

Functional phenotypes: Frailty as an example

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Introduction



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Functional Phenotypes

- At the heart of well-being in aging

- Integrative

- Older adult-centered: Preservation of well-being, independence

- Mark risk of downstream adverse outcomes

- “Raison d’etre of geriatric medicine”

Fried LP, Walston JD, Ferrucci L. In: *Hazzard's Geriatric Medicine and Gerontology*, 6e. McGraw Hill; 2009, Chapter 52.

- Such as...

- Physical and cognitive function

- Multimorbidity

- Sarcopenia

- **Frailty**



Frailty

- Consensus definition

- “A medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance, and reduced physiologic function that *increases an individual’s vulnerability* for developing increased dependency and/or death.”

Morley JE, et al. J Am Med Dir Assoc. 2013 Jun;14(6):392-7.

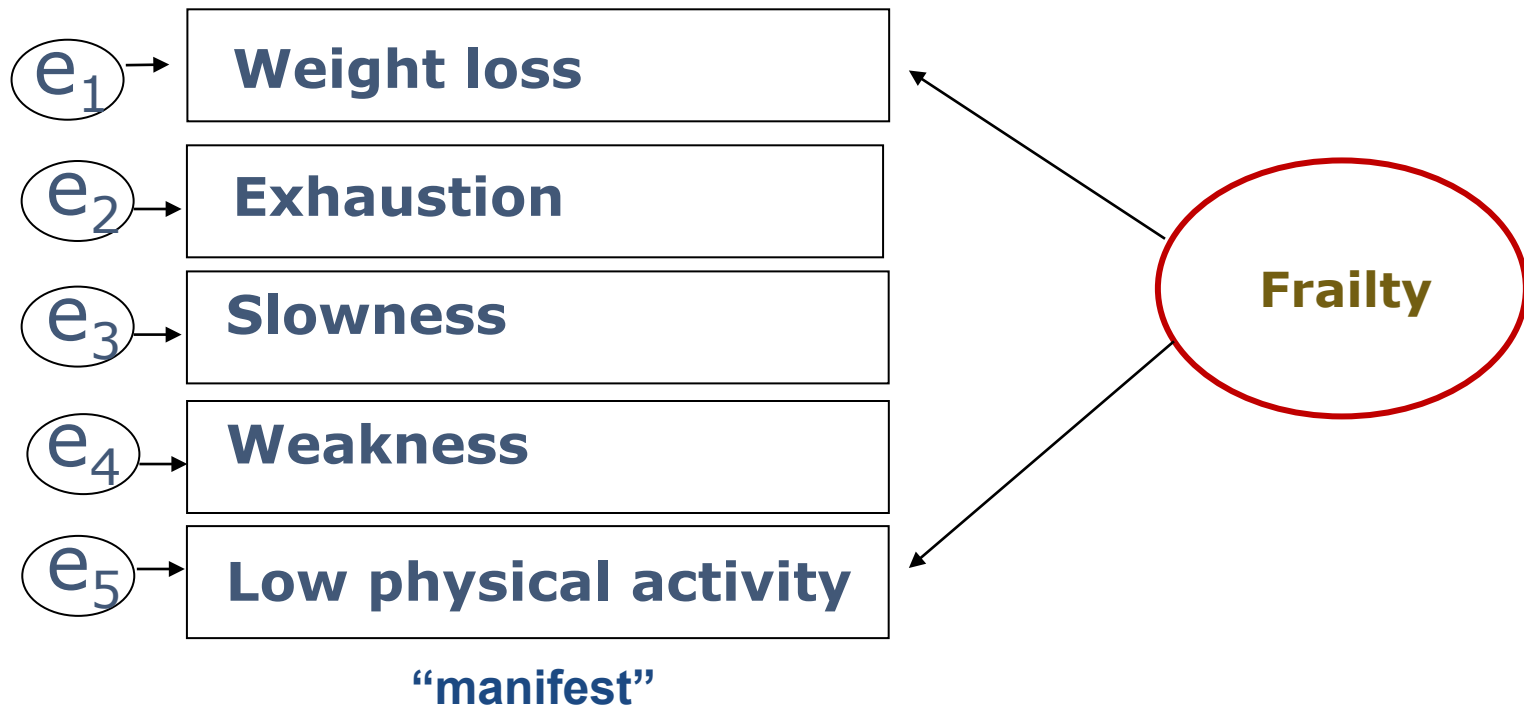
- Many measures; substantial disagreement

- Why we should especially care about racial disparities: Double jeopardy



Frailty Measurement

- **Frailty is a construct; measurement inherently is imprecise**



- **Potential for disparities in measurement (algorithmic unfairness)**



State of the Art



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Literature Review

frailty (race OR racial OR ethnic OR ethnicity) (disparity OR disparities)

After filtering for “demographic frailty” and some liberality on definitions but focusing on race/ethnicity in the US...

(All the rest did involve older adults...)



