Weight Variability, Physical Functioning, and Incident Disability in Older Adults

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BACKGROUND/OBJECTIVES

- Unintentional weight loss and sarcopenia are associated with frailty and adverse health outcomes in older adults
- Recent studies* have suggested that weight variability, not just weight loss, is associated with adverse health outcomes including cardiovascular events, cancer, hip fractures and death
- The goal of this study was to determine if high levels of body weight variability are associated with declines in physical functioning and incident disability in older adults, independently of overall weight change during the same period

METHODS

- We included participants from the Health, Aging and Body Composition (Health ABC) study who had semi-annual weight measurements and were not missing key variables
- Participants were 70-79 and able to walk one quarter mile and up a flight of stairs at baseline
- Body weight variability was determined using two methods
- Average successive variability (ASV)*: participants were sorted into quintiles according to the average of the absolute value of differences between consecutive BMI measurements over the first 3 years
- Residual average successive variability (rASV): Before sorting participants into quintiles, a linear regression was used to estimate the amount of ASV attributable to initial BMI and net change in BMI. Quintiles were based on the observed – expected for each individual
- Physical performance was measured using the Health ABC Score battery (5 repeated chair stands, progressively challenging balance test, walking gait speed over 6m, narrow walk), scored from 0-4
- Incident disability was defined as severe difficulty/inability to walk ¼ mile and/or climb 10 steps, needing equipment to ambulate, and/or having difficulty performing activities of daily living
- Linear regression was used to assess the relationship between weight variability and changes in BMI, ALMI, FMI and physical performance during the same three-year period
- Cox proportional hazards was used to assess the relationship between weight variability over 3 years and incident disability after 3 years

Figure 1: Incident disability survival curves by weight variability quintile, using the ASV method (top) and the rASV method (bottom)
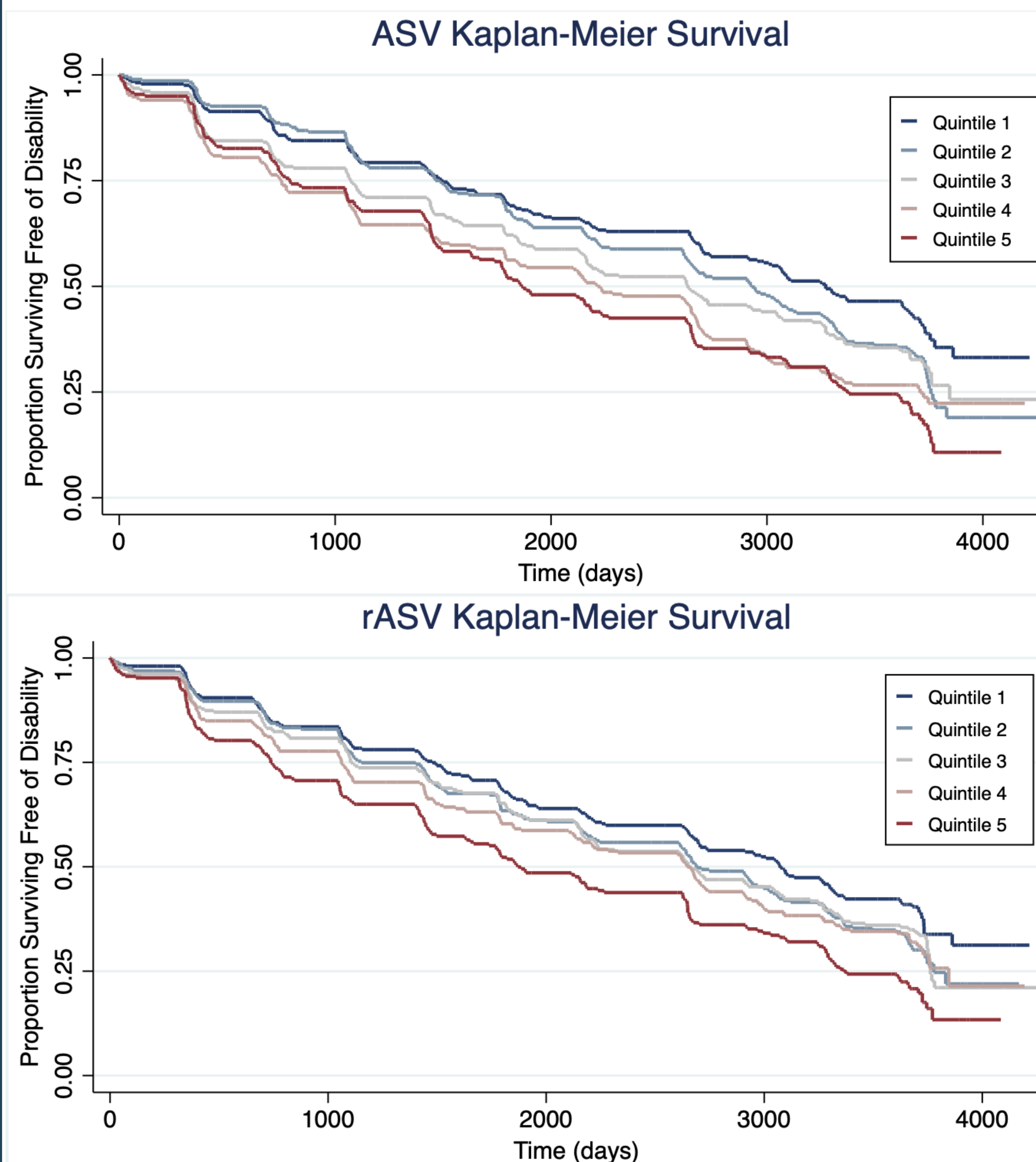
CONCLUSIONS

