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Body Composition Differences between US Population and AURA Strap users: A Comparison with NHANES Dataset

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Abstract

Introduction-AURA users' body composition results are used to provide information regarding the position of individual user's among the population: for example, if he/she has lower or higher body fat ratio or muscle mass than others. The comparison with other users is good for extra motivation since it creates a competitive element of training or/and diet.1. Can I compare my body composition with AURA users' body composition results?Brief answer: Yes, you can. In the AURA app we use data based on thousands of AURA Strap measurements conducted by a huge number of our users. All data were processed in order to exclude any incorrect data caused by various factors. As a result the final dataset provides a representation of an actual body composition of AURA users.

Index terms—

1 I. Introduction

URA users' body composition results are used to provide information regarding the position of individual user's among the population: for example, if he/she has lower or higher body fat ratio or muscle mass than others. The comparison with other users is good for extra motivation since it creates a competitive element of training or/and diet. 1. Can I compare my body composition with AURA users' body composition results? Brief answer: Yes, you can. In the AURA app we use data based on thousands of AURA Strap measurements conducted by a huge number of our users. All data were processed in order to exclude any incorrect data caused by various factors. As a result the final dataset provides a representation of an actual body composition of AURA users.

2 Is the comparison correct?

No doubt, it is really important to know if AURA users body composition data is reliable and how it relates with body composition of other populations of the US. There were many studies conducted in the US for evaluation of the health status of Americans, including body composition surveys. One of the largest of them is organized by the National Health and Nutrition Examination Survey (NHANES), a program of studies designed to assess the health and nutritional status of adults and children in the United States.

According to the number of participants which took part in the NHANES surveys and its long time duration (body composition servers were conducted for 8 years: from 1999 till 2006), it was chosen as a population sample to compare with AURA users. In the period of the DEXA data collecting, NHANES oversampled Mexican-Americans, African Americans, low-income White and Other Race people, adolescents aged 12-19, and non-Hispanic White and Other Race adults aged 70 and over than in other years of examinations (https://www.cdc.gov/visionhealth/vehss/ data/national-surveys/national-health-and-nutrition-examination-survey.html) The most NHANES examination centers where DEXA data were collected were located in the south part of USA in general (see the map below): Since there are sex and aging differences in body composition, the were divided into 10 subsets: age 18-23, 24-30, 31-40, 41-50 and 51-65 of male and female, respectively. As main parameters to compare height, weight, and body fat ratio was used because the DEXA based NHANES dataset does not provide reliable information about muscle mass or total body water.

Before the start of any statistical analysis, let us look at sample distributions of selected age groups. As it can be seen on fig. 2, AURA Strap samples for both males and females are notably smaller than NHANES. This can present a challenge for many statistical tests, as they usually assumes that samples have equal variances, and variances are directly affected by sample size. Considering this, we will employ the Welch's modification of popular Student's t-test, which does not have an equal variance assumption and thus can provide reliable results for two samples of unequal sizes. As it can be seen on Fig. **??** and in table 2, NHANES weight data have a long-tailed distribution with a considerable amount of outliers for both genders in all age groups. These outliers, however, have no specific effect on Welch test results, which in most cases reveals no significant difference between NHANES and AURA c) Comparing Body Fat Ratio For body fat ratio, the samples are not statistically different in following cases: males of 18-23 years, males of 41-50 years, both males and females of 51-65 years. In all other cases, one can assume that AURA Strap users and NHANES subjects significantly differs in body fat ratio (males: $p < 0.001$ for 24-30 years group, $p = 0.01$ for 31-40 years; females: $p = 0.002$ for 18-23 years, $p = 0.003$ for 24-30 years, $p = 0.003$ for 31-40 years, and $p = 0.002$ for 41-50 years; ? $= 0.05$ in all cases). Summarizing that, AURA Strap users are either have the same or lesser body fat ratio than NHANES subjects. It can also be noted, that the variability of AURA Strap data is rather high -and it is most probably the effect of different measurement technique: AURA Strap uses BIA for body fat estimation, which is much more sensitive for various environmental and internal conditions than DEXA.

