A Statistical Matching Procedure To Increase Diversity of the United States Air Force Anthropometric Database

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I. Introduction

In 2008 and 2011, the 711th Human Performance Wing collected 61 anthropometric measurements on 700 subjects for the USAF Aircrew Sizing Survey (ACSS) (Choi et al 2014). This survey was intended to replace the 1967 USAF Aircrew Anthropometric Survey, which is more than 45 years old and no longer reflected the age, gender, and racial variability of the current USAF aircrew population. Thus, the aim of ACSS was to construct an anthropometric database that did represent this variability.

However, due to funding limitations the ACSS sample totaled only 640 male and 60 female aircrew. It also utilized a "volunteer sampling strategy". As a result, there were too few females and non-Caucasian males in the ACSS to adequately describe size and proportional variability for those demographic categories. Demographics such as gender, age, and race have significant effects on anthropometric measurements and must be considered in sample construction (Zehner 2001). Improperly combining samples can result in statistics that do not adequately represent any group. Separate samples of each must be gathered. Finally, the size and shape of individuals in the different military branches can be significantly different based on not only differences in demographic distributions but service entrance requirements and physical training requirements.

In order to better represent our *target* populations of USAF female aircrew and all non-aircrew, the 711th Human Performance Wing decided to attempt to derive an anthropometric database from the massive US Army and US Marine Corp databases from 2011 and 2012. These two databases are considered our *baseline* sample and provide an excellent resource for attempting this.

Statistical "Matching" procedures have been used several times in the past and are described by Gordon (1992), Donelson and Gordon (1996) and other publications. The basic approach is to use limited anthropometric data (such as height and weight), along with demographic profiles to define those distributions in a *target* population. The next step is to select individuals from a large *baseline* sample that can be assembled to match those distributions. Finally, all relevant measurements made in the *baseline* sample on the selected individuals can be transferred to create a new "Matched Dataset" which is representative of the distributions in the *target* population.

Two datasets were available to us to define the target USAF populations. They were the USAF Fitness data from 2013 from the Information Delivery Division of the Defense Health Agency, and the Interactive Demographic Analysis System (IDEAS) provided by the Air Force Personnel Center (AFPC). The USAF (annual) Fitness data provided us with a general composition of the Air Force in 2013 based on gender, age, and Duty Air Force Specialty Code (DAFSC). Fitness data also includes the measured anthropometric variables Height and Weight. Demographic backgrounds of the USAF population describing gender, education level, race, age, and ethnicity could also be examined by DAFSC from IDEAS database.

Most previous matching attempts have used up to a dozen anthropometric measurements from the target population to test the validity of the matching approach. This was not possible for the USAF. The USAF data would have to be matched based on limited anthropometric information. However, the ACSS provided a substantial database of USAF Caucasian male aircrew which could be used to test our matching process. Using only height, weight, and demographic data for USAF Caucasian male aircrew (our target population for this test), we created matched datasets from the US Army's ANSUR-II and US Marine's ANSUR baseline

samples. Since we know that with large baseline samples we can match height, weight and demographic variables reasonably well, the important information on the efficacy of a matching procedure is the comparison the other (non-matched) anthropometric measurements from the samples. This report describes the methods used and the results for the 2015 USAF/ANSUR-II Matched Datasets.

The matching procedure for female aircrew resulted in a database of 913 women; which contains demographic variables (i.e. rank, primary MOS, race, and age), 81 anthropometric variables, and a 3-D scan of each individual. Two additional samples were also constructed using this method. They were Female non-aircrew n= 1014, and Male Non-Aircrew n= 1423. Summary Statistics for all samples are included in Appendix A. These datasets will be used to represent the USAF Female Aircrew and Non-Aircrew anthropometric database until funding is available to create a USAF database similar to ANSUR-II.

II. Background: Datasets Available for the Matching Process

A. Aircrew Sizing Survey (ACSS)

In 2008 and 2011, the Aircrew Sizing Survey was conducted at several Air Force bases across the US (Choi et al 2014). It measured 700 USAF aircrew, male and female. Sixty-one traditional anthropometric measures were collected; 38 taken while the participant was standing and 23 were taken while the participant was sitting.

1. ACSS Males

ACSS measured 640 males, enlisted and officers. Due to the "volunteer sampling strategy" and the demographics of the aircrew population, ACSS disproportionately collected individuals who were Caucasian and ranked as USAF Officers (college-educated). This represents a reasonably good sample of USAF aircrew Caucasian males, but not females, enlisted personnel, or minorities (Table 1). Of the population measured, 45 (7.0%) of men were enlisted, while 595 were officers (93.0%). We know that individuals that differ in demographic variables such as enlistment status can also differ anthropometrically. Officers and enlisted Airmen have different educational backgrounds and generally work in different career fields. The average age in ACSS for male officers is 30.6 years old while the average age for male enlisted was 28.4 years old.

Table 1. ACSS Males Race/Ethnicity Distribution

Self-Reported Race/Ethnicity	Count	Percent
Caucasian/White	573	89.53
Spanish/Hispanic	25	3.91
Asian/Pacific Islander	15	2.34
Black/African American	15	2.34
Other	12	1.88

2. ACSS Females

Unfortunately, ACSS only measured 60 females, not enough to populate an anthropometric database of female aircrew. Similar to the male sample, the female ACSS sample was also predominately Caucasian (Table 2). Of the population measured, only 8 (13.3%) women were enlisted, while 52 were officers (86.7%).

Table 2. ACSS Females Race/Ethnicity Distribution

Females	Count	Percent
Caucasian/White	51	85.00
Spanish/Hispanic	4	6.67
Black/African American	3	5.00
Other	2	3.33

Also similar to the male ACSS sample, enlisted women differed from officers, particularly in age. The average age for enlisted was 25.1 years old, while the average age for officers was 29.2 years old. Age can have a significant impact on an individual's BMI, educational level achieved, and subsequently their career field.

B. 2013 USAF Fitness

USAF Fitness data for 2013 was available from the Information Delivery Division of the Defense Health Agency, and contains information on individuals' age, gender, and DAFSC. Standing Height, Weight, and Waist Circumference were measured. This provides a more comprehensive look into the composition of the USAF personnel. Overall, in 2013, officers represent only 21.8% of the USAF population (Table 3). However, the proportion of officers is much higher in Aircrew career fields, totaling 67.4%.

Table 3. USAF 2013 Fitness data broken down by gender, rank and career field

	Aircrew	Non-Aircrew	Totals
Males	**20,912**	**226,185**	**247,097**
Officers	14,488	39,579	54,067
Enlisted	6,424	186,606	193,030
Females	**1,780**	**55,240**	**57,020**
Officers	814	11,285	12,099
Enlisted	966	43,955	44,921
Totals	**22,692**	**281,425**	**304,117**

Table 4. Frequency, Fitness Data (Career Field = Aircrew) by Gender and Rank

	n	%		n	%
Male	20,912	92.16	**Officer**	15,302	67.43
Female	1,780	7.84	**Enlisted**	7,390	32.57
Total	22,692	100.00	Total	22,692	100.00

However, fitness test data does not include additional demographic information such as race. It also does not include anthropometric measures beyond the basic height, weight, and waist circumference; and the reliability of these is questionable. For example, participants may or may not have been in the standardized posture anthropometrists use when standing height was taken. Waist circumference measures may not have been taken at the maximum point of quiet respiration (i.e. someone may be purposefully "sucking it in" as to achieve a smaller waist measure and higher fitness data score). As shown in Figure 1, a comparison of the waist circumference distributions for the fitness tests and the ACSS data confirmed this fear.

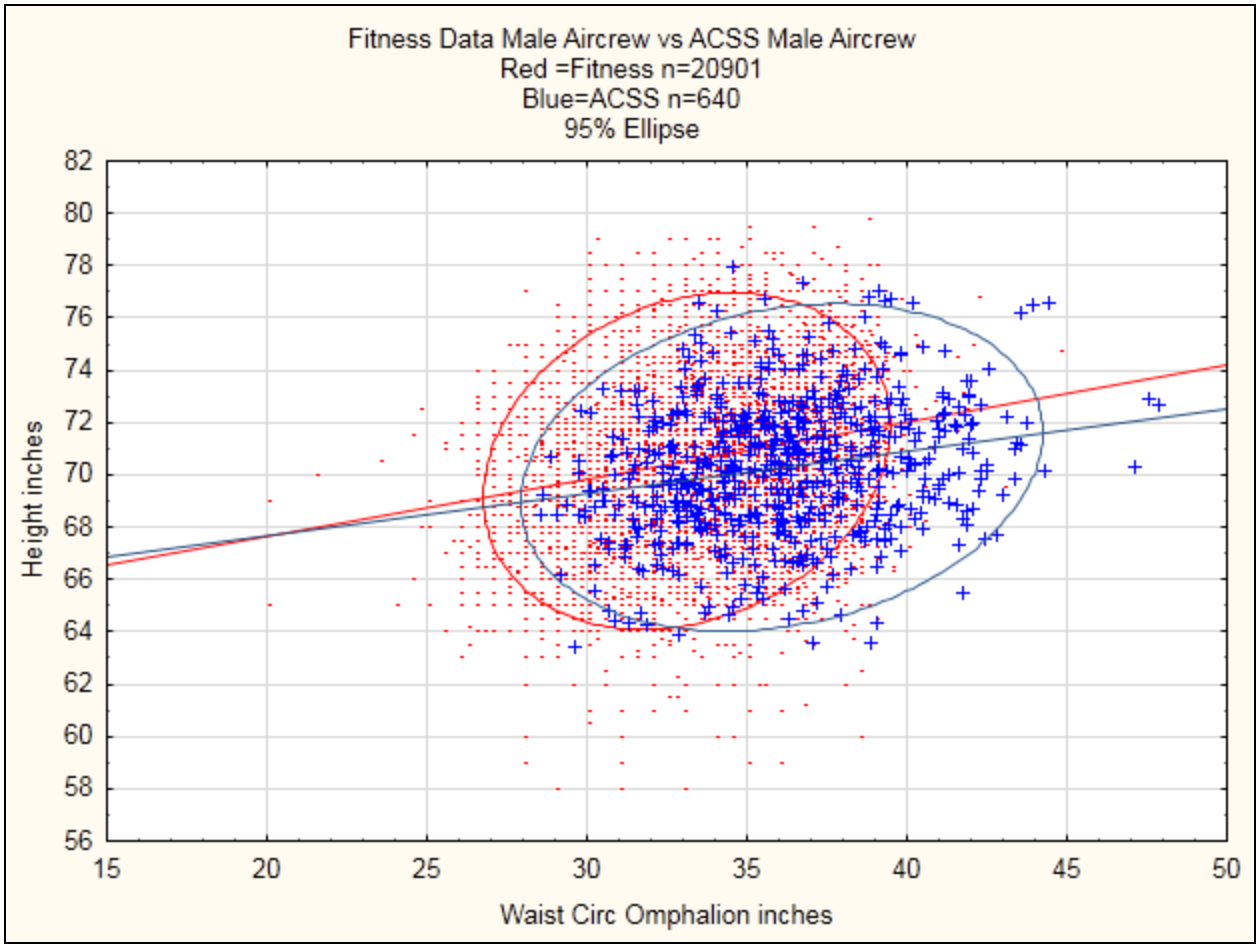

Figure 1. Comparison of Waist Circ and Standing Height between Fitness 2013 Male Aircrew and ACSS Male Aircrew

As a result, waist circumference was dropped for this analysis. Height however appeared close enough to allow use of this measurement in the matching process. The fitness data had to be edited slightly to remove outliers. A few heights as small as 50 inches were recorded for some individuals. The minimum standing height for entry into the Air Force is 58 inches. All observations under 58 inches were removed. Similar editing was performed on all variables. This is typical when sample sizes are this large.

Fitness data is limited to individuals who participated in a USAF Fitness test during the 2013 calendar year. Since individuals may have also participated in multiple fitness tests throughout the year, some multiple entries existed but were averaged for height and weight waist for each subject number. We also calculated a BMI variable from height and weight: BMI = (weight/(height^2)) * 703.

1. Fitness Data – Males

As was shown in the ACSS, in the fitness data enlisted Airmen were also consistently younger than officers (Tables 5-9), regardless of career field (aircrew vs. non-aircrew). Enlisted

men can be as young as 17 years old. However, officers need a college degree, raising the minimum age to ~22.

Non-aircrew enlisted also differed significantly from non-aircrew officers on height, weight, and BMI (Table 6). Enlisted Aircrew differed significantly from Aircrew Officers on Height and Weight (Table 8) but BMI is similar. A caution is necessary here - significance tests on sample sizes this large highlight very small differences in means and standard deviations. The BMI tests are an excellent example. For the Aircrew, a .05 difference in BMI is not significant, but for the Non-Aircrew, a difference of .08 is. These differences must be tempered with allowable measurement errors described in Appendix C and a bit of rationality.

Table 5. USAF Male Fitness Data Descriptive Statistics – All Non-Aircrew

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Age	226,185	28.89	17.00	64.00	7.32
Height (inches)	226,185	70.02	58.00*	80.00	2.82
Weight (lbs)	226,185	181.69	88.00	319.00	26.22

* 58" to 80" is the height range requirement for joining the USAF.

Table 6. USAF Male Fitness data t-tests, Non-Aircrew Enlisted vs. Non-Aircrew Officers

	Enlisted n = 186,606 Mean (Std.Dev.)	Officer n = 39,579 Mean (Std.Dev.)	*t*	*p*
Age	27.64 (6.58)	34.79 (7.76)	190.0501	**0.000000**
Height (inches)	69.86 (2.82)	70.38 (2.79)	33.0205	**0.000000**
Weight (lbs)	181.13 (26.55)	184.32 (24.39)	22.0124	**0.000000**
BMI	26.06 (3.34)	26.14 (2.99)	4.4233	**0.000000**

Table 7. USAF Male Fitness Data Descriptive Statistics - All Aircrew

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Age	20,912	31.37	17.00	58.00	6.60
Height (inches)	20,912	70.52	58.00*	80.00	2.65
Weight (lbs)	20,912	183.30	105.00	286.50	24.15

* 58" to 80" is the height range requirement for joining the USAF.

Table 8. USAF Male Fitness data t-tests, Aircrew Enlisted vs. Aircrew Officers

	Enlisted n = 6,424 Mean (Std.Dev.)	Officer n = 14,488 Mean (Std.Dev.)	*t*	*p*
Age	27.55 (6.37)	33.06 (5.98)	-60.2370	**0.000000**
Height (inches)	70.18 (2.71)	70.68 (2.61)	-12.6645	**0.000000**
Weight (lbs)	181.76 (25.60)	184.01 (23.46)	-6.2373	**0.000000**
BMI	25.93 (3.21)	25.88 (2.85)	1.0774	0.281295

Table 9. USAF Male Fitness data: Age, Height, and Weight Ranges for Aircrew

	Enlisted	Officer
Age Range	17 – 55	22 – 58
Height Range (inches)	58.00* – 80.00	58.00* – 80.00
Weight Range (lbs)	105.0 – 286.5	109.0 – 277.7

* 58" to 80" is the height range requirement for joining the USAF.

Table 10. USAF Male Fitness data t-tests, Aircrew vs. Non-Aircrew

	Aircrew n = 20,912 Mean (Std.Dev.)	**Non-Aircrew n = 226,185 Mean (Std.Dev.)**	***t***	***p***
Age	31.4 (6.6)	28.9 (7.3)	47.47694	**0.000000**
Height (inches)	70.5 (2.7)	70.0 (2.8)	28.21372	**0.000000**
Weight (lbs)	183.3 (24.2)	181.7 (26.2)	8.57338	**0.000000**

When comparing aircrew to non-aircrew, we also see significant differences between the two groups in age, height, and weight (Table 10). The distributions for height and weight are plotted in Figure 1. While the means for height and weight are not vastly different, this figure shows a tighter distribution around the aircrew population when compared to the non-aircrew population. One of the reasons for this is the size range requirement to be considered for an aircrew position (64-77 inches standing height, and 34-40 inches sitting height).

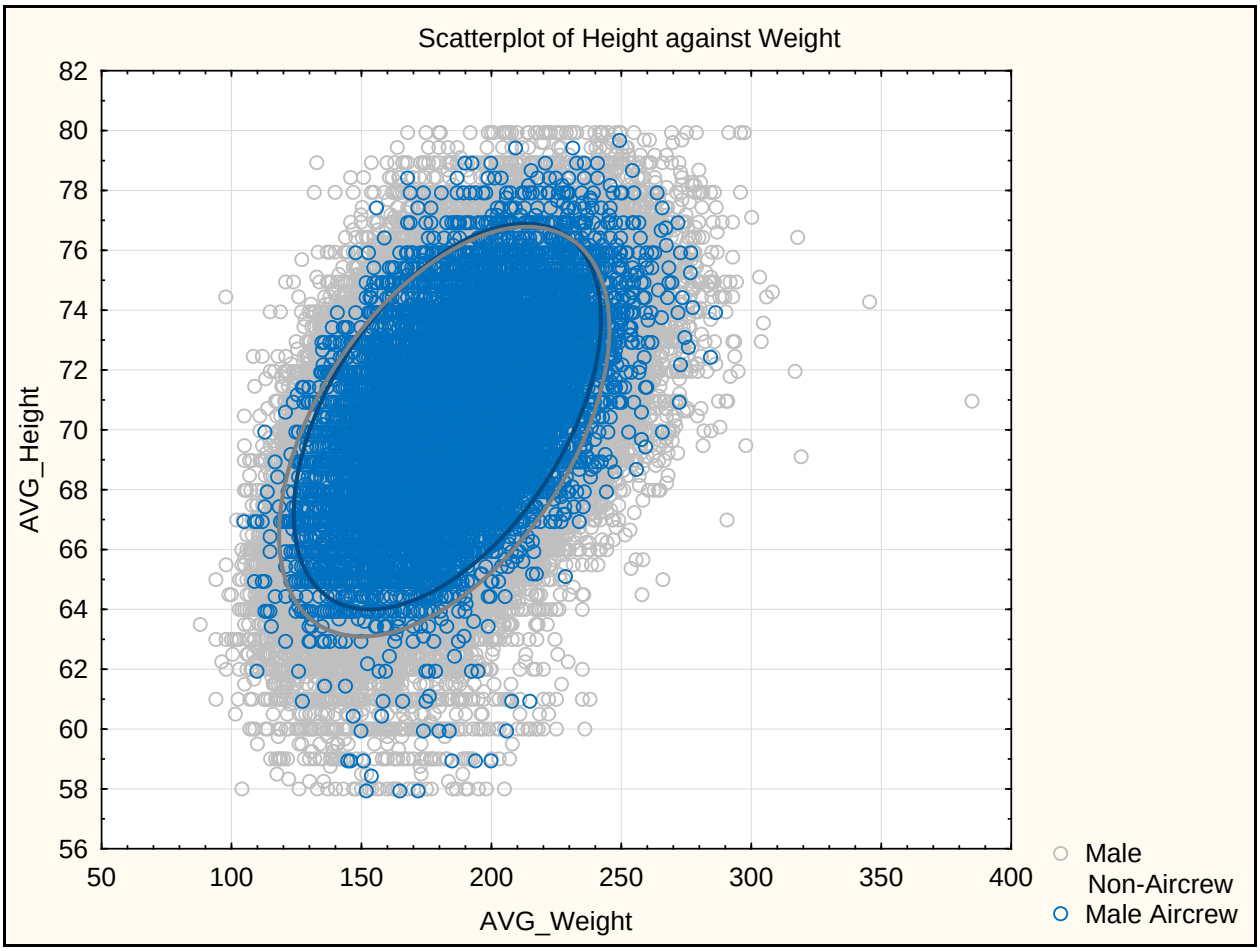

Figure 2. USAF Fitness Male Data - Aircrew Height and Weight compared to Non-Aircrew

2. Fitness Data – Females

Since female officers also need a college degree, the same pattern seen in male fitness data is also shown in the female fitness data. Enlisted were consistently younger than officers (Tables 11-15), regardless of career field (aircrew vs. non-aircrew). Non-aircrew enlisted also differed significantly from non-aircrew officers on height, weight, and BMI (Table 12). Aircrew enlisted differed significantly from aircrew officers on weight and BMI (Table 14).

Table 11. USAF Female Fitness Data Descriptive Statistics – All Non-Aircrew

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Age	55,240	28.91	17.00	64.50	7.31
Height (inches)	54,959	64.58	58.00*	79.0	2.68
Weight (lbs)	54,959	146.64	80.00	267.17	23.03

* 58" to 80 is the height range requirement for joining the USAF.

Table 12. USAF Female Fitness data t-tests, Non-Aircrew Enlisted vs. Non-Aircrew Officers

	Enlisted n = 43,955 Mean (Std.Dev.)	Officer n = 11,285 Mean (Std.Dev.)	*t*	*p*
Age	27.61 (6.49)	33.97 (8.12)	87.9594	**0.000000**
Height (inches)	64.48 (2.66)*	65.00 (2.70)**	18.5680	**0.000000**
Weight (lbs)	147.10 (23.22)*	144.84 (22.15)**	-9.2762	**0.000000**
BMI	24.85 (3.49)*	24.09 (3.33)**	-20.9153	**0.000000**

*Valid n = 43,757 **Valid n = 11,202

Table 13. USAF Female Fitness Data Descriptive Statistics - All Aircrew

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Age	1,780	27.91	17.00	52.00	5.85
Height (inches)	1,773	66.08	58.00*	74.0	2.26
Weight (lbs)	1,773	148.00	94.50	234.60	20.05

* 58" is the minimum height requirement for joining the USAF.

Table 14. USAF Female Fitness data t-tests, Aircrew Enlisted vs. Aircrew Officers

	Enlisted n = 966 Mean (Std.Dev.)	Officer n = 814 Mean (Std.Dev.)	*t*	*p*
Age	25.62 (5.65)	30.63 (4.83)	-19.9047	**0.000000**
Height (inches)	66.10 (2.25)*	66.08 (2.25)**	0.2781	0.780958
Weight (lbs)	149.94 (19.94)*	145.87 (19.98)**	4.2736	**0.000020**
BMI	24.14 (3.14)*	23.49 (3.05)**	4.3877	**0.000012**

*Valid n = 962 **Valid n = 811

Table 15. USAF Female Fitness data: Age, Height, and Weight Ranges for Aircrew

	Enlisted	Officers
Age Range	17 – 52	22 – 47
Height Range (cm)	58.00* – 73.0	58.00* – 74.00
Weight Range (lbs)	106.00 – 234.60	94.50 – 224.00

* 58" is the minimum height requirement for joining the USAF.

Table 16. USAF Female Fitness data t-tests, Aircrew vs. Non-Aircrew

	Aircrew n = 1,780 Mean (Std.Dev.)	Non-Aircrew n = 55,233 Mean (Std.Dev.)	*t*	*p*
Age	27.9 (5.9)	28.9 (7.3)	-5.76076	**0.000000**
Height (inches)	66.1 (2.3)	64.6 (2.7)	23.30983	**0.000000**
Weight (lbs)	148.0 (20.0)	146.6 (23.0)	2.49696	**0.012529**

Similar to the male sample, when comparing female aircrew to non-aircrew, we also see significant differences between the two groups in age, height, and weight (Table 16). These differences in height and weight are plotted in Figure 2, which again shows a tighter distribution around the aircrew population compared to the non-aircrew population. As with men, in order to qualify for aircrew positions, women must meet the minimum size requirements (64-77 inches standing height, and 34-40 inches sitting height). There are size waivers available for individuals outside of these requirements. Roughly 10% of female aircrew and 1% of male aircrew fall outside of the required size range.

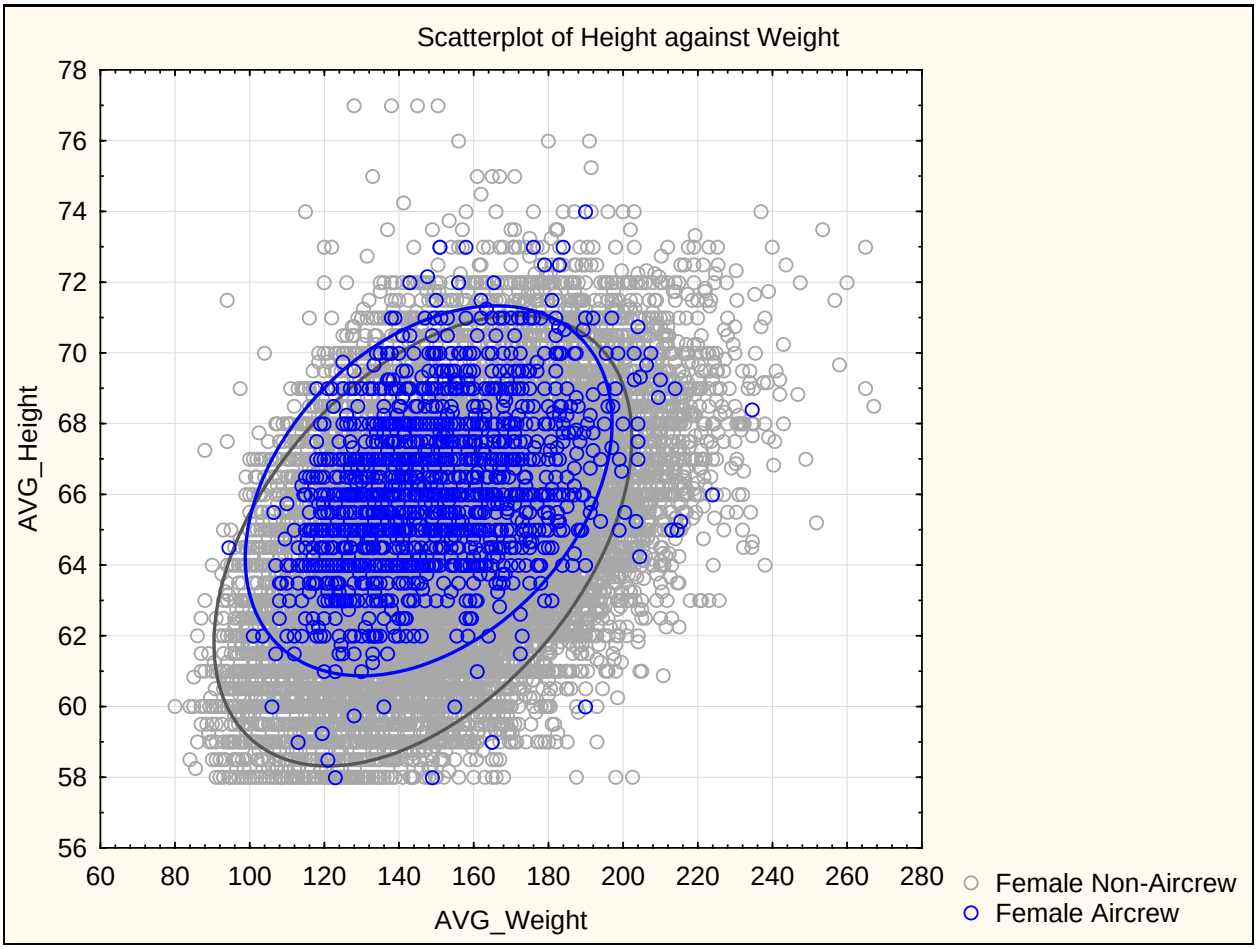

Figure 3. USAF Fitness Female Data - Aircrew Height and Weight compared to Non-Aircrew

C. AFPC IDEAS

While demographic variables such as age, education, rank, can have a significant effect on anthropometric measurements, race is by far the largest contributor of demographic influence on body size and proportions within a sample. Figure 4 below graphically illustrates the difference in limb/torso proportions due to race in the ANSUR II survey. The green ellipse represents 95% of the Caucasion-American males in ANSUR II while the red ellipse represents 95% of African-American males. The shift in the position of the ellipses highlights the differences in the sitting height and buttock-knee length distributions.

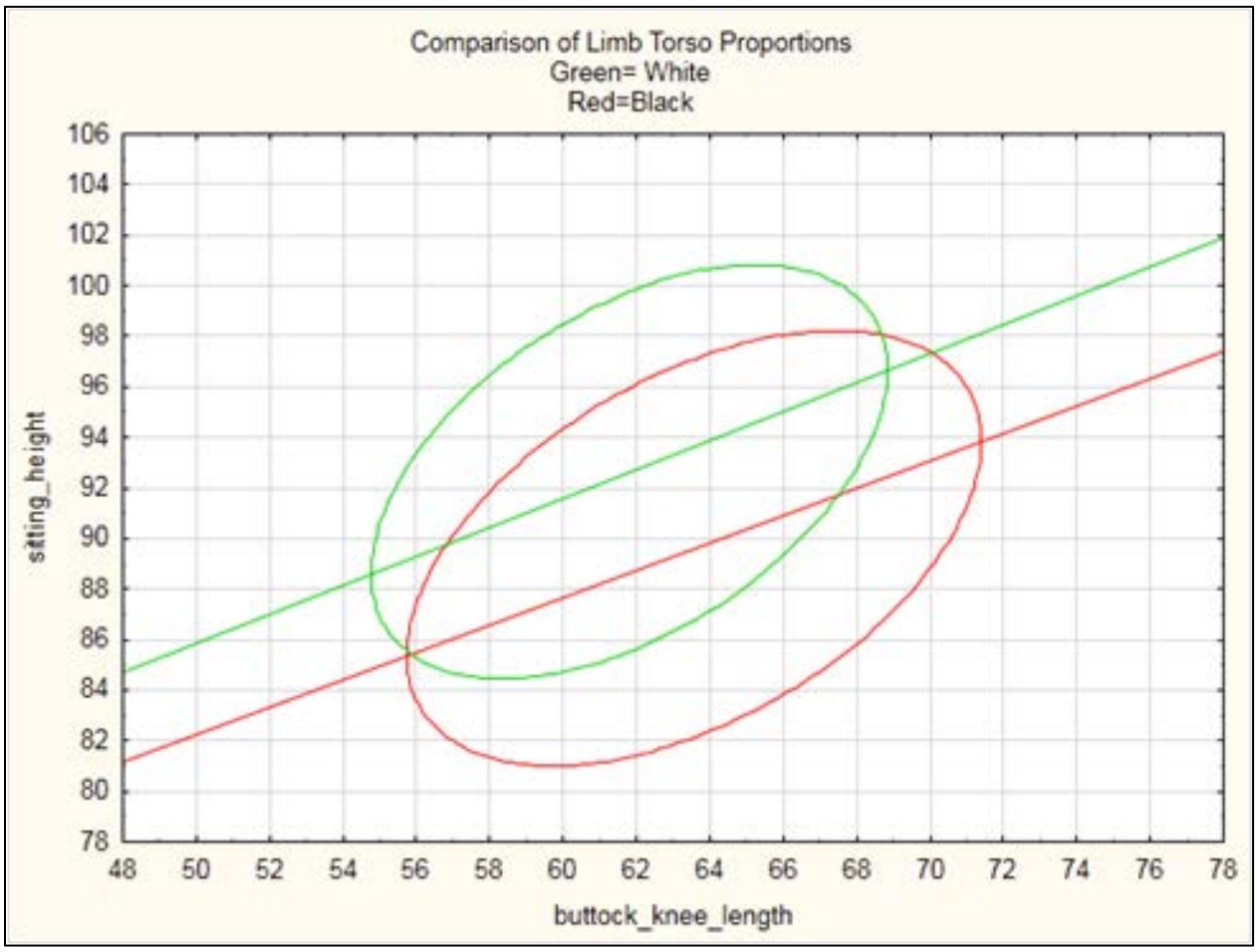

Figure 4. Comparison of Caucasian and African American Limb/Torso proportions

Demographic backgrounds of USAF population (i.e. education, race, and ethnicity), were retrieved from the Air Force Personnel Center's (AFPC) Interactive Demographic Analysis System (IDEAS). This database includes summary demographic information on the USAF population and no anthropometric data. The fitness data includes no racial information. The IDEAS breakdown of aircrew demographics will be used to structure the matched datasets to assure appropriate proportional representation of all racial categories.

Data from AFPC IDEAS provides a snapshot during a specified time of the year (i.e. weekly). Since, the number of individuals in the USAF can fluctuate over the course of the year, one particular month was chosen in 2013, in an effort to be consistent with 2013 Fitness data. The tables (17-20) below used data from fiscal year 2013.

Table 17. Demographic Comparisons between Male Non-Aircrew and Male Aircrew

	Non-Aircrew		Aircrew	
Race	**Enlisted N (%)**	**Officers N (%)**	**Enlisted N (%)**	**Officers N (%)**
American Indian/Native Alaskan	1,280 (0.6)	145 (0.4)	41 (0.5)	88 (0.6)
Asian	5,562 (2.7)	1,532 (4.2)	157 (1.8)	284 (1.9)
Black or African American	29,550 (14.5)	1,974 (5.5)	690 (8.1)	299 (2.0)
Declined to Respond	8,770 (4.3)	2,351 (6.5)	344 (4.0)	713 (4.9)
Identified more than one Race	6,746 (3.3)	599 (1.7)	258 (3.0)	145 (1.0)
Native Hawaiian/Other Pacific Isl.	2,368 (1.2)	170 (0.5)	68 (0.8)	36 (0.2)
White	149, 875 (73.4)	29,401 (81.3)	6,979 (81.8)	13,080 (89.3)
Total	204,151 (100.0)	36,172 (100.0)	8,537 (100.0)	14,645 (100.0)
Age Group				
17-24	74,833 (36.7)	3,464 (9.6)	2,333 (27.3)	236 (1.6)
25-34	90,521 (44.3)	14,440 (39.9)	4,299 (50.4)	8,716 (59.5)
35-44	35,767 (17.5)	13,038 (36.0)	1,761 (20.6)	4,951 (33.8)
45+	3,030 (1.5)	5,230 (14.5)	144 (1.7)	742 (5.1)
Total	204,151 (100.0)	36,172 (100.0)	8,537 (100.0)	14,645 (100.0)

Table 18. Demographic Comparisons between Female Non-Aircrew and Female Aircrew

	Non-Aircrew		Aircrew	
Race	**Enlisted N (%)**	**Officers N (%)**	**Enlisted N (%)**	**Officers N (%)**
American Indian/Native Alaskan	445 (0.9)	65 (0.6)	7 (0.6)	3 (0.4)
Asian	1,554 (3.2)	734 (6.4)	21 (1.9)	21 (2.5)
Black or African American	12,157 (25.3)	1,435 (12.4)	117 (10.6)	11 (1.3)
Declined to Respond	2,806 (5.8)	942 (8.2)	38 (3.4)	45 (5.3)
Identified more than one Race	2,162 (4.5)	283 (2.4)	45 (4.1)	18 (2.1)
Native Hawaiian/Other Pacific Isl.	808 (1.7)	70 (0.6)	9 (0.8)	3 (0.4)
White	28,039 (58.4)	8,024 (69.5)	871 (78.6)	741 (88.0)
Total	47,971 (100.0)	11,553 (100.0)	1,108 (100.0)	842 (100.0)
Age Group				
17-24	17,585 (36.7)	1,297 (11.2)	473 (42.7)	25 (3.0)
25-34	21,875 (45.6)	5,467 (47.3)	520 (46.9)	641 (76.1)
35-44	7.971 (16.6)	3,343 (28.9)	102 (9.2)	167 (19.8)
45+	540 (1.1)	1,446 (12.5)	13 (1.2)	9 (1.1)
Total	47,971 (100.0)	11,553 (100.0)	1,108 (100.0)	842 (100.0)

Table 19. Comparing Male and Female Aircrew Demographics

	Male Aircrew		Female Aircrew	
Race	**Enlisted N (%)**	**Officers N (%)**	**Enlisted N (%)**	**Officers N (%)**
American Indian/Native Alaskan	41 (0.5)	88 (0.6)	7 (0.6)	3 (0.4)
Asian	157 (1.8)	284 (1.9)	21 (1.9)	21 (2.5)
Black or African American	690 (8.1)	299 (2.0)	117 (10.6)	11 (1.3)
Declined to Respond	344 (4.0)	713 (4.9)	38 (3.4)	45 (5.3)
Identified more than one Race	258 (3.0)	145 (1.0)	45 (4.1)	18 (2.1)
Native Hawaiian/Other Pacific Isl.	68 (0.8)	36 (0.2)	9 (0.8)	3 (0.4)
White	6,979 (81.8)	13,080 (89.3)	871 (78.6)	741 (88.0)
Total	8,537 (100.0)	14,645 (100.0)	1,108 (100.0)	842 (100.0)
Age Group				
17-24	2,333 (27.3)	236 (1.6)	473 (42.7)	25 (3.0)
25-34	4,299 (50.4)	8,716 (59.5)	520 (46.9)	641 (76.1)
35-44	1,761 (20.6)	4,951 (33.8)	102 (9.2)	167 (19.8)
45+	144 (1.7)	742 (5.1)	13 (1.2)	9 (1.1)
Total	8,537 (100.0)	14,645 (100.0)	1,108 (100.0)	842 (100.0)

Table 20. Comparing USAF Fitness to AFPC IDEAS data from 2013

Female Aircrew	**Fitness 2013**	**AFPC IDEAS 2013**
Valid N	1,780	1,950
Enlisted	966 (54.3%)	1,108 (56.8%)
Officers	814 (45.7%)	823 (43.7%)
Race Breakdown - Enlisted	**54.3%**	**56.8%**
White	*	78.6%
Black or African American	*	10.6%
Other or Declined to Respond	*	10.8%
Race Breakdown - Officer	**45.7%**	**43.7%**
White	*	88.0%
Black or African American	*	1.3%
Other or Declined to Respond	*	10.7%
Anthropometric Statistics - Enlisted	**54.3%**	**56.8%**
Age	25.6	*
Height (inches)	66.1	*
Weight (lbs)	149.9	*
Anthropometric Statistics - Officer	**45.7%**	**43.7%**
Age	30.6	*
Height (inches)	66.1	*
Weight (lbs)	145.9	*

* Data not available from that particular resource

Looking at these two datasets together, we have a more complete idea of the composition of the total population of the USAF population. Since the percentages of officer and enlisted are reasonably close in the two datasets, we can assume that the racial breakdown in the IDEAS

dataset would apply to the fitness data and therefore can be used to structure the eventual matched dataset. Please note again that not everyone may have taken a fitness test during the 2013 calendar year (i.e. individuals on deployment or "on profile"). This most likely accounts for the differences (n=170). Since rank and race appear to influence height and weight, demographic variables were retained in the final database to allow sorting and separate analysis when needed.