Literature Review

frailty (race OR racial OR ethnic OR ethnicity) (disparity OR disparities)

25 articles

7 – Racial/ethnic disparities in frailty

4 – Algorithmic fairness

3 – Effect modification of frailty effect on outcomes by race / ethnicity

3 – Frailty implications for health in URM groups

3 – Health disparities among frail individuals

3 – Mediation of health / health care / cost disparities by frailty

2 – Health / health care / cost disparities after controlling for frailty



Frailty Disparities in the National Health and Aging Trends Study

Bandeen-Roche et al., J Gerontol Biol Sci Med Sci, 70:1427-34

Demographic characteristics	Overall Frailty Status ²			p-value
	Robust	Pre-frail	Frail	
Sex				
Male (43.6%)	43.8	43.3	12.9	0.000
Female (56.4%)	35.6	47.2	17.2	
Race/ethnicity				
White non-Hispanic (81.7%)	40.8	45.3	13.8	0.000
Black non-Hispanic (8.3%)	30.1	46.0	22.9	
Hispanic (6.7%)	28.8	46.5	24.6	
Other (3.4%)	40.5	45.8	13.7	
Residence				
Community (94.6%)	40.3	45.2	14.5	0.000
Residential Care (5.4%)	19.8	50.7	29.5	



Differential Measurement in Black vs. Non-Hispanic White Individuals in NHATS

	Black vs White Analysis		
	Associations with criteria <i>controlling for latent frailty (LCA regression with DIF)</i>		
	OR	LOR	SE(LOR)
Weight loss	1.296	0.259	0.128
Exhaustion	0.601	-0.509	0.165
Slowness	1.759	0.565	0.257
Weakness	0.795	-0.229	0.168
Low Phys. Act.	1.023	0.023	0.150

* Fit using Mplus

Related paper: Usher et al., [J Gerontol Biol Sci Med Sci](#), 76(1):69-76.



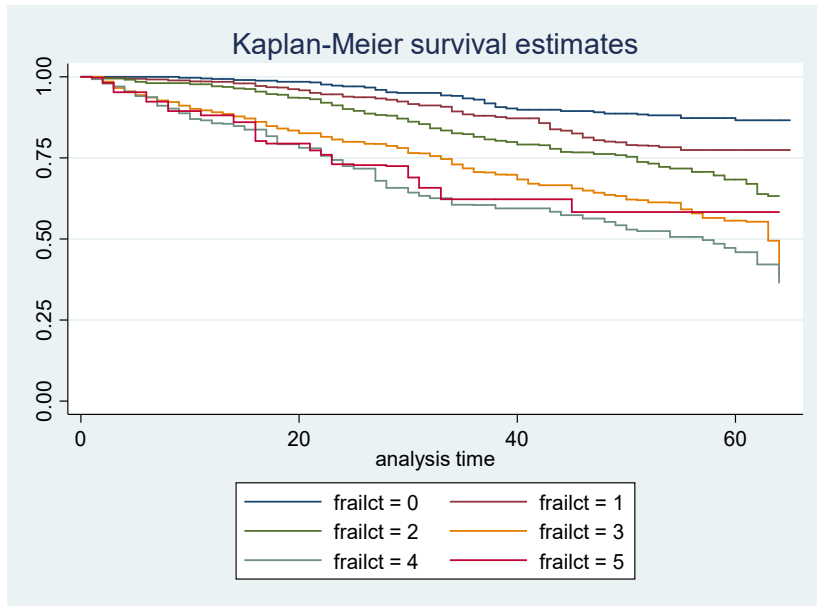
*Prediction of subsequent
outcomes: Does DIF by
race matter?*

NHATS baseline
n=6791 black, white

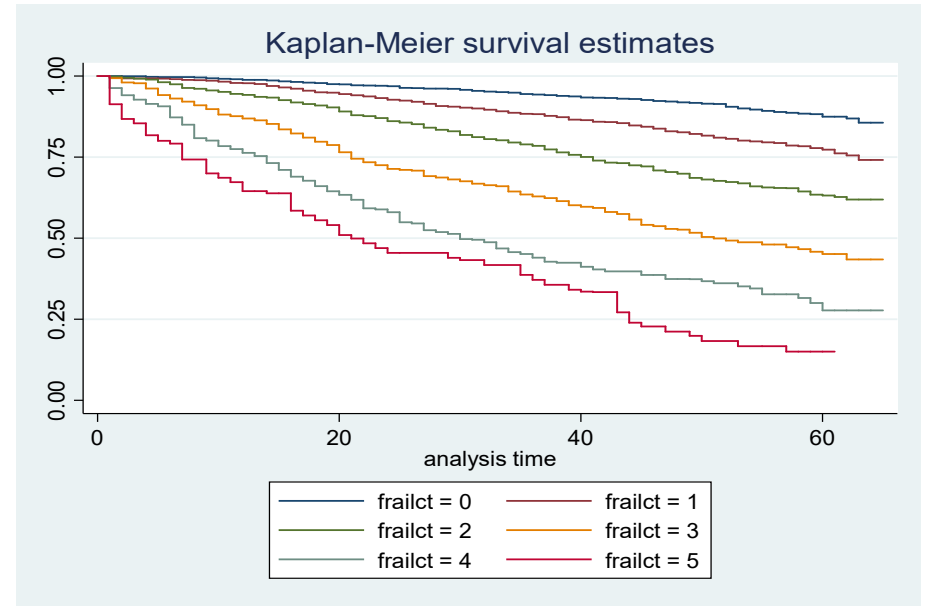


Mortality by frailty criterion count

Black Americans



White Americans



Gaps in the Field



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Research gaps / priorities - Measurement

- **Less racially sensitive assessments needed?**
 - Mixed methods work (qualitative, quantitative)
 - Tailored performance norms?
- **Better understand measurement disparity implications**
 - Over- or under-targeting for care
 - Impaired care management



Research gaps / priorities – Addressing Health

- **There remain gaps in the literature on disparities**
 - Pathways leading to disparities
 - ... phenotypes, downstream health, health care, costs
 - Synergistic implications of under-represented status, functional deficits
- **Moving beyond disparity identification to cause identification**
 - Pathways: Disadvantages
 - Racism: Individual, Institutional, Structural
- **Interventions to heighten equity**
 - Multifaceted (e.g. medical and social: ex/ CAPABLE)
 - Multilevel (e.g. individual, institutional, policies)