3 II. Conclusion

Our comparison study demonstrates that AURA strap users body composition is indeed have many similarities with NHANES study participants. The observed differences originated in either data collecting methodology, lifestyle differences, or even population change with time. [1] [2]

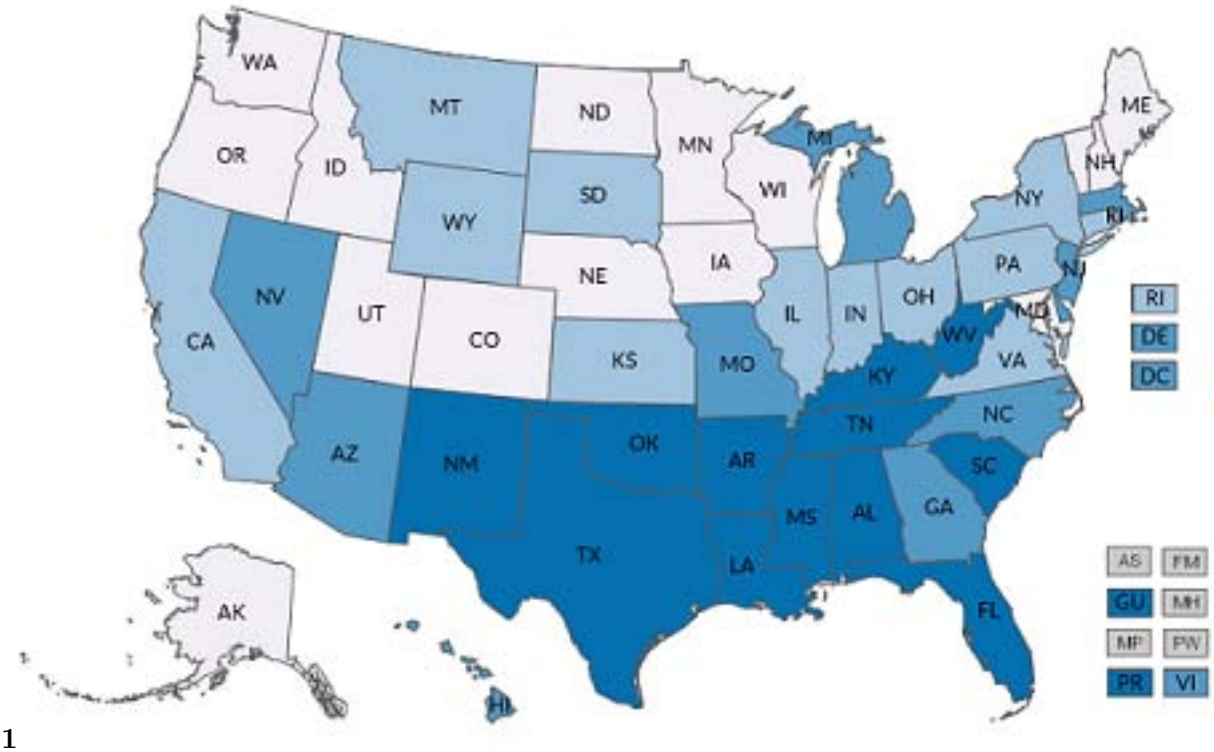

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Figure 1: Fig. 1 :

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[2] Body Composition Differences between US Population and AURA Strap users: A Comparison with NHANES Dataset

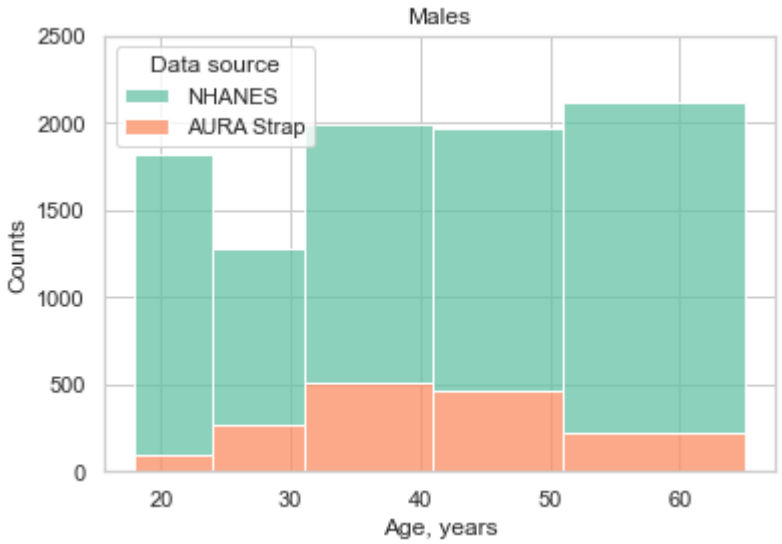

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Figure 2: Fig. 2 :