D. ANSUR-II

ANSUR was a large anthropometric survey undertaken in 1988 (Gordon et al 1989). In 2011, another anthropometric survey was undertaken to reflect changes in Army population gender, age, race, height, and weight distributions (Gordon et al 2014). Commonly referred to as ANSUR-II, it is comprised of 93 anthropometric measures on 11,357 Subjects; 3,922 females and 7,435 males. The Army creates "working databases" from this "datapool" which can be restructured from time to time to represent changing demographics within the Army. Additionally, the Army collected data on their Pilots in a separate dataset. The female pilots (n = 43) from that dataset were thrown into the potential pool of women to be matched to USAF Aircrew.

E. USMC ANSUR

In cooperation with the US Army, the United States Marine Corps (USMC) undertook a comprehensive anthropometric study in 2010 (Gordon et al 2013). Ninety-four traditional measures were taken on 1,983 subjects; 627 females and 1,356 males. USMC ANSUR used measurement descriptions consistent with ANSUR-II. Because of this, the two databases can be merged and compared.

F. Summary of Available Datasets

This study used information from all of these datasets in order to create a USAF representative dataset. Datasets to define the USAF population include the AFPC IDEAS for demographics and the Fitness 2013 data for height and weight. Both datasets have sample sizes that include almost the entire USAF population.

Other branches of the US military provide the ANSUR-II and USMC ANSUR datasets, which, as previously mentioned, can be used separately or combined into substantially larger female (and non-aircrew) dataset than ACSS.

However, there are demographic differences and anthropometric differences between the different branches of the armed forces due to entry, fitness, and career field requirements. For those reasons their data cannot be used directly. Individuals who match the USAF size and demographic distributions must be selected from the other services "datapool".

III. Creating a Matching Process using the ACSS Males

Previous matching efforts described by Gordon (1992), Donelson and Gordon (1996) were based on data gathered from samples of the target population. Typically 12 to 18 anthropometric measurements were taken on hundreds of individuals in the target population. After the matching procedure (typically age, height, and weight stratification), these additional measurements would be used to test the accuracy of the match on measurements other than those used for the stratification.

Since there is no anthropometric data for the USAF other than the ACSS (mainly Caucasian males) and that in the Fitness Tests, the ACSS males were used to develop and validate a method. As can be seen in Figure 5, the ACSS is representative of the USAF Aircrew population for height and weight. For that reason it was determined to be acceptable to use the ACSS for method testing as it supplements the Fitness Data height and weight distribution with additional measurements.

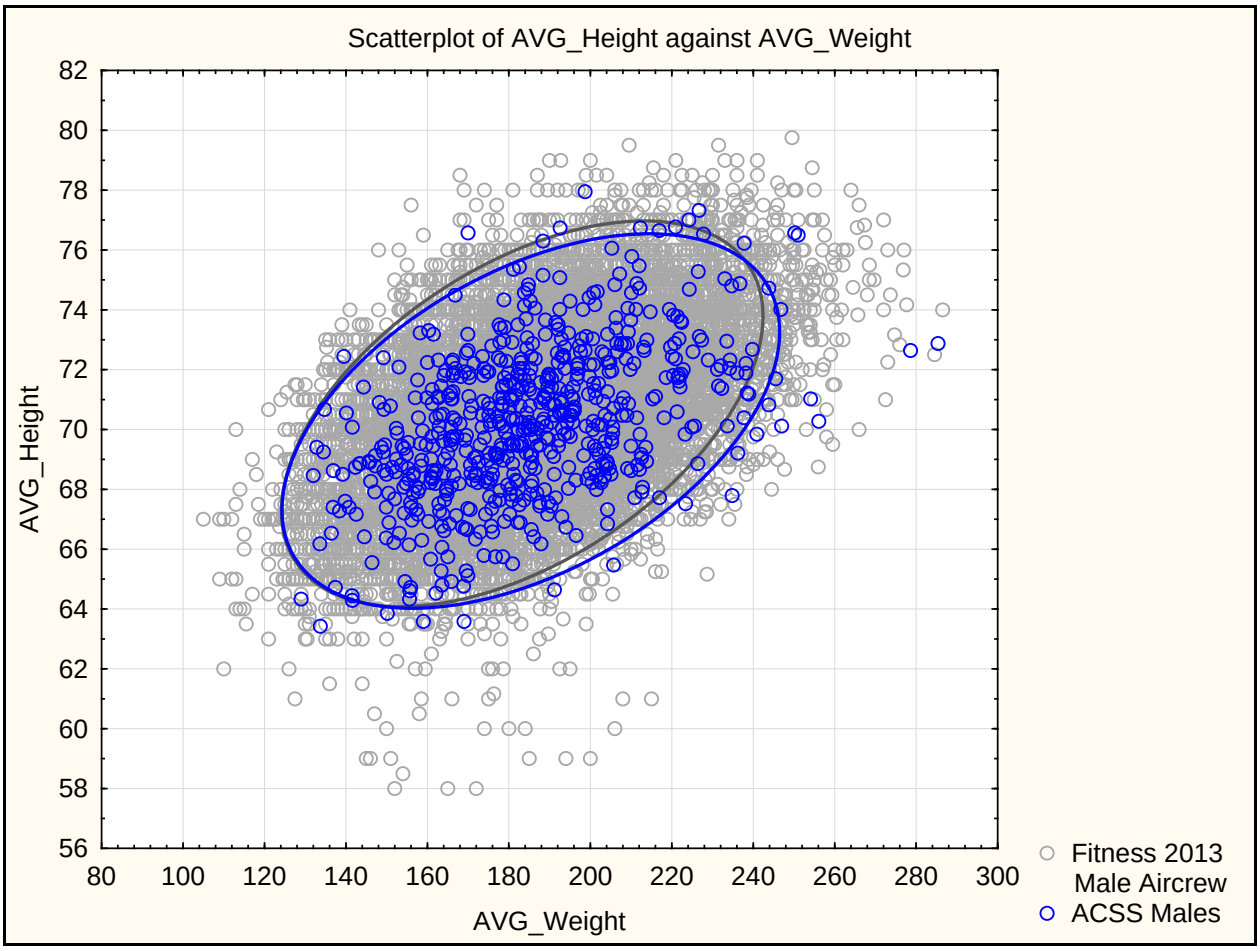

Figure 5. Comparing Males in ACSS to 2013 Fitness data of Male Aircrew.

Between ACSS and ANSUR-II there are 33 comparable measures (Table 21). For these measurements, the measurement descriptions and anatomical landmarks were identical. While this does not account for measurer differences, based on historical cooperation between the involved anthropologists they should be very similar.

Some additional variables (BMI, age category, and height category) were added to simplify selecting individuals who matched stratification criteria and to keep sample size as large as possible.

Table 21. Comparable Anthropometric Measurements between ACSS, ANSUR-II, and USMC ANSUR

Comparable Measures		
Age (years)	Forearm Circumference, Flexed	Sitting Height
Abdomen Depth	Forearm-Forearm Breadth	Span
Bicep Circumference, Flexed	Head Breadth	Stature
Bizygomatic Breadth	Head Length	Thigh Clearance
Buttock Circumference	Hip Breadth, Sitting	Thumbtip Reach
Calf Circumference	Knee Height, Sitting	Vertical Trunk Circumference
Cervicale Height	Lower Thigh Circumference	Waist Back Length
Chest Circumference	Menton-Sellion Length	Waist Circumference, Omphalion
Crotch Height	Neck Circ	Waist Height, Omphalion
Elbow Rest Height	Popliteal Height	Weight
Eye Height, Sitting	Shoulder Breadth	Wrist Circumference

Prior to beginning a matching process, we compared the ACSS and ANSURII height and weight distributions (Figure 6). Height and weight measures are important since they affect nearly all other anthropometric measurements. This scatter plot shows that while the 95% confidence ellipses do overlap, ACSS males are taller and weigh less on average than the general Army sample. The distribution is also much tighter for the ACSS. This is not surprising as USAF Aircrew have Height and Sitting Height restrictions. Given the major differences in these distributions the Army data cannot be used directly. Our approach was to build a stratified dataset by pulling individuals from the ANSUR-II male dataset which matched the anthropometric/demographic profiles of males in ACSS on age, height, and BMI, and then comparing the remaining measurements in Table 21 to test the accuracy of the method.

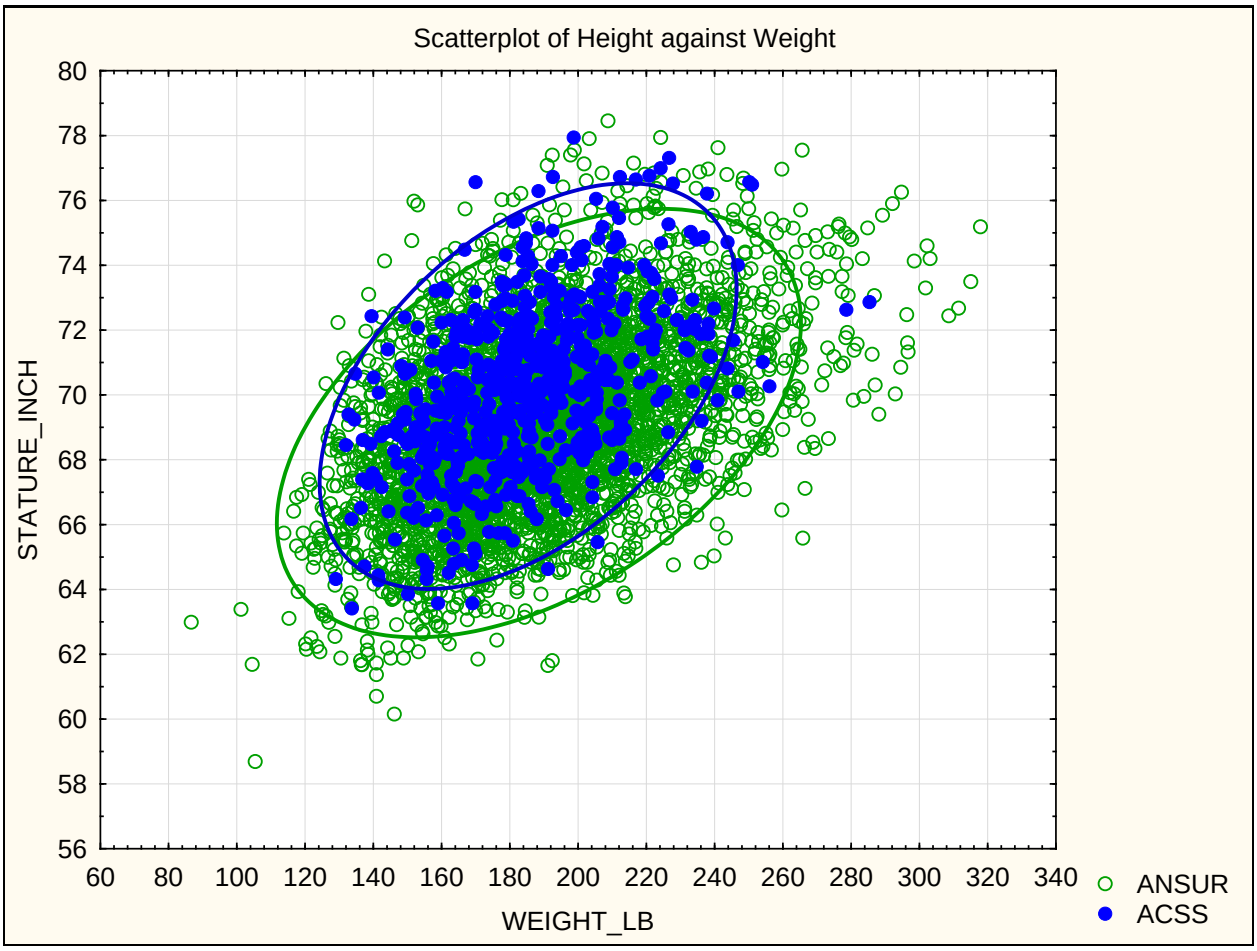

Figure 6. Comparing Males in ACSS to Males in ANSUR, Before Stratification

A. Stratification

Using Statistica software, individuals were first selected based on their reported "DOD race" code, to create populations that were demographically similar. That left 573 ACSS white males and 2,817 ANSUR-II white males. The ANSUR-II white males were then stratified based on the ACSS distributions for age, stature, and BMI for males. Since height and weight were required for matching, individuals with missing height/weight information were removed prior to stratification. Age was divided into 7 groupings: 18-24 years old, 25-29 years old, 30-34 years old, 35-39 years old, 40-44 years old, 45-49 years old, and over 50 years old. Height was divided into 7 groupings: less than 66 inches, 66-67.99 inches, 68-69.99 inches, 70-71.99 inches, 72-73.99 inches, 74-75.99 inches, and over 76 inches. BMI for all individuals was rounded to 0 decimal places and exactly matched. As matching isn't a perfect procedure, it is necessary to create intervals for the stratification variables in order to keep sample size up.

These variables were used for several reasons. First, there is a larger proportion of officers in Aircrew than other career fields. This affects the age of the sample as officers need to have a college degree. Age also has a correlation with weight. Secondly, the Aircrew career field, regardless of position, has a size selection criteria for stature (between 64 and 77 inches) and sitting height for Pilots (between 34 and 40 inches), unless a waiver is obtained. Because of

this, aircrew are taller on average than non-aircrew. And lastly BMI incorporates both weight and height and is considered to be a better indicator of fitness than height and weight taken separately.

The data was reduced by utilizing random stratified sampling. First based on age groupings, followed by sampling based on BMI and height category. This resulted in a sample of 523 men pulled from the ANSUR-II dataset.

B. Results

Figure 7 shows almost identical 95% confidence ellipses when comparing the height and weight distributions of the two populations (as expected). When comparing other anthropometric measurements between the two populations (Table 22), we see height and weight are no longer significantly different between the two populations. Having two large populations (ACSS n=573, ANSUR-II n=523) for a t-test, differences are more likely to be significant, so this should be considered.

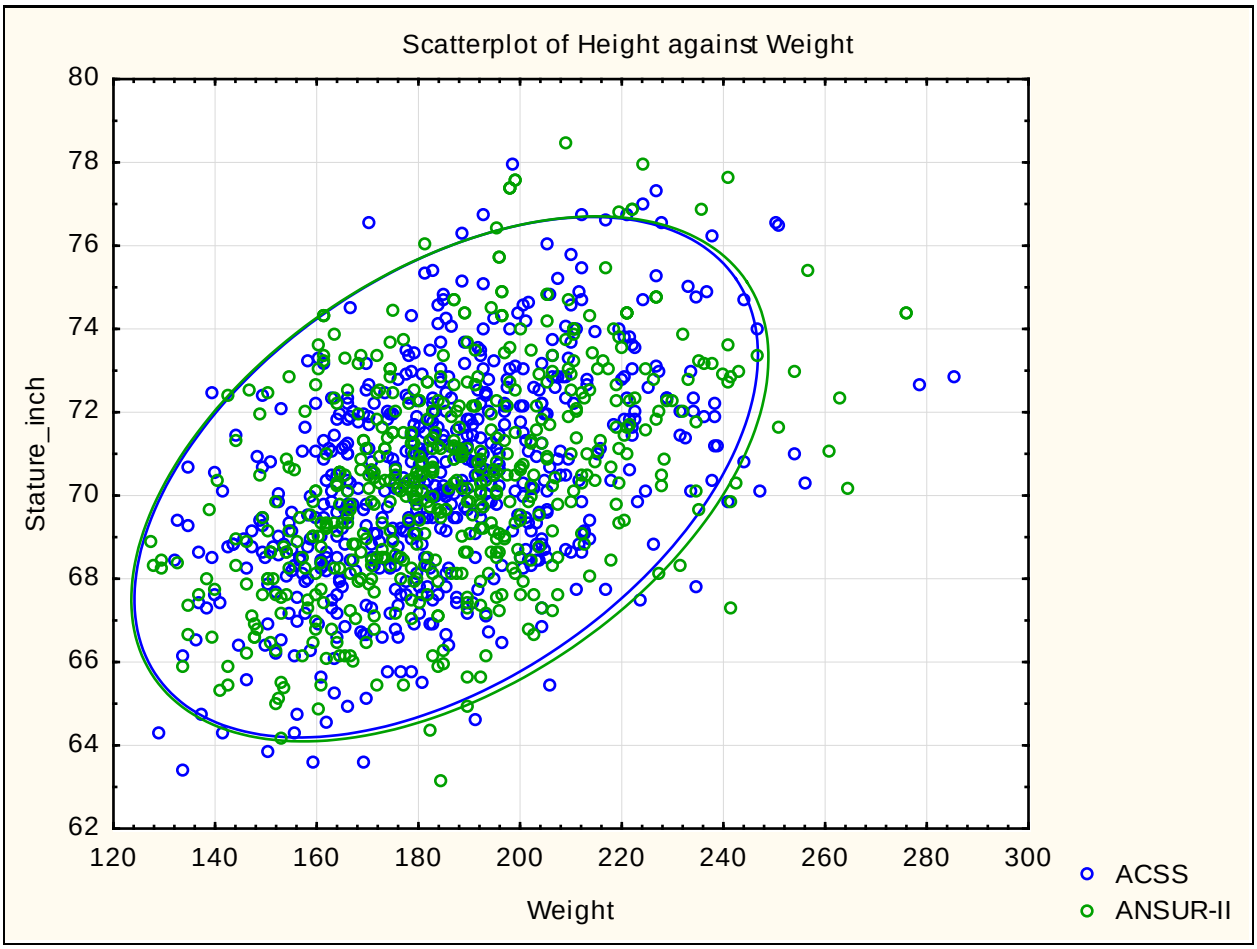

Figure 7. Comparing White Males in ACSS to White Males in ANSUR-II, After Stratification

Table 22. Random Stratified Dataset Comparison on Sample of Anthropometric Measurements (ACSS n=573, ANSUR-II n=523)

Measures (in cm; unless otherwise specified)	Mean ACSS N=573	Mean ANSUR-II N=523	Std Dev ACSS	Std Dev ANSUR-II	p-value	Measurement difference	Allowable Measurer Error**
Age (years)*	30.56	29.40	6.13	6.16	0.0019	1.16	-
Abdomen Depth	24.74	24.72	2.75	3.00	0.9125	0.02	1.0
Bicep Circ*	35.49	35.10	2.89	3.02	0.0261	0.40	0.6
Bideltoid Breadth*	49.33	50.75	2.60	2.91	0.0000	-1.42	0.8
Bizygomatic Breadth	14.19	14.14	0.58	0.60	0.1679	0.05	0.2
Buttock Circ*	102.82	101.46	6.15	6.22	0.0003	1.35	1.2
Calf Circ*	38.57	38.96	2.46	2.66	0.0129	-0.38	0.4
Cervicale Height*	153.09	153.94	6.04	5.86	0.0172	-0.86	0.7
Chest Circ*	102.83	104.93	7.23	7.38	0.0000	-2.10	0.9
Crotch Height *	80.46	85.79	4.30	4.34	0.0000	-5.33	1.0
Elbow Height Sitting	25.06	24.97	2.57	2.46	0.5602	0.09	1.0
Eye Height Sitting*	82.46	81.83	3.05	2.97	0.0005	0.63	0.8
Face Length*	12.08	12.26	0.64	0.67	0.0000	-0.18	0.3
Forearm Breadth***	55.93	57.40	4.35	4.66	0.0000	-1.47	1.7
Forearm Circ	30.54	30.66	1.86	1.96	0.2921	-0.12	0.5
Head Breadth*	15.46	15.35	0.53	0.54	0.0013	0.10	0.2
Head Length*	20.17	20.01	0.64	0.63	0.0000	0.16	0.2
Hip Breadth Sitting*	38.24	37.91	2.44	2.52	0.0308	0.32	0.6
Knee Height Sitting	55.87	56.03	2.55	2.60	0.2904	-0.16	0.2
Lower Thigh Circ***	40.39	40.44	2.32	2.67	0.7720	-0.05	0.4
Neck Circumference*	38.88	39.32	1.99	2.20	0.0005	-0.44	0.6
Popliteal Height	43.80	43.74	2.34	2.29	0.6984	0.05	0.6
Sitting Height*	93.96	93.40	3.25	3.10	0.0037	0.56	0.6
Span	182.44	182.71	7.25	7.79	0.5483	-0.27	1.0
Stature (inch)	70.44	70.20	2.54	2.50	0.1180	0.24	0.24
Thigh Clearance*	17.22	17.77	1.30	1.34	0.0000	-0.54	0.3
TTR	81.56	81.49	3.77	3.96	0.7694	0.07	2.0
Vertical Trunk Circ*	171.05	167.47	7.70	7.62	0.0000	3.58	2.4
Waist Back Length*	50.38	48.09	3.10	2.33	0.0000	2.29	0.5
Waist Circ Omphalion*	91.61	92.81	8.47	9.09	0.0237	-1.20	1.2
Waist Height Omphalion*	108.13	107.52	4.83	4.91	0.0380	0.61	0.7
Weight (lbs)	185.46	186.20	24.94	25.52	0.6284	-0.74	0.66
Wrist Circ***	17.50	17.58	0.75	0.82	0.1194	-0.08	0.3

*Statistically significant difference at $\alpha = 0.05$

***For three measures (Forearm to Forearm Breadth, Lower Thigh Circ, and Wrist Circ), ACSS sample size was n=385

Age was significantly different with the average measurement difference being 1.27 years. This is rather surprising, but due to the large age category that was necessary to keep the sample size up.

Measurements (12) where comparisons between populations were found to be insignificant include abdomen depth, bizygomatic breadth, elbow height sitting, forearm circumference, knee height sitting, lower thigh circumference, popliteal height, span, stature

thump-tip reach, weight, and wrist circ. None of these measures involve a great deal of soft tissue.

While many other measurements (21 of 33) were significantly different, the difference in means between ACSS and the ANSUR-II match was usually only a few millimeters and was within allowable measurement error (Gordon et al 2014) for 11 of the measurements. These include bicep circumference, calf circumference, eye height sitting, face length, forearm-forearm breadth, head breadth, head length, hip breadth sitting, neck circumference, sitting height, waist circumference, and waist height. These differences in means are considered acceptable.

However, there were significant differences in eight measurements (excluding age) between the two populations that were outside the allowable error and warrant further examination. Cervicale height and thigh clearance are close to the acceptable measurement error and differences in means are probably due to measurement error. The cervicale and T-1 landmarks are commonly confused and are about 1cm apart. The thigh clearance measurement is very posture sensitive and a 5mm difference is not surprising. Both of these differences are acceptable.

Bideltoid breadth, buttock circumference, and chest circumference could indicate a real difference between services. These measures are highlighted in yellow. Since the buttock circumference and chest circumference differences are in opposite directions, it is hard to believe that tape measure tension was the culprit. This is generally the problem with circumference measurements. Differences in these measures could indicate that while average overall stature may not be different, the ANSUR-II comparison population may be bulkier in certain areas than the ACSS population.

Crotch height, vertical trunk circumference, and waist back length (highlighted in red) are far beyond measurement error. In each case the measurement is made in or through the crotch area. On male subjects this area is sensitive (Hudson personal communication) and often approached differently by different anthropometrists. The ACSS data confirm that the measurements were taken with little to no compression of the genitalia. These three measures were dropped from the matching datasets.

The next step was to repeat the identical matching process a number of times to determine how variable the resulting samples would be. Table 23 shows the differences between the ACSS white male sample and four additional matches pulled from the ANSUR-II pool (ACSS minus the matched sample). The results are remarkably consistent for all five samples.

Table 23. Comparing Four Stratified Datasets

Measure (in cm, unless otherwise specified)	Comparison 1 N=518		Comparison 2 N=544		Comparison 3 N=534		Comparison 4 N=575		Average Measure-ment Difference	Allowable Measurer Error (cm)
	p-value	Measure Difference	p-value	Measure Difference	p-value	Measure Difference	p-value	Measure Difference		
Age (years)	0.0158	0.89	0.0324	0.79	0.0475	0.73	0.2743	0.41	0.71	-
Abdomen Depth	0.7682	-0.05	0.5515	-0.10	0.6534	-0.08	0.3140	-0.16	-0.10	1.00
Bicep Circ	0.2309	0.22	0.0534	0.34	0.1190	0.27	0.2532	0.19	0.26	0.60
Bideltoid Breadth	0.0000	-1.37	0.0000	-1.38	0.0000	-1.39	0.0000	-1.44	-1.39	0.80
Bizygomatic Breadth	0.0941	0.06	0.0900	0.06	0.1650	0.05	0.5198	0.02	0.05	0.20
BMI	0.2255	-0.23	0.3182	-0.19	0.1566	-0.26	0.0634	-0.31	-0.25	-
Buttock Circ	0.0007	1.29	0.0001	1.48	0.0000	1.57	0.0002	1.30	1.41	1.20
Calf Circ	0.0038	-0.45	0.0217	-0.35	0.0100	-0.39	0.0034	-0.42	-0.40	0.40
Cervicale Height	0.0008	-1.21	0.0004	-1.28	0.0153	-0.88	0.0009	-1.19	-1.14	0.70
Chest Circ	0.0000	-2.11	0.0000	-1.95	0.0000	-2.06	0.0000	-2.27	-2.10	1.40
CRTCHHT	0.0000	-5.51	0.0000	-5.62	0.0000	-5.31	0.0000	-5.49	-5.48	1.00
Elbow Height Sitting	0.7762	0.04	0.1991	0.20	0.1858	0.20	0.8387	0.03	0.12	1.00
Eye Height Sitting	0.0135	0.46	0.0029	0.55	0.0003	0.66	0.0180	0.43	0.53	0.80
Face Length	0.0000	-0.18	0.0000	-0.26	0.0000	-0.19	0.0000	-0.20	-0.21	0.30
Forearm Breadth	0.0000	-1.47	0.0000	-1.54	0.0000	-1.38	0.0000	-1.60	-1.50	1.70
Forearm Circ	0.0355	-0.25	0.0731	-0.20	0.0540	-0.22	0.0511	-0.21	-0.22	0.50
Head Breadth	0.0014	0.10	0.0021	0.10	0.0001	0.12	0.0106	0.08	0.10	0.20
Head Length	0.0000	0.17	0.0094	0.10	0.0004	0.14	0.0091	0.10	0.13	0.20
Hip Breadth Sitting	0.0305	0.33	0.0109	0.38	0.0059	0.41	0.0286	0.31	0.36	0.60
Knee Height Sitting	0.0155	-0.37	0.0143	-0.38	0.1701	-0.21	0.0656	-0.28	-0.31	0.20
Lower Thigh Circ	0.4383	-0.13	0.5667	-0.10	0.6158	-0.09	0.1972	-0.20	-0.13	0.40
Neck Circumference	0.0085	-0.32	0.0003	-0.46	0.0004	-0.43	0.0000	-0.54	-0.44	0.60
Popliteal Height	0.5414	-0.09	0.3872	-0.12	0.8065	0.03	0.9703	-0.01	-0.04	0.60
Sitting Height	0.0452	0.40	0.0252	0.44	0.0012	0.64	0.0536	0.38	0.46	0.60
Span	0.0948	-0.76	0.0778	-0.80	0.2785	-0.49	0.2101	-0.57	-0.65	1.00
Stature	0.5319	0.24	0.7338	0.13	0.0976	0.65	0.3811	0.34	0.34	0.60
Stature inch	0.5329	0.10	0.7348	0.05	0.0977	0.25	0.3820	0.13	0.13	-
Thigh Clearance	0.0000	-0.57	0.0000	-0.53	0.0000	-0.53	0.0000	-0.55	-0.55	0.30
TTR	0.6812	-0.10	0.2453	-0.27	0.7737	-0.07	0.7301	-0.08	-0.13	2.00
Vertical Trunk Circ	0.0000	3.43	0.0000	3.56	0.0000	3.65	0.0000	3.30	3.49	2.40
Waist Back Length	0.0000	2.16	0.0000	2.12	0.0000	2.21	0.0000	2.06	2.14	0.50
Waist Circ	0.0093	-1.36	0.0049	-1.48	0.0106	-1.31	0.0024	-1.45	-1.40	1.20
Waist Height	0.1599	0.41	0.1935	0.38	0.0157	0.71	0.0728	0.52	0.51	0.70
Weight (lbs)	0.4891	-1.06	0.4386	-1.19	0.7609	-0.46	0.2872	-1.50	-1.05	0.3kg
Wrist Circ	0.0179	-0.13	0.0158	-0.13	0.0265	-0.12	0.0263	-0.12	-0.12	0.30

In the above analyses we removed all but Caucasian males prior to stratifying to assure that the (racial) differences seen in Figure 4 did not influence the results of the comparisons. We would not be able to stratify the female aircrew and non-aircrew matched samples based on race since the female Fitness 2013 data (which we will be using for stratification) does not include that demographic information. The final step in this process was to ignore race stratification and create matched samples based only on age group, height category, and BMI. The results are below in table 24.

Table 24. Random Stratified Dataset Comparison on Anthropometric Measurements

Measures (in cm; unless otherwise specified)	Mean ACSS N=640	Mean ANSUR-II N= 585	Std Dev ACSS	Std Dev ANSUR-II	p-value	Measurement Difference	Allowable Measurer Error
Age (years)	30.47	29.98	6.02	6.26	0.1656	0.49	-
Abdomen Depth	24.77	24.68	2.76	2.83	0.5578	0.09	1.0
Bicep Circ	35.60	35.39	2.91	2.84	0.2008	0.21	0.6
Bideltoid Breadth*	49.37	50.75	2.58	2.65	0.0000	-1.38	0.8
Bizygomatic Breadth	14.22	14.21	0.58	0.57	0.8570	0.01	0.2
Buttock Circ*	102.80	101.16	6.13	6.55	0.0000	1.64	1.2
Calf Circ	38.58	38.85	2.45	2.59	0.0628	-0.27	0.4
Cervicale Height*	152.76	153.92	6.05	6.11	0.0009	-1.15	0.7
Chest Circ*	102.87	104.40	7.25	6.92	0.0002	-1.53	0.9
Crotch Height *	80.24	86.05	4.30	4.65	0.0000	-5.81	1.0
Elbow Height Sitting*	25.03	24.59	2.64	2.84	0.0050	0.44	1.0
Eye Height Sitting*	82.28	81.54	3.10	3.18	0.0000	0.74	0.8
Face Length*	12.08	12.31	0.65	0.67	0.0000	-0.23	0.3
Forearm Breadth*	56.07	57.35	4.39	4.39	0.0000	-1.28	1.7
Forearm Circ*	30.57	30.89	1.86	1.91	0.0032	-0.32	0.5
Head Breadth*	15.48	15.39	0.53	0.56	0.0063	0.08	0.2
Head Length*	20.15	20.04	0.64	0.69	0.0050	0.11	0.2
Hip Breadth Sitting*	38.22	37.68	2.46	2.58	0.0002	0.53	0.6
Knee Height Sitting*	55.76	56.18	2.54	2.71	0.0059	-0.41	0.2
Lower Thigh Circ	40.39	40.60	2.33	2.79	0.1939	-0.22	0.4
Neck Circumference*	38.88	39.32	1.99	2.20	0.0005	-0.44	0.6
Popliteal Height	43.68	43.82	2.35	2.39	0.3046	-0.14	0.6
Sitting Height*	93.74	93.01	3.32	3.46	0.0002	0.73	0.6
Span*	182.24	183.60	7.23	8.38	0.0024	-1.36	1.0
Stature (inch)	70.28	70.16	2.55	2.59	0.3920	0.13	0.24
Thigh Clearance*	17.24	17.84	1.28	1.40	0.0000	-0.61	0.3
TTR	81.46	81.84	3.73	4.19	0.0953	-0.38	2.0
Vertical Trunk Circ*	170.92	166.82	7.73	7.76	0.0000	4.10	2.4
Waist Back Length*	50.20	47.92	3.11	2.44	0.0000	2.28	0.5
Waist Circ	91.66	92.00	8.43	8.73	0.4924	-0.34	1.2
Waist Height	107.88	107.65	4.83	5.08	0.4116	0.23	0.7
Weight (lbs)	185.39	185.89	24.86	25.47	0.7293	-0.50	0.66
Wrist Circ*	17.47	17.62	0.77	0.83	0.0030	-0.15	0.3

While we would have liked closer results for some measurements than we see in Tables 22 and 24, matching represents the only feasible approach to create additional USAF samples. Clearly the differences between ANSURII and the ACSS data (seen in Figure 6) preclude the

direct use of ANSURII data to represent USAF Aircrew. The data must be restructured to bring it closer to the USAF size distributions. Therefore, using Fitness data and ANSUR II in the matching process for creating a female aircrew sample is deemed to be acceptable.

IV. Applying the Matching Process to create a Female Sample

To create a female baseline datapool the three available datasets; the ANSUR-II datapool, ANSUR-II female pilots, and USMC ANSUR were combined. This was done so that the population from which to pull individuals who matched female aircrew target was larger. Since height and weight were required for matching, individuals with missing height/weight information were removed. After deleting those with missing height and/or weight information, we had a baseline sample of 4,468 (Table 25) from which to find individuals who matched USAF female Aircrew.

Table 25. Datasets contributing to "baseline" sample.

Contributing Dataset	N
ANSUR-II pool	3,806
ANSUR-II female pilots	41
USMC ANSUR	621
Total	4,468

The combined dataset was then compared to the Fitness data for actual female USAF aircrew. Figure 8 shows the plot of height and weight statistics between the USAF Fitness Data target for female aircrew and the baseline dataset. The ellipses show a 95% confidence coefficient. As shown, the USAF Fitness Aircrew occupies a more concentrated ellipse in terms of height and weight and are taller and lighter on average.

The difference in height between the merged ANSUR datasets and the USAF Fitness Data for female aircrew is highlighted when divided into categories (Table 26). Over 50% of the women in the merged ANSUR datasets are less than 64 inches tall, while only 10.5% of USAF Fitness 2013 female aircrew are less than 64 inches tall. This is due to aircrew minimum size requirements. Also, according to the USAF Fitness 2013 data, a third (33.4%) of female aircrew are between 66 and 67.99 inches tall. Less than 14% of women in the merged ANSUR datasets occupy this category.

When age categories are compared, nearly half (47.8%) of women in the merged ANSUR datasets were between 18 and 24 years old, while only 30.1% of USAF female aircrew fall into this same age range (Table 17). The most common BMI calculated for female aircrew was 22, while the most common BMI calculated for women in the merged ANSUR datasets was 24. Figure 9 shows the different distributions. These comparisons show the difference between the two datasets. This difference can be minimized by pulling anthropometrically similar individuals from the ANSUR dataset.

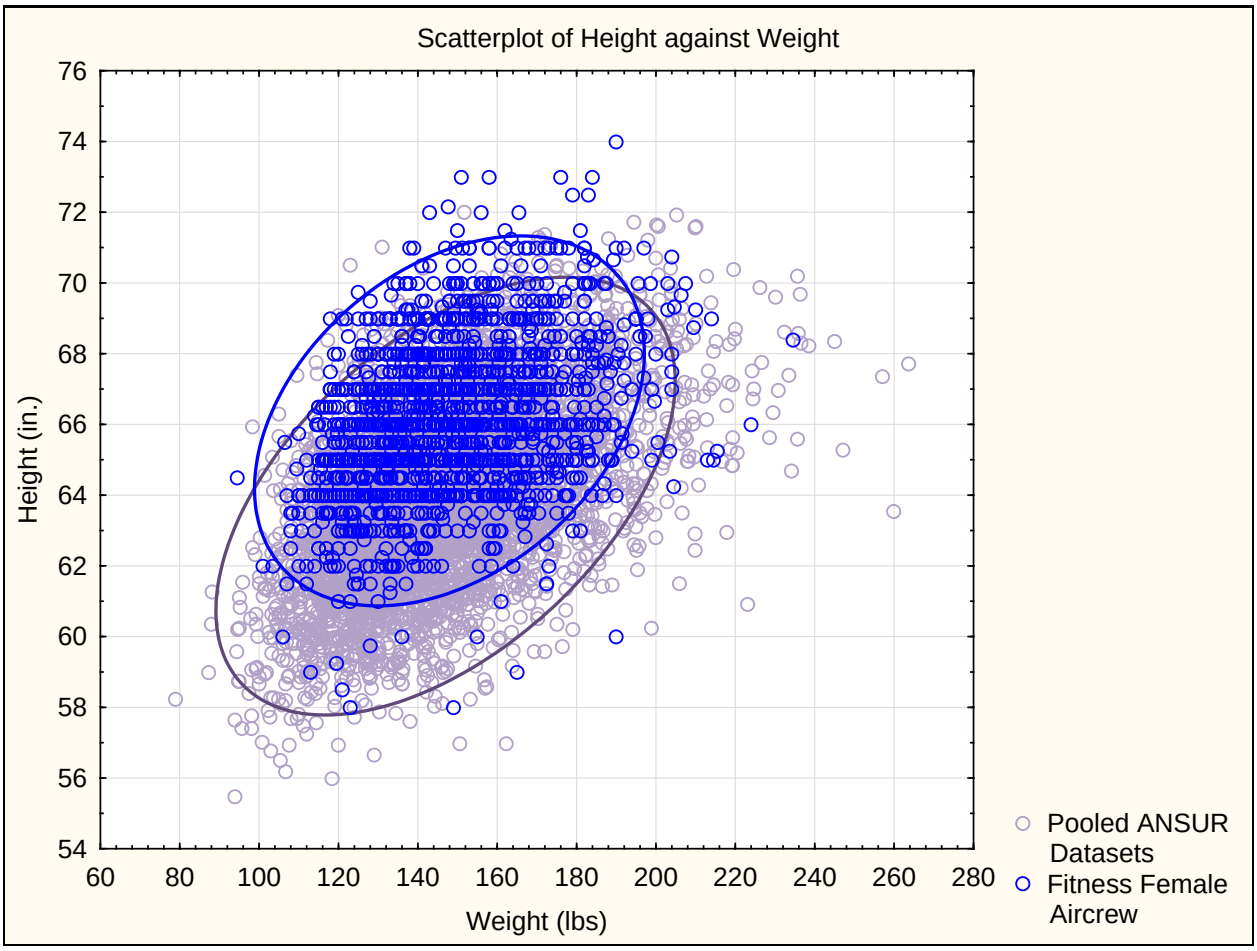

Figure 8. Height and Weight Comparison Between Female Aircrew and Pooled Potential Matched Sample

Table 26. Comparing Frequency Statistics between Merged ANSUR-II and Fitness 2013

	Merged ANSUR-II Datasets		USAF Fitness 2013	
Height Category	**N**	**%**	**N**	**%**
Less than 64 Inches	2,288	51.21	188	10.56
64-65.99 inches	1,263	28.27	608	34.14
66-67.99 inches	620	13.88	595	33.41
68-69.99 inches	254	5.68	299	16.79
Over 70 inches	43	0.96	91	5.11
Age Category	**N**	**%**	**N**	**%**
18-24 years	2,137	47.83	545	30.60
25-29 years	985	22.05	621	34.87
30-34 years	538	12.04	61	3.43
35-39 years	381	8.53	388	21.79
40-44 years	284	6.36	151	8.48
45-49 years	96	2.15	15	0.84
Over 50 years	47	1.05	0	0.00

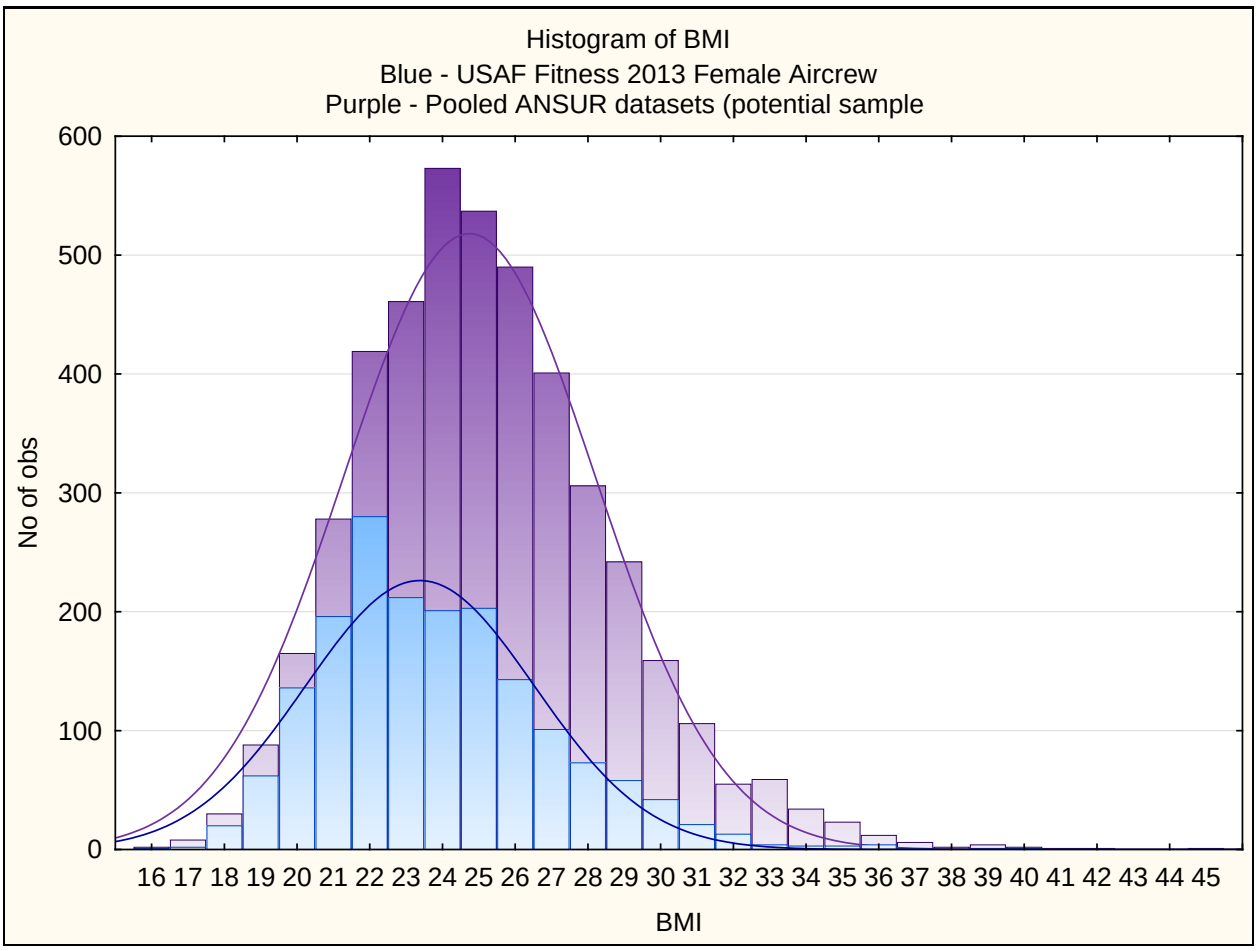

Figure 9. BMI Comparison Between Female Aircrew target and baseline sample

A. Stratification

Using Statistica software, individuals were stratified based on USAF Fitness Female Aircrew statistics of age, stature, and BMI. Age was divided into 6 groupings: 18-24, 25-29, 30-34, 35-39, 40-44, and over 45 years old. Height was divided into 5 groupings: less than 64 inches, 64-65.99 inches, 66-67.99 inches, 68-69.99 inches, and over 70 inches. BMI was rounded to 0 decimal places and exactly matched.

