

INTRODUCTION

- Over 14 million (1 in 4 older adults) report falling every year
- Age-related visceral fat gain and muscle strength decline occur independently of overall weight gain, but the impact of different obesity phenotypes on falls is understudied

OBJECTIVE

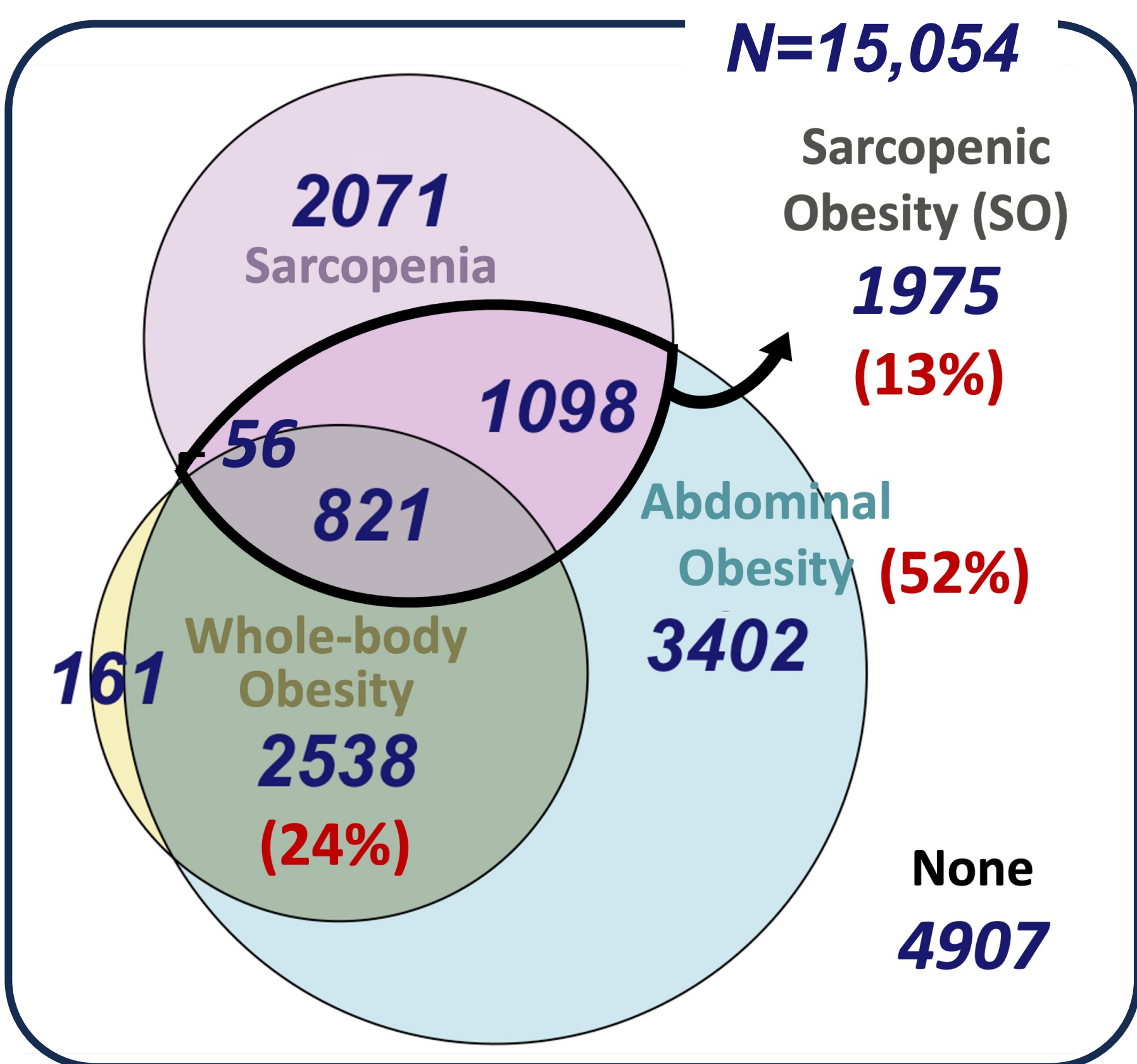
To evaluate the association between obesity phenotypes (whole-body, abdominal, sarcopenic obesity) and self-reported falls in older adults using the harmonized cohorts

METHODS

Table 1. Study population: N=15,054 from Harmonized Data of 4 U.S. Longitudinal Aging Cohorts (1992-2016)

