, Fried LP. Frailty: implications for clinical practice and public health. The Lancet 2019;394:1365-1375.
2. Joseph B, Saljuqi AT, Amos JD, Teichman A, Whitmill ML, Anand T, Hosseinpour H, Burruss SK, Dunn JA, Najafi K, Godat LN, Enniss TM, Shoultz TH, Egodage T, Bongiovanni T, Hazelton JP, Colling KP, Costantini TW, Stein DM, Schroeppel TJ, Nahmias J; AAST Frailty MIT Study Group. Prospective validation and application of the Trauma-Specific Frailty Index: Results of an American Association for the Surgery of Trauma multi-institutional observational trial. J Trauma Acute Care Surg 2023;1;94:36-44.
3. Howlett SE, Rutenberg AD, Rockwood K. The degree of frailty as a translational measure of health in aging. Nature Aging 2021;1:651-665.
4. Morley JE. The New Geriatric Giants. Clin Geriatr Med 2017;33:xi-xii.
5. Zhao J, Liu YWJ, Tyrovolas S, Mutz J. Exploring the concept of psychological frailty in older adults: a systematic scoping review. J Clin Epidemiol 2023;159:300-308.
6. Schwarzer R, Warner LM. Perceived Self-Efficacy and its Relationship to Resilience. In: Prince-Embury, S., Saklofske, D. (eds) Resilience in Children, Adolescents, and Adults. The Springer Series on Human Exceptionality. Springer 2013;139-150.