As previously mentioned, these variables were used for several reasons. First, aircrew has a larger proportion of officers than other career fields. This affects the age of the sample as officers need to have a college degree. Age also has a strong correlation with weight. Second, aircrew tend to be taller than non-aircrew since they usually have to meet size requirements. And finally BMI incorporates both weight and height and is thought to relate well to fitness.

The baseline dataset was reduced by utilizing the random stratified sampling option. First based on age groupings, followed by sampling based on BMI and then height category. This resulted in a matched sample of 913 women, of which 715 were pulled from the ANSUR-II database, with a supplemental 19 pulled from the ANSUR-II female pilot subset, and 179 pulled from USMC ANSUR.

B. Resulting Matched Population (Female “Aircrew”)

All anthropometric measures' summary statistics for the Matched Female "Aircrew" dataset can be found in Appendix A.

The matched *target* population is still fairly young, with 44% falling between the ages of 18 and 24 years old (Table 27). However, as shown in Figure 10 below, this matched population is much more comparable to the USAF Fitness 2013 female aircrew in terms of height and weight.

Table 27. Comparing Frequency Statistics between Matched "Aircrew" and Fitness 2013 Female Aircrew

	Matched Female Aircrew		USAF Fitness 2013	
Height Category	**N**	**%**	**N**	**%**
Less than 64 Inches	146	16.0	188	10.56
64-65.99 inches	385	42.2	608	34.14
66-67.99 inches	252	27.6	595	33.41
68-69.99 inches	110	12.0	299	16.79
Over 70 inches	20	2.2	91	5.11
Age Category	**N**	**%**	**N**	**%**
18-24 years	402	44.0	545	30.60
25-29 years	256	28.0	621	34.87
30-34 years	131	14.3	61	3.43
35-39 years	74	8.1	388	21.79
40-44 years	42	4.6	151	8.48
45-49 years	8	0.9	15	0.84
Over 50 years	0	0.00	0	0.00

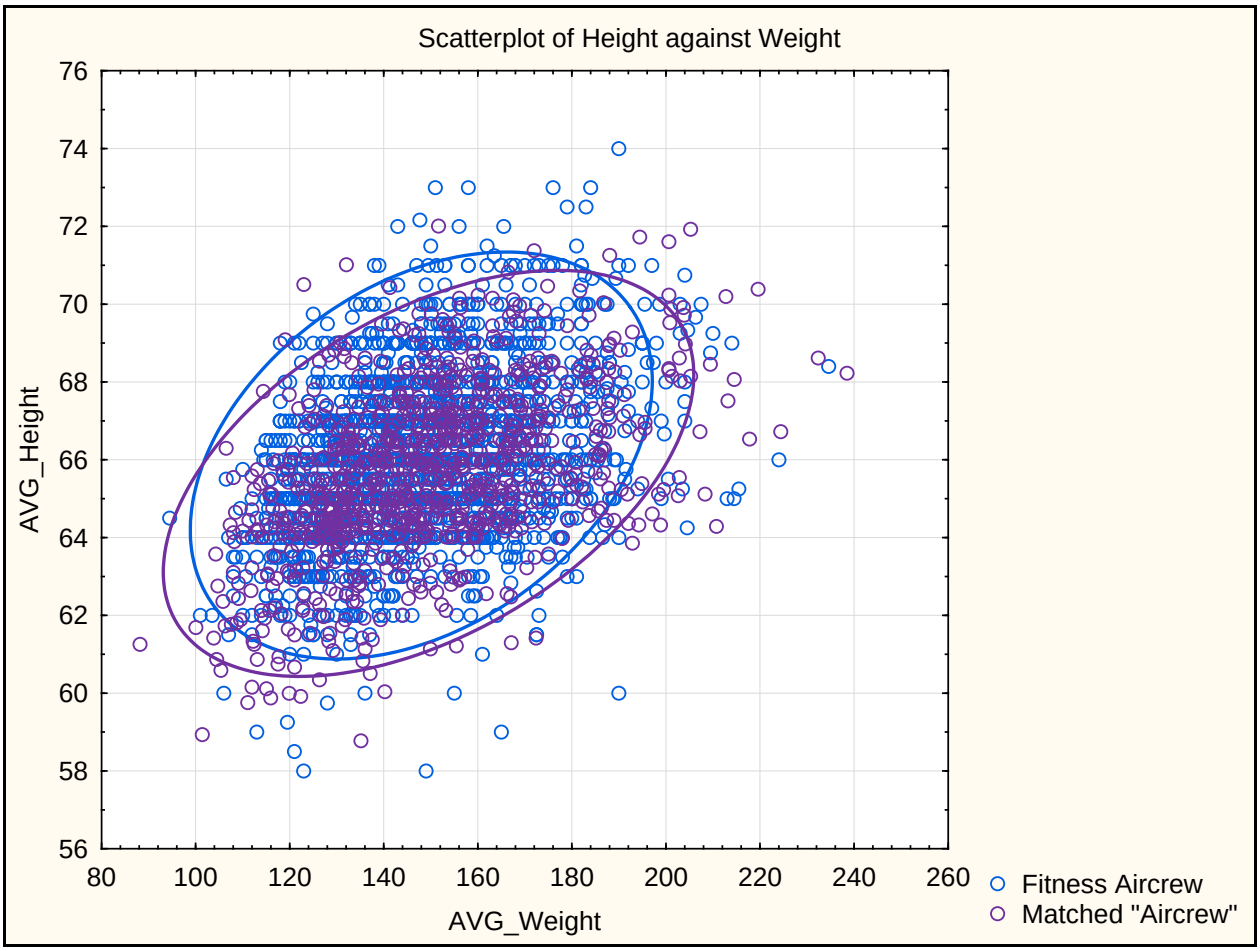

Figure 10. Height and Weight Comparison Between USAF Fitness 2013 Female Aircrew and Matched Female "Aircrew"

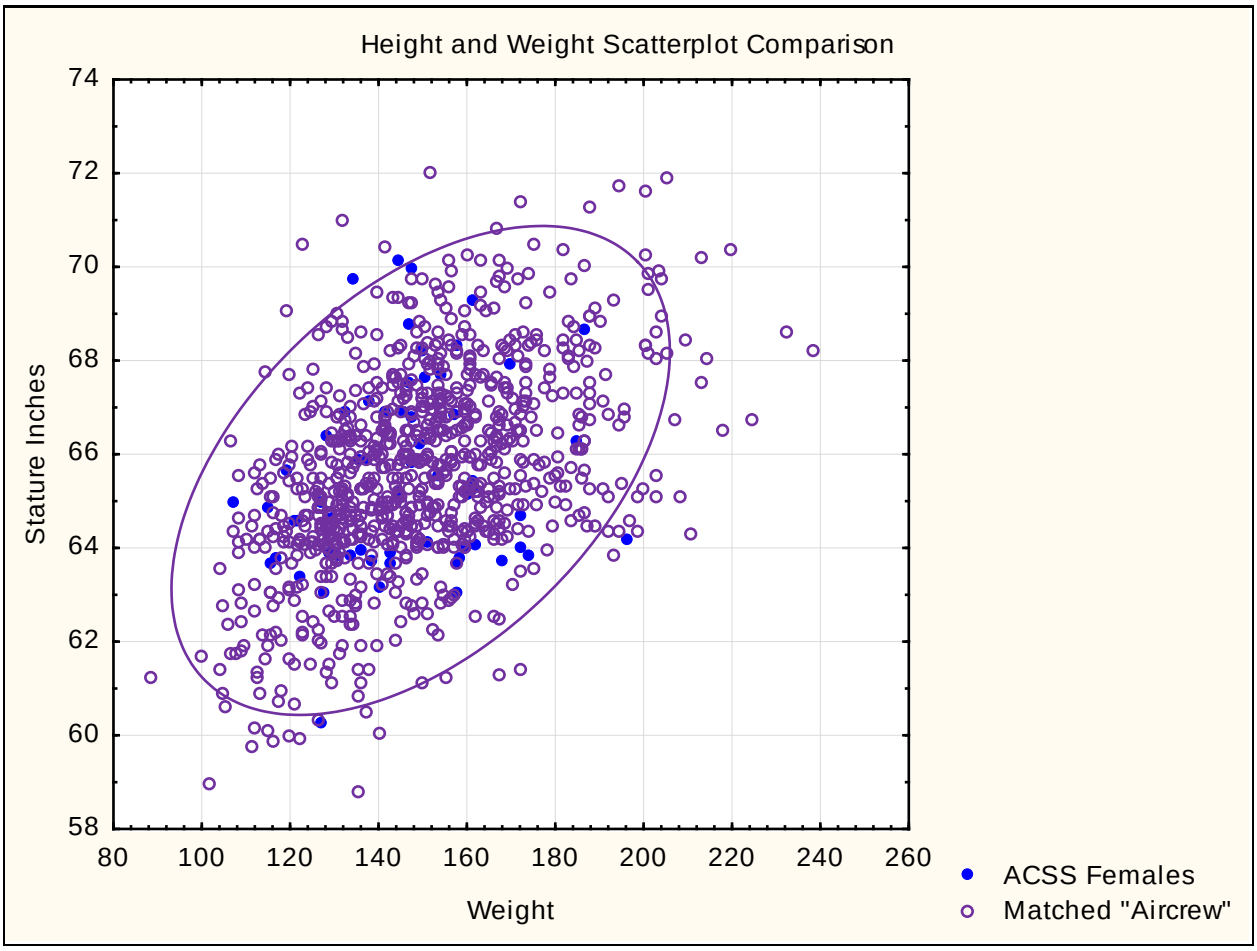

Figure 11. Height and Weight Comparison Between ACSS Female Aircrew and Matched Female "Aircrew"

Table 28. Differences between Matched "USAF Aircrew" Dataset and the original ANSUR-II at 5th and 95th%.

Measure	5th Percentile		95th Percentile	
	Matched	ANSUR-II	Matched	ANSUR-II
Stature	61.93 in (157.30cm)	60.04 in (152.50cm)	69.25 in (175.90cm)	68.50 in (174.00cm)
Weight	115.00 in (52.16cm)	113.10 lbs (51.30kg)	190.48 in (86.40cm)	192.02 lbs (87.10kg)
Bicep Circ	10.08 in (25.60cm)	10.20 in (25.90cm)	13.78 in (35.00cm)	14.17 in (36.00cm)
Head Circ	21.02 in (53.39cm)	20.94 in (53.20cm)	22.95 in (58.29cm)	23.50 in (59.70cm)
Hip Breadth, Sitting	12.40 in (31.50cm)	13.70 in (34.80cm)	15.75 in (40.01cm)	17.95 in (45.60cm)
Knee Height, Sitting	19.06 in (48.41cm)	18.46 in (46.90cm)	22.01 in (55.91cm)	21.93 in (55.70cm)
Sitting Height	32.83 in	31.61 in	36.50 in	35.91 in

	(83.39cm)	(80.30cm)	(92.71cm)	(91.20cm)
Span	61.77 in (156.90cm)	60.20 in (152.90cm)	70.35 in (178.69cm)	70.98 in (180.30cm)
Thigh Clearance	5.75 in (14.61cm)	5.71 in (14.50cm)	7.48 in (19.00cm)	7.52 in (19.10cm)
Waist Circ	27.76 in (70.51cm)	27.95 in (71.00cm)	40.47 in (102.79cm)	40.94 in (104.00cm)

Table 28 shows the difference between the Matched Aircrew dataset created and the existing army data from ANSUR-II females. Racial mix for matched female aircrew was very close to the distribution shown in the Personnel Data base IDEAS.

V. Applying the Matching Process to create Non-Aircrew Samples

Two additional samples were also constructed utilizing this method and data provided from ANSUR-II (3,922 females and 7,435 males): a female non-aircrew sample (n= 1,014) and a male non-aircrew sample (n= 1,423). Using Statistica software, individuals in the female non-aircrew sample were stratified based on USAF Fitness Female Non-Aircrew statistics of age, stature, and BMI. Individuals in the male non-aircrew sample were stratified based on USAF Fitness Male Non-Aircrew statistics of age, stature, and BMI. Both matches were also stratified to match USAF enlistment status and racial demographics (Table 29) based on the data provided by AFPC IDEAS.

Table 29. Demographic Descriptions of Matched Non-Aircrew Samples

Race	**Non-Aircrew Matched Female n=1,014**	**Non-Aircrew Matched Male n=1,423**
Asian	38 (3.75)	51 (3.58)
Black	236 (23.30)	209 (14.69)
Caucasian	605 (59.72)	1034 (72.66)
Hispanic	111 (10.96)	99 (6.96)
Other	23 (2.27)	30 (2.11)
Rank		
Officer	205 (20.24)	225 (15.81)
Enlisted	808 (79.76)	1198 (84.19)

Figures 12 and 13 show the comparisons between fitness data height/weight and the matched datasets height/weight, with 95% confidence ellipses overlaid. Summary statistics for these two samples are also shown in Appendix A.

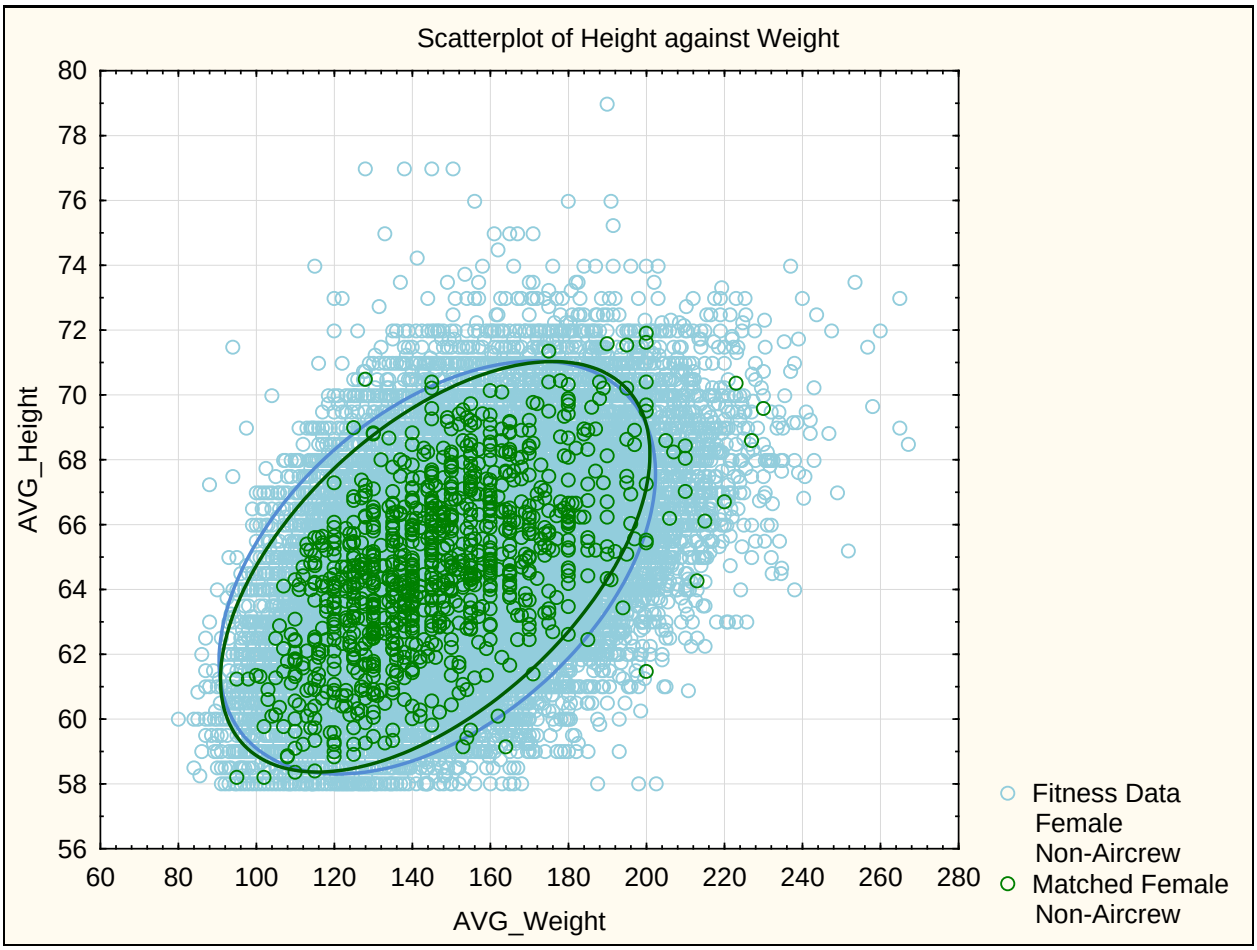

Figure 12. Height and Weight Comparison Between USAF Fitness 2013 Female Non-Aircrew and Matched Female Non-Aircrew

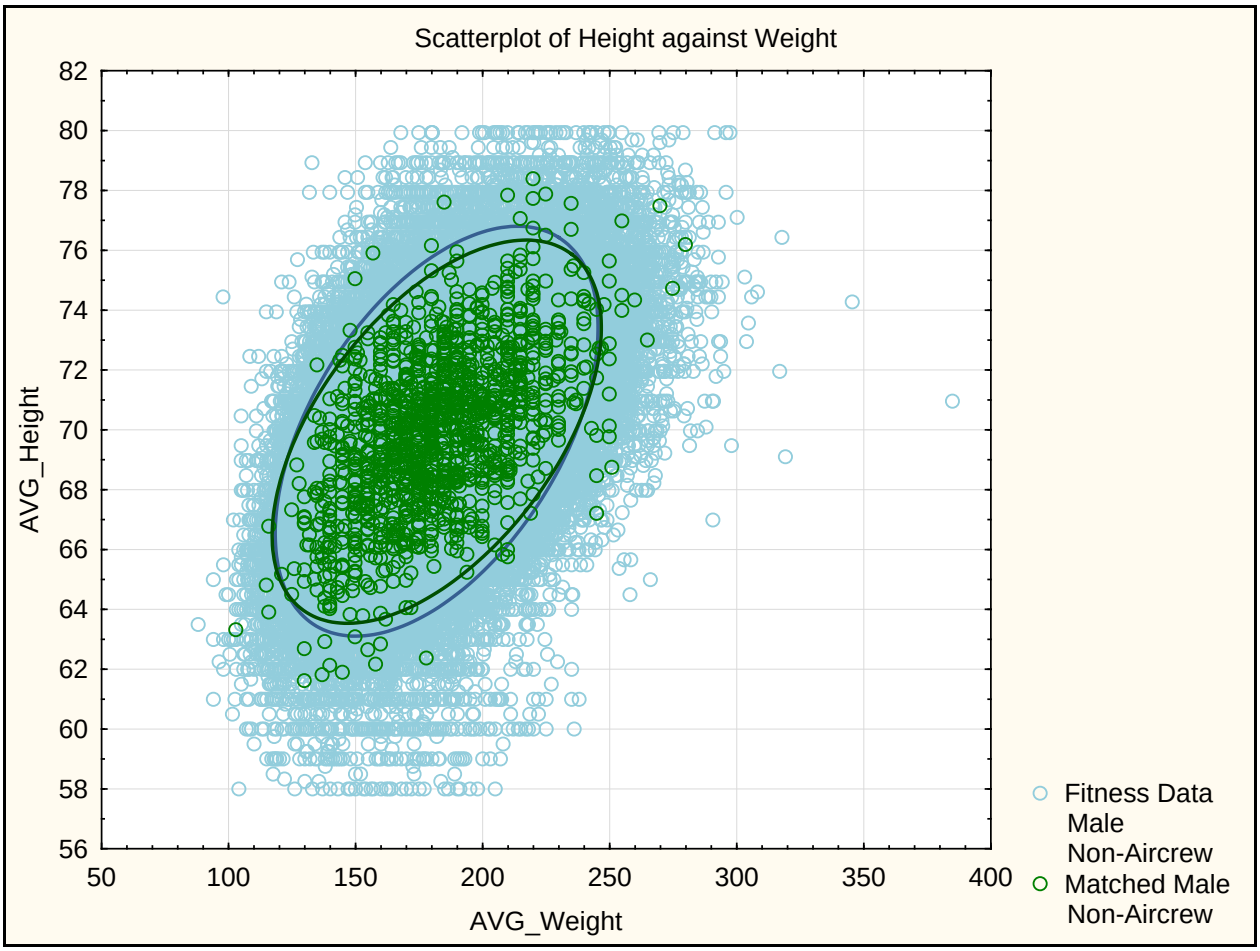

Figure 13. Height and Weight Comparison Between USAF Fitness 2013 Male Non- Aircrew and Matched Male Non-Aircrew

VI. Summary

Utilizing the datasets available to us, we created a matched female "aircrew" and two non-aircrew datasets which may be used to represent USAF populations anthropometrically. Data were pulled from three ANSUR-II datasets and matched based on age, height and weight of personnel listed in the USAF 2013 Fitness Data. This method was validated by matching males from ACSS with ANSUR-II. The resulting female aircrew dataset includes 78 anthropometric measures for 913 "aircrew" as well as demographic information (i.e. rank, primary MOS, race, and age). The female non-aircrew (n= 1014), and Male Non-Aircrew (n= 3092) have similar contents.

The resulting samples should be used cautiously because data were not collected from the actual Air Force population - but statistically created from soldiers in the US Army and the US Marines. The distribution matches were not as exact as we would have liked, but they were the best compromise we could reach.

We would have liked to stratify based on race as well, however this was not available in the Fitness 2013 data. Instead the final sample compositions were determined to be close enough (within a few percent) to the IDEAS database to be representative. These datasets will be used to represent the USAF Female Aircrew and Non-Aircrew anthropometric database until funding is available to create a USAF database similar to ANSUR-II.

VII. References

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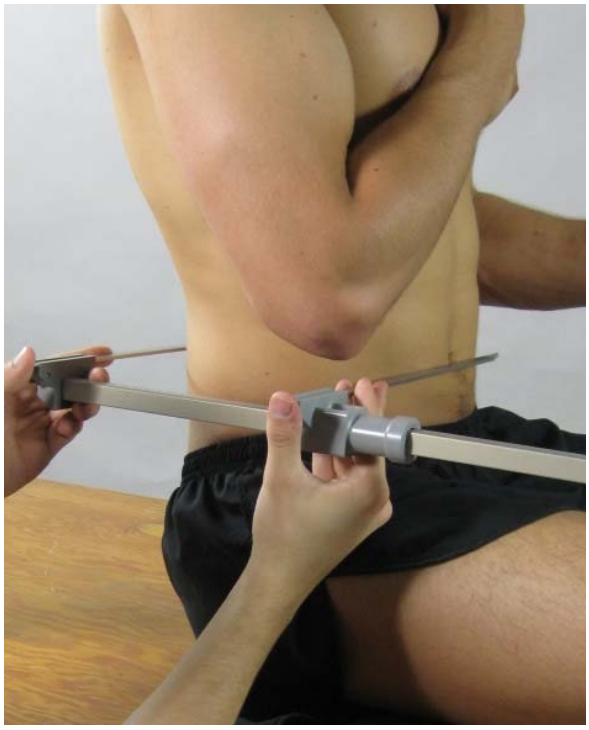
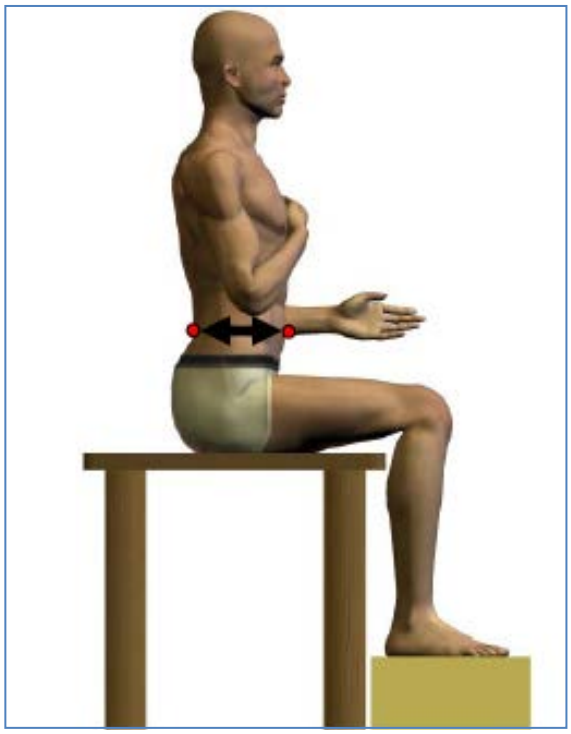
Appendix A
Matched Female "Aircrew" Population Summary Statistics

Abdomen Extension Depth (Sitting)

The horizontal distance between the abdominal point anterior and the back at the same level is measured with a beam caliper. The participant sits erect, looking straight ahead. The measurement is taken at the maximum point of quiet respiration.





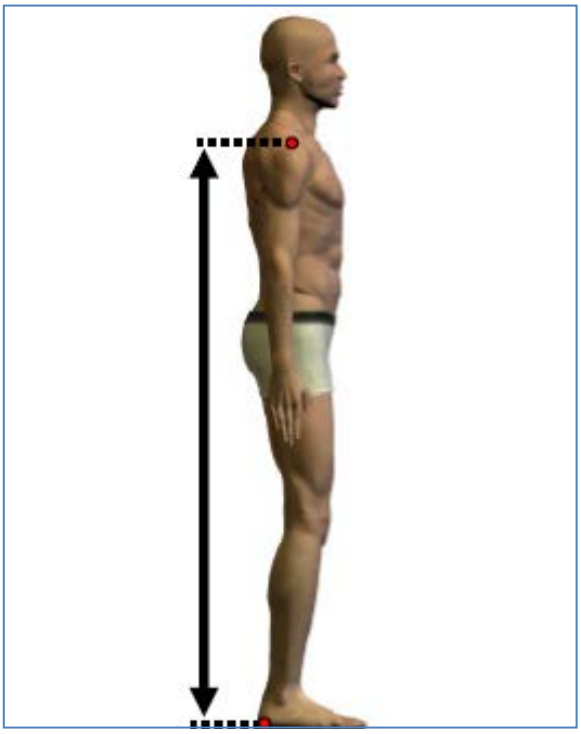
Abdomen Extension Depth (Sitting)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	13.62	13.45	13.25
Symmetry – BETA I	0.62	0.56	0.53
Kurtosis – BETA II	0.38	0.32	0.19
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	22.42	8.83	22.53	8.87	24.28	9.56
SE (mean)	0.10	0.04	0.10	0.04	0.09	0.03
St Dev	3.05	1.20	3.03	1.19	3.22	1.27
Minimum	15.80	6.22	15.60	6.14	17.40	6.85
Maximum	35.20	13.86	35.20	13.86	37.50	14.76
Percentiles						
1st	16.99	6.69	17.00	6.69	18.40	7.24
2nd	17.30	6.81	17.30	6.81	18.70	7.36
3rd	17.50	6.89	17.50	6.89	19.10	7.52
5th	18.01	7.09	18.00	7.09	19.50	7.68
10th	18.80	7.40	18.80	7.40	20.30	7.99
15th	20.29	7.99	19.30	7.60	20.90	8.23
20th	20.70	8.15	19.90	7.83	21.50	8.46
25th	21.01	8.27	20.40	8.03	21.90	8.62
30th	21.41	8.43	20.80	8.19	22.30	8.78
35th	21.69	8.54	21.20	8.35	22.70	8.94
40th	22.00	8.66	21.50	8.46	23.20	9.13
45th	22.40	8.82	21.90	8.62	23.60	9.29
50th	22.91	9.02	22.20	8.74	24.00	9.45
55th	23.39	9.21	22.60	8.90	24.40	9.61
60th	23.70	9.33	23.00	9.06	24.80	9.76
65th	24.21	9.53	23.40	9.21	25.30	9.96
70th	24.79	9.76	23.90	9.41	25.80	10.16
75th	25.60	10.08	24.30	9.57	26.40	10.39
80th	26.80	10.55	24.80	9.76	26.90	10.59
85th	28.19	11.10	25.70	10.12	27.60	10.87
90th	28.91	11.38	26.80	10.55	28.60	11.26
95th	29.39	11.57	28.10	11.06	30.00	11.81
97th	30.40	11.97	29.00	11.42	30.80	12.13
98th	16.99	6.69	29.50	11.61	31.60	12.44
99th	17.30	6.81	30.70	12.09	32.90	12.95

Acromion Height (Standing)

The vertical distance between a standing surface and the right acromion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



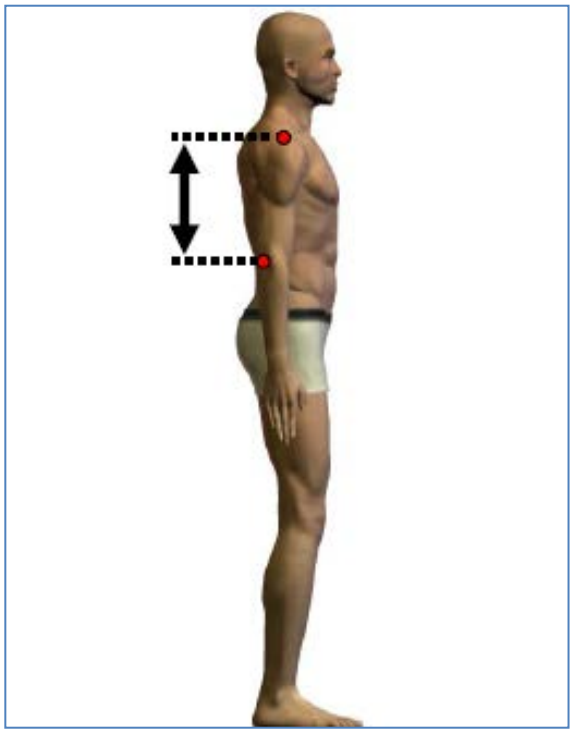
Acromion Height (Standing)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.57	4.37	4.28
Symmetry – BETA I	0.04	0.01	0.02
Kurtosis – BETA II	0.37	-0.26	0.19
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	136.82	53.87	134.74	53.05	145.77	57.39
SE (mean)	0.16	0.06	0.19	0.07	0.17	0.07
St Dev	4.88	1.92	5.89	2.32	6.24	2.46
Minimum	121.89	47.99	118.60	46.69	125.30	49.33
Maximum	153.59	60.47	153.60	60.47	168.30	66.26
Percentiles						
1st	124.69	49.09	121.70	47.91	131.10	51.61
2nd	126.11	49.65	122.80	48.35	132.80	52.28
3rd	127.41	50.16	123.40	48.58	133.90	52.72
5th	128.70	50.67	125.20	49.29	135.80	53.46
10th	130.99	51.57	127.00	50.00	137.90	54.29
15th	132.31	52.09	128.30	50.51	139.20	54.80
20th	133.10	52.40	129.70	51.06	140.60	55.35
25th	133.81	52.68	130.90	51.54	141.70	55.79
30th	134.29	52.87	131.70	51.85	142.60	56.14
35th	134.90	53.11	132.40	52.13	143.50	56.50
40th	135.51	53.35	133.20	52.44	144.20	56.77
45th	135.99	53.54	134.00	52.76	145.00	57.09
50th	136.70	53.82	134.60	52.99	145.70	57.36
55th	137.31	54.06	135.50	53.35	146.70	57.76
60th	137.90	54.29	136.30	53.66	147.40	58.03
65th	138.51	54.53	137.30	54.06	148.20	58.35
70th	139.19	54.80	137.90	54.29	149.00	58.66
75th	139.80	55.04	138.70	54.61	149.90	59.02
80th	140.59	55.35	139.50	54.92	150.90	59.41
85th	142.01	55.91	140.90	55.47	152.10	59.88
90th	143.10	56.34	142.50	56.10	153.50	60.43
95th	145.21	57.17	144.80	57.01	156.10	61.46
97th	146.41	57.64	145.80	57.40	157.60	62.05
98th	147.19	57.95	146.70	57.76	158.50	62.40
99th	148.49	58.46	148.10	58.31	161.30	63.50

Acromion Radiale Length

The distance between the right acromion landmark and the radiale landmark is measured with a beam caliper held parallel to the long axis of the arm. The participant stands erect. The shoulders and upper extremities are relaxed with the palms facing the thighs.



Acromion Radiale Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.61	5.39	5.13
Symmetry – BETA I	0.06	0.02	0.05
Kurtosis – BETA II	0.03	-0.16	0.12
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	31.75	12.50	31.37	12.35	33.90	13.35
SE (mean)	0.05	0.02	0.05	0.02	0.05	0.02
St Dev	1.46	0.58	1.69	0.67	1.74	0.68
Minimum	27.10	10.67	26.90	10.59	28.30	11.14
Maximum	36.30	14.29	37.10	14.61	40.20	15.83
Percentiles						
1st	28.50	11.22	27.60	10.87	29.90	11.77
2nd	28.80	11.34	27.90	10.98	30.30	11.93
3rd	28.91	11.38	28.10	11.06	30.50	12.01
5th	29.31	11.54	28.50	11.22	31.00	12.20
10th	29.90	11.77	29.10	11.46	31.70	12.48
15th	30.20	11.89	29.50	11.61	32.20	12.68
20th	30.61	12.05	29.90	11.77	32.50	12.80
25th	30.81	12.13	30.30	11.93	32.70	12.87
30th	30.99	12.20	30.50	12.01	33.00	12.99
35th	31.19	12.28	30.70	12.09	33.20	13.07
40th	31.39	12.36	31.00	12.20	33.40	13.15
45th	31.60	12.44	31.10	12.24	33.70	13.27
50th	31.70	12.48	31.40	12.36	33.90	13.35
55th	31.90	12.56	31.60	12.44	34.10	13.43
60th	32.11	12.64	31.80	12.52	34.30	13.50
65th	32.31	12.72	32.00	12.60	34.50	13.58
70th	32.59	12.83	32.30	12.72	34.80	13.70
75th	32.79	12.91	32.60	12.83	35.10	13.82
80th	32.99	12.99	32.80	12.91	35.30	13.90
85th	33.20	13.07	33.20	13.07	35.70	14.06
90th	33.60	13.23	33.50	13.19	36.10	14.21
95th	34.19	13.46	34.10	13.43	36.80	14.49
97th	34.49	13.58	34.40	13.54	37.20	14.65
98th	34.80	13.70	34.80	13.70	37.50	14.76
99th	35.61	14.02	35.60	14.02	38.10	15.00

Ankle Circumference

The minimum horizontal circumference of the right ankle is measured with a tape. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.