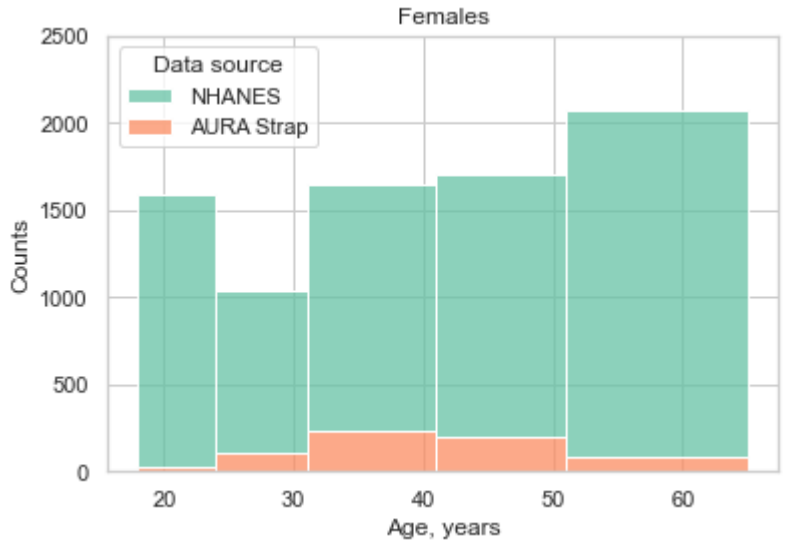

Figure 3:

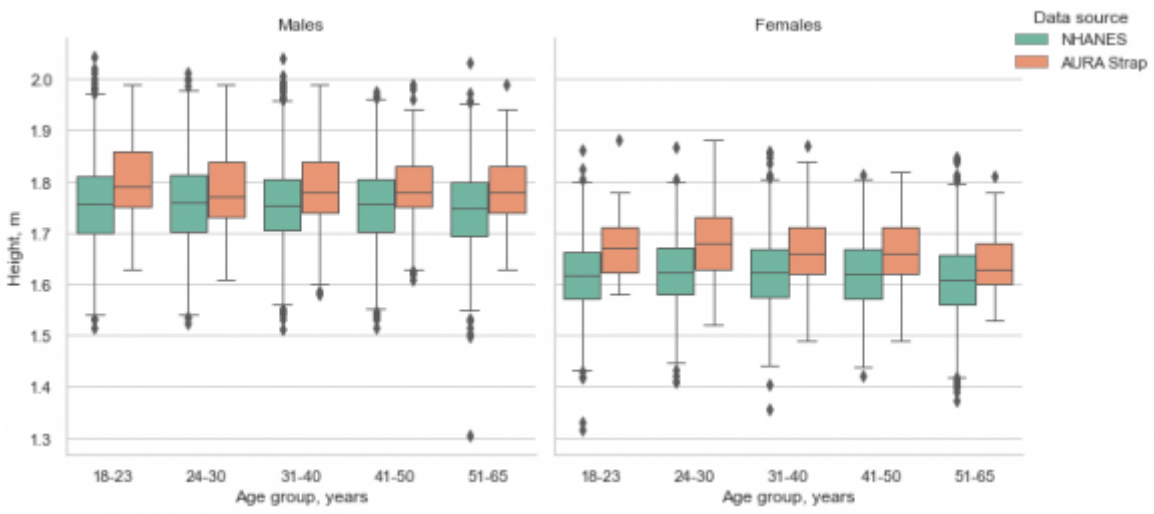

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Figure 4: Fig. 5 :

1

	Strap populations									
	NHANES					AURA Strap				
Males	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	1.76	1.76	1.76	1.75	1.75	1.79	1.78	1.79	1.79	1.78
SD	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.07
Females	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	1.62	1.62	1.62	1.62	1.61	1.68	1.68	1.66	1.66	1.64
SD	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06

Figure 5: Table 1 :

2

	Strap populations									
	NHANES					AURA Strap				
Males	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	78.64	85.08	87.26	87.83	88.53	79.87	82.01	87.07	87.73	88.36
SD	20.45	20.77	20.01	18.34	18.66	13.60	13.22	14.55	14.25	15.33
Females	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	68.78	73.24	75.58	78.62	77.66	71.42	74.06	77.44	76.84	76.68
SD	19.12	20.00	20.69	20.50	19.38	12.51	13.00	14.97	15.06	14.06

Figure 6: Table 2 :

3

	Strap populations									
	NHANES					AURA Strap				
Males	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	23.54	26.33	27.20	28.07	29.79	22.45	23.99	25.99	28.11	29.57
SD	7.35	6.41	5.98	5.68	5.70	7.54	8.91	10.00	10.35	10.46
Females	18-23	24-30	31-40	41-50	51-65	18-23	24-30	31-40	41-50	51-65
Mean	36.89	38.35	39.43	40.88	42.53	30.66	35.51	37.73	38.87	41.58
SD	7.26	6.98	6.79	6.48	5.86	8.94	7.32	8.24	8.87	8.82

Figure 7: Table 3 :