

Rowan University

Rowan Digital Works

Stratford Campus Research Day

26th Annual Research Day

May 5th, 12:00 AM

Association Between Leg Adiposity & Hypertension Subtypes in Young & Middle-aged American Adults

David Lo

Rowan University

Aayush Visaria

Rutgers New Jersey Medical School

Pranay Maniar

American Preventive Screening & Education Association

Follow this and additional works at: https://rdw.rowan.edu/stratford_research_day



Part of the [Cardiovascular Diseases Commons](#), [Diagnosis Commons](#), [Investigative Techniques Commons](#), and the [Pathological Conditions, Signs and Symptoms Commons](#)

Let us know how access to this document benefits you - share your thoughts on our [feedback form](#).

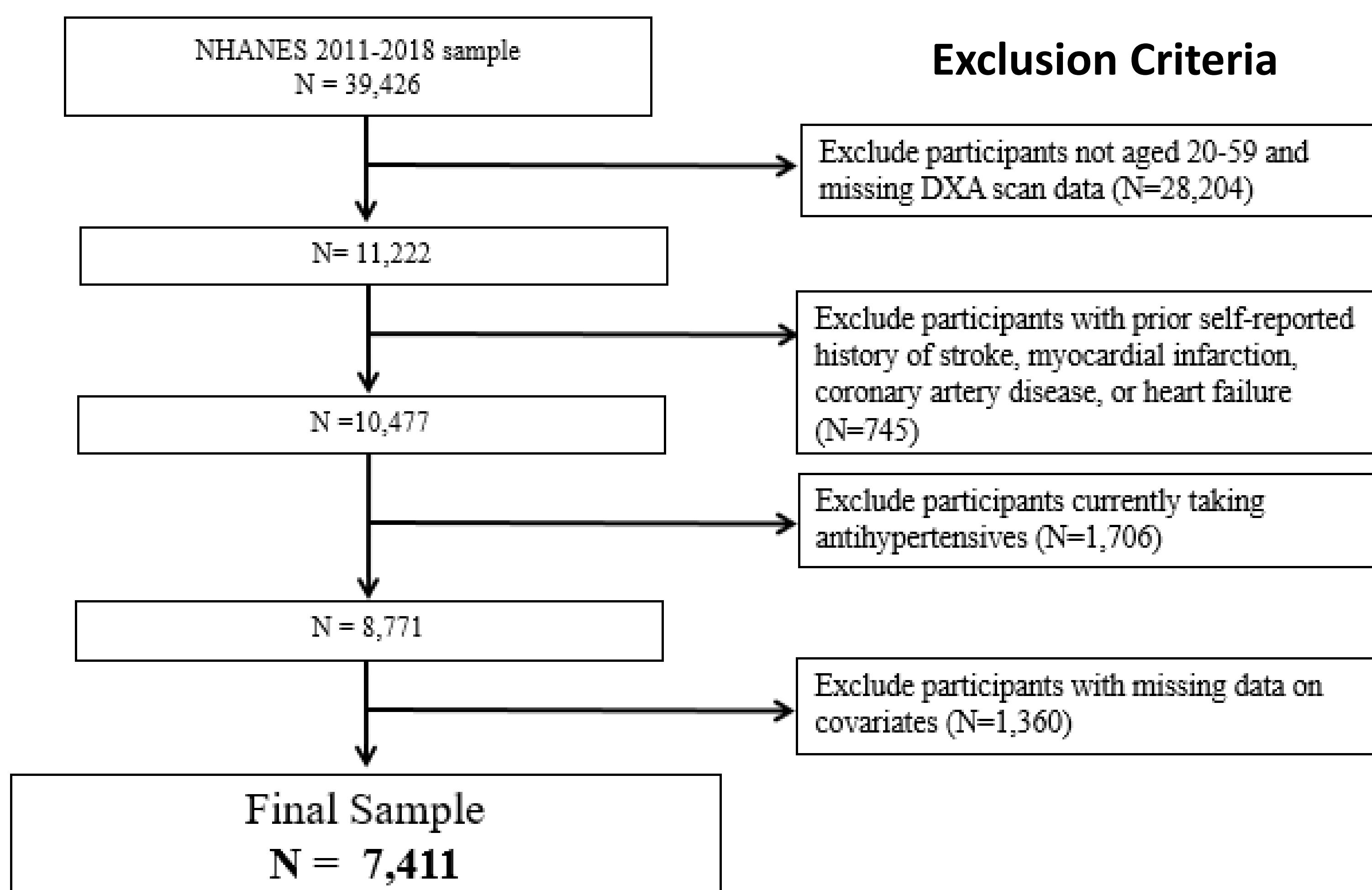
Lo, David; Visaria, Aayush; and Maniar, Pranay, "Association Between Leg Adiposity & Hypertension Subtypes in Young & Middle-aged American Adults" (2022). *Stratford Campus Research Day*. 74. https://rdw.rowan.edu/stratford_research_day/2022/May5/74