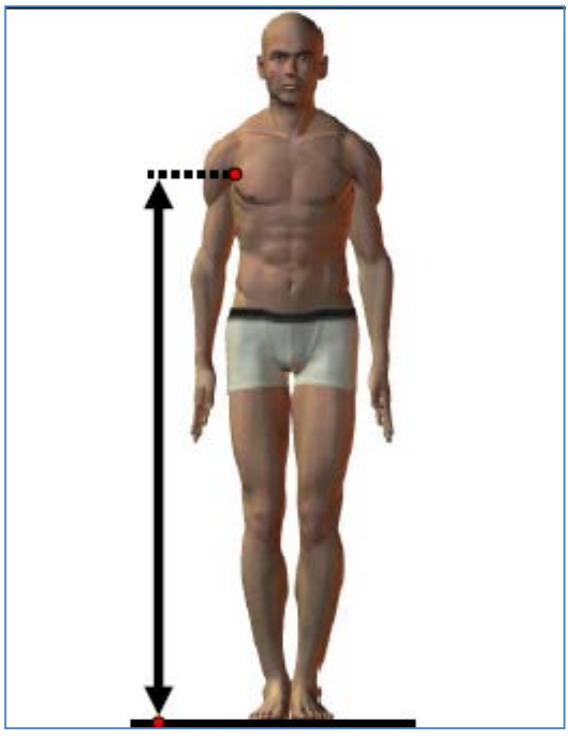
Ankle Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.51	6.83	5.97
Symmetry – BETA I	0.44	0.39	0.27
Kurtosis – BETA II	0.27	0.49	-0.02
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	21.88	8.62	21.58	8.50	22.79	8.97
SE (mean)	0.05	0.02	0.05	0.02	0.04	0.01
St Dev	1.42	0.56	1.47	0.58	1.36	0.54
Minimum	18.39	7.24	17.30	6.81	19.30	7.60
Maximum	27.10	10.67	27.40	10.79	27.60	10.87
Percentiles						
1st	19.00	7.48	18.60	7.32	20.00	7.87
2nd	19.30	7.60	18.90	7.44	20.20	7.95
3rd	19.41	7.64	19.00	7.48	20.40	8.03
5th	19.71	7.76	19.30	7.60	20.60	8.11
10th	20.19	7.95	19.70	7.76	21.10	8.31
15th	20.50	8.07	20.10	7.91	21.40	8.43
20th	20.70	8.15	20.30	7.99	21.60	8.50
25th	20.90	8.23	20.60	8.11	21.80	8.58
30th	21.11	8.31	20.80	8.19	22.00	8.66
35th	21.21	8.35	21.00	8.27	22.20	8.74
40th	21.41	8.43	21.20	8.35	22.40	8.82
45th	21.59	8.50	21.30	8.39	22.60	8.90
50th	21.69	8.54	21.50	8.46	22.70	8.94
55th	21.89	8.62	21.70	8.54	22.90	9.02
60th	22.10	8.70	21.80	8.58	23.10	9.09
65th	22.30	8.78	22.00	8.66	23.30	9.17
70th	22.50	8.86	22.30	8.78	23.40	9.21
75th	22.81	8.98	22.50	8.86	23.70	9.33
80th	23.01	9.06	22.70	8.94	24.00	9.45
85th	23.29	9.17	23.00	9.06	24.20	9.53
90th	23.80	9.37	23.50	9.25	24.50	9.65
95th	24.41	9.61	24.10	9.49	25.10	9.88
97th	24.79	9.76	24.70	9.72	25.50	10.04
98th	25.20	9.92	24.90	9.80	25.80	10.16
99th	25.70	10.12	25.60	10.08	26.30	10.35

Axilla Height

The vertical distance between a standing surface and the anterior-scye-on-the-torso landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed with the palms facing the thighs. The measurement is taken at the maximum point of quiet respiration.



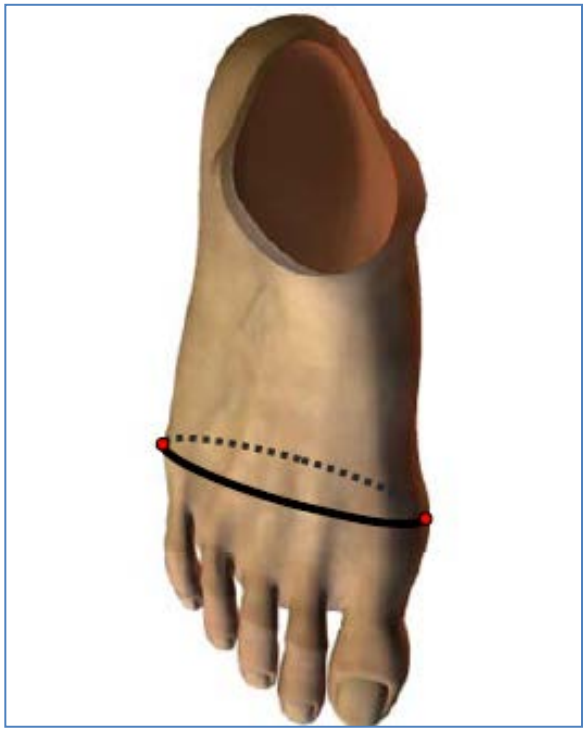
Axilla Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.68	4.52	4.35
Symmetry – BETA I	0.03	0.02	0.03
Kurtosis – BETA II	0.33	-0.29	0.23
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	127.06	50.03	125.12	49.26	134.76	53.06
SE (mean)	0.15	0.06	0.18	0.07	0.16	0.06
St Dev	4.68	1.84	5.65	2.22	5.86	2.31
Minimum	112.60	44.33	110.60	43.54	115.00	45.28
Maximum	143.00	56.30	141.50	55.71	155.30	61.14
Percentiles						
1st	115.80	45.59	112.20	44.17	120.80	47.56
2nd	116.89	46.02	113.30	44.61	122.60	48.27
3rd	118.01	46.46	114.40	45.04	123.60	48.66
5th	119.30	46.97	115.80	45.59	125.30	49.33
10th	121.31	47.76	117.80	46.38	127.30	50.12
15th	122.61	48.27	119.20	46.93	128.70	50.67
20th	123.39	48.58	120.10	47.28	129.80	51.10
25th	124.21	48.90	121.30	47.76	130.90	51.54
30th	124.69	49.09	122.20	48.11	131.80	51.89
35th	125.20	49.29	122.80	48.35	132.50	52.17
40th	125.81	49.53	123.70	48.70	133.30	52.48
45th	126.49	49.80	124.30	48.94	134.00	52.76
50th	126.90	49.96	125.10	49.25	134.70	53.03
55th	127.51	50.20	125.70	49.49	135.50	53.35
60th	128.19	50.47	126.60	49.84	136.20	53.62
65th	128.70	50.67	127.50	50.20	137.00	53.94
70th	129.39	50.94	128.30	50.51	137.80	54.25
75th	130.00	51.18	129.00	50.79	138.70	54.61
80th	130.91	51.54	129.90	51.14	139.60	54.96
85th	131.80	51.89	131.00	51.57	140.80	55.43
90th	132.89	52.32	132.50	52.17	142.10	55.94
95th	134.80	53.07	134.50	52.95	144.20	56.77
97th	136.40	53.70	136.40	53.70	145.90	57.44
98th	136.80	53.86	136.70	53.82	147.20	57.95
99th	138.30	54.45	137.40	54.09	148.80	58.58

Ball of Foot Circumference

The circumference of the foot at the first and fifth metatarsophalangeal landmarks is measured with a tape. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



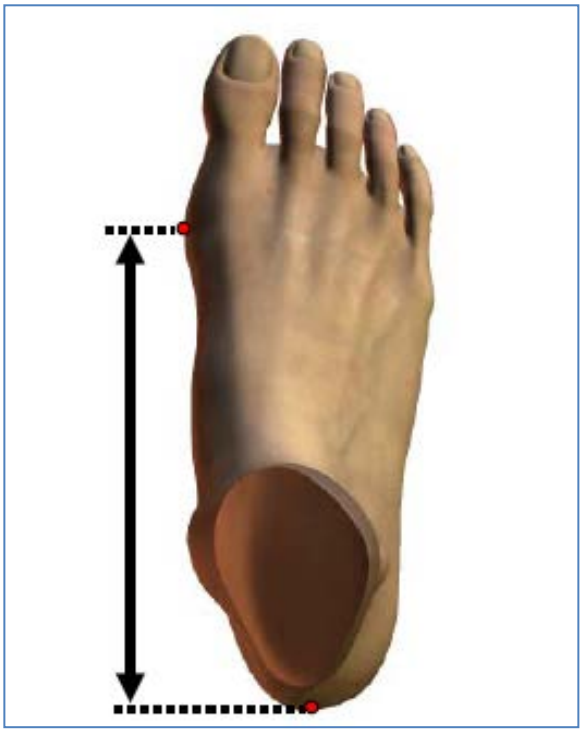
Ball of Foot Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.96	5.18	4.95
Symmetry – BETA I	0.12	0.18	0.24
Kurtosis – BETA II	-0.20	-0.15	0.34
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	22.99	9.05	22.79	8.97	25.18	9.91
SE (mean)	0.04	0.01	0.04	0.01	0.03	0.01
St Dev	1.14	0.45	1.18	0.47	1.25	0.49
Minimum	20.09	7.91	19.7	7.76	20.60	8.11
Maximum	26.70	10.51	26.6	10.47	30.10	11.85
Percentiles						
1st	20.50	8.07	20.2	7.95	22.50	8.86
2nd	20.70	8.15	20.5	8.07	22.70	8.94
3rd	20.80	8.19	20.7	8.15	22.90	9.02
5th	21.21	8.35	20.9	8.23	23.30	9.17
10th	21.49	8.46	21.3	8.39	23.60	9.29
15th	21.69	8.54	21.6	8.5	23.90	9.41
20th	22.00	8.66	21.8	8.58	24.10	9.49
25th	22.20	8.74	21.9	8.62	24.30	9.57
30th	22.40	8.82	22.1	8.7	24.50	9.65
35th	22.50	8.86	22.3	8.78	24.70	9.72
40th	22.71	8.94	22.4	8.82	24.80	9.76
45th	22.81	8.98	22.6	8.9	25.00	9.84
50th	23.01	9.06	22.7	8.94	25.20	9.92
55th	23.09	9.09	22.9	9.02	25.30	9.96
60th	23.29	9.17	23.1	9.09	25.40	10.00
65th	23.39	9.21	23.3	9.17	25.60	10.08
70th	23.60	9.29	23.4	9.21	25.80	10.16
75th	23.70	9.33	23.6	9.29	26.00	10.24
80th	23.90	9.41	23.7	9.33	26.30	10.35
85th	24.21	9.53	24	9.45	26.50	10.43
90th	24.41	9.61	24.3	9.57	26.70	10.51
95th	24.79	9.76	24.8	9.76	27.20	10.71
97th	25.10	9.88	25.1	9.88	27.60	10.87
98th	25.50	10.04	25.5	10.04	27.90	10.98
99th	25.70	10.12	25.7	10.12	28.40	11.18

Ball of Foot Length

The distance from the back of the heel to the landmark at the first metatarsophalangeal protrusion is measured with the Brannock Device®. The participant stands erect with the right foot in the Brannock Device® and the other foot on a board of equal height. The weight is distributed equally on both feet. The medial side of the right foot is parallel with the long axis of the device.



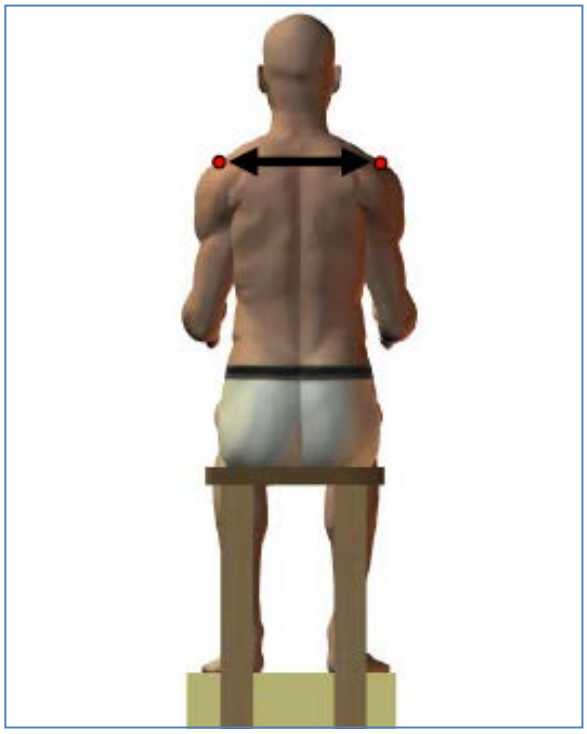
Ball of Foot Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.71	5.24	5.12
Symmetry – BETA I	0.07	0.07	0.12
Kurtosis – BETA II	-0.27	-0.28	0.15
Number of Subjects	913	1012	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	**IN**	**CM**	**IN**	**CM**	**IN**
Mean	18.34	7.22	18.27	7.19	20.27	7.98
SE (mean)	0.03	0.01	0.03	0.01	0.03	0.01
St Dev	0.86	0.34	0.96	0.38	1.04	0.41
Minimum	16.00	6.30	15.60	6.14	17.00	6.69
Maximum	20.80	8.19	21.10	8.31	24.50	9.65
Percentiles						
1st	16.41	6.46	16.10	6.34	18.00	7.09
2nd	16.61	6.54	16.40	6.46	18.20	7.17
3rd	16.69	6.57	16.50	6.50	18.40	7.24
5th	16.99	6.69	16.70	6.57	18.60	7.32
10th	17.20	6.77	17.10	6.73	19.00	7.48
15th	17.40	6.85	17.20	6.77	19.20	7.56
20th	17.60	6.93	17.40	6.85	19.40	7.64
25th	17.70	6.97	17.60	6.93	19.60	7.72
30th	17.91	7.05	17.70	6.97	19.70	7.76
35th	18.01	7.09	17.90	7.05	19.90	7.83
40th	18.11	7.13	18.00	7.09	20.00	7.87
45th	18.21	7.17	18.10	7.13	20.10	7.91
50th	18.29	7.20	18.30	7.20	20.30	7.99
55th	18.39	7.24	18.40	7.24	20.40	8.03
60th	18.59	7.32	18.50	7.28	20.50	8.07
65th	18.69	7.36	18.70	7.36	20.60	8.11
70th	18.80	7.40	18.80	7.40	20.80	8.19
75th	18.90	7.44	18.90	7.44	21.00	8.27
80th	19.10	7.52	19.10	7.52	21.20	8.35
85th	19.30	7.60	19.30	7.60	21.30	8.39
90th	19.51	7.68	19.50	7.68	21.60	8.50
95th	19.81	7.80	19.80	7.80	22.00	8.66
97th	19.99	7.87	20.10	7.91	22.30	8.78
98th	20.19	7.95	20.20	7.95	22.50	8.86
99th	20.40	8.03	20.50	8.07	22.90	9.02

Biacromial Breadth

The distance between the right and left acromion landmarks is measured with a beam caliper. The participant sits erect. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.



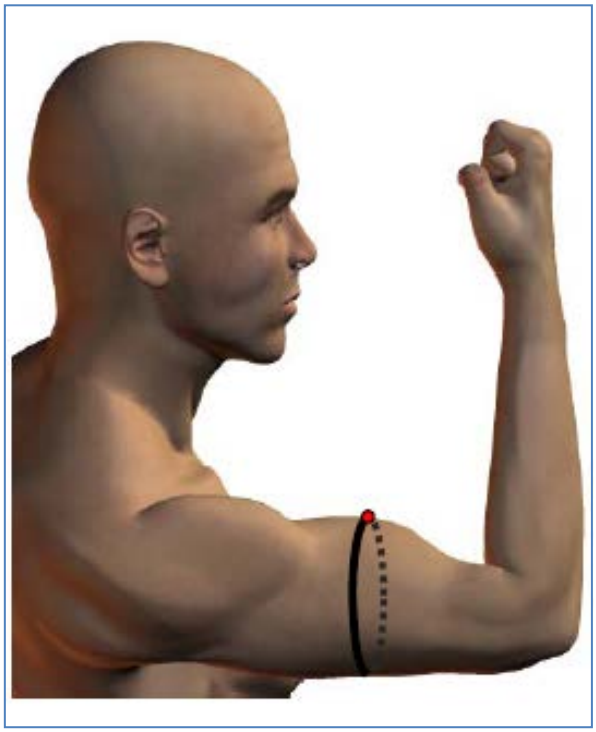
Biacromial Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.55	5.02	4.57
Symmetry – BETA I	-0.13	-0.05	-0.10
Kurtosis – BETA II	0.05	0.00	0.25
Number of Subjects	911	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	36.80	14.49	36.73	14.46	41.57	16.37
SE (mean)	0.06	0.02	0.06	0.02	0.05	0.02
St Dev	1.67	0.66	1.84	0.73	1.90	0.75
Minimum	31.19	12.28	30.50	12.01	34.30	13.50
Maximum	42.01	16.54	42.50	16.73	47.20	18.58
Percentiles						
1st	32.69	12.87	32.40	12.76	36.80	14.49
2nd	33.30	13.11	33.10	13.03	37.40	14.72
3rd	33.50	13.19	33.40	13.15	37.80	14.88
5th	34.01	13.39	33.60	13.23	38.40	15.12
10th	34.70	13.66	34.30	13.50	39.30	15.47
15th	35.10	13.82	34.80	13.70	39.70	15.63
20th	35.41	13.94	35.20	13.86	40.00	15.75
25th	35.71	14.06	35.40	13.94	40.40	15.91
30th	35.99	14.17	35.70	14.06	40.60	15.98
35th	36.20	14.25	36.10	14.21	40.90	16.10
40th	36.40	14.33	36.30	14.29	41.10	16.18
45th	36.60	14.41	36.50	14.37	41.30	16.26
50th	36.91	14.53	36.80	14.49	41.50	16.34
55th	37.11	14.61	37.00	14.57	41.80	16.46
60th	37.21	14.65	37.20	14.65	42.00	16.54
65th	37.49	14.76	37.40	14.72	42.30	16.65
70th	37.69	14.84	37.70	14.84	42.60	16.77
75th	38.00	14.96	38.00	14.96	42.90	16.89
80th	38.20	15.04	38.30	15.08	43.20	17.01
85th	38.51	15.16	38.60	15.20	43.50	17.13
90th	38.89	15.31	39.10	15.39	43.90	17.28
95th	39.50	15.55	39.70	15.63	44.70	17.60
97th	39.80	15.67	40.10	15.79	45.20	17.80
98th	40.11	15.79	40.30	15.87	45.50	17.91
99th	40.41	15.91	41.00	16.14	46.00	18.11

Bicep Circumference

The circumference of the right upper arm around the flexed biceps brachii muscle at the biceps point landmark is measured with a tape held perpendicular to the long axis of the upper arm. The participant stands with the upper arm extended horizontally and the elbow flexed 90°. The fist is clenched and held facing the head, and the participant exerts maximum effort in contracting the biceps brachii muscle.



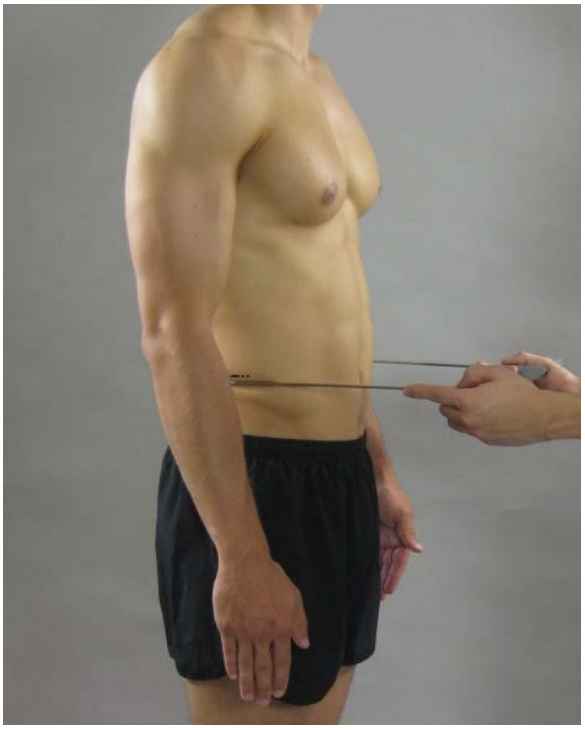
Bicep Circumference

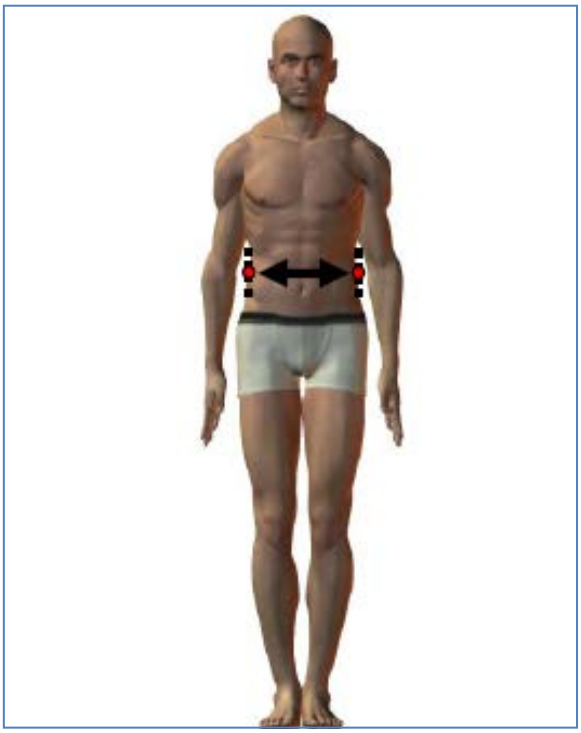
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	9.43	10.06	9.43
Symmetry – BETA I	0.42	0.52	0.19
Kurtosis – BETA II	0.18	0.31	0.15
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	29.94	11.79	30.17	11.88	34.95	13.76
SE (mean)	0.09	0.04	0.10	0.04	0.09	0.03
St Dev	2.82	1.11	3.03	1.19	3.29	1.30
Minimum	23.01	9.06	21.60	8.50	24.60	9.69
Maximum	41.50	16.34	41.50	16.34	47.70	18.78
Percentiles						
1st	24.31	9.57	24.20	9.53	27.60	10.87
2nd	24.89	9.80	25.00	9.84	28.40	11.18
3rd	25.20	9.92	25.30	9.96	29.00	11.42
5th	25.60	10.08	25.80	10.16	29.60	11.65
10th	26.39	10.39	26.50	10.43	30.80	12.13
15th	27.10	10.67	27.10	10.67	31.60	12.44
20th	27.51	10.83	27.50	10.83	32.20	12.68
25th	27.79	10.94	28.00	11.02	32.70	12.87
30th	28.30	11.14	28.40	11.18	33.10	13.03
35th	28.70	11.30	28.80	11.34	33.70	13.27
40th	29.01	11.42	29.20	11.50	34.00	13.39
45th	29.49	11.61	29.60	11.65	34.40	13.54
50th	29.79	11.73	30.00	11.81	34.80	13.70
55th	30.10	11.85	30.40	11.97	35.20	13.86
60th	30.51	12.01	30.70	12.09	35.70	14.06
65th	30.81	12.13	31.10	12.24	36.20	14.25
70th	31.19	12.28	31.40	12.36	36.70	14.45
75th	31.60	12.44	32.00	12.60	37.20	14.65
80th	32.31	12.72	32.50	12.80	37.70	14.84
85th	32.79	12.91	33.40	13.15	38.40	15.12
90th	33.81	13.31	34.40	13.54	39.20	15.43
95th	35.00	13.78	35.60	14.02	40.50	15.94
97th	35.61	14.02	36.50	14.37	41.30	16.26
98th	36.20	14.25	37.10	14.61	42.00	16.54
99th	37.11	14.61	38.30	15.08	43.00	16.93

Bicristal Breadth

The straight-line distance between the right and left iliocristale landmarks is measured with a beam caliper. The participant stands erect, looking straight ahead. The tissue is firmly compressed to ensure the measurement is taken on the bony landmarks.





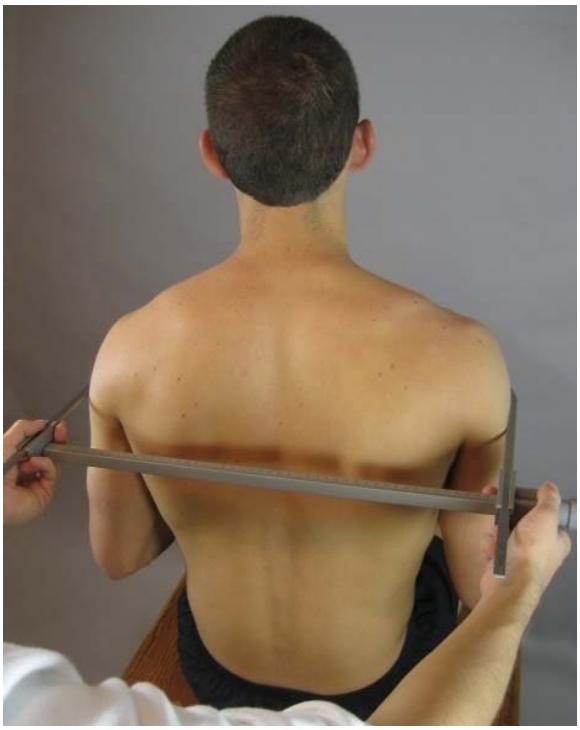
Bicristal Breadth

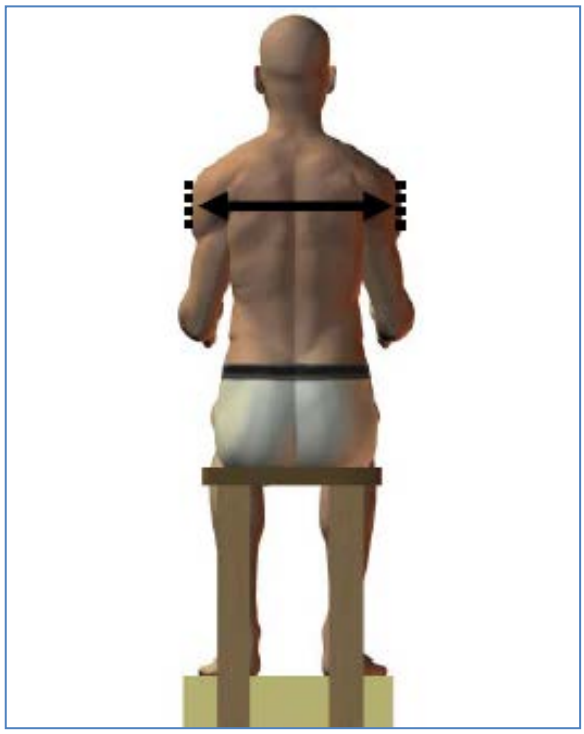
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.26	7.97	6.14
Symmetry – BETA I	0.20	0.21	0.03
Kurtosis – BETA II	0.42	0.00	0.11
Number of Subjects	912	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	27.87	10.97	27.52	10.84	27.48	10.82
SE (mean)	0.07	0.03	0.07	0.03	0.04	0.02
St Dev	2.02	0.80	2.19	0.86	1.69	0.66
Minimum	21.11	8.31	21.30	8.39	21.60	8.50
Maximum	35.10	13.82	35.10	13.82	33.20	13.07
Percentiles						
1st	23.29	9.17	22.70	8.94	23.50	9.25
2nd	23.60	9.29	23.20	9.13	24.10	9.49
3rd	24.31	9.57	23.40	9.21	24.30	9.57
5th	24.69	9.72	24.10	9.49	24.70	9.72
10th	25.40	10.00	24.80	9.76	25.30	9.96
15th	25.81	10.16	25.20	9.92	25.70	10.12
20th	26.29	10.35	25.60	10.08	26.10	10.28
25th	26.59	10.47	26.00	10.24	26.30	10.35
30th	26.90	10.59	26.30	10.35	26.60	10.47
35th	27.10	10.67	26.60	10.47	26.80	10.55
40th	27.31	10.75	27.00	10.63	27.00	10.63
45th	27.61	10.87	27.20	10.71	27.30	10.75
50th	27.79	10.94	27.40	10.79	27.50	10.83
55th	28.09	11.06	27.70	10.91	27.70	10.91
60th	28.30	11.14	28.00	11.02	27.90	10.98
65th	28.50	11.22	28.30	11.14	28.20	11.10
70th	28.80	11.34	28.60	11.26	28.40	11.18
75th	29.11	11.46	28.90	11.38	28.60	11.26
80th	29.49	11.61	29.30	11.54	28.90	11.38
85th	30.00	11.81	29.90	11.77	29.20	11.50
90th	30.40	11.97	30.30	11.93	29.60	11.65
95th	31.19	12.28	31.20	12.28	30.10	11.85
97th	32.00	12.60	32.00	12.60	30.60	12.05
98th	32.41	12.76	32.50	12.80	30.80	12.13
99th	33.20	13.07	33.20	13.07	31.80	12.52

Bideltoid Breadth

The maximum horizontal distance between the lateral margins of the upper arms on the deltoid muscles is measured with a beam caliper. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.





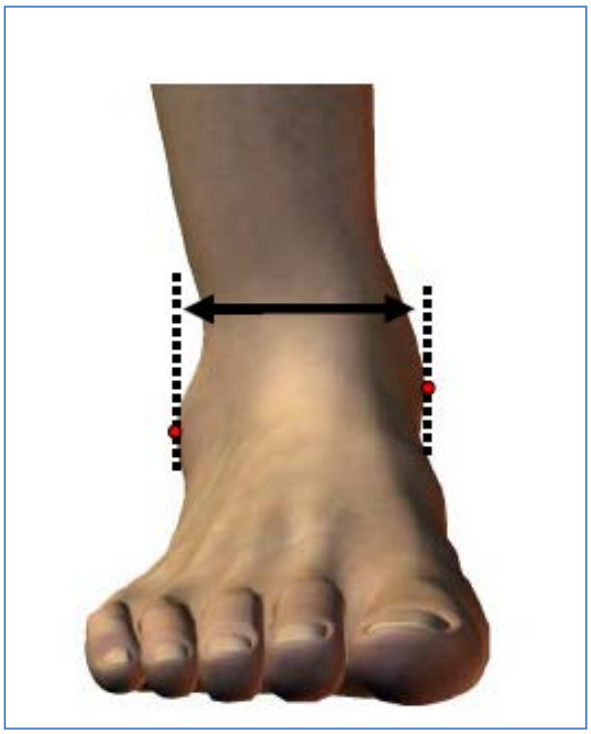
Bideltoid Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.01	6.28	5.89
Symmetry – BETA I	0.21	0.21	0.03
Kurtosis – BETA II	0.11	-0.06	0.03
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	44.80	17.64	44.86	17.66	69.80	19.80
SE (mean)	0.09	0.04	0.09	0.03	0.11	0.03
St Dev	2.69	1.06	2.82	1.11	4.29	1.17
Minimum	35.7	14.09	35.80	14.09	54.86	16.02
Maximum	54.61	21.50	53.10	20.91	84.33	23.62
Percentiles						
1st	38.89	15.31	38.80	15.28	59.69	17.20
2nd	39.80	15.67	39.70	15.63	61.21	17.40
3rd	40.21	15.83	40.00	15.75	61.72	17.68
5th	40.59	15.98	40.50	15.94	62.74	17.91
10th	41.50	16.34	41.30	16.26	64.26	18.27
15th	42.01	16.54	41.90	16.50	65.28	18.58
20th	42.49	16.73	42.40	16.69	66.29	18.82
25th	42.90	16.89	42.80	16.85	66.80	19.02
30th	43.21	17.01	43.30	17.05	67.56	19.21
35th	43.69	17.20	43.70	17.20	68.07	19.37
40th	44.09	17.36	44.10	17.36	68.58	19.53
45th	44.40	17.48	44.40	17.48	69.34	19.69
50th	44.81	17.64	44.80	17.64	69.85	19.84
55th	45.01	17.72	45.10	17.76	70.36	19.96
60th	45.39	17.87	45.40	17.87	70.87	20.12
65th	45.69	17.99	45.70	17.99	71.63	20.24
70th	46.10	18.15	46.10	18.15	72.14	20.39
75th	46.51	18.31	46.70	18.39	72.64	20.51
80th	47.09	18.54	47.30	18.62	73.41	20.71
85th	47.60	18.74	47.90	18.86	74.17	21.02
90th	48.31	19.02	48.60	19.13	75.18	21.30
95th	49.40	19.45	49.70	19.57	76.45	21.73
97th	50.29	19.80	50.60	19.92	77.72	22.05
98th	50.60	19.92	51.00	20.08	78.23	22.20
99th	51.41	20.24	51.90	20.43	80.77	22.60

Bimalleolar Breadth

The horizontal distance between the maximum protrusions of the ankle bones (lateral and medial malleoli) of the right foot is measured with a Holtain caliper. The participant stands with the weight equally distributed on both feet.



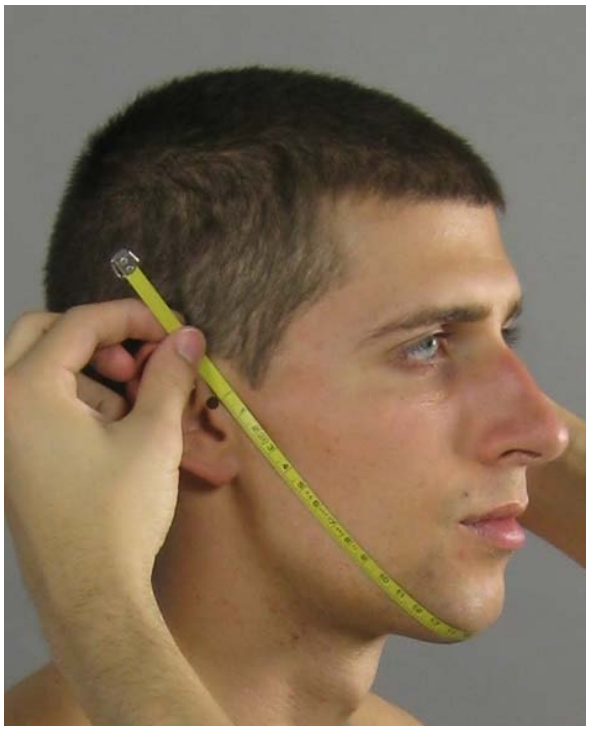
Bimalleolar Breadth

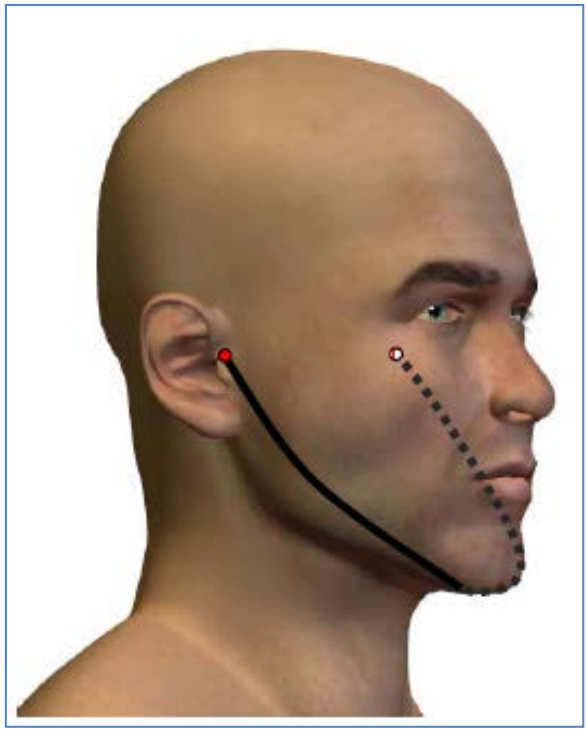
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	5.08	5.21	5.37
Symmetry – BETA I	0.04	-0.06	0.07
Kurtosis – BETA II	-0.17	0.27	0.08
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	6.77	2.66	6.72	2.65	7.50	2.95
SE (mean)	0.01	0.00	0.01	0.00	0.01	0.00
St Dev	0.34	0.14	0.35	0.14	0.40	0.16
Minimum	5.69	2.24	5.50	2.17	6.30	2.48
Maximum	7.70	3.03	7.80	3.07	8.90	3.50
Percentiles						
1st	5.99	2.36	5.90	2.32	6.60	2.60
2nd	6.10	2.40	6.00	2.36	6.70	2.64
3rd	6.10	2.40	6.10	2.40	6.80	2.68
5th	6.20	2.44	6.10	2.40	6.80	2.68
10th	6.30	2.48	6.30	2.48	7.00	2.76
15th	6.40	2.52	6.40	2.52	7.10	2.80
20th	6.50	2.56	6.40	2.52	7.10	2.80
25th	6.50	2.56	6.50	2.56	7.20	2.83
30th	6.60	2.60	6.50	2.56	7.30	2.87
35th	6.60	2.60	6.60	2.60	7.40	2.91
40th	6.71	2.64	6.60	2.60	7.40	2.91
45th	6.71	2.64	6.70	2.64	7.50	2.95
50th	6.71	2.64	6.70	2.64	7.50	2.95
55th	6.81	2.68	6.80	2.68	7.50	2.95
60th	6.81	2.68	6.80	2.68	7.60	2.99
65th	6.91	2.72	6.80	2.68	7.70	3.03
70th	6.91	2.72	6.90	2.72	7.70	3.03
75th	7.01	2.76	7.00	2.76	7.80	3.07
80th	7.01	2.76	7.00	2.76	7.80	3.07
85th	7.11	2.80	7.10	2.80	7.90	3.11
90th	7.19	2.83	7.20	2.83	8.00	3.15
95th	7.39	2.91	7.30	2.87	8.10	3.19
97th	7.39	2.91	7.40	2.91	8.20	3.23
98th	7.49	2.95	7.40	2.91	8.40	3.31
99th	7.49	2.95	7.50	2.95	8.40	3.31

Bitragion Chin Arc

The surface distance between the right and left tragion landmarks across the chin landmark is measured with a tape. The teeth are lightly occluded.





