CIRUGIA Y CIRUJANOS
ISSN / eISSN 0009-7411
Publisher MEXICAN ACAD SURGERY,
CENTRO MED NAC SIGLO XXI, EDIFICIO BLOQUE B,
SOTANO, AVE CUAUHTEMOC NO 330, MEXICO D G, MEXICO, 06700
Volume 26-Issue 1-(2026)
DOI:http://doi.org/10.65281/669324

Multimorbidity and Functional Limitations in Cancer Survivors' Health: an Evidence from CHARLS

Jiafeng Jin, RN[1]*, Xiaohong Liu, RN[2]*, Beinuo Cao, RN[1#]

[1]Department of Nursing, Jiangsu Cancer Hospital & Jiangsu Institute of Cancer Research & The Affiliated Cancer Hospital of Nanjing Medical University, Nanjing, 210000, China
[2]Department of Spleen and Stomach, Guangzhou University of Chinese Medicine Shenzhen Hospital (Futian), Shenzhen, China

[#]: Correspondence: Beinuo Cao, RN, Department of Nursing, Jiangsu Cancer Hospital & Jiangsu Institute of Cancer Research & The Affiliated Cancer Hospital of Nanjing Medical University, Nanjing, 210000, China (beinuocao6@126.com)

*These authors contributed equally: J.F.J., X.H.L.

Abstract

This study of 77 Chinese cancer survivors examined how multimorbidity affects well-being. It found that functional limitations—specifically instrumental activities of daily living (IADL) limitations and reduced handgrip strength—directly predicted lower life satisfaction and poorer self-rated health. While age intensified the effect of chronic diseases on these functional declines, functional limitations did not mediate the overall link between total disease burden and well-being. The results indicate that functional status, not just the number of diseases, is a primary driver of reduced well-being, with older, multimorbid survivors being particularly vulnerable to functional decline.

Introduction

The growing number of cancer survivors often experience multimorbidity, which significantly affects their physical function and quality of life[1]. Understanding how chronic diseases and functional limitations—such as activities of daily living (ADL), instrumental activities of daily living (IADL), walking speed, and handgrip strength—impact life satisfaction is essential for nursing care[2,3]. This study examines their direct effects, investigates IADL and handgrip strength as mediators, and considers age, gender, exercise, and body mass index (BMI) as potential moderators. The findings aim to support targeted nursing interventions for this population.

Methods

This cross-sectional study utilized data from the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative survey of middle-aged and elderly Chinese residents[4]. Data from 96,628 respondents across five waves (2011-2020) were initially considered. The final sample comprised 77 cancer survivors, aged 45 or older, who self-reported a cancer diagnosis and had complete data for all key variables. For individuals participating in multiple waves, only their initial survey data were included (Figure 1).

The study measured life satisfaction and self-rated health using single 5-point items. Key predictors included the total number of chronic diseases and physical function indicators (IADL, ADL, handgrip strength, walking speed). Covariates covered sociodemographic factors, health behaviors, and BMI. Analyses included descriptive statistics, correlations, and multiple linear regression. Mediation was tested via bootstrapping to see if IADL or handgrip strength mediated between disease burden and life satisfaction. Moderated mediation analysis assessed age and gender as potential moderators. Self-rated health was analyzed with ordinal logistic regression. All analyses used SPSS 27.0, with significance at $p < 0.05$.

Results

The study included 77 cancer survivors, with a mean age of 66.3 years, predominantly male (55.8%) and urban (57.1%). Participants reported an average of 2.9 chronic diseases. Mean life satisfaction was 3.1, and 84.4% rated their health as "general," "bad," or "very bad" (Table 1). Higher education correlated with better functional status, self-rated health, and life satisfaction, and with fewer chronic conditions. Chronic disease burden was strongly associated with ADL/IADL limitations and poorer self-rated health. ADL and IADL limitations correlated negatively with both health and life satisfaction, whereas greater handgrip strength and faster walking speed correlated positively. Self-rated health and life satisfaction were strongly interrelated.