This Poster is brought to you for free and open access by the Conferences, Events, and Symposia at Rowan Digital Works. It has been accepted for inclusion in Stratford Campus Research Day by an authorized administrator of Rowan Digital Works.

Background

Our research aim was to determine the association between appendicular adiposity & hypertension to better elucidate the role of body fat distribution on blood pressure (BP). Many studies have provided evidence for the inverse association between leg adiposity & metabolic syndrome criteria. Hypertension (HT) subtypes have unique age distributions & associated risk factors. BMI ± triglycerides are major risk factors for isolated diastolic hypertension (IDH).

Study Population & Statistics



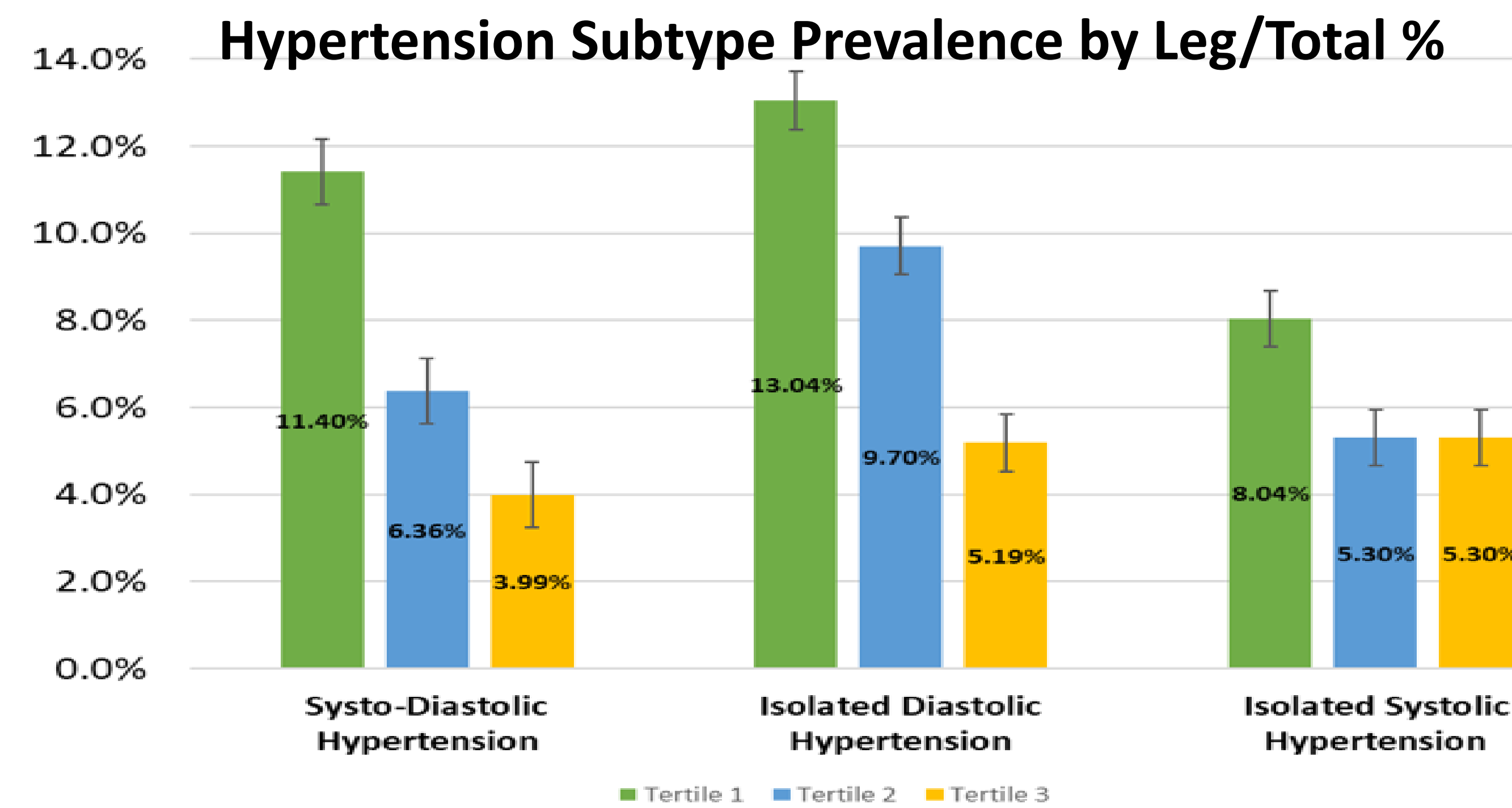
Abbreviations: NHANES- National Health and Nutrition Examination Survey