	CHS	Health ABC	MrOS	WHI LLS
Full Name	Cardiovascular Health Study	Health, Aging, and Body Composition	Osteoporotic Fractures in Men Study	Women's Health Initiative Long Life Study
Age	65+ years	70-79 years	65+ years	63-93 years
Sites	4 sites	2 sites	6 sites	40 sites
Years	1992-2005	1997-2009	2000-2016	2012-2016
Women (%) (N=8,210)	2,482 (57.2)	1,412 (52.3)	-	4,316 (100)
Men (%) (N=6,844)	1,856 (42.8)	1,287 (47.7)	3,701 (100)	-
N by Cohort	4,338	2,699	3,701	4,316
Overall %	28.8	17.9	24.6	28.7

Figure 2. Exposure: Three Obesity Phenotypes



Whole-body Obesity: BMI ≥30 kg/m²

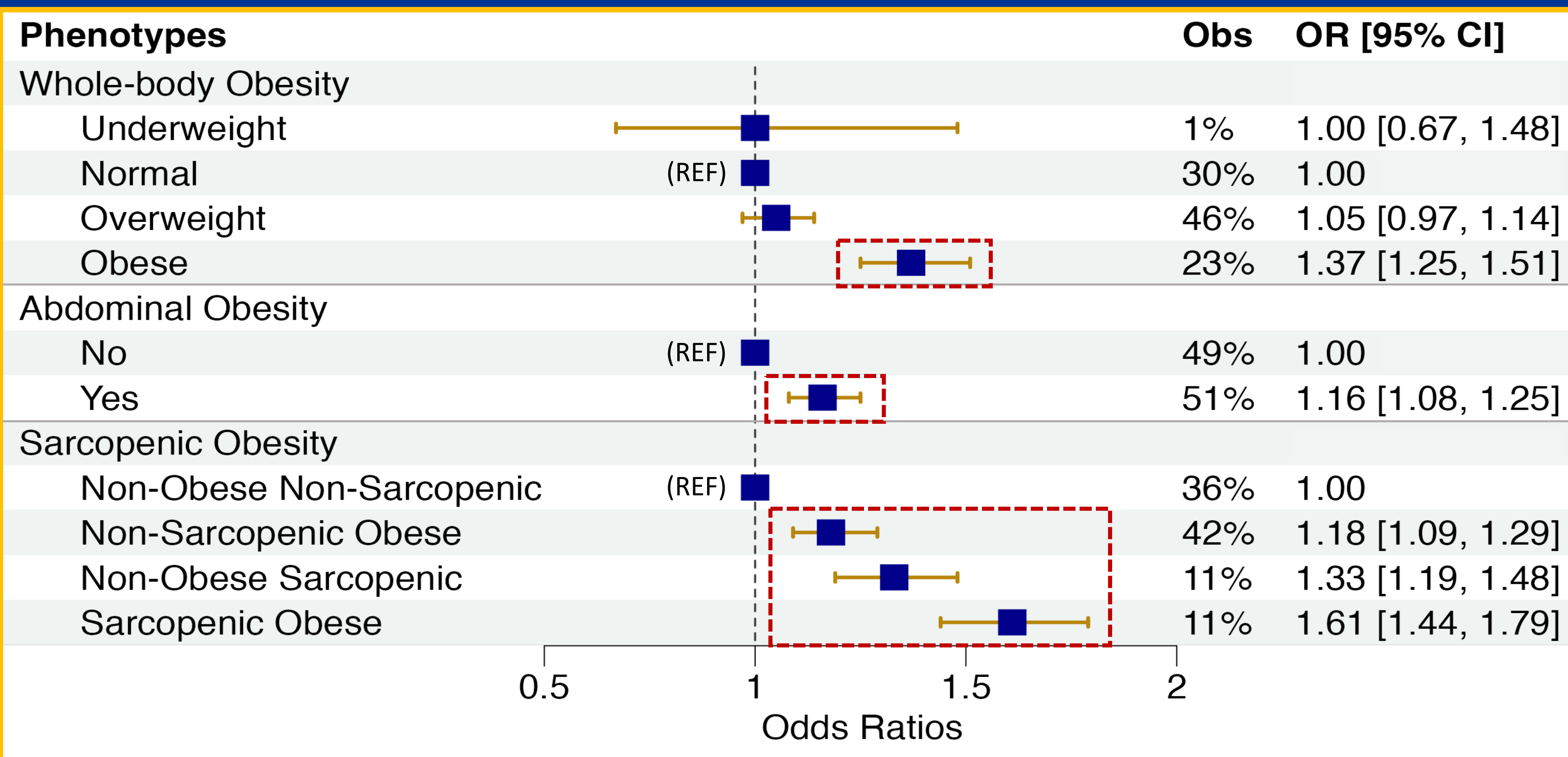
Abdominal Obesity: Waist circumference (WC) ≥88 cm (women) or ≥102 cm (men)

