Audrey Gun
Tim Bennett
Lauren Deaver

Do gender and collegiate sport participation correlate with healthier body composition in collegiate subjects?

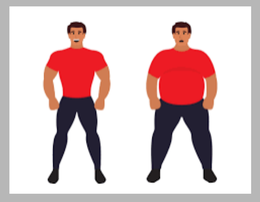
Department of Exercise Science

GARDNER-WEBB UNIVERSITY

This project was completed for academic purposes only. while it contains a research component, its purpose is to demonstrate academic progress.

Introduction

There has been extensive research by many in the past into body fat percentage measurement methods as well as these measurements. It is historically proven that the common method of BMI is not a good measurement of this, as it is often found that male and female college athletes BMI are significantly higher than non-athletes (Ode et al., 2007). With this in mind, there were many other methods that proved to be more reliable when compared to the golden standard, the bod pod.



Male Body Types

Female Body Types

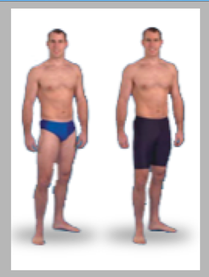
These methods include bioelectrical impedance (BIA) measurements, and waist-to-hip ratio. For our study, we decided to use three different types of BIA measurements including the handheld BIA, standup BIA, and the electrode BIA, the waist-to hip ratio, and the BodPod to compare between male athletes and non-athletes and female athletes and non-athletes.

Hypothesis

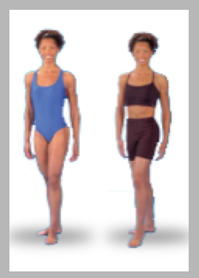
It is hypothesized that participation in collegiate sports positively impacts the body composition through increasing fat-free mass and decreasing fat mass in males and females when compared to non-athletes.

Methods

The participants were 8 males (4 collegiate athletes; 4 collegiate nonathletes) and 8 females (4 collegiate athletes; 4 collegiate nonathletes). All participants were between 18-22 years of age. Participants confirmed they had no existing health conditions that would alter test results. Exclusion criteria were diabetes and hyperthyroidism.



Male BodPod Clothing



Female BodPod Clothing

Testing procedure was explained to the participants and they were informed they could terminate the procedure at any time they wished. Participants were emailed 24 hours prior and asked to fast for 9 hours prior to testing, refrain from exercise, hydrate normally, and wear either compression shorts or spandex and a sports bra for the BodPod

Methodology

Height

Subjects Arranged Via Email

Waist-to-Height Ratio

Weight

Handheld BIA

Stand-Up BIA

Electrode BIA

BodPod

Results

In table 1, males typically were closer to the minimum whereas women were closer to the maximum. All body composition methods were significantly correlated to each other. Table 2 correlated no significant body fat distinctions between college-age athletes and non-athletes for both genders. Figure 1 shows average male athlete body fat was measured lower than non-athlete males by all the methods except for the BodPod. Female athlete average body fat composition was measured to be equal to or lesser than female non-athlete body composition with the biggest difference as 5% more body fat on the BIA: Stand-up.

Table 1: Descriptive Statistics of All Participants

	N	Minimum	Maximum	Mean	Std. Deviation
BodPod	16	8.20	38.20	21.3188	8.73561
Handheld BIA	16	8.80	38.40	20.5563	9.20920
Stand-up BIA	16	15.50	44.70	26.1125	8.89051
Electrode BIA	16	8.40	35.50	21.6688	9.18794
Waist-to-Height	16	16.30	33.80	23.6250	5.66657