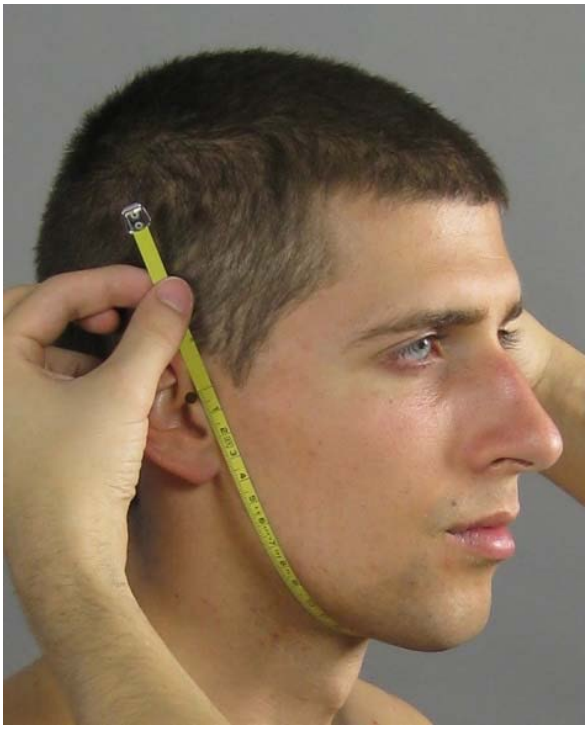
Bitragion Chin Arc

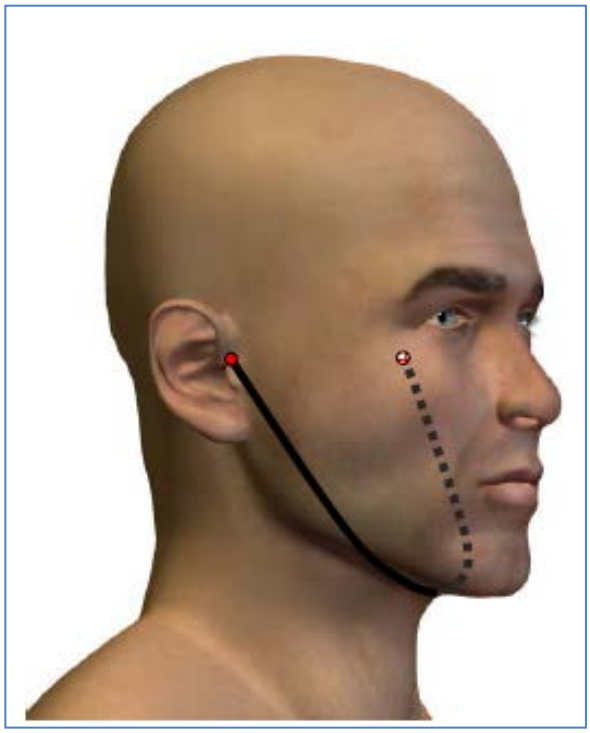
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.03	4.46	4.08
Symmetry – BETA I	0.14	0.10	0.03
Kurtosis – BETA II	0.34	-0.20	0.34
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	30.69	12.08	30.95	12.19	33.01	13.00
SE (mean)	0.04	0.02	0.04	0.02	0.04	0.01
St Dev	1.24	0.49	1.38	0.54	1.35	0.53
Minimum	27.41	10.79	26.70	10.51	28.80	11.34
Maximum	36.09	14.21	35.50	13.98	38.00	14.96
Percentiles						
1st	27.89	10.98	27.90	10.98	29.80	11.73
2nd	28.09	11.06	28.20	11.10	30.20	11.89
3rd	28.30	11.14	28.40	11.18	30.50	12.01
5th	28.60	11.26	28.70	11.30	30.80	12.13
10th	29.21	11.50	29.20	11.50	31.20	12.28
15th	29.49	11.61	29.50	11.61	31.60	12.44
20th	29.59	11.65	29.80	11.73	31.90	12.56
25th	29.79	11.73	30.00	11.81	32.20	12.68
30th	30.00	11.81	30.20	11.89	32.40	12.76
35th	30.20	11.89	30.40	11.97	32.50	12.80
40th	30.40	11.97	30.60	12.05	32.70	12.87
45th	30.51	12.01	30.70	12.09	32.90	12.95
50th	30.71	12.09	30.90	12.17	33.10	13.03
55th	30.81	12.13	31.10	12.24	33.20	13.07
60th	30.99	12.20	31.30	12.32	33.40	13.15
65th	31.19	12.28	31.50	12.40	33.50	13.19
70th	31.29	12.32	31.70	12.48	33.60	13.23
75th	31.50	12.40	31.90	12.56	33.80	13.31
80th	31.70	12.48	32.20	12.68	34.10	13.43
85th	32.00	12.60	32.40	12.76	34.40	13.54
90th	32.31	12.72	32.80	12.91	34.70	13.66
95th	32.59	12.83	33.30	13.11	35.20	13.86
97th	32.99	12.99	33.60	13.23	35.50	13.98
98th	33.30	13.11	33.80	13.31	35.70	14.06
99th	33.50	13.19	34.20	13.46	36.20	14.25

Bitragion Submandibular Arc

The surface distance between the right and left tragion landmarks across the submandibular landmark is measured with a tape. The head is in the Frankfurt plane, and the teeth are lightly occluded.





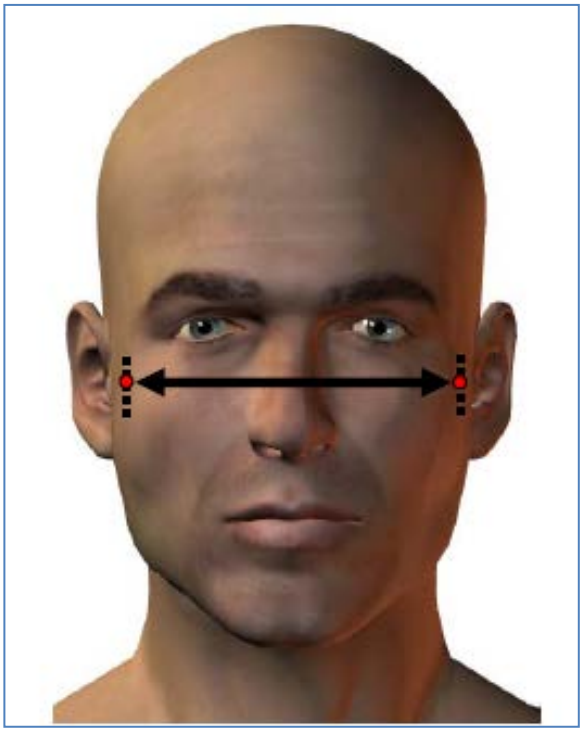
Bitragion Submandibular Arc

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.95	5.28	4.88
Symmetry – BETA I	0.09	0.13	0.14
Kurtosis – BETA II	0.04	0.01	-0.03
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	28.41	11.19	28.70	11.30	31.31	12.33
SE (mean)	0.05	0.02	0.05	0.02	0.04	0.02
St Dev	1.41	0.55	1.51	0.60	1.53	0.60
Minimum	24.69	9.72	24.40	9.61	25.90	10.20
Maximum	33.81	13.31	34.40	13.54	36.40	14.33
Percentiles						
1st	25.30	9.96	25.40	10.00	28.00	11.02
2nd	25.50	10.04	25.70	10.12	28.40	11.18
3rd	25.70	10.12	26.00	10.24	28.60	11.26
5th	26.01	10.24	26.30	10.35	28.80	11.34
10th	26.59	10.47	26.70	10.51	29.40	11.57
15th	27.00	10.63	27.10	10.67	29.70	11.69
20th	27.20	10.71	27.40	10.79	30.00	11.81
25th	27.41	10.79	27.70	10.91	30.20	11.89
30th	27.61	10.87	27.90	10.98	30.40	11.97
35th	27.79	10.94	28.10	11.06	30.70	12.09
40th	28.09	11.06	28.30	11.14	30.90	12.17
45th	28.19	11.10	28.50	11.22	31.10	12.24
50th	28.50	11.22	28.70	11.30	31.30	12.32
55th	28.60	11.26	28.80	11.34	31.50	12.40
60th	28.80	11.34	29.00	11.42	31.60	12.44
65th	29.01	11.42	29.30	11.54	31.80	12.52
70th	29.21	11.50	29.50	11.61	32.00	12.60
75th	29.39	11.57	29.70	11.69	32.30	12.72
80th	29.59	11.65	30.00	11.81	32.60	12.83
85th	29.79	11.73	30.30	11.93	33.00	12.99
90th	30.20	11.89	30.70	12.09	33.30	13.11
95th	30.71	12.09	31.20	12.28	33.90	13.35
97th	31.09	12.24	31.60	12.44	34.30	13.50
98th	31.29	12.32	31.90	12.56	34.60	13.62
99th	31.90	12.56	32.20	12.68	35.00	13.78

Bizygomatic Breadth

The maximum horizontal breadth of the face (between the zygomatic arches) at the left and right zygion landmarks is measured with a spreading caliper.



Bizygomatic Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.95	4.26	4.17
Symmetry – BETA I	0.22	0.16	0.06
Kurtosis – BETA II	0.38	-0.03	-0.12
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	13.29	5.23	13.34	5.25	14.16	5.57
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.53	0.21	0.57	0.22	0.59	0.23
Minimum	11.61	4.57	11.60	4.57	12.10	4.76
Maximum	15.19	5.98	15.10	5.94	16.10	6.34
Percentiles						
1st	12.19	4.80	12.10	4.76	12.80	5.04
2nd	12.29	4.84	12.30	4.84	13.00	5.12
3rd	12.29	4.84	12.30	4.84	13.10	5.16
5th	12.40	4.88	12.40	4.88	13.20	5.20
10th	12.60	4.96	12.60	4.96	13.40	5.28
15th	12.80	5.04	12.70	5.00	13.60	5.35
20th	12.80	5.04	12.90	5.08	13.60	5.35
25th	13.00	5.12	13.00	5.12	13.70	5.39
30th	13.00	5.12	13.00	5.12	13.80	5.43
35th	13.11	5.16	13.10	5.16	13.90	5.47
40th	13.11	5.16	13.20	5.20	14.00	5.51
45th	13.21	5.20	13.30	5.24	14.00	5.51
50th	13.31	5.24	13.30	5.24	14.10	5.55
55th	13.31	5.24	13.40	5.28	14.20	5.59
60th	13.41	5.28	13.50	5.31	14.30	5.63
65th	13.49	5.31	13.50	5.31	14.40	5.67
70th	13.49	5.31	13.60	5.35	14.50	5.71
75th	13.59	5.35	13.70	5.39	14.60	5.75
80th	13.69	5.39	13.80	5.43	14.70	5.79
85th	13.79	5.43	13.90	5.47	14.80	5.83
90th	14.00	5.51	14.00	5.51	14.90	5.87
95th	14.20	5.59	14.30	5.63	15.20	5.98
97th	14.30	5.63	14.40	5.67	15.30	6.02
98th	14.50	5.71	14.60	5.75	15.40	6.06
99th	14.61	5.75	14.70	5.79	15.50	6.10

Buttock Circumference

The horizontal circumference of the trunk at the level of the buttock point, posterior, right and left lateral landmarks, is measured with a tape. The participant stands erect with the heels together and the weight equally distributed on both feet.

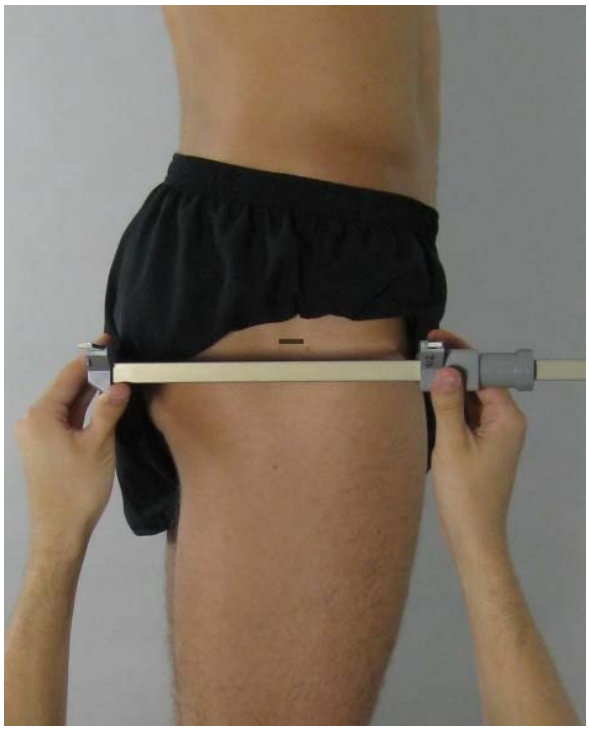
Buttock Circumference

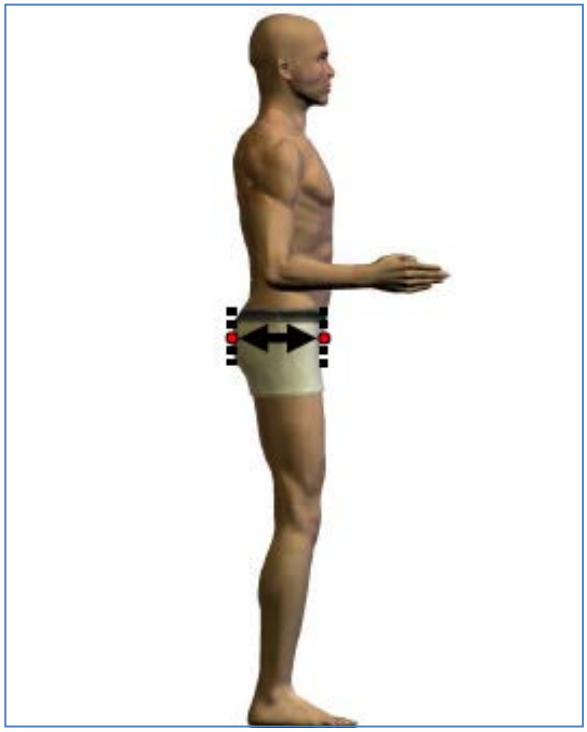
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.28	7.54	6.94
Symmetry – BETA I	0.37	0.32	0.17
Kurtosis – BETA II	0.13	0.03	-0.11
Number of Subjects	912	1005	1416

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	101.74	40.06	101.54	39.98	100.25	39.47
SE (mean)	0.25	0.10	0.24	0.10	0.18	0.07
St Dev	7.40	2.91	7.65	3.01	6.96	2.74
Minimum	83.21	32.76	79.80	31.42	80.20	31.57
Maximum	129.49	50.98	129.50	50.98	130.10	51.22
Percentiles						
1st	87.00	34.25	86.80	34.17	85.70	33.74
2nd	87.91	34.61	87.80	34.57	87.20	34.33
3rd	88.80	34.96	88.60	34.88	88.00	34.65
5th	89.99	35.43	89.80	35.35	89.10	35.08
10th	92.71	36.50	91.80	36.14	91.30	35.94
15th	94.01	37.01	93.50	36.81	92.80	36.54
20th	95.50	37.60	94.70	37.28	94.20	37.09
25th	96.55	38.01	96.00	37.80	95.30	37.52
30th	97.61	38.43	97.10	38.23	96.30	37.91
35th	98.40	38.74	98.10	38.62	97.20	38.27
40th	99.39	39.13	99.10	39.02	98.20	38.66
45th	100.41	39.53	100.00	39.37	99.30	39.09
50th	101.09	39.80	101.10	39.80	100.10	39.41
55th	102.31	40.28	102.30	40.28	101.20	39.84
60th	103.40	40.71	103.40	40.71	102.20	40.24
65th	104.19	41.02	104.30	41.06	102.90	40.51
70th	105.21	41.42	105.50	41.54	103.90	40.91
75th	106.40	41.89	106.60	41.97	105.10	41.38
80th	107.80	42.44	107.80	42.44	106.20	41.81
85th	109.19	42.99	109.30	43.03	107.40	42.28
90th	111.51	43.90	111.40	43.86	109.30	43.03
95th	114.81	45.20	115.00	45.28	111.90	44.06
97th	116.99	46.06	117.00	46.06	113.80	44.80
98th	118.29	46.57	118.10	46.50	114.70	45.16
99th	120.50	47.44	120.50	47.44	116.00	45.67

Buttock Depth

The horizontal depth of the torso at the level of the buttock point, posterior and right lateral landmarks, is measured using a beam caliper. The participant stands erect with the heels together and the weight distributed equally on both feet.





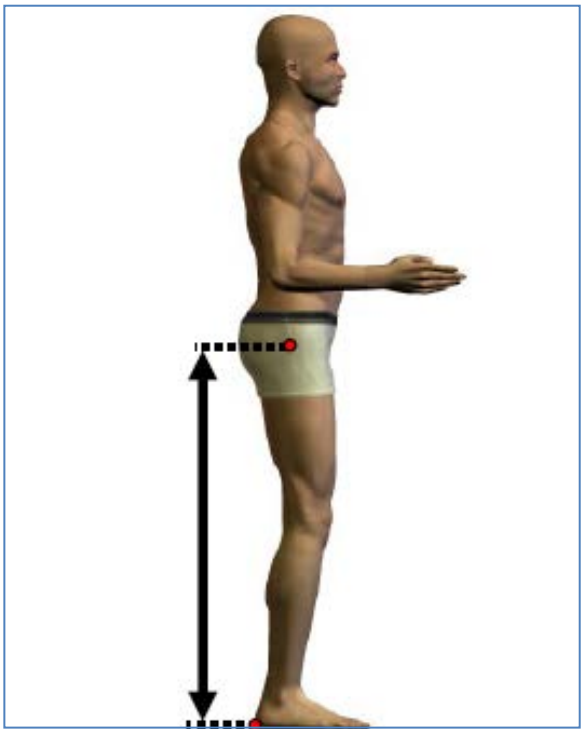
Buttock Depth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	10.44	10.26	10.02
Symmetry – BETA I	0.60	0.59	0.18
Kurtosis – BETA II	0.99	1.20	-0.26
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	22.67	8.93	22.97	9.04	23.88	9.40
SE (mean)	0.08	0.03	0.07	0.03	0.06	0.02
St Dev	2.37	0.93	2.36	0.93	2.39	0.94
Minimum	16.79	6.61	16.80	6.61	17.30	6.81
Maximum	34.90	13.74	35.60	14.02	32.70	12.87
Percentiles						
1st	18.01	7.09	18.40	7.24	19.20	7.56
2nd	18.39	7.24	18.90	7.44	19.50	7.68
3rd	18.80	7.40	19.10	7.52	19.70	7.76
5th	19.20	7.56	19.30	7.60	20.10	7.91
10th	19.89	7.83	20.10	7.91	20.80	8.19
15th	20.29	7.99	20.60	8.11	21.20	8.35
20th	20.70	8.15	21.00	8.27	21.60	8.50
25th	21.01	8.27	21.30	8.39	22.00	8.66
30th	21.31	8.39	21.60	8.50	22.40	8.82
35th	21.59	8.50	21.90	8.62	22.80	8.98
40th	21.89	8.62	22.20	8.74	23.20	9.13
45th	22.20	8.74	22.50	8.86	23.60	9.29
50th	22.40	8.82	22.80	8.98	23.90	9.41
55th	22.81	8.98	23.10	9.09	24.30	9.57
60th	23.09	9.09	23.40	9.21	24.60	9.69
65th	23.39	9.21	23.80	9.37	24.90	9.80
70th	23.80	9.37	24.10	9.49	25.20	9.92
75th	24.10	9.49	24.40	9.61	25.50	10.04
80th	24.61	9.69	24.90	9.80	25.80	10.16
85th	25.10	9.88	25.40	10.00	26.30	10.35
90th	25.81	10.16	26.00	10.24	27.00	10.63
95th	26.80	10.55	27.10	10.67	27.80	10.94
97th	27.41	10.79	27.70	10.91	28.40	11.18
98th	28.09	11.06	28.10	11.06	28.90	11.38
99th	28.91	11.38	28.80	11.34	29.80	11.73

Buttock Circumference Height

The vertical distance between a standing surface and the level of the buttock point, right lateral landmark, is measured with an anthropometer at the right side of the thigh. The participant stands erect with the heels together and the weight distributed equally on both feet.



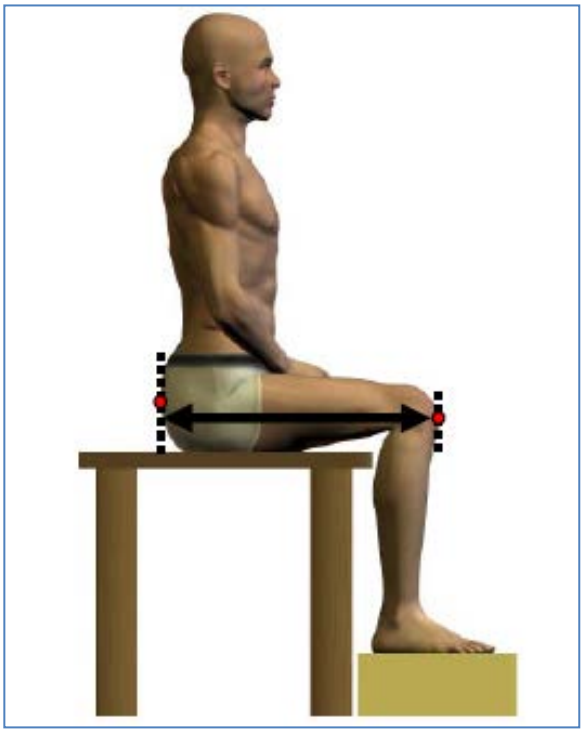
Buttock Circumference Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.42	5.36	5.65
Symmetry – BETA I	0.04	0.15	0.12
Kurtosis – BETA II	0.20	0.03	0.01
Number of Subjects	911	1012	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	84.93	33.44	83.96	33.05	90.09	35.47
SE (mean)	0.12	0.05	0.14	0.06	0.13	0.05
St Dev	3.76	1.48	4.50	1.77	5.09	2.00
Minimum	72.90	28.70	70.70	27.83	74.30	29.25
Maximum	97.41	38.35	98.70	38.86	108.00	42.52
Percentiles						
1st	76.20	30.00	74.70	29.41	78.90	31.06
2nd	76.99	30.31	75.10	29.57	79.90	31.46
3rd	77.60	30.55	75.70	29.80	80.80	31.81
5th	78.79	31.02	76.60	30.16	82.00	32.28
10th	80.29	31.61	78.20	30.79	83.50	32.87
15th	81.10	31.93	79.30	31.22	84.90	33.43
20th	81.89	32.24	80.20	31.57	85.80	33.78
25th	82.60	32.52	80.90	31.85	86.60	34.09
30th	83.11	32.72	81.50	32.09	87.30	34.37
35th	83.59	32.91	82.20	32.36	88.00	34.65
40th	84.00	33.07	82.80	32.60	88.60	34.88
45th	84.40	33.23	83.40	32.83	89.40	35.20
50th	84.81	33.39	84.00	33.07	90.10	35.47
55th	85.29	33.58	84.50	33.27	90.70	35.71
60th	85.90	33.82	85.00	33.46	91.30	35.94
65th	86.41	34.02	85.50	33.66	91.90	36.18
70th	86.89	34.21	86.20	33.94	92.60	36.46
75th	87.40	34.41	86.90	34.21	93.50	36.81
80th	87.91	34.61	87.60	34.49	94.30	37.13
85th	88.90	35.00	88.60	34.88	95.40	37.56
90th	89.69	35.31	89.60	35.28	96.80	38.11
95th	91.01	35.83	91.60	36.06	98.60	38.82
97th	91.80	36.14	92.60	36.46	100.00	39.37
98th	92.71	36.50	94.00	37.01	100.90	39.72
99th	94.31	37.13	94.90	37.36	102.20	40.24

Buttock Knee - Length

The horizontal distance between a buttock plate placed at the most posterior point on either buttock and the knee point, anterior landmark, is measured with an anthropometer. The participant sits erect. The thighs are parallel and the knees flexed 90° with the feet in line with the thighs.



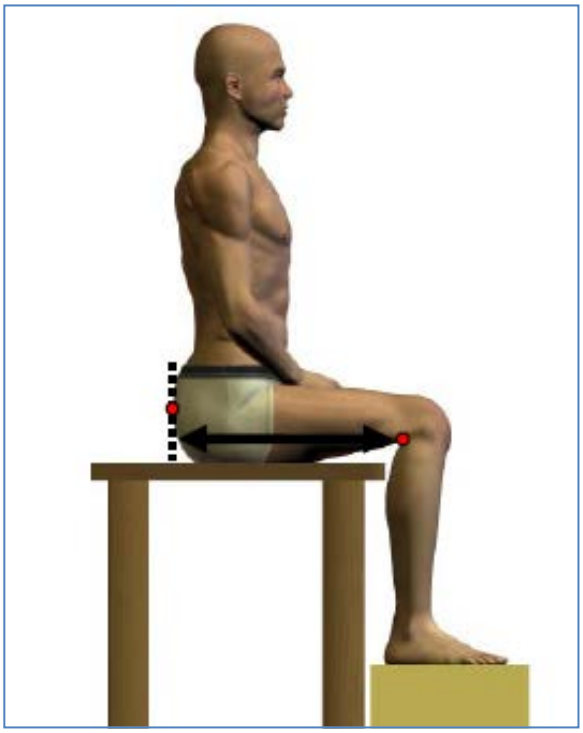
Buttock - Knee Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.46	5.42	4.89
Symmetry – BETA I	0.09	0.15	0.04
Kurtosis – BETA II	0.27	0.10	-0.11
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	59.43	23.40	59.11	23.27	62.18	24.48
SE (mean)	0.09	0.03	0.10	0.04	0.08	0.03
St Dev	2.65	1.04	3.21	1.26	3.04	1.20
Minimum	50.80	20.00	49.70	19.57	52.70	20.75
Maximum	68.61	27.01	69.20	27.24	72.40	28.50
Percentiles						
1st	53.19	20.94	52.00	20.47	55.30	21.77
2nd	53.80	21.18	52.70	20.75	56.00	22.05
3rd	54.31	21.38	53.40	21.02	56.50	22.24
5th	54.99	21.65	53.80	21.18	57.30	22.56
10th	56.11	22.09	55.00	21.65	58.20	22.91
15th	56.79	22.36	55.80	21.97	59.00	23.23
20th	57.30	22.56	56.50	22.24	59.70	23.50
25th	57.71	22.72	56.90	22.40	60.10	23.66
30th	57.99	22.83	57.40	22.60	60.70	23.90
35th	58.39	22.99	57.80	22.76	61.00	24.02
40th	58.80	23.15	58.20	22.91	61.40	24.17
45th	59.11	23.27	58.70	23.11	61.70	24.29
50th	59.41	23.39	59.10	23.27	62.10	24.45
55th	59.69	23.50	59.50	23.43	62.60	24.65
60th	59.99	23.62	59.90	23.58	63.00	24.80
65th	60.40	23.78	60.30	23.74	63.40	24.96
70th	60.71	23.90	60.70	23.90	63.70	25.08
75th	61.11	24.06	61.10	24.06	64.30	25.31
80th	61.49	24.21	61.70	24.29	64.70	25.47
85th	62.00	24.41	62.40	24.57	65.40	25.75
90th	62.79	24.72	63.20	24.88	66.10	26.02
95th	63.91	25.16	64.40	25.35	67.20	26.46
97th	64.39	25.35	65.10	25.63	67.90	26.73
98th	64.69	25.47	66.00	25.98	68.50	26.97
99th	66.40	26.14	67.30	26.50	68.90	27.13

Buttock Popliteal Length

The horizontal distance between a buttock plate placed at the most posterior point on either buttock and the back of the right knee (the popliteal fossa at the dorsal juncture of the calf and thigh) is measured with an anthropometer. The participant sits erect. The thighs are parallel and the knees flexed 90° with the feet in line with the thighs.



Buttock Popliteal Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.75	5.83	5.41
Symmetry – BETA I	0.10	0.11	0.10
Kurtosis – BETA II	0.22	0.11	-0.02
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	48.75	19.19	48.63	19.15	50.77	19.99
SE (mean)	0.08	0.03	0.09	0.04	0.07	0.03
St Dev	2.32	0.91	2.83	1.12	2.75	1.08
Minimum	41.81	16.46	40.80	16.06	42.70	16.81
Maximum	56.31	22.17	58.00	22.83	60.50	23.82
Percentiles						
1st	43.31	17.05	41.90	16.50	44.50	17.52
2nd	43.99	17.32	42.70	16.81	45.00	17.72
3rd	44.50	17.52	43.40	17.09	45.60	17.95
5th	45.01	17.72	44.00	17.32	46.40	18.27
10th	45.90	18.07	45.00	17.72	47.30	18.62
15th	46.41	18.27	45.80	18.03	48.00	18.90
20th	46.81	18.43	46.30	18.23	48.50	19.09
25th	47.19	18.58	46.80	18.43	49.00	19.29
30th	47.50	18.70	47.20	18.58	49.30	19.41
35th	47.80	18.82	47.50	18.70	49.70	19.57
40th	48.11	18.94	47.80	18.82	50.00	19.69
45th	48.41	19.06	48.20	18.98	50.30	19.80
50th	48.59	19.13	48.50	19.09	50.60	19.92
55th	49.10	19.33	49.00	19.29	51.00	20.08
60th	49.40	19.45	49.40	19.45	51.40	20.24
65th	49.61	19.53	49.70	19.57	51.80	20.39
70th	50.01	19.69	50.00	19.69	52.30	20.59
75th	50.29	19.80	50.50	19.88	52.70	20.75
80th	50.70	19.96	51.00	20.08	53.20	20.94
85th	51.10	20.12	51.60	20.31	53.60	21.10
90th	51.69	20.35	52.30	20.59	54.20	21.34
95th	52.50	20.67	53.30	20.98	55.30	21.77
97th	53.19	20.94	53.80	21.18	56.20	22.13
98th	53.59	21.10	54.20	21.34	56.60	22.28
99th	54.31	21.38	56.10	22.09	57.30	22.56

Calf Circumference

The maximum horizontal circumference of the right calf is measured with a tape. The participant stands erect with the heels approximately 10 cm apart and the weight distributed equally on both feet.

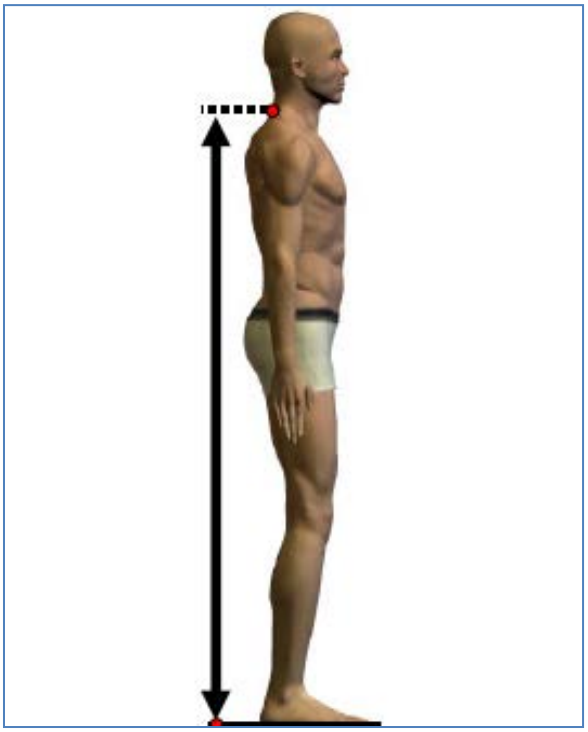
Calf Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.54	7.64	7.18
Symmetry – BETA I	0.35	0.30	0.17
Kurtosis – BETA II	0.07	0.26	0.16
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	37.36	14.71	37.13	14.62	38.60	15.20
SE (mean)	0.09	0.04	0.09	0.04	0.07	0.03
St Dev	2.82	1.11	2.84	1.12	2.77	1.09
Minimum	28.80	11.34	28.20	11.10	29.30	11.54
Maximum	46.71	18.39	47.10	18.54	48.80	19.21
Percentiles						
1st	31.70	12.48	31.20	12.28	32.30	12.72
2nd	32.31	12.72	31.70	12.48	33.30	13.11
3rd	32.59	12.83	32.10	12.64	33.50	13.19
5th	32.99	12.99	32.70	12.87	34.20	13.46
10th	33.81	13.31	33.60	13.23	35.20	13.86
15th	34.39	13.54	34.20	13.46	35.70	14.06
20th	34.90	13.74	34.70	13.66	36.30	14.29
25th	35.41	13.94	35.30	13.90	36.70	14.45
30th	35.79	14.09	35.60	14.02	37.20	14.65
35th	36.20	14.25	35.90	14.13	37.50	14.76
40th	36.50	14.37	36.20	14.25	37.90	14.92
45th	36.80	14.49	36.50	14.37	38.30	15.08
50th	37.11	14.61	37.00	14.57	38.50	15.16
55th	37.49	14.76	37.40	14.72	38.80	15.28
60th	38.00	14.96	37.70	14.84	39.20	15.43
65th	38.30	15.08	38.20	15.04	39.50	15.55
70th	38.71	15.24	38.50	15.16	39.90	15.71
75th	39.09	15.39	38.90	15.31	40.40	15.91
80th	39.60	15.59	39.30	15.47	40.90	16.10
85th	40.31	15.87	40.00	15.75	41.50	16.34
90th	41.20	16.22	40.70	16.02	42.30	16.65
95th	42.39	16.69	42.00	16.54	43.10	16.97
97th	43.00	16.93	42.70	16.81	44.00	17.32
98th	43.79	17.24	43.90	17.28	44.60	17.56
99th	44.81	17.64	44.40	17.48	45.70	17.99

Cervicale Height

The vertical distance between a standing surface and the cervicale landmark is measured with an anthropometer. The participant stands erect with the head in the Frankfurt plane. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



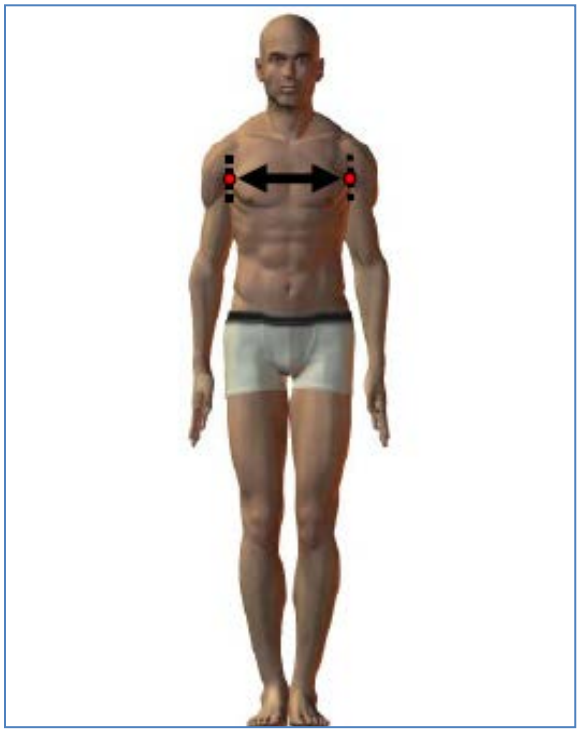
Cervicale Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.48	4.29	4.01
Symmetry – BETA I	0.00	-0.04	-0.02
Kurtosis – BETA II	0.28	-0.33	0.09
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	142.93	56.27	140.91	55.47	153.56	60.46
SE (mean)	0.16	0.06	0.19	0.07	0.16	0.06
St Dev	4.97	1.96	6.04	2.38	6.15	2.42
Minimum	126.29	49.72	125.20	49.29	134.50	52.95
Maximum	158.70	62.48	158.70	62.48	173.80	68.43
Percentiles						
1st	130.40	51.34	127.30	50.12	138.50	54.53
2nd	132.41	52.13	128.70	50.67	140.80	55.43
3rd	133.20	52.44	129.30	50.91	142.20	55.98
5th	134.49	52.95	130.50	51.38	143.60	56.54
10th	136.70	53.82	132.80	52.28	145.40	57.24
15th	138.40	54.49	134.20	52.83	147.30	57.99
20th	139.29	54.84	135.60	53.39	148.50	58.46
25th	139.90	55.08	136.90	53.90	149.60	58.90
30th	140.49	55.31	137.90	54.29	150.40	59.21
35th	141.00	55.51	138.80	54.65	151.30	59.57
40th	141.50	55.71	139.60	54.96	152.00	59.84
45th	142.09	55.94	140.30	55.24	152.80	60.16
50th	142.80	56.22	141.00	55.51	153.55	60.45
55th	143.31	56.42	141.70	55.79	154.40	60.79
60th	144.09	56.73	142.40	56.06	155.20	61.10
65th	144.70	56.97	143.20	56.38	155.90	61.38
70th	145.39	57.24	144.20	56.77	156.80	61.73
75th	146.20	57.56	145.00	57.09	157.50	62.01
80th	146.99	57.87	146.00	57.48	158.60	62.44
85th	148.21	58.35	147.30	57.99	159.80	62.91
90th	149.10	58.70	148.90	58.62	161.10	63.43
95th	151.41	59.61	151.20	59.53	163.70	64.45
97th	152.20	59.92	152.20	59.92	165.30	65.08
98th	153.39	60.39	152.90	60.20	166.10	65.39
99th	154.31	60.75	153.60	60.47	168.10	66.18

Chest Breadth

The maximum horizontal breadth of the chest at the level of the chest point anterior landmark is measured with a beam caliper. The participant stands erect, looking straight ahead with the heels together and the weight distributed evenly on both feet. The participant places both hands on the hips and takes a deep breath and holds it. The tissue is compressed with the beam caliper, and then the participant lowers the arms. The measurement is taken at maximum inspiration.



Chest Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.90	6.93	6.04
Symmetry – BETA I	0.36	0.29	0.21
Kurtosis – BETA II	0.18	0.01	0.14
Number of Subjects	912	1013	1420

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	27.01	10.63	26.93	10.60	28.66	11.28
SE (mean)	0.06	0.02	0.06	0.02	0.05	0.02
St Dev	1.86	0.73	1.87	0.73	1.73	0.68
Minimum	21.31	8.39	21.30	8.39	23.10	9.09
Maximum	33.81	13.31	33.20	13.07	34.90	13.74
Percentiles						
1st	23.01	9.06	23.10	9.09	24.90	9.80
2nd	23.50	9.25	23.40	9.21	25.30	9.96
3rd	23.90	9.41	23.80	9.37	25.60	10.08
5th	24.21	9.53	24.10	9.49	25.90	10.20
10th	24.79	9.76	24.60	9.69	26.50	10.43
15th	25.20	9.92	25.00	9.84	26.80	10.55
20th	25.50	10.04	25.40	10.00	27.20	10.71
25th	25.76	10.14	25.60	10.08	27.40	10.79
30th	26.01	10.24	25.90	10.20	27.70	10.91
35th	26.19	10.31	26.10	10.28	28.00	11.02
40th	26.39	10.39	26.40	10.39	28.20	11.10
45th	26.59	10.47	26.60	10.47	28.40	11.18
50th	26.80	10.55	26.80	10.55	28.60	11.26
55th	27.00	10.63	27.00	10.63	28.80	11.34
60th	27.31	10.75	27.30	10.75	29.10	11.46
65th	27.61	10.87	27.50	10.83	29.30	11.54
70th	27.79	10.94	27.80	10.94	29.50	11.61
75th	28.30	11.14	28.20	11.10	29.80	11.73
80th	28.50	11.22	28.50	11.22	30.10	11.85
85th	28.91	11.38	28.90	11.38	30.40	11.97
90th	29.49	11.61	29.30	11.54	30.80	12.13
95th	30.30	11.93	30.30	11.93	31.70	12.48
97th	30.91	12.17	30.80	12.13	32.30	12.72
98th	31.19	12.28	31.10	12.24	32.60	12.83
99th	31.60	12.44	31.60	12.44	33.10	13.03

Chest Circumference

The maximum horizontal circumference of the chest at the level of chest point, anterior is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.

