



Hot Bods: Body Composition and Hot Flashes



Sofiya I. Shreyer¹, Lynnette L. Sievert¹, Daniel E. Brown²

¹Department of Anthropology, University of Massachusetts Amherst, Amherst MA

² Department of Anthropology, University of Hawai'i at Hilo, Hilo HI

INTRODUCTION

- Even though 75% of menopausal women experience hot flashes (HF), factors associated with HF are poorly understood. Body fat has been examined as both a protective factor and a risk factor for HF.
 - A) Protective Factor: Body fat reduces HF by increasing the amount of circulating estrogens, thereby replenishing some of the estrogen decline caused by reproductive aging.¹
 - B) Risk Factor: Body fat acts as an insulator, therefore increasing the risk of a heat dissipation event triggered by the narrowing of the thermoneutral zone in menopausal women.²
- Data supporting these models have been mixed, with some finding that body fat increases HF³, others finding that body fat decreases HF⁴, and several studies finding no relationship between the two⁵.
- These discrepancies in data may be a byproduct of using different locations/measures of adiposity⁶. Also, body fat may be beneficial only during the later stages of the menopausal transition, when estrogen levels are lowest⁴. The relationship between body fat and HF requires further elaboration.

In this study, we test whether hot flash frequency and intensity are influenced by body mass index (BMI), waist to hip ratio (WHR), summed skinfold measures, and total body fat percentage (TBF%).

METHODS

- We utilize an on-going study of brown adipose tissue activity and hot flashes conducted in Massachusetts, U.S among women ages 45-55 (n=180). Women were interviewed about demographics, reproductive history, and menopause experience. Height, weight, hip and waist circumferences, and skinfolds were measured. A symptom list was administered that included incidence of hot flashes and bothersomeness of HF and night sweats.

Table 1. Variable Summary	
Predictors:	
BMI	kg/m ²
WHR	Waist/Hip Circumferences
Sum of Skinfolds	bicep, tricep, subscapular, and suprailiac
TBF%	Total Body Fat %
Covariate:	
Menopausal Status	
pre-	no changes in cycle or subtle changes
peri-	+/- 6 day change in cycle or >60 days between periods
post-	more than 12 months since last period
Outcome Variables:	
Objective Hot Flashes	# of HF measured by Biolog monitor during 24hrs
Self-Reported Hot Flashes	a scale of 1 (no HF or less than 1 per month) to 8 (5+ HF per day)
Hot Flash Intensity	0=HF not bothersome or a little bothersome 1=somewhat bothersome or a lot bothersome
Night Sweat Intensity	0=HF not bothersome or a little bothersome 1=somewhat bothersome or a lot bothersome

- TBF% was calculated from bioelectric impedance analysis. Women wore a sternal skin conductance monitor (Biolog; UFI, Morro Bay, CA) for up to 24 hours. Objective hot flashes were identified when skin conductance rose at least 2 µmho in 30 sec, and when women self-reported a hot flash.

- Linear regression and binary logistic regression analyses (as appropriate) were carried out in SPSS for each of the following predictors: BMI, WHR, sum of skinfolds, and TBF%, while adjusting for menopausal status. Outcome variables included number of objective hot flashes, self-reported frequency of hot flashes and hot flash and night sweat intensity (Table 1).



Fig. 1. A participant wearing a Biolog monitor

RESULTS

- Table 2 shows the characteristics of our study sample. There were no significant differences between women who reported feeling hot flashes (n=156) and women who did not (n=24). Women who experienced hot flashes experienced an average of 4.38 hot flashes during the study period (24hrs).

Table 2. Sample Characteristics	
	n= 180 Mean (s.d.)
Age (years)	51.1 (2.9)
Age at menopause (years)	48.7 (5.2)
# Children	1.7 (1.1)
Menopausal Status	n (% of sample)
Pre-Menopausal	35 (15.9%)
Peri-Menopausal	72 (32.7%)
Post-Menopausal	70 (31.8%)
Education	
High school or less	9 (4.1%)
College	79 (35.9%)
Post-Graduate	92 (41.8%)