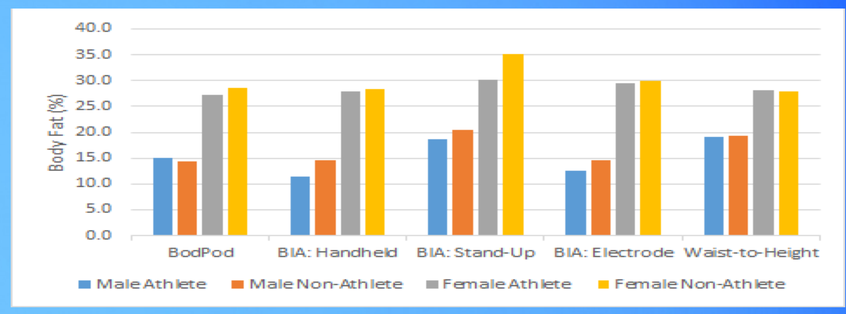
Table 2: Correlation of Body Composition to Activity Status by Gender

		Code	BodPod	Handheld BIA	Stand-up BIA	Electrode BIA	Waist-to-Height
Male Athlete VS Male Non-Athlete	Pearson Correlation	1	-.110	.476	.344	.351	.110
	Sig. (2-tailed)		.795	.233	.404	.394	.795
	N	8	8	8	8	8	8
Female Athlete VS Female Non-Athlete	Pearson Correlation	1	.113	.045	.329	.064	-.026
	Sig. (2-tailed)		.789	.915	.427	.880	.951
	N	8	8	8	8	8	8

** Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Results Continued

Figure 1: Athlete & Non-Athlete Body Composition Across Five Methods



Discussion

No significant differences were found in body composition between college-age athletes and non-athletes for both genders. Some reasons why this could be the case are small sample size, active "non-athletes" throwing off results, and/or a true lack of difference. The small sample size could skew the results because higher variability is possible with less data points. Too many active "non-athletes" could skew the study because their body compositions may reflect more of an athlete than traditional non-athlete. A true lack of difference of body composition in college-age people may be the case as the results show.

Body Fat Rating	Men*	Women*
Risky (high body fat)	>30%	>40%
Excess Fat	21-30%	31-40%
Moderately Lean	13-20%	23-30%
Lean	9-12%	19-22%
Ultra Lean	5-8%	15-18%
Risky (low body fat)	<5%	<15%

*Adapted from (BodPod Weight Chart, 2019)

Figure 1 shows both male and female athletes and non-athletes were measured to be in the moderately lean category for their respective gender (BodPod Weight Chart, 2019). With all categories given the same classification of body fat rating, the lack of significant correlation found is explained.

In conclusion, no results were found to support the hypothesis that fat-free mass is greater and fat mass lower in both male and female athletes when compared to non-athletes of the same gender.

References

Ashtary-Larky, D., Nazary Vanani, A., Hosseini, S. A., Rafie, R., Abbasnezhad, A., & Alipour, M. (2018). Relationship between the body fat percentage and Anthropometric measurements in Athletes compared with Non-Athletes. *Zahedan Journal of Research in Medical Sciences, 20*(2). doi:10.5812/zjrms.10422

BodPod Weight Chart. (2019). Retrieved April 27, 2021, from http://portlandbodpod.com/bod-pod-weight-chart

Fornetti, Willa C., Pivarnik, James M., Foley, Jeanne M., & Fiechtner, Justus J. (1999). Reliability and validity of body composition measures in female athletes. *Journal of Applied Physiolgy, 87*(3), p. 1114-1122. Doi: 10.1152/jappl.1999.87.3.1114

Malina, R.M. (1989). Growth and maturation: Normal variation and effect of training. *Youth, Exercise, and Sport, 2*(1), 223–265.

Midorikawa, T., Sekiguchi, O., Beekley, M.D., Bemben, M.G., & Abe, T. (2006). A comparison of organ-tissue level body composition between college-age male athletes and nonathletes. *International Journal of Sports Medicine. 28*(2), 100-105. doi: 10.1055/s-2006-924139

Ode, J. J., Pivarink, J. M., Reeves, M. J., & Knous, J. L. (2007). Body mass index as a predictor of percent fat in college athletes and Nonathletes. *Medicine & Science in Sports & Exercise, 39*(3), 403-409. doi:10.1249/01.mss.0000247008.19127.3e