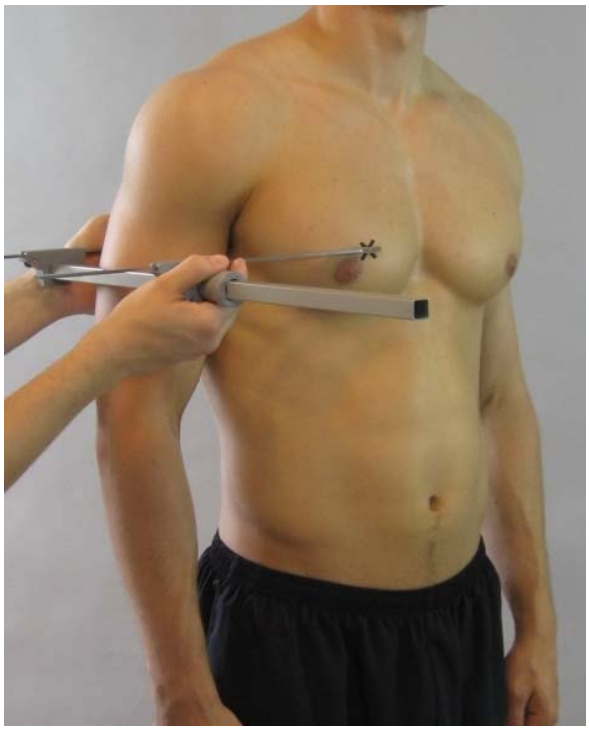
Chest Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	8.26	8.41	7.64
Symmetry – BETA I	0.49	0.45	0.21
Kurtosis – BETA II	0.30	0.11	-0.25
Number of Subjects	912	1007	1416

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	94.05	37.03	93.84	36.95	103.37	40.70
SE (mean)	0.26	0.10	0.25	0.10	0.21	0.08
St Dev	7.77	3.06	7.89	3.11	7.89	3.11
Minimum	75.69	29.80	69.50	27.36	82.00	32.28
Maximum	122.91	48.39	122.00	48.03	128.50	50.59
Percentiles						
1st	79.20	31.18	78.80	31.02	87.20	34.33
2nd	80.01	31.50	80.00	31.50	89.20	35.12
3rd	81.20	31.97	80.80	31.81	90.00	35.43
5th	82.40	32.44	82.40	32.44	90.70	35.71
10th	84.51	33.27	84.20	33.15	93.20	36.69
15th	86.00	33.86	85.80	33.78	94.80	37.32
20th	87.20	34.33	87.00	34.25	96.30	37.91
25th	88.49	34.84	88.20	34.72	97.50	38.39
30th	89.61	35.28	89.10	35.08	99.00	38.98
35th	90.81	35.75	90.30	35.55	99.80	39.29
40th	91.59	36.06	91.30	35.94	101.10	39.80
45th	92.71	36.50	92.30	36.34	102.20	40.24
50th	93.60	36.85	93.20	36.69	103.30	40.67
55th	94.21	37.09	94.10	37.05	104.30	41.06
60th	95.10	37.44	95.00	37.40	105.30	41.46
65th	96.49	37.99	96.10	37.83	106.30	41.85
70th	97.61	38.43	97.60	38.43	107.40	42.28
75th	98.91	38.94	98.90	38.94	108.70	42.80
80th	100.10	39.41	100.30	39.49	110.10	43.35
85th	102.11	40.20	102.10	40.20	111.70	43.98
90th	104.29	41.06	104.50	41.14	113.70	44.76
95th	107.49	42.32	108.50	42.72	116.70	45.94
97th	110.01	43.31	110.10	43.35	118.40	46.61
98th	111.51	43.90	111.80	44.02	120.30	47.36
99th	115.19	45.35	114.70	45.16	122.30	48.15

Chest Depth

The horizontal distance between the chest point anterior landmark and the back at the same level is measured with a beam caliper. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



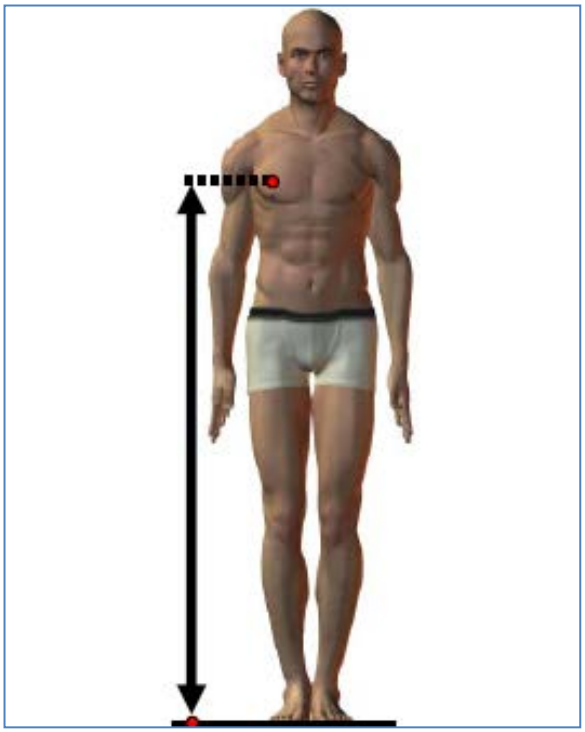
Chest Depth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	10.61	10.69	9.89
Symmetry – BETA I	0.37	0.29	0.27
Kurtosis – BETA II	0.08	-0.13	-0.05
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	24.42	9.62	24.46	9.63	24.63	9.70
SE (mean)	0.09	0.03	0.08	0.03	0.06	0.03
St Dev	2.59	1.02	2.61	1.03	2.44	0.96
Minimum	18.29	7.20	17.00	6.69	18.10	7.13
Maximum	33.20	13.07	32.80	12.91	34.20	13.46
Percentiles						
1st	19.20	7.56	19.20	7.56	19.60	7.72
2nd	19.81	7.80	19.70	7.76	20.10	7.91
3rd	19.99	7.87	20.00	7.87	20.50	8.07
5th	20.50	8.07	20.50	8.07	20.90	8.23
10th	21.11	8.31	21.20	8.35	21.50	8.46
15th	21.59	8.50	21.60	8.50	22.00	8.66
20th	22.20	8.74	22.20	8.74	22.40	8.82
25th	22.61	8.90	22.60	8.90	22.80	8.98
30th	23.01	9.06	23.00	9.06	23.30	9.17
35th	23.29	9.17	23.30	9.17	23.60	9.29
40th	23.60	9.29	23.70	9.33	23.90	9.41
45th	23.90	9.41	24.00	9.45	24.30	9.57
50th	24.31	9.57	24.30	9.57	24.50	9.65
55th	24.61	9.69	24.60	9.69	24.90	9.80
60th	24.89	9.80	25.00	9.84	25.20	9.92
65th	25.30	9.96	25.40	10.00	25.50	10.04
70th	25.70	10.12	25.70	10.12	25.90	10.20
75th	26.11	10.28	26.10	10.28	26.30	10.35
80th	26.59	10.47	26.70	10.51	26.70	10.51
85th	27.00	10.63	27.20	10.71	27.20	10.71
90th	27.71	10.91	27.90	10.98	27.80	10.94
95th	28.91	11.38	29.10	11.46	28.80	11.34
97th	29.59	11.65	29.70	11.69	29.30	11.54
98th	30.40	11.97	30.40	11.97	29.60	11.65
99th	31.29	12.32	31.00	12.20	30.30	11.93

Chest Height

The vertical distance between a standing surface and the chest point anterior landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



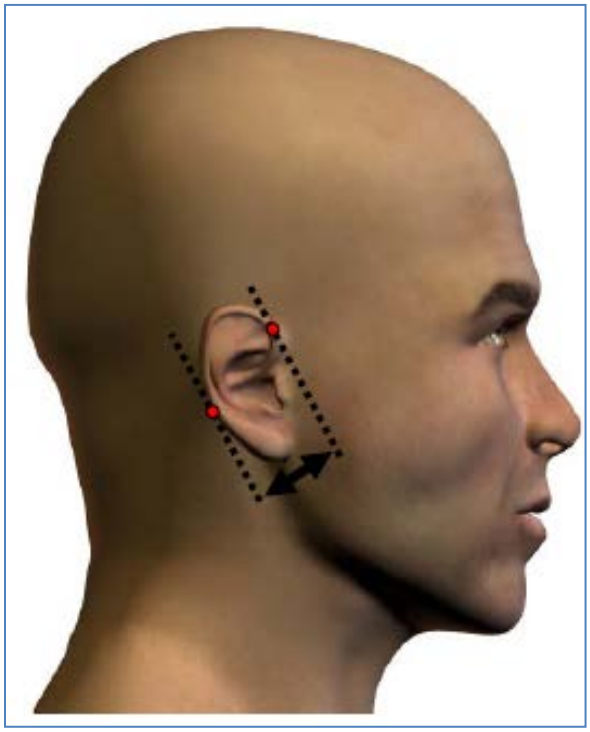
Chest Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.84	4.62	4.34
Symmetry – BETA I	0.07	0.04	0.04
Kurtosis – BETA II	0.11	-0.22	0.22
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	120.28	47.36	118.41	46.62	130.82	51.50
SE (mean)	0.15	0.06	0.17	0.07	0.15	0.06
St Dev	4.62	1.82	5.46	2.15	5.67	2.23
Minimum	104.60	41.18	103.70	40.83	111.20	43.78
Maximum	135.41	53.31	135.50	53.35	150.60	59.29
Percentiles						
1st	110.11	43.35	106.10	41.77	118.10	46.50
2nd	111.10	43.74	107.60	42.36	119.30	46.97
3rd	111.40	43.86	108.10	42.56	120.30	47.36
5th	112.60	44.33	109.10	42.95	121.90	47.99
10th	114.50	45.08	111.50	43.90	123.60	48.66
15th	115.60	45.51	112.80	44.41	124.90	49.17
20th	116.61	45.91	113.70	44.76	126.10	49.65
25th	117.30	46.18	114.70	45.16	127.00	50.00
30th	118.01	46.46	115.50	45.47	127.70	50.28
35th	118.49	46.65	116.30	45.79	128.70	50.67
40th	119.10	46.89	116.80	45.98	129.40	50.94
45th	119.61	47.09	117.50	46.26	130.20	51.26
50th	120.09	47.28	118.30	46.57	130.80	51.50
55th	120.60	47.48	119.10	46.89	131.40	51.73
60th	121.31	47.76	119.80	47.17	132.10	52.01
65th	121.89	47.99	120.50	47.44	132.90	52.32
70th	122.61	48.27	121.50	47.83	133.70	52.64
75th	123.29	48.54	122.20	48.11	134.70	53.03
80th	124.21	48.90	123.10	48.46	135.70	53.43
85th	125.20	49.29	124.30	48.94	136.60	53.78
90th	126.29	49.72	125.50	49.41	137.80	54.25
95th	128.09	50.43	127.50	50.20	140.20	55.20
97th	129.59	51.02	128.90	50.75	141.50	55.71
98th	130.20	51.26	130.00	51.18	142.40	56.06
99th	131.50	51.77	130.90	51.54	144.90	57.05

Ear Breadth

The maximum breadth of the right ear perpendicular to its long axis is measured with a sliding caliper.



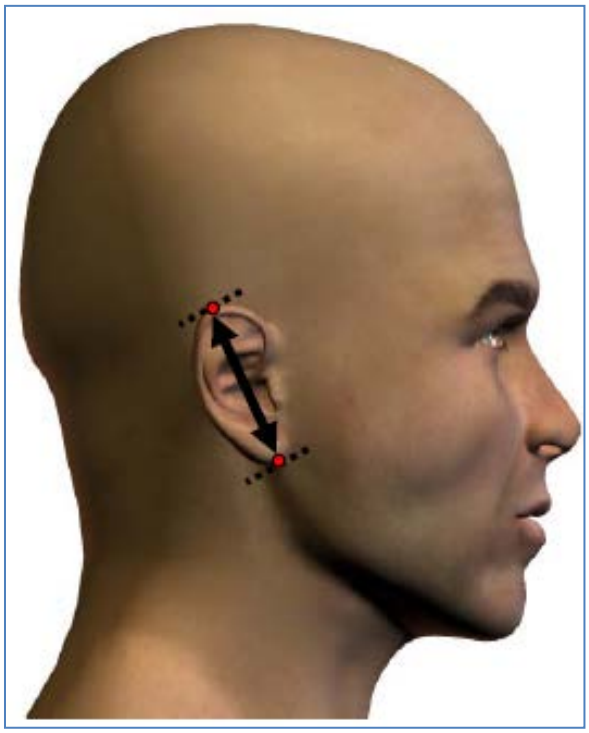
Ear Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.99	8.24	8.26
Symmetry – BETA I	0.11	-0.01	0.03
Kurtosis – BETA II	0.00	-0.20	-0.07
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	3.32	1.31	3.31	1.30	3.59	1.41
SE (mean)	0.01	0.00	0.01	0.00	0.01	0.00
St Dev	0.27	0.10	0.27	0.11	0.30	0.12
Minimum	2.69	1.06	2.60	1.02	2.60	1.02
Maximum	4.19	1.65	4.10	1.61	4.50	1.77
Percentiles						
1st	2.69	1.06	2.70	1.06	2.90	1.14
2nd	2.79	1.10	2.70	1.06	3.00	1.18
3rd	2.79	1.10	2.80	1.10	3.00	1.18
5th	2.90	1.14	2.90	1.14	3.10	1.22
10th	3.00	1.18	2.90	1.14	3.20	1.26
15th	3.10	1.22	3.00	1.18	3.30	1.30
20th	3.10	1.22	3.10	1.22	3.30	1.30
25th	3.20	1.26	3.10	1.22	3.40	1.34
30th	3.20	1.26	3.20	1.26	3.40	1.34
35th	3.20	1.26	3.20	1.26	3.50	1.38
40th	3.20	1.26	3.30	1.30	3.50	1.38
45th	3.30	1.30	3.30	1.30	3.50	1.38
50th	3.30	1.30	3.30	1.30	3.60	1.42
55th	3.30	1.30	3.30	1.30	3.60	1.42
60th	3.40	1.34	3.40	1.34	3.70	1.46
65th	3.40	1.34	3.40	1.34	3.70	1.46
70th	3.40	1.34	3.40	1.34	3.70	1.46
75th	3.51	1.38	3.50	1.38	3.80	1.50
80th	3.51	1.38	3.50	1.38	3.80	1.50
85th	3.61	1.42	3.60	1.42	3.90	1.54
90th	3.71	1.46	3.70	1.46	4.00	1.57
95th	3.81	1.50	3.80	1.50	4.10	1.61
97th	3.81	1.50	3.80	1.50	4.20	1.65
98th	3.91	1.54	3.90	1.54	4.20	1.65
99th	3.99	1.57	3.90	1.54	4.30	1.69

Ear Length

The length of the right ear, from its highest to lowest points on a line parallel to the long axis of the ear, is measured with a sliding caliper.



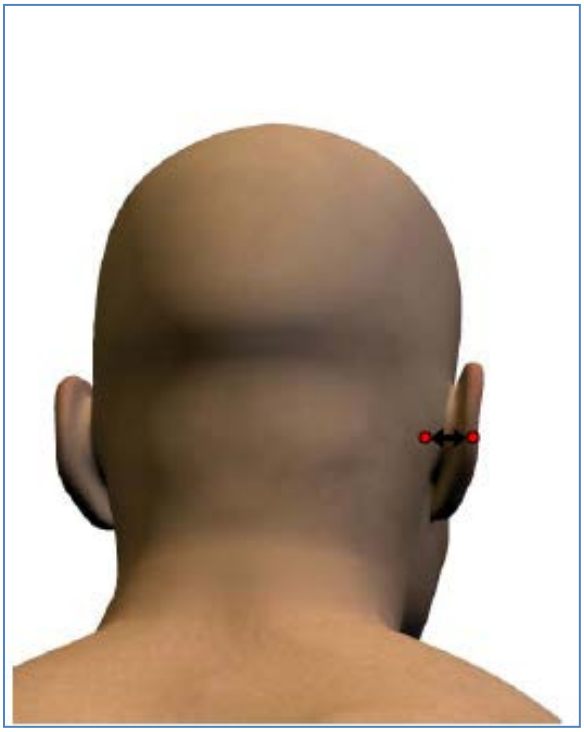
Ear Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.16	6.46	6.75
Symmetry – BETA I	0.13	0.20	0.12
Kurtosis – BETA II	-0.28	-0.15	-0.04
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	5.99	2.36	5.97	2.35	6.37	2.51
SE (mean)	0.01	0.00	0.01	0.00	0.01	0.00
St Dev	0.37	0.15	0.39	0.15	0.43	0.17
Minimum	5.00	1.97	4.90	1.93	4.60	1.81
Maximum	7.11	2.80	7.10	2.80	7.80	3.07
Percentiles						
1st	5.21	2.05	5.20	2.05	5.50	2.17
2nd	5.31	2.09	5.20	2.05	5.60	2.20
3rd	5.31	2.09	5.30	2.09	5.60	2.20
5th	5.41	2.13	5.40	2.13	5.70	2.24
10th	5.51	2.17	5.50	2.17	5.80	2.28
15th	5.59	2.20	5.50	2.17	5.90	2.32
20th	5.69	2.24	5.60	2.20	6.00	2.36
25th	5.69	2.24	5.70	2.24	6.10	2.40
30th	5.79	2.28	5.80	2.28	6.10	2.40
35th	5.79	2.28	5.80	2.28	6.20	2.44
40th	5.89	2.32	5.90	2.32	6.30	2.48
45th	5.99	2.36	5.90	2.32	6.30	2.48
50th	5.99	2.36	6.00	2.36	6.40	2.52
55th	5.99	2.36	6.00	2.36	6.40	2.52
60th	6.10	2.40	6.00	2.36	6.50	2.56
65th	6.10	2.40	6.10	2.40	6.50	2.56
70th	6.20	2.44	6.10	2.40	6.60	2.60
75th	6.20	2.44	6.20	2.44	6.70	2.64
80th	6.30	2.48	6.30	2.48	6.70	2.64
85th	6.40	2.52	6.40	2.52	6.80	2.68
90th	6.50	2.56	6.50	2.56	6.90	2.72
95th	6.60	2.60	6.60	2.60	7.10	2.80
97th	6.71	2.64	6.80	2.68	7.20	2.83
98th	6.71	2.64	6.80	2.68	7.30	2.87
99th	6.81	2.68	6.90	2.72	7.40	2.91

Ear Protrusion

The horizontal distance between the mastoid process and the outside edge of the right ear at its most lateral point is measured using a sliding caliper with its slide reversed.



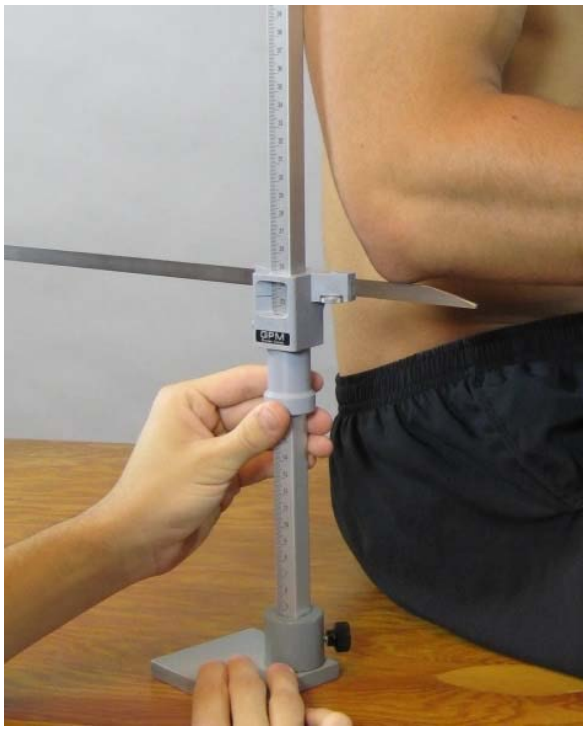
Ear Protrusion

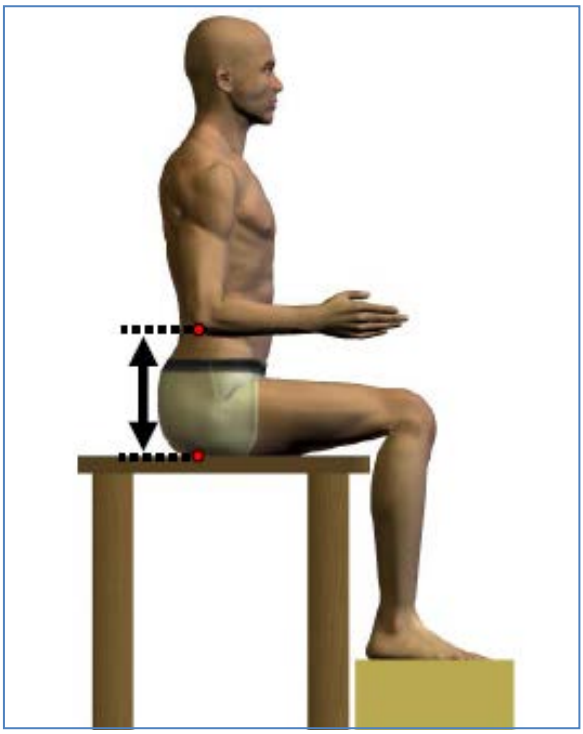
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	12.70	12.77	12.71
Symmetry – BETA I	0.34	0.37	0.33
Kurtosis – BETA II	0.45	0.07	0.32
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	2.11	0.83	2.07	0.82	2.33	0.92
SE (mean)	0.01	0.00	0.01	0.00	0.01	0.00
St Dev	0.27	0.11	0.26	0.10	0.30	0.12
Minimum	1.30	0.51	1.30	0.51	1.40	0.55
Maximum	3.30	1.30	3.10	1.22	3.50	1.38
Percentiles						
1st	1.50	0.59	1.50	0.59	1.70	0.67
2nd	1.60	0.63	1.60	0.63	1.80	0.71
3rd	1.60	0.63	1.60	0.63	1.80	0.71
5th	1.70	0.67	1.70	0.67	1.90	0.75
10th	1.80	0.71	1.70	0.67	2.00	0.79
15th	1.91	0.75	1.80	0.71	2.00	0.79
20th	1.91	0.75	1.90	0.75	2.10	0.83
25th	1.91	0.75	1.90	0.75	2.10	0.83
30th	2.01	0.79	1.90	0.75	2.20	0.87
35th	2.01	0.79	2.00	0.79	2.20	0.87
40th	2.01	0.79	2.00	0.79	2.20	0.87
45th	2.01	0.79	2.00	0.79	2.30	0.91
50th	2.11	0.83	2.00	0.79	2.30	0.91
55th	2.11	0.83	2.10	0.83	2.40	0.94
60th	2.21	0.87	2.10	0.83	2.40	0.94
65th	2.21	0.87	2.20	0.87	2.40	0.94
70th	2.21	0.87	2.20	0.87	2.50	0.98
75th	2.31	0.91	2.20	0.87	2.50	0.98
80th	2.31	0.91	2.30	0.91	2.50	0.98
85th	2.39	0.94	2.40	0.94	2.60	1.02
90th	2.49	0.98	2.40	0.94	2.70	1.06
95th	2.59	1.02	2.50	0.98	2.80	1.10
97th	2.69	1.06	2.60	1.02	2.90	1.14
98th	2.69	1.06	2.60	1.02	3.00	1.18
99th	2.79	1.10	2.80	1.10	3.10	1.22

Elbow Rest Height

The vertical distance between a sitting surface and the olecranon, bottom landmark on the flexed right elbow, is measured with an anthropometer. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.





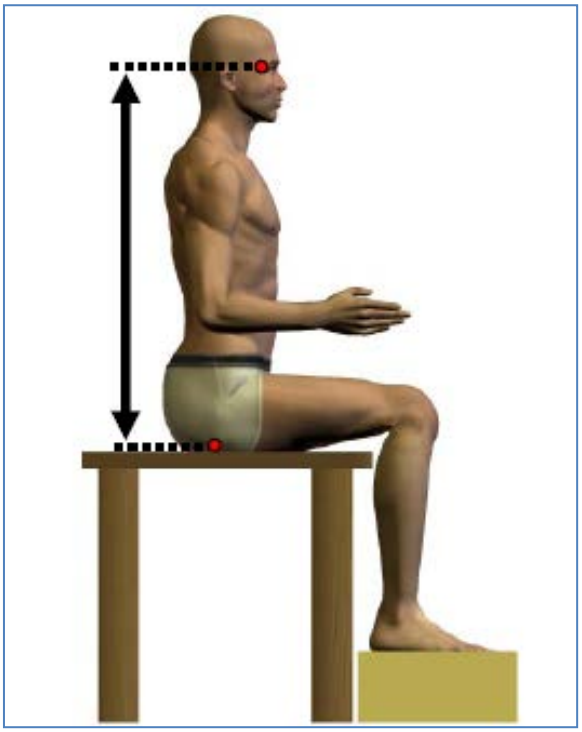
Elbow Rest Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	10.18	11.06	11.56
Symmetry – BETA I	0.03	-0.01	-0.14
Kurtosis – BETA II	-0.08	0.11	-0.11
Number of Subjects	913	1013	1420

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	24.29	9.56	23.52	9.26	24.41	9.61
SE (mean)	0.08	0.03	0.08	0.03	0.07	0.03
St Dev	2.47	0.97	2.60	1.02	2.82	1.11
Minimum	17.20	6.77	15.10	5.94	15.80	6.22
Maximum	32.59	12.83	32.20	12.68	32.80	12.91
Percentiles						
1st	18.49	7.28	17.20	6.77	17.40	6.85
2nd	19.20	7.56	18.20	7.17	18.40	7.24
3rd	19.51	7.68	18.80	7.40	18.90	7.44
5th	20.19	7.95	19.30	7.60	19.70	7.76
10th	21.11	8.31	20.30	7.99	20.70	8.15
15th	21.69	8.54	20.80	8.19	21.55	8.48
20th	22.30	8.78	21.40	8.43	22.00	8.66
25th	22.71	8.94	21.80	8.58	22.50	8.86
30th	23.01	9.06	22.20	8.74	22.90	9.02
35th	23.29	9.17	22.50	8.86	23.40	9.21
40th	23.60	9.29	22.80	8.98	23.70	9.33
45th	23.90	9.41	23.10	9.09	24.10	9.49
50th	24.21	9.53	23.40	9.21	24.50	9.65
55th	24.51	9.65	23.80	9.37	24.90	9.80
60th	24.89	9.80	24.10	9.49	25.30	9.96
65th	25.30	9.96	24.50	9.65	25.60	10.08
70th	25.60	10.08	24.90	9.80	25.95	10.22
75th	26.01	10.24	25.20	9.92	26.30	10.35
80th	26.39	10.39	25.70	10.12	26.80	10.55
85th	26.90	10.59	26.30	10.35	27.40	10.79
90th	27.51	10.83	26.80	10.55	28.10	11.06
95th	28.30	11.14	27.90	10.98	28.90	11.38
97th	28.80	11.34	28.50	11.22	29.50	11.61
98th	29.31	11.54	28.70	11.30	30.00	11.81
99th	29.79	11.73	29.40	11.57	30.70	12.09

Eye Height Sitting

The vertical distance between a sitting surface and the ectocanthus landmark is measured with an anthropometer. The participant sits erect with the head in the Frankfurt plane. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The thighs are parallel, and the knees are flexed 90° with the feet in line with the thighs. The measurement is taken at the maximum point of quiet respiration.



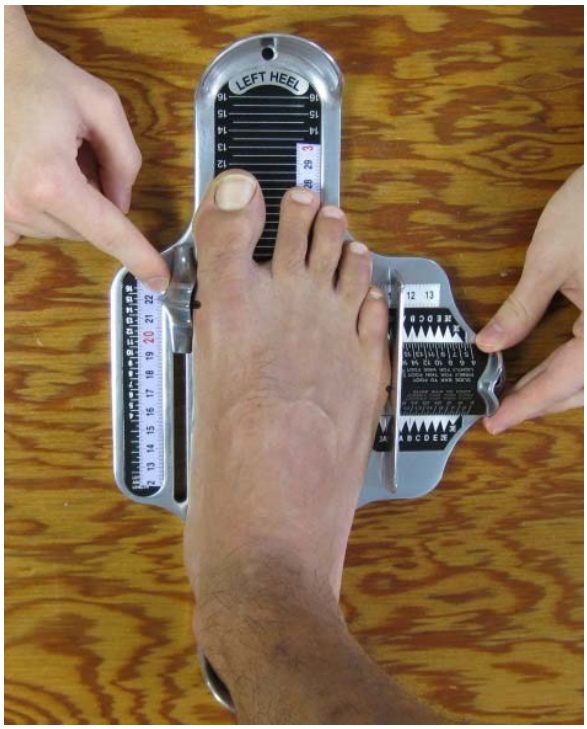
Eye Height Sitting

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.41	4.10	3.84
Symmetry – BETA I	-0.11	-0.08	0.02
Kurtosis – BETA II	0.04	-0.31	0.00
Number of Subjects	913	1013	1420

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	77.06	30.34	75.60	29.77	81.24	31.98
SE (mean)	0.09	0.03	0.10	0.04	0.08	0.03
St Dev	2.63	1.03	3.10	1.22	3.12	1.23
Minimum	68.20	26.85	66.80	26.30	71.20	28.03
Maximum	84.30	33.19	84.30	33.19	91.20	35.91
Percentiles						
1st	70.61	27.80	68.30	26.89	73.90	29.09
2nd	71.50	28.15	69.20	27.24	74.70	29.41
3rd	72.11	28.39	69.80	27.48	75.50	29.72
5th	72.59	28.58	70.40	27.72	76.20	30.00
10th	73.61	28.98	71.50	28.15	77.30	30.43
15th	74.40	29.29	72.40	28.50	78.00	30.71
20th	75.01	29.53	73.00	28.74	78.50	30.91
25th	75.41	29.69	73.40	28.90	79.10	31.14
30th	75.79	29.84	73.90	29.09	79.60	31.34
35th	76.10	29.96	74.30	29.25	80.00	31.50
40th	76.40	30.08	74.90	29.49	80.40	31.65
45th	76.71	30.20	75.30	29.65	80.80	31.81
50th	77.09	30.35	75.70	29.80	81.20	31.97
55th	77.39	30.47	76.10	29.96	81.70	32.17
60th	77.70	30.59	76.50	30.12	82.00	32.28
65th	78.00	30.71	76.80	30.24	82.40	32.44
70th	78.51	30.91	77.30	30.43	82.80	32.60
75th	78.79	31.02	77.80	30.63	83.30	32.80
80th	79.40	31.26	78.40	30.87	83.80	32.99
85th	79.81	31.42	78.90	31.06	84.40	33.23
90th	80.39	31.65	79.60	31.34	85.30	33.58
95th	81.31	32.01	80.60	31.73	86.50	34.06
97th	81.89	32.24	81.30	32.01	87.10	34.29
98th	82.09	32.32	81.80	32.20	87.50	34.45
99th	83.31	32.80	82.10	32.32	88.60	34.88

Foot Breadth

The maximum breadth of the right foot is measured with a Brannock Device®. The participant stands with the right foot on the device and the left foot on a board of equal height with the weight distributed equally on both feet. The heel of the right foot lightly touches the back of the device, and the medial side of the right foot is parallel with the long axis of the device. The vertical slide of the device is moved until it lightly touches the fifth metatarsophalangeal protrusion landmark.



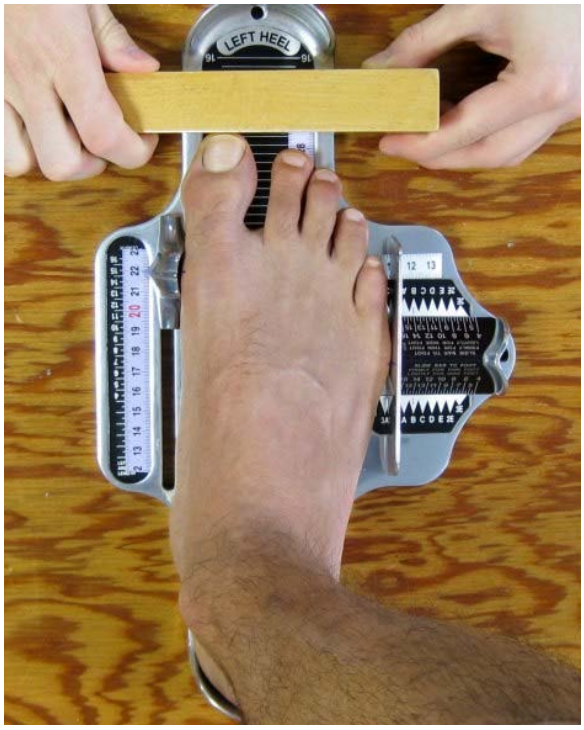
Foot Breadth

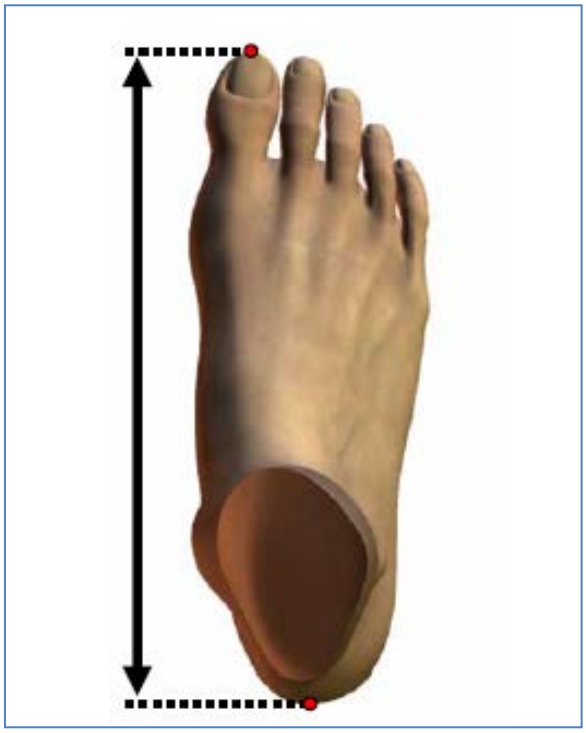
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	5.07	5.18	4.99
Symmetry – BETA I	0.11	0.15	0.34
Kurtosis – BETA II	-0.28	-0.38	0.63
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	9.27	3.65	9.25	3.64	10.18	4.01
SE (mean)	0.02	0.01	0.02	0.01	0.01	0.01
St Dev	0.47	0.19	0.48	0.19	0.51	0.20
Minimum	7.90	3.11	7.90	3.11	8.30	3.27
Maximum	10.59	4.17	10.70	4.21	12.60	4.96
Percentiles						
1st	8.31	3.27	8.30	3.27	9.10	3.58
2nd	8.41	3.31	8.40	3.31	9.20	3.62
3rd	8.41	3.31	8.40	3.31	9.30	3.66
5th	8.51	3.35	8.50	3.35	9.40	3.70
10th	8.71	3.43	8.60	3.39	9.50	3.74
15th	8.79	3.46	8.70	3.43	9.70	3.82
20th	8.89	3.50	8.80	3.46	9.80	3.86
25th	8.89	3.50	8.90	3.50	9.90	3.90
30th	8.99	3.54	8.90	3.50	9.90	3.90
35th	9.09	3.58	9.00	3.54	10.00	3.94
40th	9.19	3.62	9.10	3.58	10.00	3.94
45th	9.19	3.62	9.20	3.62	10.10	3.98
50th	9.30	3.66	9.20	3.62	10.20	4.02
55th	9.30	3.66	9.30	3.66	10.20	4.02
60th	9.40	3.70	9.40	3.70	10.30	4.06
65th	9.40	3.70	9.40	3.70	10.40	4.09
70th	9.50	3.74	9.50	3.74	10.40	4.09
75th	9.60	3.78	9.60	3.78	10.50	4.13
80th	9.70	3.82	9.70	3.82	10.60	4.17
85th	9.80	3.86	9.80	3.86	10.70	4.21
90th	9.91	3.90	9.90	3.90	10.80	4.25
95th	10.01	3.94	10.00	3.94	11.00	4.33
97th	10.21	4.02	10.10	3.98	11.20	4.41
98th	10.31	4.06	10.20	4.02	11.30	4.45
99th	10.39	4.09	10.30	4.06	11.40	4.49

Foot Length

The maximum length of the right foot is measured with a Brannock Device®. The participant stands with the right foot on the device and the left foot on a board of equal height with the weight distributed equally on both feet. The heel of the right foot lightly touches the back of the device, and the medial side of the right foot is parallel with the long axis of the device. A block is placed against the tip of the longest toe to establish the measurement on the scale of the device.





Foot Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.41	4.94	4.71
Symmetry – BETA I	0.14	0.14	0.01
Kurtosis – BETA II	-0.12	-0.09	0.00
Number of Subjects	913	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	24.83	9.77	24.73	9.74	27.36	10.77
SE (mean)	0.04	0.01	0.04	0.02	0.03	0.01
St Dev	1.09	0.43	1.22	0.48	1.29	0.51
Minimum	22.00	8.66	21.00	8.27	22.60	8.90
Maximum	28.30	11.14	29.00	11.42	31.80	12.52
Percentiles						
1st	22.50	8.86	22.20	8.74	24.60	9.69
2nd	22.71	8.94	22.40	8.82	24.80	9.76
3rd	22.81	8.98	22.50	8.86	25.00	9.84
5th	23.09	9.09	22.70	8.94	25.30	9.96
10th	23.39	9.21	23.20	9.13	25.60	10.08
15th	23.60	9.29	23.40	9.21	26.00	10.24
20th	23.90	9.41	23.70	9.33	26.30	10.35
25th	24.10	9.49	23.90	9.41	26.50	10.43
30th	24.21	9.53	24.10	9.49	26.70	10.51
35th	24.41	9.61	24.30	9.57	26.90	10.59
40th	24.51	9.65	24.40	9.61	27.10	10.67
45th	24.69	9.72	24.50	9.65	27.20	10.71
50th	24.79	9.76	24.70	9.72	27.40	10.79
55th	24.99	9.84	24.90	9.80	27.50	10.83
60th	25.10	9.88	25.00	9.84	27.70	10.91
65th	25.30	9.96	25.20	9.92	27.80	10.94
70th	25.40	10.00	25.40	10.00	28.00	11.02
75th	25.60	10.08	25.60	10.08	28.20	11.10
80th	25.70	10.12	25.70	10.12	28.40	11.18
85th	26.01	10.24	26.00	10.24	28.70	11.30
90th	26.19	10.31	26.30	10.35	29.00	11.42
95th	26.70	10.51	26.80	10.55	29.50	11.61
97th	26.90	10.59	27.20	10.71	29.80	11.73
98th	27.20	10.71	27.40	10.79	30.00	11.81
99th	27.51	10.83	27.60	10.87	30.30	11.93

Forearm Circumference

The circumference of the flexed right forearm is measured with a tape passing across the crease at the juncture between the upper arm and the forearm. The measurement is taken in a plane perpendicular to the long axis of the forearm. The participant stands with the upper arm extended forward horizontally, the elbow flexed 90°, and the fist tightly clenched with palm facing the head.