The results of the multiple linear regression analysis for factors associated with life satisfaction are presented below. Chronic disease burden ($\beta = 0.018$, $p = 0.681$, 95% CI: −0.068, 0.103) and limitations in basic activities of daily living (ADL; $\beta = 0.196$, $p = 0.135$, 95% CI: −0.063, 0.456) were not significantly associated with life satisfaction. In contrast, greater limitations in instrumental activities of daily living (IADL; $\beta = -0.268$, $p = 0.007$, 95% CI: −0.458, −0.077) and higher maximum handgrip strength (MHGS; $\beta = 0.037$, $p = 0.004$, 95% CI: 0.012, 0.061) were significant predictors. Several sociodemographic factors also showed significant associations. Female gender was associated with lower life satisfaction ($\beta = -1.039$, $p = 0.002$, 95% CI: −1.682, −0.397). Older age ($\beta = 0.032$, $p = 0.043$, 95% CI: 0.001, 0.064) and participation in Medicare ($\beta = 1.846$, $p < 0.001$, 95% CI: 0.851, 2.842) were positively associated with life satisfaction, while larger family size had a negative association ($\beta = -0.134$, $p = 0.030$, 95% CI: −0.254, −0.013). Other variables, including walking speed, educational level, marital status, area of residence, exercise habits, BMI, and drinking or smoking status, were not significantly associated with life satisfaction. For self-rated health, regression results showed that chronic disease count ($p = 0.041$) and IADL difficulties ($p = 0.046$) were significant negative

predictors (Table 2). Other factors, including ADL limitations, MHGS, and demographics, were non-significant. Moderated mediation (Table 3) showed that age strengthened the association between chronic diseases and IADL limitations, but no indirect effects on life satisfaction emerged.

Discussion

The growing population of cancer survivors faces the dual challenges of long-term cancer effects and multimorbidity, underscoring the need for holistic, person-centered care models that promote overall well-being beyond disease management[5].This study examined how chronic disease burden influences life satisfaction, focusing on functional limitations as mediators and demographic or lifestyle factors as moderators. Key findings highlight the central role of physical function. IADL limitations and lower MHGS emerged as direct predictors of reduced life satisfaction, supporting evidence that physical function underpins autonomy and quality of life in aging populations and cancer survivors. From a nursing perspective, these results call for integrating routine functional assessments — such as simple grip-strength tests or brief IADL questionnaires—into oncology care to identify patients at risk and enable timely rehabilitation referrals[6].

Contrary to hypotheses, IADL limitations and handgrip strength did not mediate between chronic disease burden and life satisfaction. This indicates that other factors—such as symptom burden, psychological distress, or financial strain—may be more influential[7]. Age moderated the effect of diseases on IADL, with older, multimorbid survivors being more vulnerable to functional decline. However, this did not lower life satisfaction, possibly due to psychological adaptation or social support. Gender differences also emerged. While the study used robust functional measures, its cross-sectional design and omitted variables like depression limit causality inferences, underscoring the need for longitudinal research[8].

These findings support nursing and policy initiatives that prioritize functional assessments and targeted interventions for older survivors with multimorbidity. Integrated geriatric-oncology programs and community-based supportive services are critical to preserving independence and promoting life satisfaction in this growing population[9].

Conclusions

This study underscores physical function as a key determinant of life satisfaction in cancer survivors. Older survivors with multimorbidity are especially vulnerable to functional decline, highlighting the need for proactive, person-centered nursing interventions that prioritize functional preservation and address psychosocial influences on well-being.

Ethical Considerations

The original CHARLS study was approved by the Institutional Review Board (IRB) of

Peking University (approval number: IRB00001052-11015 for the household survey and IRB00001052-11014 for blood samples). All participants provided written informed consent.

Acknowledgements
The funding for this study was provided by the Shenzhen Natural Science Foundation General Program for Basic Research (No. JCYJ20240813160614019).

Conflicts of Interest
The authors have no conflicts of interest to declare.

References
1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: Globocan Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin* (2021) 71(3):209-49.
2. Stewart M, Fortin M, Brown JB, et al. Patient-Centred Innovation for Multimorbidity Care: A Mixed-Methods, Randomised Trial and Qualitative Study of the Patients' Experience. *Br J Gen Pract* (2021) 71(705):e320-e30.
3. Sharma P, Maurya P, Muhammad T. Number of Chronic Conditions and Associated Functional Limitations among Older Adults: Cross-Sectional Findings from the Longitudinal Aging Study in India. *BMC Geriatr* (2021) 21(1):664.
4. Zhao Y, Hu Y, Smith JP, Strauss J, et al. Cohort Profile: The China Health and Retirement Longitudinal Study (Charls). *Int J Epidemiol* (2014) 43(1):61-8.
5. Blane DN, Lewandowska M. Living with Cancer and Multimorbidity: The Role of Primary Care. *Curr Opin Support Palliat Care* (2019) 13(3):213-9.
6. Stout NL, Santa Mina D, Lyons KD, et al. A Systematic Review of Rehabilitation and Exercise Recommendations in Oncology Guidelines. *CA Cancer J Clin* (2021) 71(2):149-75.
7. Singh A, Contreras Suarez D, You E, et al. Role of Social Support in the Relationship between Financial Hardship and Multimorbidity-a Causal Mediation Analysis. *Eur J Public Health* (2021) 31(3):482-7.
8. Temel JS, Petrillo LA, Greer JA. Patient-Centered Palliative Care for Patients with Advanced Lung Cancer. *J Clin Oncol* (2022) 40(6):626-34.
9. Vonnes C, El-Rady R. Implementing the 4 Ms in a Geriatric Oncology Clinic to Create Age Friendly Cancer Care. *Geriatr Nurs* (2023) 54:365-8.