7. Koga HK, Trudel-Fitzgerald C, Lee LO, James P, Kroenke C, Garcia L, Shadyab AH, Salmoirago-Blotcher E, Manson JE, Grodstein F, Kubzansky LD. Optimism, lifestyle, and longevity in a racially diverse cohort of women. J Am Geriatr Soc 2022;70:2793-2804.
8. dos Santos SB, Rocha GP, Fernandez LL, de Padua AC, Reppold CT. Association of Lower Spiritual Well-Being, Social Support, Self-Esteem, Subjective Well-Being, Optimism and Hope Scores With Mild Cognitive Impairment and Mild Dementia. Front Psychol 2018;3;9:371.
9. Bandura A, Freeman WH, Lightsey R. Self-Efficacy: The Exercise of Control. Journal of Cognitive Psychotherapy 1999;13:158-166.
10. Hladek MD, Gill J, Bandeen-Roche K, Walston J, Allen J, Hinkle JL, Lorig K, Szanton SL. High coping self-efficacy associated with lower odds of pre-frailty/frailty in older adults with chronic disease. Aging Ment Health 2020;24:1956-1962.
11. Doba N, Tokuda Y, Saiki K, Kushiro T, Hirano M, Matsubara Y, Hinohara S. Assessment of Self-Efficacy and its Relationship with Frailty in the Elderly. Intern Med 2016;55:2785-2792.
12. Avila-Funes JA, Helmer C, Amieva H, Barberger-Gateau P, Le Goff M, Ritchie K, Portet F, Carrière I, Tavernier B, Gutiérrez-Robledo LM, Dartigues JF. Frailty among community-dwelling elderly people in France: the three-city study. J Gerontol A Biol Sci Med Sci 2008;63:1089-1096.
13. Marengoni A, Angleman S, Fratiglioni L. Prevalence of Disability According to Multimorbidity and Disease Clustering: A Population-Based Study. Journal of Comorbidity 2011;1:11-18.
14. Guigoz Y, Vellas B. The Mini Nutritional Assessment (MNA) for grading the nutritional state of elderly patients: presentation of the MNA, history and validation. Nestle Nutr Workshop Ser Clin Perform Programme 1999;1:3-11.
15. El-Okl MA, Elbanoby MH, Eletrby MA, MN. MAaE. Prevalence of Alzheimer dementia and other causes of dementia in Egyptian elderly. MD thesis, Faculty of Medicine, Ain Shams University. Geriatric Department Library 2002.
16. Folstein MF, Folstein SE, McHugh PR. Mini-mental state. Journal of Psychiatric Research 1975;12:189-198.
17. Crum RM. Population-based norms for the Mini-Mental State Examination by age and educational level. JAMA 1993;269:2386-2391.
18. Shehata AS, Elbanoby MH, M MAaG. Prevalence of depression among Egyptian geriatric community. Faculty of Medicine, Ain Shams University 1998.
19. Sheikh. Yesavage, A. J. 9/Geriatric Depression Scale (GDS). Clinical Gerontologist 1986;5:165-173.
20. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, Leirer VO. Development and validation of a geriatric depression screening scale: a preliminary report. J Psychiatr Res 1982;17:37-49.
21. Katz S, Ford Ab, Moskowitz Rw, Jackson Ba, Jaffe Mw. Studies Of Illness in the Aged. The Index of ADL: a Standardized Measure of Biological and Psychosocial Function. JAMA 1963;185:914-919.
22. Lawton MP, Brody EM. Assessment of Older People: Self-Maintaining and Instrumental Activities of Daily Living. The Gerontologist 1969;9:179-186.
23. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, Seeman T, Tracy R, Kop WJ, Burke G, McBurnie MA; Cardiovascular Health Study Collaborative Research Group. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci 2001;56:M146-M157.
24. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. J Pers Soc Psychol 1994;67:1063-1078.
25. Rudwan SJ. Expectations of self-efficacy "theoretical construction and measurement". Social Affairs Collection, Sharjah 1997;14:25-51.
26. Schwarzer R, Jerusalem M. General Self-Efficacy Scale. PsycTESTS Dataset: American Psychological Association 1995.
27. Li X, Yang K, An Y, Liu M, Yan C, Huang R. General self-efficacy and frailty in hospitalized older patients: The mediating effect of loneliness. Geriatric Nursing 2022;48:315-319.
28. Hladek MD, Zhu J, Buta BJ, Szanton SL, Bandeen-Roche K, Walston JD, Xue QL. Self-efficacy proxy predicts frailty incidence over time in non-institutionalized older adults. J Am Geriatr Soc 2021;69:3507-3518.
29. Schiavon CC, Marchetti E, Gurgel LG, Busnello FM, Reppold CT. Optimism and Hope in Chronic Disease: A Systematic Review. Front Psychol 2017;4;7:2022.
30. Nes LS, Segerstrom SC. Dispositional optimism and coping: a meta-analytic review. Pers Soc Psychol Rev 2006;10:235-251.
31. Kim S, Won CW. Optimistic orientation and frailty in community-dwelling older adults: Results from KFACS study. Experimental Gerontology 2022;170:111963.
32. Wang Y, Chen Y, Xu J, Chen H, Gao J. Association between resilience and frailty among Chinese older adults. Frontiers in Psychiatry 2022;15;13:948958.
33. Popa-Velea O, Pîrvan I, Diaconescu LV. The Impact of Self-Efficacy, Optimism, Resilience and Perceived Stress on Academic Performance and Its Subjective Evaluation: A Cross-Sectional Study. Int J Environ Res Public Health 2021;24;18:8911.
34. Dionigi A, Casu G, Gremigni P. Associations of Self-Efficacy, Optimism, and Empathy with Psychological Health in Healthcare Volunteers. Int J Environ Res Public Health 2020;18;17:6001.
35. Stone JK, Shafer LA, Graff LA, Witges K, Sexton K, Lix LM, Haviva C, Targownik LE, Bernstein CN. The association of efficacy, optimism, uncertainty and health anxiety with inflammatory bowel disease activity. J Psychosom Res 2022;154:110719.
36. Xu L, Zhang J, Shen S, Hong X, Zeng X, Yang Y, Liu Z, Chen L, Chen X. Association Between Body Composition and Frailty in Elder Inpatients. Clin Interv Aging 2020;4;15:313-320.
37. Wu LC, Kao HH, Chen HJ, Huang PF. Preliminary screening for sarcopenia and related risk factors among the elderly. Medicine 2021;14;100:e25946.
38. Pedro O, Reyes, Perea EG, Marcos AP. Chronic pain and frailty in community-dwelling older adults: A systematic review. Pain Management Nursing 2019;20:309-315.
39. Yamada K, Kubota Y, Iso H, Oka H, Katsuhira J, Matsudaira K. Association of body mass index with chronic pain prevalence: a large population-based cross-sectional study in Japan. Journal of Anesthesia 2018;32:360-367.
40. Chen C, Winterstein AG, Fillingim RB, Wei YJ. Body weight, frailty, and chronic pain in older adults: a cross-sectional study. BMC Geriatr 2019;24;19:143.
41. Pourmotabbed A, Boozari B, Babaei A, Asbaghi O, Campbell MS, Mohammadi H, Hadi A, Moradi S. Sleep and frailty risk: a systematic review and meta-analysis. Sleep Breath 2020;24:1187-1197.
42. Davies K, Maharani A, Chandola T, Todd C, Pendleton N. The longitudinal relationship between loneliness, social isolation, and frailty in older adults in England: a prospective analysis. Lancet Healthy Longev 202;2:e70-e77.
43. Mehrabi F, Béland F. Effects of social isolation, loneliness and frailty on health outcomes and their possible mediators and moderators in community-dwelling older adults: A scoping review. Arch Gerontol Geriatr 2020;90:104119.
44. Zhang Q, Yu S, Li Q, Zhang M, Meng L, Hu S. Preoperative Nutritional Status in Elderly Inpatients with Gastrointestinal Cancer and Its Linear Association with Frailty. Nutr Cancer 2022;74:1376-1387.
45. Zamudio-Rodríguez A, Letenneur L, Féart C, Avila-Funes JA, Amieva H, Pérès K. The disability process: is there a place for frailty? Age and Ageing 2020;49:764-770.
46. Pérez-Ros P, Vila-Candel R, López-Hernández L, Martínez-Arnau FM. Nutritional Status and Risk Factors for Frailty in Community-Dwelling Older People: A Cross-Sectional Study. Nutrients 2020;12:1041.

47. Soysal P, Veronese N, Thompson T, Kahl KG, Fernandes BS, Prina AM, Solmi M, Schofield P, Koyanagi A, Tseng PT, Lin PY, Chu CS, Cosco TD, Cesari M, Carvalho AF, Stubbs B. Relationship between depression and frailty in older adults: A systematic review and meta-analysis. Ageing Res Rev 2017;36:78-87.

48. Vetrano DL, Palmer K, Marengoni A, Marzetti E, Lattanzio F, Roller-Wirnsberger R, Lopez Samaniego L, Rodríguez-Mañas L, Bernabei R, Onder G; Joint Action ADVANTAGE WP4 Group. Frailty and Multimorbidity: A Systematic Review and Meta-analysis. J Gerontol A Biol Sci Med Sci 2019;23;74:659-666.

49. Hanlon P, Nicholl BI, Jani BD, Lee D, McQueenie R, Mair FS. Frailty and pre-frailty in middle-aged and older adults and its association with multimorbidity and mortality: a prospective analysis of 493 737 UK Biobank participants. The Lancet Public Health 2018;3:e323-e332.