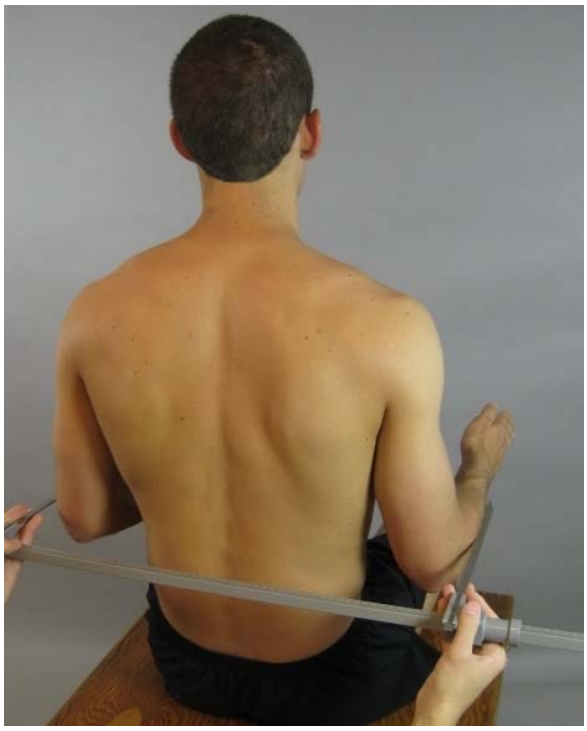
Forearm Circumference

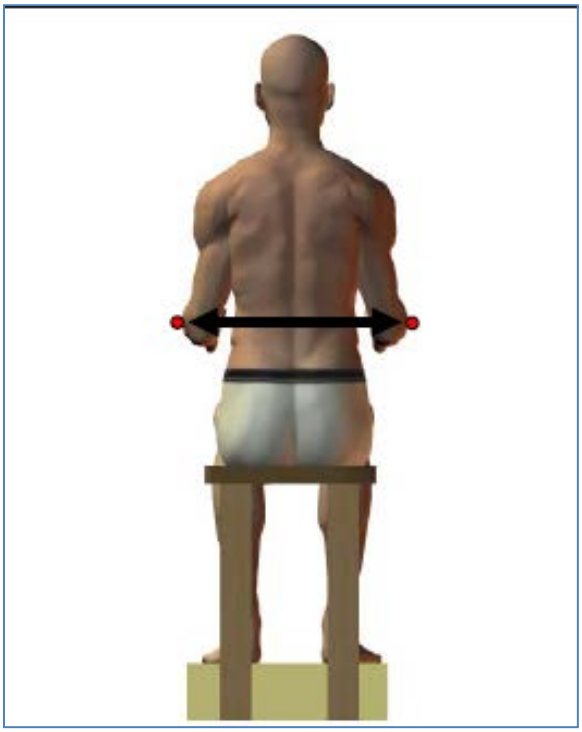
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.32	7.05	6.80
Symmetry – BETA I	0.22	0.43	0.25
Kurtosis – BETA II	0.08	0.43	0.14
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	26.24	10.33	26.23	10.33	30.56	12.03
SE (mean)	0.05	0.02	0.06	0.02	0.06	0.02
St Dev	1.66	0.65	1.85	0.73	2.08	0.82
Minimum	21.41	8.43	20.00	7.87	24.40	9.61
Maximum	31.80	12.52	33.80	13.31	39.10	15.39
Percentiles						
1st	22.71	8.94	22.40	8.82	26.00	10.24
2nd	23.01	9.06	22.90	9.02	26.60	10.47
3rd	23.29	9.17	23.20	9.13	26.80	10.55
5th	23.50	9.25	23.50	9.25	27.20	10.71
10th	24.10	9.49	24.00	9.45	28.00	11.02
15th	24.51	9.65	24.40	9.61	28.40	11.18
20th	24.79	9.76	24.70	9.72	28.80	11.34
25th	25.10	9.88	25.00	9.84	29.10	11.46
30th	25.40	10.00	25.20	9.92	29.40	11.57
35th	25.60	10.08	25.50	10.04	29.70	11.69
40th	25.81	10.16	25.70	10.12	30.00	11.81
45th	26.01	10.24	25.80	10.16	30.20	11.89
50th	26.19	10.31	26.10	10.28	30.50	12.01
55th	26.39	10.39	26.30	10.35	30.80	12.13
60th	26.59	10.47	26.60	10.47	31.10	12.24
65th	26.80	10.55	26.80	10.55	31.30	12.32
70th	27.10	10.67	27.00	10.63	31.60	12.44
75th	27.31	10.75	27.30	10.75	31.90	12.56
80th	27.61	10.87	27.70	10.91	32.20	12.68
85th	27.99	11.02	28.00	11.02	32.70	12.87
90th	28.40	11.18	28.60	11.26	33.20	13.07
95th	29.01	11.42	29.60	11.65	34.10	13.43
97th	29.39	11.57	30.20	11.89	34.80	13.70
98th	30.00	11.81	30.50	12.01	35.10	13.82
99th	30.51	12.01	30.90	12.17	35.80	14.09

Forearm to Forearm Breadth

The maximum horizontal distance across the upper body between the outer sides of the forearms is measured with a beam caliper. The participant sits erect, looking straight ahead. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The measurement is taken at the maximum point of quiet respiration.





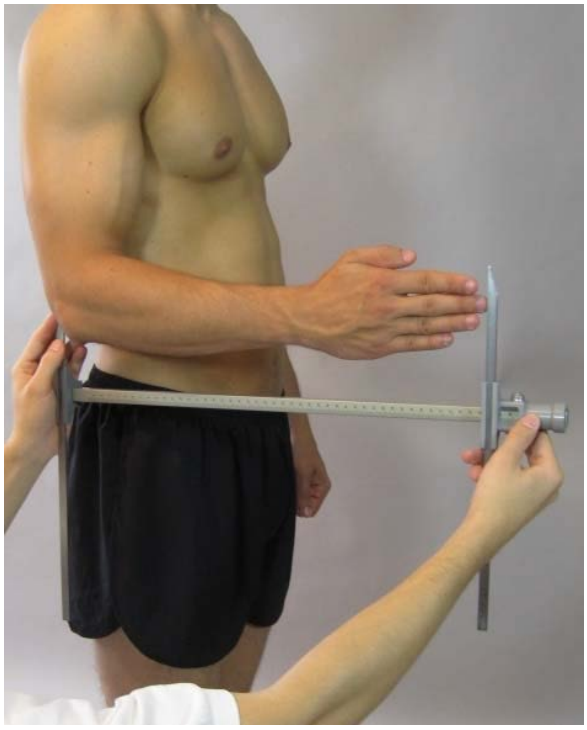
Forearm to Forearm Breadth

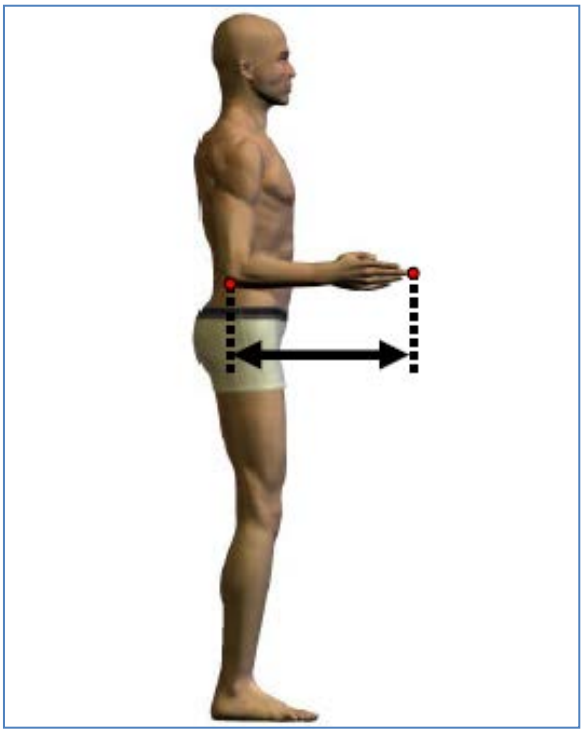
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.90	8.16	8.27
Symmetry – BETA I	0.32	0.32	0.19
Kurtosis – BETA II	0.08	0.04	-0.19
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	49.21	19.38	49.20	19.37	56.72	22.33
SE (mean)	0.13	0.05	0.13	0.05	0.12	0.05
St Dev	3.89	1.53	4.02	1.58	4.69	1.85
Minimum	38.99	15.35	37.60	14.80	42.50	16.73
Maximum	63.50	25.00	62.00	24.41	72.20	28.43
Percentiles						
1st	41.00	16.14	41.10	16.18	47.30	18.62
2nd	41.40	16.30	41.80	16.46	48.00	18.90
3rd	42.29	16.65	42.30	16.65	48.70	19.17
5th	43.41	17.09	43.10	16.97	49.30	19.41
10th	44.60	17.56	44.20	17.40	50.70	19.96
15th	45.29	17.83	45.10	17.76	51.70	20.35
20th	45.90	18.07	45.80	18.03	52.50	20.67
25th	46.51	18.31	46.40	18.27	53.30	20.98
30th	46.99	18.50	46.90	18.46	54.10	21.30
35th	47.50	18.70	47.50	18.70	54.80	21.57
40th	47.90	18.86	48.10	18.94	55.40	21.81
45th	48.49	19.09	48.50	19.09	56.00	22.05
50th	48.90	19.25	48.90	19.25	56.60	22.28
55th	49.50	19.49	49.40	19.45	57.20	22.52
60th	50.01	19.69	49.90	19.65	57.80	22.76
65th	50.50	19.88	50.50	19.88	58.40	22.99
70th	51.21	20.16	51.20	20.16	59.00	23.23
75th	51.79	20.39	51.70	20.35	59.80	23.54
80th	52.40	20.63	52.40	20.63	60.60	23.86
85th	53.19	20.94	53.40	21.02	61.70	24.29
90th	54.51	21.46	54.60	21.50	62.90	24.76
95th	55.91	22.01	56.30	22.17	64.80	25.51
97th	57.20	22.52	57.60	22.68	65.80	25.91
98th	57.81	22.76	58.20	22.91	66.70	26.26
99th	59.00	23.23	59.60	23.46	68.00	26.77

Forearm-Hand Length

The horizontal distance between the olecranon rear landmark and the dactylion III landmark is measured with a beam caliper. The participant stands erect with the upper arms hanging at the sides and the right elbow flexed 90°. The hand is held out straight with the palm facing inward.





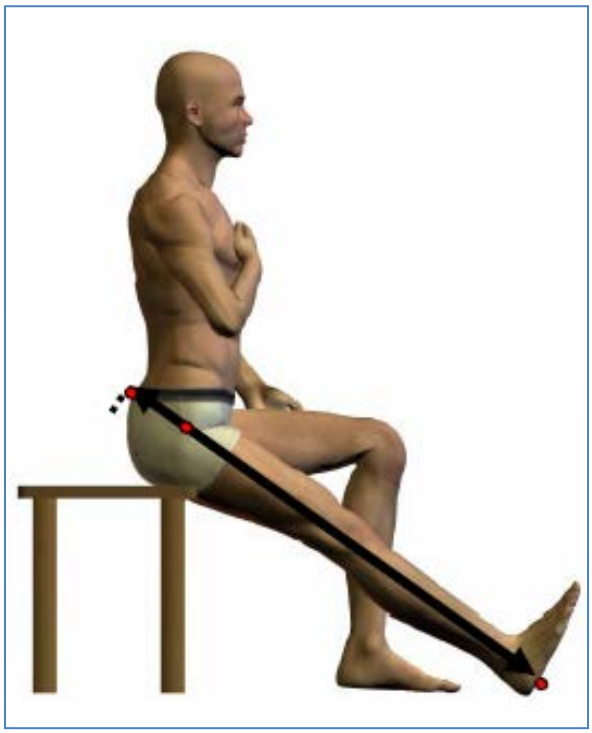
Forearm-Hand Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.11	5.16	4.77
Symmetry – BETA I	0.22	0.34	0.21
Kurtosis – BETA II	0.37	0.15	0.20
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	44.18	17.40	44.21	17.40	48.53	19.11
SE (mean)	0.06	0.02	0.07	0.03	0.06	0.02
St Dev	1.82	0.71	2.28	0.90	2.32	0.91
Minimum	38.30	15.08	38.20	15.04	40.90	16.10
Maximum	51.99	20.47	52.70	20.75	55.90	22.01
Percentiles						
1st	40.21	15.83	39.50	15.55	43.60	17.17
2nd	40.79	16.06	39.80	15.67	44.00	17.32
3rd	40.89	16.10	40.30	15.87	44.40	17.48
5th	41.30	16.26	40.70	16.02	44.80	17.64
10th	41.91	16.50	41.40	16.30	45.60	17.95
15th	42.29	16.65	41.90	16.50	46.20	18.19
20th	42.70	16.81	42.30	16.65	46.60	18.35
25th	43.00	16.93	42.60	16.77	47.00	18.50
30th	43.31	17.05	42.90	16.89	47.30	18.62
35th	43.51	17.13	43.20	17.01	47.60	18.74
40th	43.69	17.20	43.50	17.13	47.90	18.86
45th	43.89	17.28	43.80	17.24	48.20	18.98
50th	44.09	17.36	44.10	17.36	48.50	19.09
55th	44.30	17.44	44.40	17.48	48.80	19.21
60th	44.50	17.52	44.70	17.60	49.00	19.29
65th	44.81	17.64	45.00	17.72	49.30	19.41
70th	45.11	17.76	45.40	17.87	49.50	19.49
75th	45.39	17.87	45.60	17.95	50.00	19.69
80th	45.69	17.99	46.00	18.11	50.40	19.84
85th	46.10	18.15	46.60	18.35	50.80	20.00
90th	46.51	18.31	47.10	18.54	51.60	20.31
95th	47.19	18.58	48.10	18.94	52.50	20.67
97th	47.50	18.70	48.80	19.21	53.20	20.94
98th	47.90	18.86	49.40	19.45	53.50	21.06
99th	48.69	19.17	50.30	19.80	54.70	21.54

Functional Leg Length

The straight-line distance between the plane of the bottom of the right foot with the leg extended and the back of the body of a seated participant is measured with an anthropometer passing over the trochanter landmark. The participant sits erect on a stool 45.81 cm high. The right leg is extended, and the foot is on the base plate of the anthropometer, which rests on the floor. The measurement is taken from the footrest surface of the base plate.



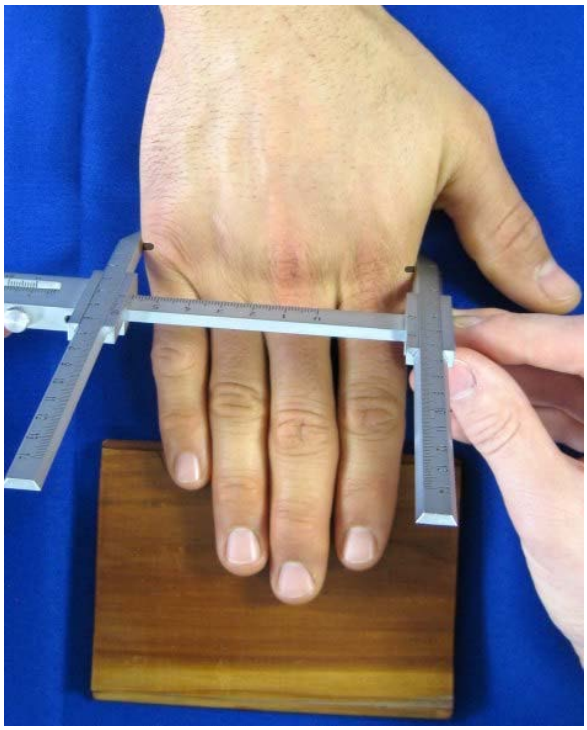
Functional Leg Length

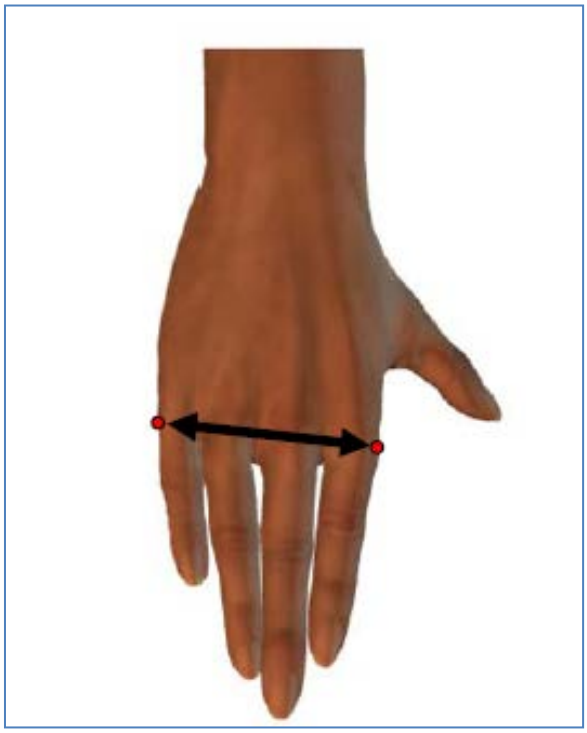
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.31	5.12	4.87
Symmetry – BETA I	0.06	0.11	0.02
Kurtosis – BETA II	-0.06	-0.34	0.15
Number of Subjects	912	1011	1418

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	106.52	41.94	105.23	41.43	114.14	44.94
SE (mean)	0.15	0.06	0.17	0.07	0.15	0.06
St Dev	4.59	1.81	5.39	2.12	5.56	2.19
Minimum	91.21	35.91	90.10	35.47	96.30	37.91
Maximum	119.71	47.13	121.00	47.64	132.30	52.09
Percentiles						
1st	96.01	37.80	93.40	36.77	100.80	39.69
2nd	97.31	38.31	95.30	37.52	102.50	40.35
3rd	97.99	38.58	95.80	37.72	104.20	41.02
5th	99.01	38.98	96.80	38.11	105.30	41.46
10th	100.71	39.65	98.20	38.66	107.10	42.17
15th	102.01	40.16	99.40	39.13	108.30	42.64
20th	102.59	40.39	100.50	39.57	109.40	43.07
25th	103.51	40.75	101.40	39.92	110.50	43.50
30th	104.19	41.02	102.20	40.24	111.50	43.90
35th	104.80	41.26	102.80	40.47	112.20	44.17
40th	105.31	41.46	103.70	40.83	112.80	44.41
45th	105.69	41.61	104.60	41.18	113.50	44.69
50th	106.30	41.85	105.20	41.42	114.10	44.92
55th	106.91	42.09	105.70	41.61	114.70	45.16
60th	107.49	42.32	106.50	41.93	115.40	45.43
65th	108.20	42.60	107.30	42.24	116.20	45.75
70th	108.71	42.80	108.20	42.60	117.00	46.06
75th	109.60	43.15	109.00	42.91	117.60	46.30
80th	110.39	43.46	109.80	43.23	118.50	46.65
85th	111.40	43.86	111.00	43.70	119.80	47.17
90th	112.60	44.33	112.50	44.29	121.50	47.83
95th	114.30	45.00	114.20	44.96	123.40	48.58
97th	115.09	45.31	115.50	45.47	124.80	49.13
98th	116.21	45.75	116.70	45.94	125.50	49.41
99th	117.09	46.10	117.90	46.42	127.30	50.12

Hand Breadth

The breadth of the right hand between the landmarks at metacarpale II and metacarpale V is measured with a sliding caliper. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.





Hand Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.65	4.93	4.94
Symmetry – BETA I	0.11	0.12	0.20
Kurtosis – BETA II	0.12	-0.08	0.34
Number of Subjects	913	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	7.89	3.11	7.83	3.08	8.82	3.47
SE (mean)	0.01	0.00	0.01	0.00	0.01	0.00
St Dev	0.37	0.14	0.39	0.15	0.44	0.17
Minimum	6.71	2.64	6.80	2.68	7.40	2.91
Maximum	9.30	3.66	9.20	3.62	10.50	4.13
Percentiles						
1st	7.11	2.80	7.00	2.76	7.80	3.07
2nd	7.11	2.80	7.00	2.76	8.00	3.15
3rd	7.19	2.83	7.10	2.80	8.00	3.15
5th	7.29	2.87	7.20	2.83	8.10	3.19
10th	7.39	2.91	7.40	2.91	8.30	3.27
15th	7.49	2.95	7.40	2.91	8.40	3.31
20th	7.59	2.99	7.50	2.95	8.40	3.31
25th	7.70	3.03	7.60	2.99	8.50	3.35
30th	7.70	3.03	7.60	2.99	8.60	3.39
35th	7.80	3.07	7.70	3.03	8.70	3.43
40th	7.80	3.07	7.70	3.03	8.70	3.43
45th	7.80	3.07	7.80	3.07	8.80	3.46
50th	7.90	3.11	7.80	3.07	8.80	3.46
55th	7.90	3.11	7.90	3.11	8.80	3.46
60th	8.00	3.15	7.90	3.11	8.90	3.50
65th	8.00	3.15	8.00	3.15	9.00	3.54
70th	8.10	3.19	8.00	3.15	9.00	3.54
75th	8.10	3.19	8.10	3.19	9.10	3.58
80th	8.20	3.23	8.20	3.23	9.20	3.62
85th	8.31	3.27	8.20	3.23	9.30	3.66
90th	8.41	3.31	8.30	3.27	9.40	3.70
95th	8.51	3.35	8.50	3.35	9.50	3.74
97th	8.61	3.39	8.60	3.39	9.70	3.82
98th	8.71	3.43	8.60	3.39	9.80	3.86
99th	8.71	3.43	8.70	3.43	9.90	3.90

Hand Circumference

The circumference of the right hand is measured with a tape passing over the landmarks at metacarpale II and metacarpale V. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.

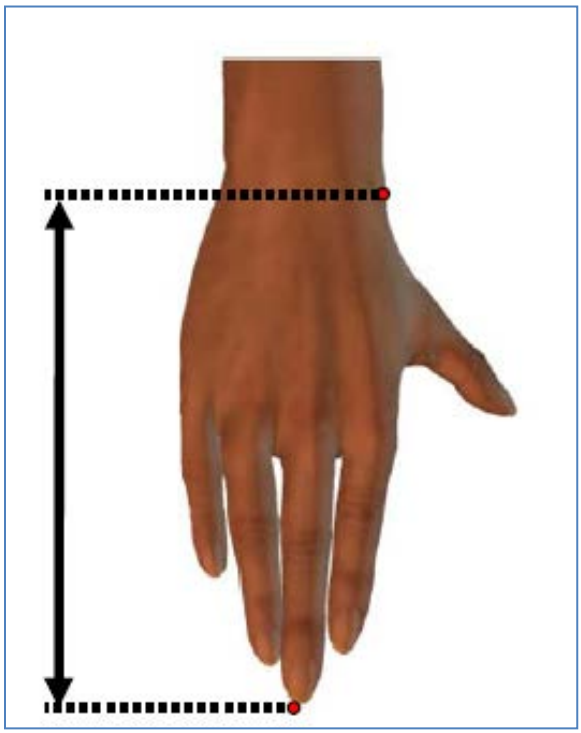
Hand Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.44	4.72	4.74
Symmetry – BETA I	0.02	0.04	0.15
Kurtosis – BETA II	0.04	0.15	0.19
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	18.75	7.38	18.67	7.35	21.17	8.33
SE (mean)	0.03	0.01	0.03	0.01	0.03	0.01
St Dev	0.83	0.33	0.88	0.35	1.00	0.40
Minimum	16.31	6.42	15.70	6.18	18.20	7.17
Maximum	21.59	8.50	21.70	8.54	24.80	9.76
Percentiles						
1st	16.79	6.61	16.70	6.57	19.00	7.48
2nd	16.99	6.69	16.90	6.65	19.20	7.56
3rd	17.09	6.73	17.10	6.73	19.30	7.60
5th	17.40	6.85	17.30	6.81	19.50	7.68
10th	17.70	6.97	17.50	6.89	19.80	7.80
15th	17.91	7.05	17.70	6.97	20.20	7.95
20th	18.11	7.13	17.90	7.05	20.30	7.99
25th	18.21	7.17	18.10	7.13	20.50	8.07
30th	18.29	7.20	18.20	7.17	20.60	8.11
35th	18.49	7.28	18.30	7.20	20.80	8.19
40th	18.59	7.32	18.50	7.28	20.90	8.23
45th	18.69	7.36	18.60	7.32	21.00	8.27
50th	18.69	7.36	18.70	7.36	21.20	8.35
55th	18.80	7.40	18.80	7.40	21.30	8.39
60th	18.90	7.44	18.80	7.40	21.40	8.43
65th	19.00	7.48	19.00	7.48	21.50	8.46
70th	19.20	7.56	19.10	7.52	21.70	8.54
75th	19.30	7.60	19.20	7.56	21.80	8.58
80th	19.41	7.64	19.40	7.64	22.00	8.66
85th	19.61	7.72	19.60	7.72	22.20	8.74
90th	19.81	7.80	19.80	7.80	22.40	8.82
95th	20.19	7.95	20.20	7.95	22.80	8.98
97th	20.40	8.03	20.40	8.03	23.10	9.09
98th	20.40	8.03	20.50	8.07	23.30	9.17
99th	20.70	8.15	20.70	8.15	23.60	9.29

Hand Length

The length of the right hand between the stylion landmark on the wrist and the tip of the middle finger is measured with a Poech sliding caliper. The participant places the palm on a table with the fingers together and the thumb abducted. The middle finger is parallel to the long axis of the forearm. The two distal phalanges of the fingers lie on a flat surface 8 mm higher than the table.



Hand Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.63	5.41	5.07
Symmetry – BETA I	0.16	0.26	0.27
Kurtosis – BETA II	0.21	0.07	0.35
Number of Subjects	913	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	18.12	7.14	18.14	7.14	19.48	7.67
SE (mean)	0.03	0.01	0.03	0.01	0.03	0.01
St Dev	0.84	0.33	0.98	0.39	0.99	0.39
Minimum	15.80	6.22	15.70	6.18	16.40	6.46
Maximum	21.01	8.27	21.70	8.54	23.50	9.25
Percentiles						
1st	16.21	6.38	16.10	6.34	17.30	6.81
2nd	16.41	6.46	16.20	6.38	17.60	6.93
3rd	16.61	6.54	16.40	6.46	17.70	6.97
5th	16.69	6.57	16.60	6.54	17.90	7.05
10th	17.09	6.73	16.90	6.65	18.30	7.20
15th	17.30	6.81	17.10	6.73	18.50	7.28
20th	17.40	6.85	17.30	6.81	18.70	7.36
25th	17.60	6.93	17.50	6.89	18.80	7.40
30th	17.70	6.97	17.60	6.93	19.00	7.48
35th	17.81	7.01	17.70	6.97	19.10	7.52
40th	17.91	7.05	17.90	7.05	19.20	7.56
45th	18.01	7.09	18.00	7.09	19.30	7.60
50th	18.11	7.13	18.10	7.13	19.40	7.64
55th	18.21	7.17	18.20	7.17	19.50	7.68
60th	18.29	7.20	18.30	7.20	19.70	7.76
65th	18.39	7.24	18.50	7.28	19.80	7.80
70th	18.49	7.28	18.60	7.32	20.00	7.87
75th	18.69	7.36	18.70	7.36	20.10	7.91
80th	18.80	7.40	18.90	7.44	20.30	7.99
85th	19.00	7.48	19.20	7.56	20.50	8.07
90th	19.20	7.56	19.40	7.64	20.70	8.15
95th	19.51	7.68	19.80	7.80	21.20	8.35
97th	19.81	7.80	20.10	7.91	21.50	8.46
98th	19.99	7.87	20.30	7.99	21.70	8.54
99th	20.19	7.95	20.60	8.11	22.00	8.66

Head Breadth

The maximum horizontal breadth of the head above the plane of attachment of the ears is measured with a spreading caliper. For female participants with braids or cornrows, the measurement includes the styled hair.

Head Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.30	3.43	3.56
Symmetry – BETA I	0.24	0.15	0.18
Kurtosis – BETA II	0.01	0.25	0.37
Number of Subjects	913	1012	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	14.71	5.79	14.74	5.80	15.37	6.05
SE (mean)	0.02	0.01	0.02	0.01	0.01	0.01
St Dev	0.49	0.19	0.51	0.20	0.55	0.22
Minimum	13.41	5.28	13.10	5.16	13.70	5.39
Maximum	16.41	6.46	16.50	6.50	17.70	6.97
Percentiles						
1st	13.69	5.39	13.60	5.35	14.10	5.55
2nd	13.79	5.43	13.70	5.39	14.30	5.63
3rd	13.79	5.43	13.80	5.43	14.40	5.67
5th	14.00	5.51	13.90	5.47	14.50	5.71
10th	14.10	5.55	14.10	5.55	14.70	5.79
15th	14.20	5.59	14.20	5.59	14.80	5.83
20th	14.30	5.63	14.30	5.63	14.90	5.87
25th	14.40	5.67	14.40	5.67	15.00	5.91
30th	14.40	5.67	14.50	5.71	15.10	5.94
35th	14.50	5.71	14.50	5.71	15.20	5.98
40th	14.61	5.75	14.60	5.75	15.20	5.98
45th	14.61	5.75	14.60	5.75	15.30	6.02
50th	14.71	5.79	14.70	5.79	15.40	6.06
55th	14.71	5.79	14.80	5.83	15.40	6.06
60th	14.81	5.83	14.90	5.87	15.50	6.10
65th	14.91	5.87	14.90	5.87	15.60	6.14
70th	15.01	5.91	15.00	5.91	15.60	6.14
75th	15.01	5.91	15.10	5.94	15.70	6.18
80th	15.09	5.94	15.20	5.98	15.80	6.22
85th	15.19	5.98	15.20	5.98	15.90	6.26
90th	15.39	6.06	15.40	6.06	16.10	6.34
95th	15.60	6.14	15.60	6.14	16.30	6.42
97th	15.70	6.18	15.70	6.18	16.40	6.46
98th	15.80	6.22	15.90	6.26	16.60	6.54
99th	15.90	6.26	16.00	6.30	16.70	6.57

Head Circumference

The maximum circumference of the head above the attachment of the ears is measured with a tape passing just above the ridges of the eyebrows and around the back of the head. For female participants with braids or cornrows, the measurement includes the styled hair.

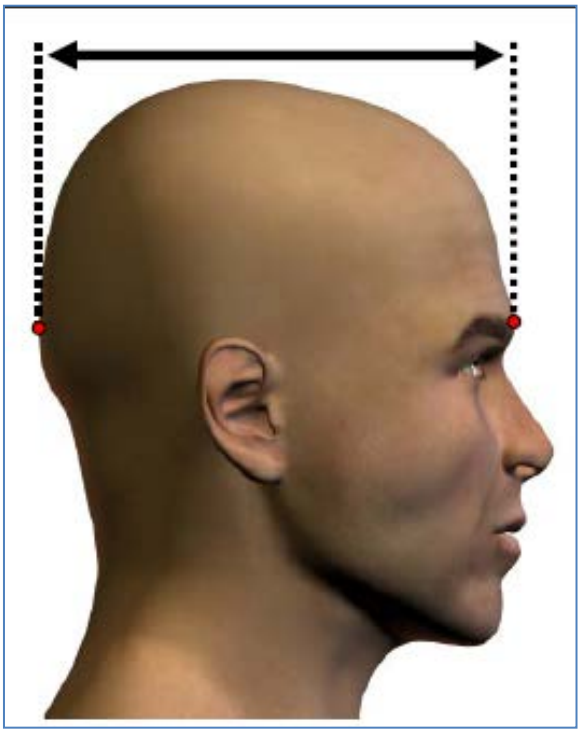
Head Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	2.74	3.37	2.71
Symmetry – BETA I	0.31	0.54	0.13
Kurtosis – BETA II	0.35	0.35	0.14
Number of Subjects	913	1012	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	55.75	21.95	56.01	22.05	57.40	22.60
SE (mean)	0.05	0.02	0.06	0.02	0.04	0.02
St Dev	1.53	0.60	1.89	0.74	1.55	0.61
Minimum	51.79	20.39	51.60	20.31	51.60	20.31
Maximum	62.10	24.45	63.00	24.80	63.30	24.92
Percentiles						
1st	52.50	20.67	52.30	20.59	53.80	21.18
2nd	52.81	20.79	52.50	20.67	54.30	21.38
3rd	53.11	20.91	52.80	20.79	54.50	21.46
5th	53.39	21.02	53.30	20.98	54.90	21.61
10th	53.80	21.18	53.80	21.18	55.40	21.81
15th	54.20	21.34	54.10	21.30	55.80	21.97
20th	54.51	21.46	54.40	21.42	56.20	22.13
25th	54.71	21.54	54.70	21.54	56.40	22.20
30th	54.89	21.61	54.90	21.61	56.60	22.28
35th	55.19	21.73	55.20	21.73	56.80	22.36
40th	55.30	21.77	55.40	21.81	57.00	22.44
45th	55.50	21.85	55.60	21.89	57.20	22.52
50th	55.60	21.89	55.80	21.97	57.40	22.60
55th	55.80	21.97	56.00	22.05	57.50	22.64
60th	56.01	22.05	56.40	22.20	57.70	22.72
65th	56.31	22.17	56.60	22.28	57.90	22.80
70th	56.49	22.24	56.80	22.36	58.20	22.91
75th	56.69	22.32	57.15	22.50	58.40	22.99
80th	57.00	22.44	57.50	22.64	58.70	23.11
85th	57.40	22.60	57.80	22.76	59.00	23.23
90th	57.71	22.72	58.50	23.03	59.40	23.39
95th	58.29	22.95	59.60	23.46	60.00	23.62
97th	58.70	23.11	60.20	23.70	60.30	23.74
98th	59.00	23.23	60.60	23.86	60.80	23.94
99th	59.99	23.62	61.00	24.02	61.20	24.09

Head Length

The distance from the glabella landmark to the opisthocranion landmark is measured with a spreading caliper. For female participants with braids or cornrows, the measurement includes the styled hair.



Head Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.45	3.88	3.36
Symmetry – BETA I	0.03	0.11	-0.14
Kurtosis – BETA II	0.18	0.11	0.16
Number of Subjects	911	1012	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	18.99	7.48	18.99	7.48	19.97	7.86
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.66	0.26	0.74	0.29	0.67	0.26
Minimum	16.79	6.61	16.80	6.61	17.20	6.77
Maximum	21.21	8.35	21.30	8.39	22.20	8.74
Percentiles						
1st	17.50	6.89	17.30	6.81	18.30	7.20
2nd	17.70	6.97	17.50	6.89	18.50	7.28
3rd	17.81	7.01	17.70	6.97	18.60	7.32
5th	17.91	7.05	17.80	7.01	18.80	7.40
10th	18.21	7.17	18.10	7.13	19.10	7.52
15th	18.29	7.20	18.20	7.17	19.30	7.60
20th	18.39	7.24	18.40	7.24	19.40	7.64
25th	18.59	7.32	18.50	7.28	19.50	7.68
30th	18.59	7.32	18.60	7.32	19.60	7.72
35th	18.69	7.36	18.70	7.36	19.70	7.76
40th	18.80	7.40	18.80	7.40	19.80	7.80
45th	18.90	7.44	18.90	7.44	19.90	7.83
50th	19.00	7.48	19.00	7.48	20.00	7.87
55th	19.10	7.52	19.10	7.52	20.10	7.91
60th	19.20	7.56	19.20	7.56	20.10	7.91
65th	19.30	7.60	19.30	7.60	20.20	7.95
70th	19.41	7.64	19.40	7.64	20.30	7.99
75th	19.41	7.64	19.50	7.68	20.40	8.03
80th	19.51	7.68	19.60	7.72	20.50	8.07
85th	19.61	7.72	19.70	7.76	20.70	8.15
90th	19.81	7.80	19.90	7.83	20.80	8.19
95th	19.99	7.87	20.20	7.95	21.10	8.31
97th	20.19	7.95	20.50	8.07	21.20	8.35
98th	20.40	8.03	20.60	8.11	21.30	8.39
99th	20.60	8.11	20.80	8.19	21.50	8.46

Heel-Ankle Circumference

The circumference of the right foot is measured with a tape passing over the point at which the heel first contacts the table and over the dorsal juncture of the foot and leg landmark at the front of the ankle. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.

