Imbalanced Dual Functionality and Mortality in Later Life

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BACKGROUND

- Growing attention on functionality in older adults
- Proposing concept of **dual functionality: no limitations in both physical and cognitive abilities** (Ferraro et al., 2023)
- Many studies link cognitive or physical limitations to higher mortality in older adults
- However, they are often studied separately, **overlooking their joint impact on survival**

Current Research

1. ***Imbalanced cognitive-physical functioning*** and **mortality** in **older adults**
2. ***Moderating effects*** of sociodemographic and psychological resources

DATA & METHODS

Data

- Midlife in the U.S. (MIDUS), a longitudinal study of a national probability sample of U.S. adults

Sample

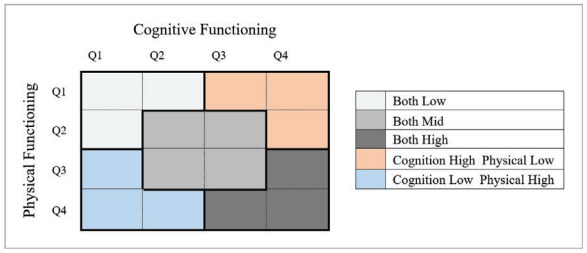
- MIDUS 2 (2004–2006) and MIDUS 3 (2013–2014)
- Aged 60 or older (N = 1,578)
- N = 396 (25.1%) were identified as deceased

Key variables

- **Cognitive Functioning**: Composite Cognitive Score (Brief Test of Adult Cognition by Telephone)
- **Physical Functioning**: limitation in physical activities in doing daily activities (MOS SF-36)
- **Mortality**: MIDUS mortality data based on NDI 2023 search (Covering deaths up to Dec 2023)
- **Purpose in Life:** 7-item scale (Ryff, 1989); higher scores reflect greater purpose (α = .76)

Method & Design

- Classifying dual functionality group
- Predicting mortality via Survival Analysis



RESULTS

A substantial number of people fall into imbalanced groups (nearly 25% of the full sample)

Descriptive Statistics: Dual Functionality Group - Cognition and Physic Functioning

	Both Low	Both Mid	Both High	Cognition Low Physical High	Cognition High Physical Low
	M (SD), %	M (SD), %	M (SD), %	M (SD), %	M (SD), %
Age	74.12(8.28)	69.42(6.69)	66.02(4.46)	70.37(6.94)	68.30(6.06)
Sex (Female)	65.59	54.83	47.35	16.43	64.12
Race/Ethnicity					
Non-Hispanic White	75.36	87.74	91.43	74.89	86.39
Black	16.29	5.86	3.27	14.80	4.14
Others	8.35	6.34	5.31	10.31	9.47
Education (years)	13.28 (2.49)	15.22 (2.49)	15.98 (2.46)	15.22 (2.65)	14.06 (2.30)
Mortality	45.6	16.4	21.2	22.3	4.9
Observations	494	445	245	170	224

Cognitive functioning may be a stronger mortality predictor than physical functioning

Cox Regression Model Predicting Mortality

Functionality Group	HR	95% CI
Both Low	2.51***	1.83 – 3.43
Cognition High Physical Low	1.18	0.76 – 1.85
Cognition Low Physical High	1.51*	1.01 – 2.25
Both High	0.39**	0.20 – 0.74

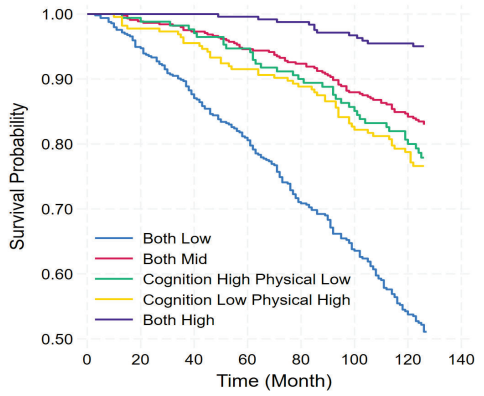
Note: Age, sex, race/ethnicity, education(year), income(log), base line physical health and cognition were controlled in the models. '*Both Mid*' was used as the reference group. *** p < .001, ** p < .01, * p < .05

Higher purpose in life may reduce mortality risk, especially in imbalanced groups

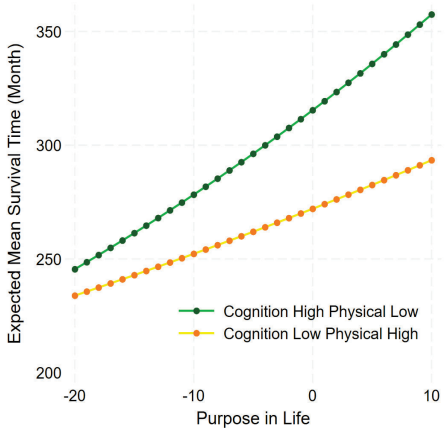
Moderating Effect of Purpose in Life

	HR	95% CI
Purpose in Life (PL)	1.05*	1.00 – 1.09
Both low	2.61***	1.88 – 3.61
Cognition high – Physical low	1.25	0.80 – 1.98
Cognition low – Physical high	1.60*	1.06 – 2.41
Both high	0.42*	0.22 – 0.83
Both Low x PL	0.96+	0.91 – 1.00
Cognition High – Physical Low x PL	0.94*	0.88 – 0.99
Cognition Low – Physical High x PL	0.94+	0.89 – 1.00
Both High x PL	0.94	0.84 – 1.05

Kaplan-Meier Curve of Dual Functionality Group



Predicted Mean Survival Time by Purpose in Life



DISCUSSION & IMPLICATIONS

- The first study to **examine how combinations of cognitive and physical functioning** jointly predict mortality, moving beyond approaches that consider these domains independently
- Older adults **with low cognitive but high physical functioning faced elevated mortality risk**, emphasizing the importance of cognitive health for survival and the need for early intervention
- The moderating role of purpose in life suggests **that psychological resources interact with functional domains**, highlighting the value of integrating psychological perspectives.

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