Predictor: Leg Fat Mass / Total Fat Mass (leg/total %) male: <31.5%, 31.5-36%, ≥36%; female: <36%, 36-41%, ≥41%
 Leg Fat Mass / Leg Mass (leg fat %) male: <24%, 24-29%, ≥29%; female: <40%, 40-45%, ≥45%
Outcome: Hypertension as per 2017 AHA/ACC guidelines (BP >130/80)
 HT Subtype (IDH, ISH, SDH, Normal)

Differences in baseline characteristics: 1-way ANOVA for continuous variables and Rao-Scott χ^2 test for categorical variables.
 Association between leg adiposity & hypertension [HT] (yes/no): multivariate logistic regression (odds ratios)
 Association between leg adiposity & hypertension subtype: multinomial logistic regression (relative risk ratios)
 All analyses accounted for complex survey design & weighting to provide nationally representative & accurate variance estimates.

Materials & Methods

Included 7411 adults ages 20-59 not taking antihypertensives and without cardiovascular disease from 2011-2018 National Health and Nutrition Examination Surveys (NHANES). Leg & arm fat, determined by dual-energy X-ray absorptiometry scans, was defined as % of total body fat in legs/arms (leg/total%, arm/total%), categorized into sex-specific tertiles. Change in BP & odds ratios (ORs) of hypertension (BP ≥ 130/80) & HT subtypes was estimated using multivariable, survey design-adjusted linear & logistic regression, respectively.



Inverse Association between Leg Adiposity & Hypertension

		Tertile 1	Tertile 2	Tertile 3
N (%)	1853 (23.8%)			
Leg/Total %	Unadjusted (c=0.600)	1.00 (Ref)	0.57 (0.47, 0.69)	0.35 (0.29, 0.42)
	Adjusted (c=0.740)	1.00 (Ref)	0.81 (0.66, 0.99)	0.70 (0.55, 0.89)
Leg fat %	Unadjusted (c=0.534)	1.00 (Ref)	1.24 (1.01, 1.53)	1.44 (1.19, 1.73)
	Adjusted (c= 0.740)	1.00 (Ref)	0.93 (0.75, 1.15)	0.82 (0.63, 1.05)

Leg Fat Mass / Total Fat Mass (leg/total %) male: <31.5%, 31.5-36%, ≥36%; female: <36%, 36-41%, ≥41%
 Leg Fat Mass / Leg Mass (leg fat %) male: <24%, 24-29%, ≥29%; female: <40%, 40-45%, ≥45%