- Body weight variability in older adults is associated with decline in physical performance and incident disability
- This relationship cannot be explained by weight loss alone
- These results support the hypothesis that body weight variability represents a feature of frailty and may be a valuable biomarker

RESULTS

Table 1: Study Population Characteristics		
n		2,121
Age (years)	Median (IQR)	73.7 (71.6, 76.2)
Sex	Female	1,099 (51.8%)
	Male	1,022 (48.18%)
Race	Black	763 (64%)
	White	1,358 (36%)
Year 1 BMI	Mean (SD)	27.22 (4.59)
Year 1 HABC Score	Mean (SD)	2.24 (0.53)

- Participants in the highest ASV quintile were significantly more likely to lose body mass (β = -0.085, p < 0.01) and fat mass (β = -0.059, p = 0.044) than those in the lowest quintile (not shown)
- rASV quintile had no significant association with change in body or fat mass
- Participants in the highest quintiles had a greater decline in physical performance (HABC Score) using both ASV (β = -0.094, p < 0.01) and rASV (β = -0.0674, p = 0.04) methods, compared with those in the lowest quintiles
- Participants in the highest quintiles had a higher risk of incident disability using both ASV (HR = 1.36 [95% CI: 1.07, 1.72] , p = 0.01) and rASV (HR = 1.38, [95% CI: 1.11, 1.72] , p < 0.01) methods, compared with those in the lowest quintiles

Table 2: 3-year change in HABC Score and Weight Variability Quintile

Quintile	ASV Method β (95% CI)	P	rASV Method β	P
1	(reference)	--	(reference)	
2	-0.011 (-0.07, 0.05)	0.73	0.018 (-0.04, 0.08)	0.58
3	0.000 (-0.06, 0.06)	0.99	-0.038 (-0.10,0.02)	0.23
4	-0.034 (-0.10, 0.03)	0.29	-0.016 (-0.08,0.05)	0.63
5	-0.094 (-0.16,-0.03)	<0.01	-0.067 (-0.13,-0.00)	0.04

Table 3: Incident Variability After Year 3 and Weight Variability Quintile

Quintile	ASV Method Hazard Ratio (95% CI)	P	rASV Method Hazard Ratio (95% CI)	P
1	1 (reference)	--	1 (reference)	--
2	1.198 (0.97, 1.48)	0.09	1.187 (0.96, 1.47)	0.11
3	1.246 (1.01, 1.54)	0.04	1.166 (0.94,1.45)	0.17
4	1.559 (1.25,1.94)	<0.01	1.231 (0.99,1.53)	0.06
5	1.357 (1.07, 1.72)	0.01	1.378 (1.11,1.72)	<0.01

*Bangalore, S. et al. Body-Weight Fluctuations and Outcomes in Coronary Disease. New England Journal of Medicine 376, 1332–1340 (2017).