RESULTS

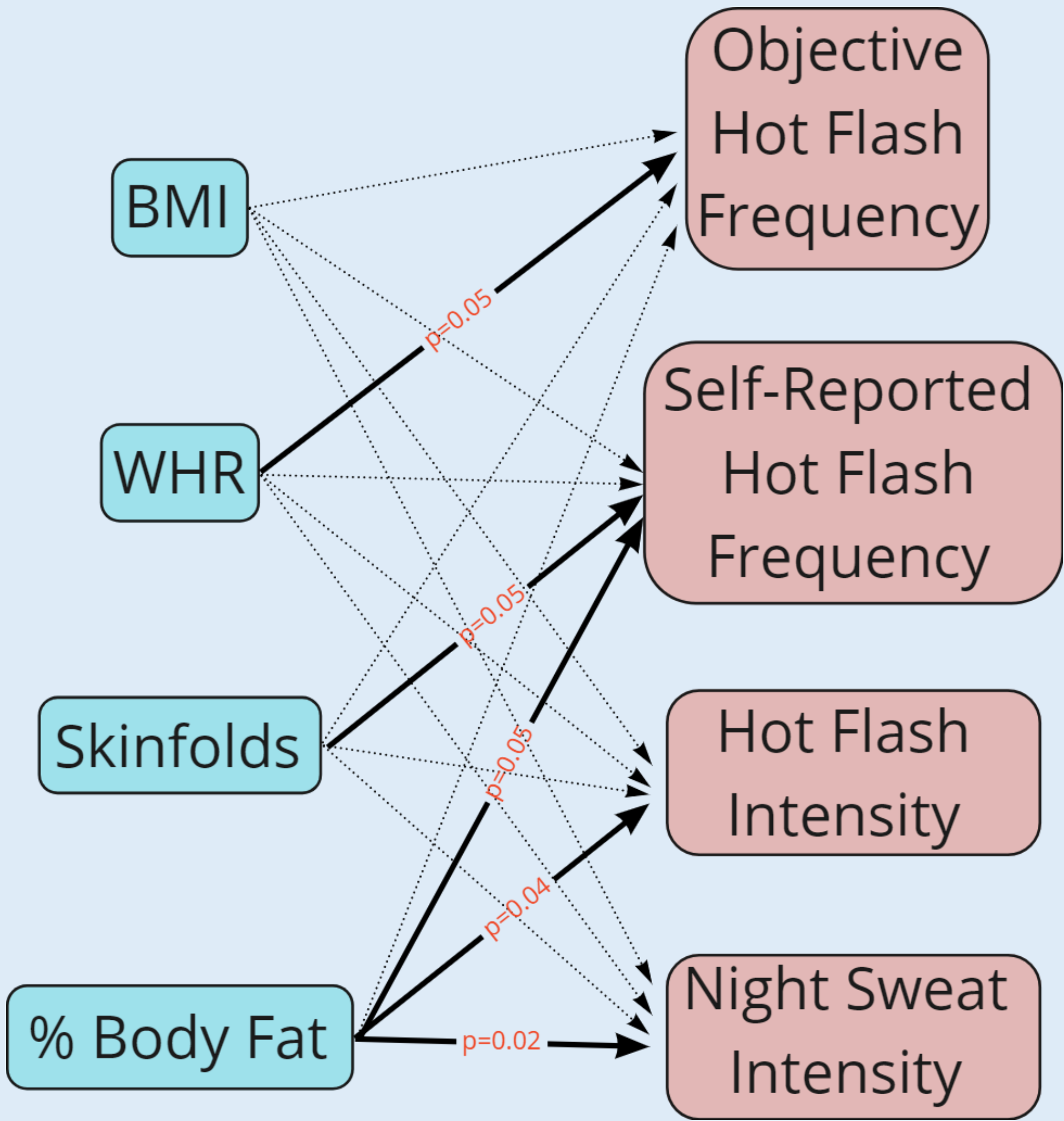


Fig. 1. Regression analyses performed and significant associations.

Table 3. Linear Regressions Results						
Predictors	Objective Hot Flashes			Self-Reported Hot Flashes		
	β	t	p	β	t	p
Menopause Status	0.204	2.5	0.01	0.28	3.84	<0.001
BMI	-0.083	-1.01	0.31	0.06	0.68	0.37
Predictors						
Menopause Status	0.19	2.3	0.02	0.26	3.5	<0.001
WHR	0.16	1.97	0.05	0.07	0.91	0.36
Predictors						
Menopause Status	0.2	2.5	0.01	0.26	3.5	<0.001
Sum Skinfold	-0.07	-0.83	0.41	0.15	1.99	0.05
Predictors						
Menopause Status	0.16	1.9	0.06	0.28	3.8	<0.001
Percent Body Fat	-0.09	-1.1	0.24	0.14	1.95	0.05

Table 4. Binary Logistic Regressions Results						
Predictors	Hot Flash Intensity			Night Sweat Intensity		
	b	SE	p	b	SE	p
Menopause Status	0.615	0.22	0.004	0.04	0.02	0.09
BMI	0.029	0.03	0.25	0.06	0.68	0.37
Predictors						
Menopause Status	0.56	0.21	0.009	0.4	0.21	0.06
WHR	0.85	2.1	0.68	1.19	2.09	0.57
Predictors						
Menopause Status	0.59	0.22	0.006	0.43	0.22	0.05
Sum Skinfold	0.005	0.01	0.25	0.01	0.01	0.12
Predictors						
Menopause Status	0.6	0.22	0.006	0.44	0.21	0.04
Percent Body Fat	4.17	2.03	0.04	4.65	2.03	0.02

- Controlling for menopausal status, higher TBF% was associated with an increase in self-reported hot flash frequency, and hot flash and night sweat intensity (Tables 3, 4 and Fig.1).
- Higher WHR was associated with more frequent objective hot flashes and higher skinfold measurements were associated with self-reported hot flash frequency (Tables 3, 4 and Fig.1).

CONCLUSIONS

- Our research supports previous findings that body fat is a risk factor for hot flash frequency and intensity. We found that multiple measures of adiposity significantly predict both hot flash frequency and intensity. Our research shows that BMI, which is frequently used to represent adiposity, may not be a good predictor for vasomotor symptoms in midlife women.
- Percent Body Fat was the strongest predictor of hot flash symptoms, but only for self-reported measures. Objectively measured hot flash frequency was only significantly associated with WHR.