Association between Leg/Total % & Hypertension Subtypes

RRR (95% CI)	Leg / Total %			Leg Adiposity: Continuous Variable
	Tertile 1 (Lowest)	Tertile 2	Tertile 3 (Highest)	
Isolated Diastolic Hypertension vs. Normotension				
Unadjusted	1 (ref)	0.64 (0.48, 0.84)	0.31 (0.23, 0.43)	0.91 (0.89, 0.93)
Fully Adjusted	1 (ref)	0.82 (0.62, 1.11)	0.55 (0.40, 0.75)	0.96 (0.94, 0.99)
Isolated Systolic Hypertension vs. Normotension				
Unadjusted	1 (ref)	0.57 (0.42, 0.75)	0.52 (0.38, 0.71)	0.93 (0.91, 0.95)
Fully Adjusted	1 (ref)	0.82 (0.64, 1.12)	1.02 (0.69, 1.49)	0.99 (0.96, 1.03)
Systo-Diastolic Hypertension vs. Normotension				
Unadjusted	1 (ref)	0.48 (0.35, 0.65)	0.28 (0.21, 0.37)	0.88 (0.86, 0.90)
Fully Adjusted	1 (ref)	0.72 (0.51, 0.99)	0.62 (0.45, 0.84)	0.95 (0.92, 0.97)

Leg Fat Mass / Total Fat Mass (leg/total %) male: <31.5%, 31.5-36%, ≥36%; female: <36%, 36-41%, ≥41%

Results

Association between Leg Fat % & Hypertension Subtypes

RRR (95% CI)	Leg Fat %			Leg Fat %: Continuous Variable
	Tertile 1 (Lowest)	Tertile 2	Tertile 3 (Highest)	
Isolated Diastolic Hypertension vs. Normotension				
Fully Adjusted	1 (ref)	1.09 (0.83, 1.44)	0.87 (0.59, 1.27)	0.98 (0.96, 1.00)
Isolated Systolic Hypertension vs. Normotension				
Fully Adjusted	1 (ref)	0.76 (0.54, 1.06)	0.70 (0.45, 1.07)	0.97 (0.94, 1.00)
Systo-Diastolic Hypertension vs. Normotension				
Fully Adjusted	1 (ref)	0.76 (0.55, 1.06)	0.60 (0.41, 0.86)	0.96 (0.94, 0.98)

Abbreviations: RRR: Relative Risk Ratio; CI: Confidence Interval.

Leg Fat Mass / Leg Mass (leg fat %) male: <24%, 24-29%, ≥29%; female: <40%, 40-45%, ≥45%

Data not shown: Upon stratifying by sex, no significant difference between males and females, although tended to be more protective in females. No significant difference by BMI.

Of the participants, 49% were female, with average (standard deviation) age 37.4 (0.3) years, & 24% had hypertension (HT). Those in T3 (highest tertile) of leg/total% had 30% lowered adjusted ORs (aOR) of HT compared to the lowest tertile (T1; aOR, 0.70; 95% confidence interval [95% CI], 0.55-0.89). This association was not significant for arm/total% (0.89, 0.68-1.17). T3 of leg/total% was associated with 49% lower, 41% lower, and unchanged relative odds of isolated diastolic hypertension (IDH), systolic-diastolic HT (SDH), & isolated systolic HT (ISH) compared to T1 (IDH: 0.51, 0.37-0.70; SDH: 0.59, 0.43-0.80; ISH: 1.06, 0.70-1.59). For every 10% raise in leg/total%, diastolic BP lowered by an adjusted mean 3.5 mmHg (95% CI, -4.8 to -2.2) in males and 1.8 mmHg (95% CI, -2.8 to -0.8) in females (P < 0.001 for both).

Discussion

Greater proportional fat distribution around lower extremities was independently associated with lower odds of HT. Leg fat tended to lower odds of systo-diastolic hypertension & isolated diastolic hypertension more than isolated systolic HT. May be clinically useful to risk stratify individuals.
Limitations: Self-report bias along with cross-sectional nature, residual confounding, and blood pressure readings taken only at one time point instead of multiple time points.

Conclusion

A greater proportional distribution of fat around the legs is inversely, independently associated with hypertension, and more specifically, diastolic hypertension (IDH and SDH).