Figure 1. Flowchart of Study Participant Selection

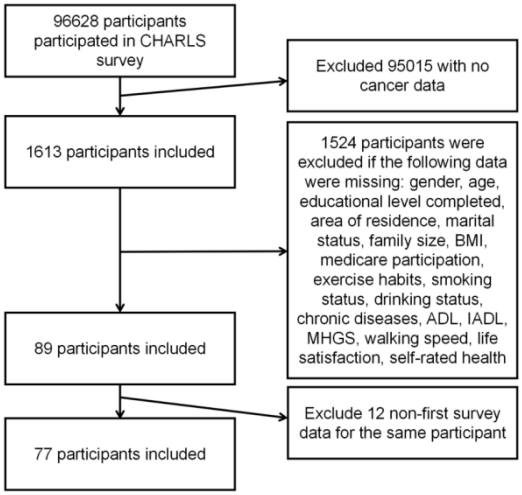

Table 1. Baseline characteristics of 77 participants

Variables	N (%)	Mean (SD)
Gender	Male: 43 (55.8%), Female: 34 (44.2%)	
Age (years)		66.3 (6.8)
Educational level completed	Below primary school: 39 (50.6%), Primary school: 21 (27.3%), Middle school: 9 (11.7%), Above middle school: 8 (10.4%)	
Area of residence	Urban: 44 (57.1%), Rural: 33 (42.9%)	
Marital status	Married or cohabitated: 64 (83.1%), Unmarried: 13 (16.9%)	
Family size		3.2 (1.5)
BMI (kg/m^2)		18.7 (2.0)
Medicare participation	Yes: 74 (96.1%), No: 3 (3.9%)	
Exercise Habits	Yes: 67 (87.0%), No: 10 (13.0%)	
Smoking status	Never smoker: 51 (66.2%), Ever smoker: 17 (22.1%), Current smoker: 9 (11.7%)	
Drinking status	Never drinker: 44 (57.1%), Ever drinker: 21 (27.3%), Current drinker: 12 (15.6%)	
Chronic diseases		2.9 (2.3)
ADL		0.5 (1.2)
IADL		0.8 (1.3)
MHGS (kg)		28.6 (10.3)
Walking speed (m/s)		3.8 (1.6)
Life Satisfaction		3.1 (0.9)

Self-rated health	Very bad or bad: 31 (40.2%), General: 34 (44.2%), Good or very good: 12 (15.6%)

Table 2. Mediation Analysis of IADL Limitations and Maximum Handgrip Strength on the Relationship Between Chronic Diseases and Life Satisfaction Among Cancer Survivors

	Life Satisfaction		IADL		MHGS		Life Satisfaction	
	B	*P*	*B*	*P*	*B*	*P*	*B*	*P*
Constant	1.448	0.260	2.019	0.279	32.241**	0.005	0.769	0.560
Gender	-0.440*	0.029	-0.024	0.933	13.299**	0.000	-0.827**	0.002
Age	0.011	0.436	0.003	0.879	-0.299*	0.022	0.021	0.168
Educational level completed	0.080	0.437	-0.131	0.379	-0.939	0.295	0.091	0.368
BMI	0.030	0.252	-0.025	0.501	0.484*	0.034	0.013	0.627
Exercise Habits	0.385	0.190	-1.287**	0.003	1.359	0.594	0.186	0.537
Chronic diseases	-0.017	0.684	0.177**	0.006	-0.202	0.589	0.010	0.815
IADL							-0.124	0.124
MHGS							0.029*	0.033

Abbreviations: ADL, activities of daily living; IADL, instrumental activities of daily living; MHGS, maximum handgrip strength; BMI, body mass index; SD, standard deviation.

* *P*<.05 ** *P*<.01

Table 3. Moderated Mediation Analysis of the Role of Age in the Relationship Between Chronic Diseases and Life Satisfaction via Functional Limitations

	Life Satisfaction	IADL	MHGS
	P	*P*	*P*
Constant	0.004**	0.374	0.000**
Chronic diseases	0.029*	0.003**	0.367
Age	0.205		
Chronic diseases:Age	0.025*		
IADL	0.018*		
MHGS	0.926		

'Chronic diseases:Age' represents the interaction term for the variables 'Chronic diseases' and 'Age'.

Abbreviations: IADL, instrumental activities of daily living; MHGS, maximum handgrip strength; SE, standard error.

* *P*<.05 ** *P*<.01