INTRODUCTION
Sleep apnea (SA) is prevalent in 25% of older adults, and is associated with an increased risk of cardiovascular disease. One powerful risk factor of SA is elevated body mass index (BMI). High cardiorespiratory fitness (CRF) often attenuates the association between BMI and age-associated morbidities. However, the impact of CRF on the association between BMI on SA in older adulthood is not well-defined.

METHODS
PARTICIPANTS: 569 older adults (mean age of 71 years) enrolled in the Physical Activity and Aging Study (PAAS) who reported no history of myocardial infarction, stroke, or cancer. BMI: Body mass in kilograms (kg) divided by height in meters squared (m²). CRF: Time to complete the 400m walk test (minutes), with participants subsequently categorized into sex-ranked quartiles (Q1 = least fit, Q4 = most fit). SA: Self-reported, physician diagnosis using a medical history questionnaire.

STATISTICAL ANALYSIS
Participant characteristics were analyzed using general linear models for continuous variables and chi-squared ($\chi^2$) for categorical variables. The independent and joint associations of CRF and BMI on SA were determined using multivariable logistic regression (adjusting for potential confounders).

ABSTRACT
Association of Body Mass Index and Cardiorespiratory Fitness with Sleep Apnea in Older Adults
Joey M. Saavedra 1, Elizabeth C. Lefferts 1, Bong Kil Song 1, Duck-chul Lee 1, FACSM
1Iowa State University, Ames, IA.

PURPOSE: To estimate the independent and joint associations of body mass index (BMI) and cardiorespiratory fitness (CRF) with prevalent sleep apnea (SA) in older adults.

METHODS: This cross-sectional study included 569 adults aged 65-90 (62% female, mean age 71 years), all of whom were free from myocardial infarction, stroke, and cancer. BMI was calculated as measured body mass (kg) divided by height squared (m²). CRF was assessed by a 400m walk test. Participants were classified as normal weight (BMI<25), overweight (25≤BMI<30), obese class I (30≤BMI<35), or obese class II+ (BMI≥35). Participants were also divided into sex-specific quartiles (Q) of CRF (Q1: least fit, Q4: most fit). Cases of SA were identified by self-reported physician diagnosis from a medical history questionnaire. Multivariable logistic regression was used to estimate the odds ratios (ORs) and 95% confidence intervals (CIs) of prevalent SA across the four groups of BMI and quartiles of CRF, adjusting for age, sex, smoking status, heavy alcohol drinking, and meeting the aerobic physical activity guidelines. Participants were further categorized as ‘normal weight’ (BMI<25) or ‘overweight/obese’ (BMI≥25), as well as ‘fit’ (Q4-Q2 or ‘unfit’) to evaluate the joint association of BMI and CRF on prevalent SA.

RESULTS: There were 81 (14%) cases of SA. Compared to ‘normal weight’, the ORs (95% CIs) of SA were 3.00 (1.61-5.57), 4.66 (2.82-7.62), and 12.50 (4.33-38.07) for Q3, and Q4, respectively, adjusting for potential confounders including CRF. Compared to Q1, the ORs (95% CIs) of SA were 0.86 (0.43-1.70), 0.88 (0.40-1.92), and 0.90 (0.32-2.97), for Q2, Q3, and Q4, respectively, adjusting for potential confounders including BMI. In the joint analysis, compared to ‘normal weight’ & ‘fit’; the ORs (95% CIs) of SA were 6.73 (2.34-19.4), 4.44 (0.88-22.47), and 7.18 (3.44-32.38) for the ‘overweight/obese’/‘fit’, ‘normal weight’/‘unfit’, and ‘overweight/obese’/‘unfit’, respectively. CONCLUSIONS: In fully adjusted models, BMI, but not CRF, was significantly associated with prevalent SA in older adults, suggesting the ‘fat but fit’ phenotype may not extend to sleep apnea. However, prospective studies are warranted.

PUBLIC HEALTH MESSAGE
Maintain a normal BMI (healthy body weight) to reduce the likelihood of SA in older adulthood, but don’t discount the potential added benefits of high CRF.