Sarcopenic Obesity: (Whole-body or abdominal obesity) + Maximal grip strength <20 kg (women) or <35.5 kg (men)

Outcome: Annual self-reported fall outcomes (past 25 years), including any fall (0 vs. 1); recurrent falls (<2 vs. ≥2) (**Figure 1**); and number of falls (0 vs. 1, and ≥2)

Older adults with **sarcopenic obesity** have **47% higher** odds of **any fall** and **61% higher** odds of **recurrent falls** compared to non-obese non-sarcopenic adults.

Figure 1. Associations of Obesity Phenotypes with Recurrent Falls (Obs=113,082)



* **Cohort indicator** (4 studies), **age** (years, continuous; time-varying), **sex**, **race** (White, Black, others), **education** (<high school, high school, >high school), **smoking** (never, former, current; time-varying), **alcohol** (none, ≤1 drink/week, >1 drink/week; time-varying), and **self-reported physical activity** (standardized physical activity/week; time-varying)

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STATISTICAL ANALYSES (Table 2 & Figure 1)

- Univariate analysis: Independent t-test/Wilcoxon rank-sum test or Chi-square test by groups (**Table 2**)
- Multivariable Generalized Estimating Equation with AR(1):

Any/recurrent falls	Binomial distribution & logit link function
Number of falls	Multinomial distribution & cumulative logit link function

- Covariates specified under **Figure 1**

Table 2. Baseline Characteristics by SO Groups

Mean (SD) or %	Non-Obese Non-Sarcopenic (N=4907)	Non-Sarcopenic Obese (N=6101)	Non-obese Sarcopenic (N=2071)	Sarcopenic Obesity (N=1975)
Any fall (≥1), % *	17.7	19.5	25.5	29.2†‡
Recurrent falls (≥2), % *	6.0	6.8	9.2	12.1†‡
Sex (male), % *	60.2	39.4	43.8	29.3†‡
Age, years *	74.1 (5.4)	73.7 (4.9)	79.0 (6.4)	77.7 (6.2)†‡
Physical activity, min/wk *	385.3 (94.7)	323.3 (89.6)	298.9 (89.9)	354.8 (93.5)†‡
BMI, kg/m ² *	24.4 (2.6)	30.0 (4.5)	23.8 (2.8)	30.0 (4.7)†‡
Race, % *				
White	77.0	71.7	82.6	77.1†‡
Black	20.3	27.0	14.9	21.3†‡
Other	2.7	1.3	2.5	1.6†‡
Education, % *				
<High school	12.0	17.1	11.1	14.6†‡
Some college	21.8	28.0	21.1	24.7†‡
≥College graduate	66.2	54.9	67.8	60.7†‡
Current smoking, % *	7.4	6.0	5.6	6.4†‡
Alcohol drinking, % *				
Never	36.8	44.0	37.9	36.9†‡
<1 drink/wk	19.3	22.2	22.4	30.3†‡
≥1 drinks/wk	43.9	33.8	39.7	18.0†‡

* **P-value <0.05** (one-way ANOVA/Kruskal-Wallis or Chi-square test by groups)

†: Significantly different (Sarcopenic Obese vs. Non-Sarcopenic Obese)

‡: Significantly different (Sarcopenic Obese vs. Non-Obese Sarcopenic)

STRENGTHS AND LIMITATIONS

- Strengths:** 1) Large longitudinal cross-cohort study; 2) Covers 25 years of data (1992 to 2016); 3) Includes longitudinal fall outcomes and time-varying covariates collected at various time points
- Limitations:** 1) Obesity assessed by indirect measures; 2) Obesity phenotypes assessed at baseline only due to limited data availability; 3) Generalizability may be limited to older adults in the U.S. population

CONCLUSIONS AND FUTURE DIRECTIONS

- Sarcopenia and sarcopenic obesity significantly increase fall risk in older women, highlighting the critical role of muscle strength preservation in fall prevention
- We are evaluating interpolation methods to optimize the use of time-varying obesity phenotype measures