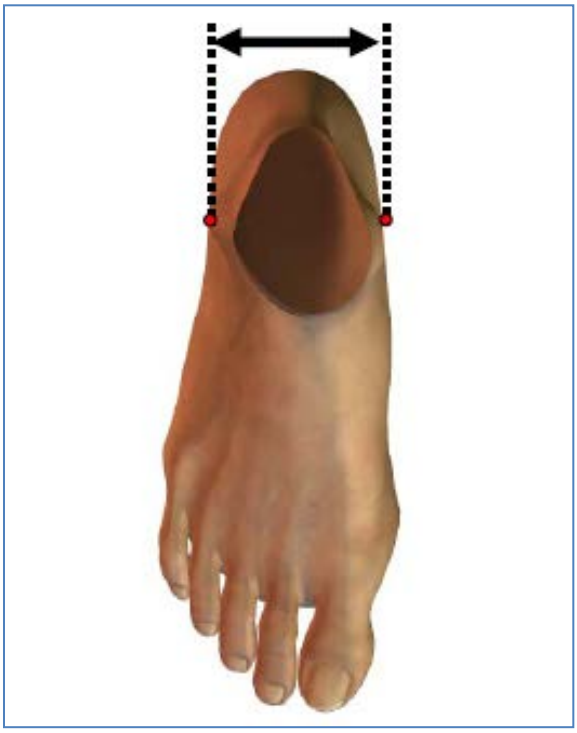
Heel-Ankle Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.44	4.99	4.71
Symmetry – BETA I	0.19	0.22	0.09
Kurtosis – BETA II	0.22	-0.06	0.21
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	31.15	12.26	31.02	12.21	34.42	13.55
SE (mean)	0.05	0.02	0.05	0.02	0.04	0.02
St Dev	1.38	0.54	1.55	0.61	1.62	0.64
Minimum	27.20	10.71	26.40	10.39	28.10	11.06
Maximum	36.70	14.45	36.70	14.45	39.50	15.55
Percentiles						
1st	28.19	11.10	27.70	10.91	30.60	12.05
2nd	28.40	11.18	28.10	11.06	31.10	12.24
3rd	28.60	11.26	28.30	11.14	31.40	12.36
5th	29.01	11.42	28.60	11.26	31.80	12.52
10th	29.39	11.57	29.10	11.46	32.40	12.76
15th	29.69	11.69	29.40	11.57	32.70	12.87
20th	30.00	11.81	29.70	11.69	33.10	13.03
25th	30.20	11.89	29.90	11.77	33.30	13.11
30th	30.40	11.97	30.10	11.85	33.60	13.23
35th	30.61	12.05	30.30	11.93	33.80	13.31
40th	30.81	12.13	30.50	12.01	34.00	13.39
45th	30.99	12.20	30.70	12.09	34.30	13.50
50th	31.19	12.28	31.00	12.20	34.40	13.54
55th	31.29	12.32	31.20	12.28	34.60	13.62
60th	31.50	12.40	31.40	12.36	34.70	13.66
65th	31.70	12.48	31.70	12.48	35.00	13.78
70th	31.80	12.52	31.80	12.52	35.30	13.90
75th	32.00	12.60	32.10	12.64	35.50	13.98
80th	32.21	12.68	32.30	12.72	35.70	14.06
85th	32.51	12.80	32.60	12.83	36.00	14.17
90th	32.89	12.95	33.00	12.99	36.50	14.37
95th	33.40	13.15	33.60	13.23	37.20	14.65
97th	33.71	13.27	34.10	13.43	37.70	14.84
98th	34.01	13.39	34.40	13.54	38.00	14.96
99th	34.80	13.70	34.70	13.66	38.40	15.12

Heel Breadth

The maximum horizontal distance between the medial and lateral points of the right heel, at or posterior to the lateral malleolus landmark, is measured with a Holtain caliper. The measurement is taken just above the level of the standing surface at the most protruding points of the curvature of the heel. The participant stands with the feet about 10 cm apart and the weight distributed equally on both feet.



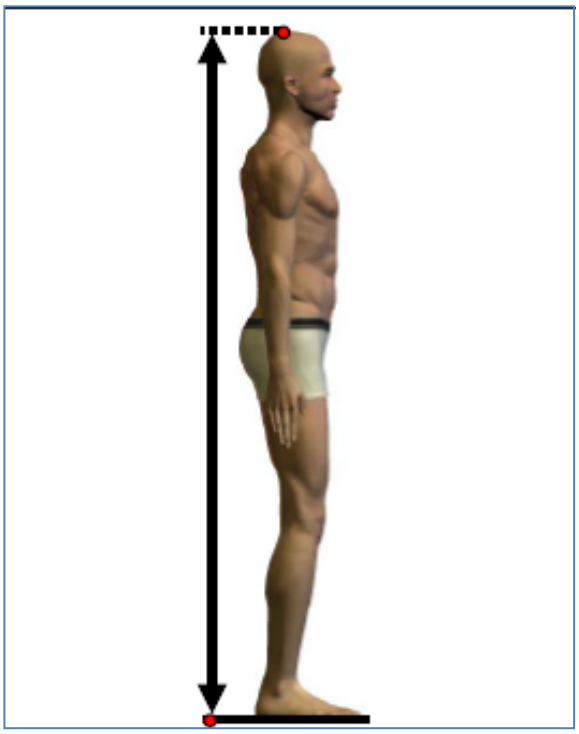
Heel Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	6.98	7.63	7.39
Symmetry – BETA I	0.42	0.29	0.41
Kurtosis – BETA II	0.54	-0.16	0.40
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	6.53	2.57	6.66	2.62	7.19	2.83
SE (mean)	0.02	0.01	0.02	0.01	0.01	0.01
St Dev	0.46	0.18	0.51	0.20	0.53	0.21
Minimum	5.31	2.09	5.20	2.05	5.70	2.24
Maximum	8.71	3.43	8.40	3.31	9.30	3.66
Percentiles						
1st	5.59	2.20	5.60	2.20	6.10	2.40
2nd	5.69	2.24	5.70	2.24	6.20	2.44
3rd	5.69	2.24	5.80	2.28	6.30	2.48
5th	5.79	2.28	5.90	2.32	6.40	2.52
10th	5.99	2.36	6.00	2.36	6.50	2.56
15th	6.10	2.40	6.10	2.40	6.60	2.60
20th	6.10	2.40	6.20	2.44	6.70	2.64
25th	6.20	2.44	6.30	2.48	6.80	2.68
30th	6.30	2.48	6.40	2.52	6.90	2.72
35th	6.40	2.52	6.40	2.52	7.00	2.76
40th	6.40	2.52	6.50	2.56	7.00	2.76
45th	6.50	2.56	6.60	2.60	7.10	2.80
50th	6.50	2.56	6.60	2.60	7.10	2.80
55th	6.60	2.60	6.70	2.64	7.20	2.83
60th	6.60	2.60	6.80	2.68	7.30	2.87
65th	6.71	2.64	6.80	2.68	7.40	2.91
70th	6.71	2.64	6.90	2.72	7.40	2.91
75th	6.81	2.68	7.00	2.76	7.50	2.95
80th	6.91	2.72	7.10	2.80	7.60	2.99
85th	7.01	2.76	7.20	2.83	7.70	3.03
90th	7.11	2.80	7.40	2.91	7.90	3.11
95th	7.29	2.87	7.60	2.99	8.10	3.19
97th	7.39	2.91	7.70	3.03	8.30	3.27
98th	7.49	2.95	7.70	3.03	8.40	3.31
99th	7.70	3.03	7.90	3.11	8.60	3.39

Height (Stature)

The vertical distance from a standing surface to the top of the head is measured with an anthropometer. The participant stands erect with the head in the Frankfurt plane. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



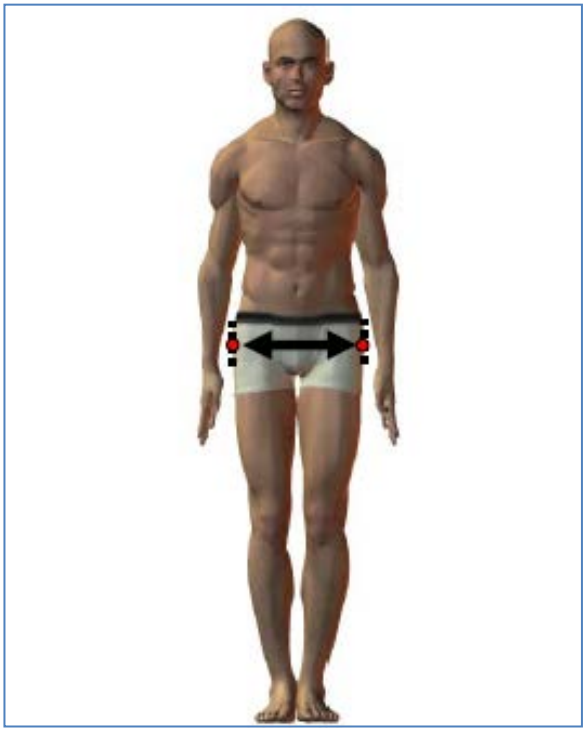
Height (Stature)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.24	3.99	3.73
Symmetry – BETA I	-0.03	-0.01	-0.02
Kurtosis – BETA II	0.24	-0.34	0.11
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	166.78	65.66	164.41	64.73	177.82	70.01
SE (mean)	0.18	0.07	0.21	0.08	0.18	0.07
St Dev	5.41	2.13	6.55	2.58	6.63	2.61
Minimum	149.30	58.78	147.90	58.23	156.70	61.69
Maximum	182.91	72.01	182.70	71.93	199.30	78.46
Percentiles						
1st	153.29	60.35	150.30	59.17	162.30	63.90
2nd	155.19	61.10	151.00	59.45	164.30	64.69
3rd	155.91	61.38	151.90	59.80	165.30	65.08
5th	157.30	61.93	153.20	60.31	167.20	65.83
10th	159.99	62.99	155.70	61.30	169.10	66.57
15th	162.20	63.86	157.20	61.89	170.90	67.28
20th	162.99	64.17	158.70	62.48	172.30	67.83
25th	163.50	64.37	159.90	62.95	173.50	68.31
30th	163.91	64.53	161.10	63.43	174.30	68.62
35th	164.49	64.76	162.00	63.78	175.20	68.98
40th	165.30	65.08	163.00	64.17	176.10	69.33
45th	165.81	65.28	163.60	64.41	177.10	69.72
50th	166.40	65.51	164.40	64.72	178.00	70.08
55th	167.31	65.87	165.30	65.08	178.80	70.39
60th	168.00	66.14	166.10	65.39	179.60	70.71
65th	168.81	66.46	167.10	65.79	180.40	71.02
70th	169.49	66.73	168.00	66.14	181.00	71.26
75th	170.31	67.05	168.80	66.46	182.30	71.77
80th	171.20	67.4	169.80	66.85	183.50	72.24
85th	172.49	67.91	171.30	67.44	184.70	72.72
90th	173.61	68.35	173.20	68.19	186.00	73.23
95th	175.90	69.25	175.30	69.02	188.60	74.25
97th	177.19	69.76	176.60	69.53	190.00	74.80
98th	178.10	70.12	177.40	69.84	191.40	75.35
99th	178.99	70.47	178.90	70.43	193.50	76.18

Hip Breadth Standing

The horizontal distance between the lateral buttock landmarks is measured with a beam caliper. The participant stands erect with the heels together and the weight distributed equally on both feet.



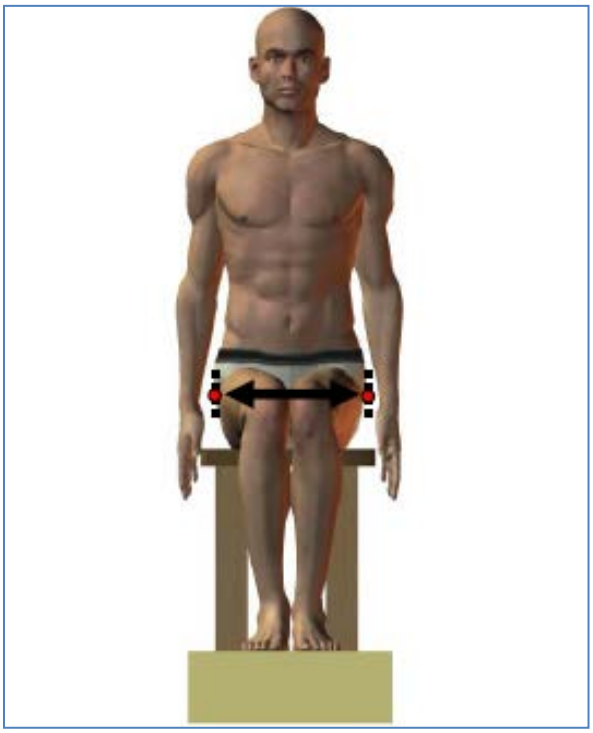
Hip Breadth Standing

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.28	7.64	6.45
Symmetry – BETA I	0.40	0.30	0.29
Kurtosis – BETA II	0.37	0.25	0.31
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	35.57	14.00	35.33	13.91	34.17	13.45
SE (mean)	0.09	0.03	0.08	0.03	0.06	0.02
St Dev	2.59	1.02	2.70	1.06	2.20	0.87
Minimum	29.01	11.42	26.50	10.43	28.20	11.10
Maximum	45.29	17.83	45.30	17.83	45.20	17.80
Percentiles						
1st	30.10	11.85	29.90	11.77	29.70	11.69
2nd	30.81	12.13	30.40	11.97	30.00	11.81
3rd	31.09	12.24	30.70	12.09	30.30	11.93
5th	31.50	12.40	31.00	12.20	30.70	12.09
10th	32.41	12.76	31.90	12.56	31.40	12.36
15th	32.99	12.99	32.60	12.83	31.80	12.52
20th	33.30	13.11	33.00	12.99	32.20	12.68
25th	33.76	13.29	33.40	13.15	32.60	12.83
30th	34.19	13.46	33.80	13.31	33.00	12.99
35th	34.49	13.58	34.20	13.46	33.30	13.11
40th	34.80	13.70	34.50	13.58	33.60	13.23
45th	35.10	13.82	34.90	13.74	33.80	13.31
50th	35.41	13.94	35.30	13.90	34.10	13.43
55th	35.71	14.06	35.70	14.06	34.40	13.54
60th	36.09	14.21	36.00	14.17	34.70	13.66
65th	36.50	14.37	36.30	14.29	35.00	13.78
70th	36.80	14.49	36.60	14.41	35.30	13.90
75th	37.11	14.61	37.00	14.57	35.60	14.02
80th	37.59	14.80	37.40	14.72	36.00	14.17
85th	38.20	15.04	38.00	14.96	36.50	14.37
90th	38.89	15.31	38.80	15.28	37.00	14.57
95th	40.01	15.75	40.00	15.75	37.90	14.92
97th	40.79	16.06	40.80	16.06	38.60	15.20
98th	41.30	16.26	41.50	16.34	39.00	15.35
99th	42.80	16.85	42.50	16.73	39.70	15.63

Hip Breadth Sitting

The distance between the lateral points of the hips or thighs (whichever are broader) is measured with a beam caliper. The participant sits erect with the feet and knees together.



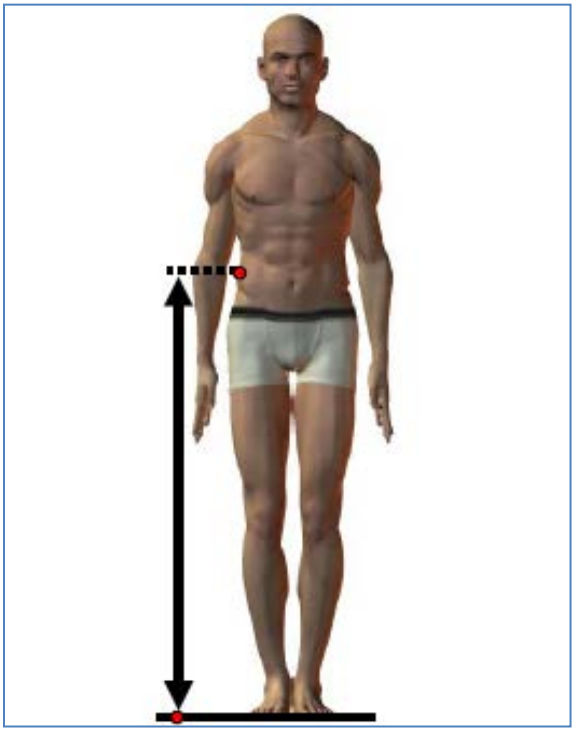
Hip Breadth Sitting

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	8.23	8.30	34.17
Symmetry – BETA I	0.40	0.34	0.06
Kurtosis – BETA II	0.14	0.26	2.20
Number of Subjects	913	1013	28.20

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	40.06	15.77	39.73	15.64	37.37	14.71
SE (mean)	0.11	0.04	0.10	0.04	0.07	0.03
St Dev	3.30	1.30	3.30	1.30	2.70	1.06
Minimum	31.29	12.32	30.40	11.97	29.30	11.54
Maximum	53.80	21.18	53.80	21.18	49.50	19.49
Percentiles						
1st	33.81	13.31	33.10	13.03	31.80	12.52
2nd	34.29	13.50	33.70	13.27	32.30	12.72
3rd	34.49	13.58	34.20	13.46	32.70	12.87
5th	35.00	13.78	34.60	13.62	33.10	13.03
10th	35.99	14.17	35.50	13.98	34.00	13.39
15th	36.60	14.41	36.20	14.25	34.60	13.62
20th	37.11	14.61	36.80	14.49	35.00	13.78
25th	37.69	14.84	37.30	14.69	35.40	13.94
30th	38.10	15.00	37.80	14.88	35.80	14.09
35th	38.51	15.16	38.30	15.08	36.20	14.25
40th	38.99	15.35	38.80	15.28	36.60	14.41
45th	39.40	15.51	39.20	15.43	36.90	14.53
50th	39.90	15.71	39.70	15.63	37.30	14.69
55th	40.41	15.91	40.20	15.83	37.70	14.84
60th	40.79	16.06	40.60	15.98	38.00	14.96
65th	41.20	16.22	41.00	16.14	38.40	15.12
70th	41.71	16.42	41.30	16.26	38.70	15.24
75th	42.19	16.61	41.80	16.46	39.10	15.39
80th	42.70	16.81	42.30	16.65	39.60	15.59
85th	43.41	17.09	43.00	16.93	40.00	15.75
90th	44.40	17.48	44.00	17.32	40.90	16.10
95th	45.80	18.03	45.60	17.95	42.00	16.54
97th	46.71	18.39	46.20	18.19	42.60	16.77
98th	47.50	18.70	47.40	18.66	43.40	17.09
99th	48.69	19.17	48.10	18.94	43.80	17.24

Iliocristale Height

The vertical distance between a standing surface and the right iliocristale landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet. The shoulders and upper extremities are relaxed.



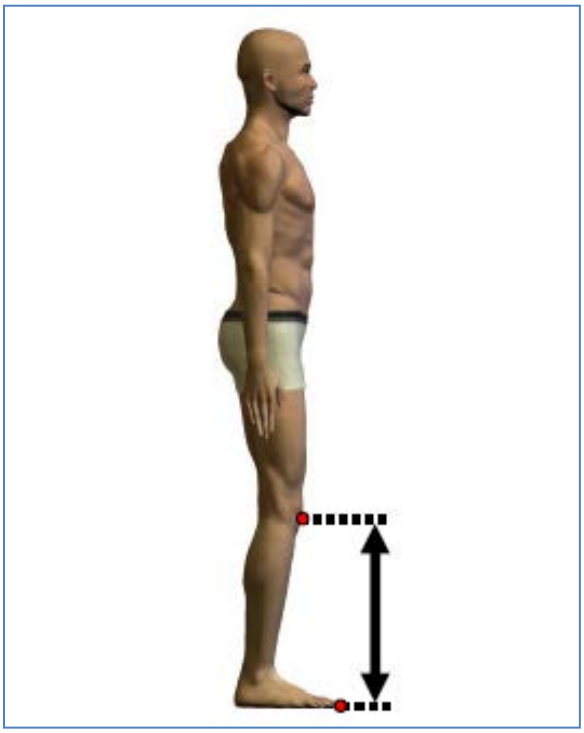
Iliocristale Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.09	4.96	4.85
Symmetry – BETA I	-0.01	0.07	0.07
Kurtosis – BETA II	0.18	-0.31	0.06
Number of Subjects	913	1004	1419

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	101.90	40.12	100.51	39.57	107.74	42.42
SE (mean)	0.14	0.05	0.16	0.06	0.14	0.05
St Dev	4.17	1.64	4.98	1.96	5.22	2.06
Minimum	89.51	35.24	87.30	34.37	90.60	35.67
Maximum	115.01	45.28	114.50	45.08	125.10	49.25
Percentiles						
1st	92.20	36.30	89.90	35.39	95.50	37.60
2nd	93.19	36.69	90.50	35.63	97.30	38.31
3rd	93.90	36.97	91.20	35.91	98.00	38.58
5th	94.69	37.28	92.30	36.34	99.20	39.06
10th	96.60	38.03	93.80	36.93	101.20	39.84
15th	97.69	38.46	95.20	37.48	102.50	40.35
20th	98.50	38.78	96.20	37.87	103.40	40.71
25th	99.21	39.06	97.00	38.19	104.30	41.06
30th	99.80	39.29	97.60	38.43	105.00	41.34
35th	100.41	39.53	98.40	38.74	105.60	41.57
40th	100.89	39.72	99.00	38.98	106.30	41.85
45th	101.40	39.92	99.80	39.29	107.00	42.13
50th	101.80	40.08	100.55	39.59	107.60	42.36
55th	102.39	40.31	101.30	39.88	108.40	42.68
60th	102.90	40.51	101.80	40.08	109.10	42.95
65th	103.40	40.71	102.50	40.35	109.70	43.19
70th	103.99	40.94	103.30	40.67	110.40	43.46
75th	104.70	41.22	104.00	40.94	111.20	43.78
80th	105.51	41.54	104.80	41.26	112.00	44.09
85th	106.20	41.81	105.60	41.57	113.10	44.53
90th	106.91	42.09	106.80	42.05	114.40	45.04
95th	108.31	42.64	108.90	42.87	116.40	45.83
97th	109.80	43.23	110.40	43.46	118.10	46.50
98th	110.69	43.58	111.10	43.74	118.80	46.77
99th	111.99	44.09	112.30	44.21	119.80	47.17

Knee Height (Midpatella) Standing

The vertical distance between a standing surface and the midpatella landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet.



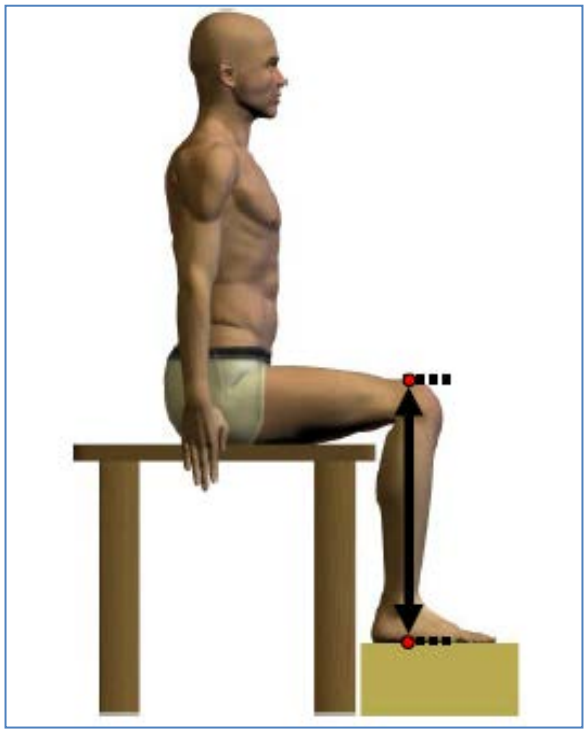
Knee Height (Midpatella) Standing

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.73	5.62	5.74
Symmetry – BETA I	0.04	0.17	0.12
Kurtosis – BETA II	0.43	0.01	0.34
Number of Subjects	912	1012	1420

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	45.87	18.06	45.29	17.83	49.55	19.51
SE (mean)	0.07	0.03	0.08	0.03	0.08	0.03
St Dev	2.17	0.85	2.54	1.00	2.84	1.12
Minimum	38.20	15.04	37.30	14.69	39.70	15.63
Maximum	53.19	20.94	54.00	21.26	61.20	24.09
Percentiles						
1st	40.69	16.02	39.60	15.59	43.00	16.93
2nd	41.50	16.34	40.30	15.87	43.90	17.28
3rd	41.81	16.46	40.60	15.98	44.30	17.44
5th	42.39	16.69	41.20	16.22	44.95	17.70
10th	43.21	17.01	42.00	16.54	46.00	18.11
15th	43.69	17.20	42.80	16.85	46.60	18.35
20th	44.20	17.40	43.10	16.97	47.20	18.58
25th	44.50	17.52	43.50	17.13	47.70	18.78
30th	44.81	17.64	43.90	17.28	48.10	18.94
35th	45.01	17.72	44.20	17.40	48.40	19.06
40th	45.29	17.83	44.50	17.52	48.80	19.21
45th	45.59	17.95	44.90	17.68	49.20	19.37
50th	45.80	18.03	45.20	17.80	49.50	19.49
55th	46.10	18.15	45.50	17.91	49.75	19.59
60th	46.41	18.27	45.90	18.07	50.15	19.74
65th	46.61	18.35	46.20	18.19	50.60	19.92
70th	46.99	18.50	46.60	18.35	50.90	20.04
75th	47.29	18.62	47.00	18.50	51.40	20.24
80th	47.70	18.78	47.40	18.66	51.90	20.43
85th	48.01	18.90	47.90	18.86	52.40	20.63
90th	48.59	19.13	48.50	19.09	53.20	20.94
95th	49.50	19.49	49.50	19.49	54.30	21.38
97th	50.01	19.69	50.20	19.76	55.20	21.73
98th	50.29	19.80	50.70	19.96	55.60	21.89
99th	51.41	20.24	51.40	20.24	56.40	22.20

Knee Height Sitting

The vertical distance between a footrest surface and the suprapatella landmark is measured with an anthropometer. The participant sits with the thighs parallel, the knees flexed 90°, and the feet in line with the thighs.



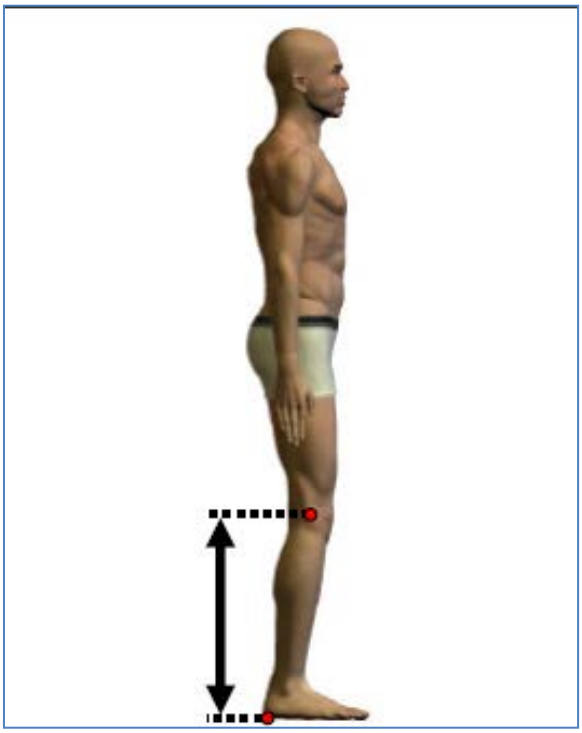
Knee Height Sitting

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.31	5.16	4.96
Symmetry – BETA I	0.16	0.19	0.13
Kurtosis – BETA II	0.24	-0.11	0.26
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	51.97	20.46	51.50	20.28	56.08	22.08
SE (mean)	0.07	0.03	0.08	0.03	0.07	0.03
St Dev	2.24	0.88	2.66	1.05	2.78	1.10
Minimum	45.11	17.76	43.60	17.17	46.50	18.31
Maximum	59.59	23.46	60.50	23.82	66.60	26.22
Percentiles						
1st	46.99	18.50	45.90	18.07	49.60	19.53
2nd	47.29	18.62	46.30	18.23	50.50	19.88
3rd	47.70	18.78	46.70	18.39	50.90	20.04
5th	48.41	19.06	47.30	18.62	51.60	20.31
10th	49.20	19.37	48.10	18.94	52.50	20.67
15th	49.81	19.61	48.80	19.21	53.30	20.98
20th	50.19	19.76	49.20	19.37	53.90	21.22
25th	50.50	19.88	49.60	19.53	54.30	21.38
30th	50.80	20.00	50.00	19.69	54.60	21.50
35th	51.10	20.12	50.40	19.84	55.00	21.65
40th	51.41	20.24	50.80	20.00	55.30	21.77
45th	51.59	20.31	51.10	20.12	55.70	21.93
50th	51.79	20.39	51.40	20.24	56.00	22.05
55th	51.99	20.47	51.70	20.35	56.30	22.17
60th	52.40	20.63	52.00	20.47	56.70	22.32
65th	52.71	20.75	52.50	20.67	57.00	22.44
70th	53.11	20.91	52.90	20.83	57.40	22.60
75th	53.49	21.06	53.40	21.02	57.90	22.80
80th	53.90	21.22	53.80	21.18	58.30	22.95
85th	54.31	21.38	54.30	21.38	58.90	23.19
90th	54.71	21.54	54.90	21.61	59.60	23.46
95th	55.91	22.01	56.00	22.05	60.70	23.90
97th	56.49	22.24	56.80	22.36	61.50	24.21
98th	56.79	22.36	57.20	22.52	62.20	24.49
99th	57.30	22.56	58.10	22.87	63.00	24.80

Lateral Femoral Epicondyle Height

The vertical distance between a standing surface and the standing lateral femoral epicondyle landmark is measured with an anthropometer. The participant stands erect with the heels together and the weight distributed equally on both feet.



Lateral Femoral Epicondyle Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.82	5.71	5.32
Symmetry – BETA I	0.11	0.19	0.06
Kurtosis – BETA II	0.44	0.14	0.26
Number of Subjects	912	1013	1416

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	47.21	18.59	46.95	18.48	49.87	19.63
SE (mean)	0.08	0.03	0.08	0.03	0.07	0.03
St Dev	2.27	0.90	2.68	1.05	2.65	1.04
Minimum	39.70	15.63	38.60	15.20	40.70	16.02
Maximum	55.50	21.85	58.00	22.83	59.10	23.27
Percentiles						
1st	41.71	16.42	41.00	16.14	43.80	17.24
2nd	42.60	16.77	41.70	16.42	44.30	17.44
3rd	43.21	17.01	42.10	16.57	44.90	17.68
5th	43.79	17.24	42.70	16.81	45.50	17.91
10th	44.40	17.48	43.70	17.20	46.50	18.31
15th	44.91	17.68	44.20	17.40	47.20	18.58
20th	45.29	17.83	44.60	17.56	47.70	18.78
25th	45.69	17.99	45.10	17.76	48.15	18.96
30th	46.00	18.11	45.40	17.87	48.60	19.13
35th	46.41	18.27	45.80	18.03	48.80	19.21
40th	46.71	18.39	46.10	18.15	49.20	19.37
45th	46.89	18.46	46.50	18.31	49.50	19.49
50th	47.09	18.54	46.90	18.46	49.80	19.61
55th	47.40	18.66	47.20	18.58	50.10	19.72
60th	47.70	18.78	47.60	18.74	50.50	19.88
65th	48.01	18.90	48.00	18.90	50.80	20.00
70th	48.31	19.02	48.30	19.02	51.20	20.16
75th	48.59	19.13	48.80	19.21	51.60	20.31
80th	49.10	19.33	49.20	19.37	52.00	20.47
85th	49.61	19.53	49.90	19.65	52.60	20.71
90th	50.09	19.72	50.30	19.80	53.30	20.98
95th	50.90	20.04	51.40	20.24	54.20	21.34
97th	51.59	20.31	52.00	20.47	54.80	21.57
98th	51.89	20.43	52.40	20.63	55.70	21.93
99th	52.60	20.71	53.60	21.10	56.40	22.20

Lateral Malleolus (Ankle) Height

The vertical distance between a standing surface and the lateral malleolus landmark is measured with a modified height gauge. The participant stands erect with the heels together and the weight distributed equally on both feet.

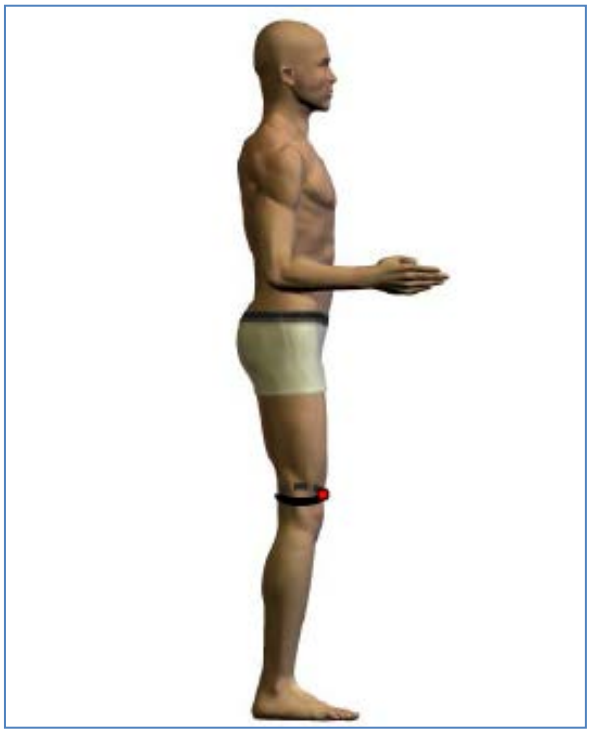
Lateral Malleolus (Ankle) Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	8.68	7.74	7.71
Symmetry – BETA I	-0.55	0.05	0.13
Kurtosis – BETA II	0.80	-0.19	0.01
Number of Subjects	913	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	6.44	2.54	6.36	2.50	7.33	2.89
SE (mean)	0.02	0.01	0.02	0.01	0.01	0.01
St Dev	0.56	0.22	0.49	0.19	0.57	0.22
Minimum	3.81	1.50	4.90	1.93	5.80	2.28
Maximum	7.90	3.11	7.70	3.03	9.10	3.58
Percentiles						
1st	4.90	1.93	5.30	2.09	6.00	2.36
2nd	5.11	2.01	5.40	2.13	6.20	2.44
3rd	5.21	2.05	5.50	2.17	6.30	2.48
5th	5.41	2.13	5.60	2.20	6.40	2.52
10th	5.69	2.24	5.70	2.24	6.60	2.60
15th	5.89	2.32	5.80	2.28	6.70	2.64
20th	5.99	2.36	5.90	2.32	6.80	2.68
25th	6.10	2.40	6.00	2.36	7.00	2.76
30th	6.20	2.44	6.10	2.40	7.00	2.76
35th	6.30	2.48	6.20	2.44	7.10	2.80
40th	6.40	2.52	6.20	2.44	7.20	2.83
45th	6.40	2.52	6.30	2.48	7.30	2.87
50th	6.50	2.56	6.40	2.52	7.30	2.87
55th	6.60	2.60	6.40	2.52	7.40	2.91
60th	6.60	2.60	6.50	2.56	7.50	2.95
65th	6.71	2.64	6.60	2.60	7.50	2.95
70th	6.71	2.64	6.70	2.64	7.60	2.99
75th	6.81	2.68	6.70	2.64	7.70	3.03
80th	6.91	2.72	6.80	2.68	7.80	3.07
85th	7.01	2.76	6.90	2.72	7.90	3.11
90th	7.11	2.80	7.00	2.76	8.00	3.15
95th	7.29	2.87	7.20	2.83	8.30	3.27
97th	7.39	2.91	7.30	2.87	8.50	3.35
98th	7.49	2.95	7.40	2.91	8.60	3.39
99th	7.70	3.03	7.50	2.95	8.70	3.43

Lower Thigh (Knee) Circumference

The horizontal circumference of the right thigh at the level of the suprapatella landmark is measured with a tape. The participant stands erect with the feet about 10 cm apart and the weight distributed equally on both feet.



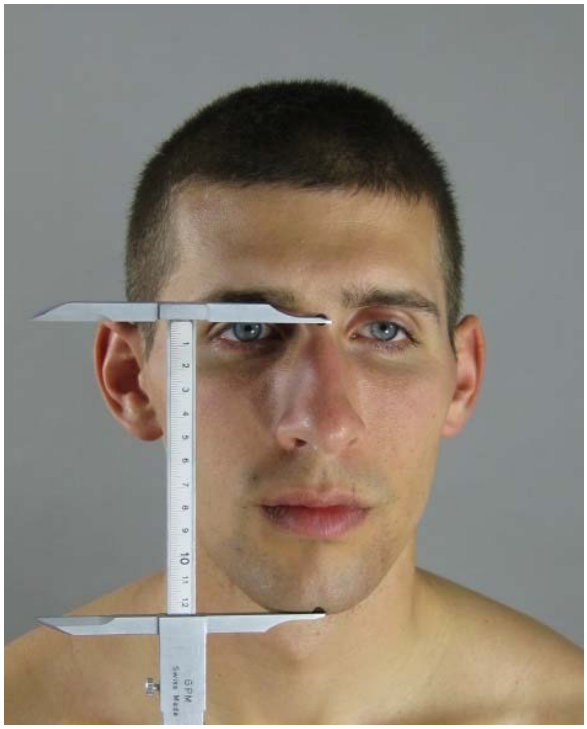
Lower Thigh (Knee) Circumference

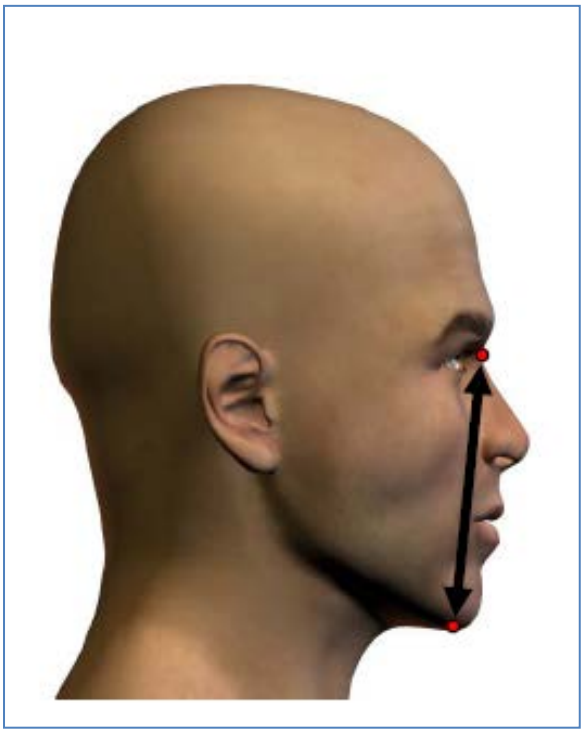
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	8.15	8.39	7.35
Symmetry – BETA I	0.41	0.39	0.12
Kurtosis – BETA II	0.17	0.17	0.01
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	39.64	15.61	39.72	15.64	40.26	15.85
SE (mean)	0.11	0.04	0.10	0.04	0.08	0.03
St Dev	3.23	1.27	3.33	1.31	2.96	1.17
Minimum	30.71	12.09	30.20	11.89	30.20	11.89
Maximum	51.31	20.20	53.30	20.98	50.30	19.80
Percentiles						
1st	32.89	12.95	33.20	13.07	33.90	13.35
2nd	33.81	13.31	33.80	13.31	34.60	13.62
3rd	34.19	13.46	34.10	13.43	34.80	13.70
5th	34.90	13.74	34.50	13.58	35.50	13.98
10th	35.79	14.09	35.70	14.06	36.50	14.37
15th	36.50	14.37	36.30	14.29	37.20	14.65
20th	37.01	14.57	36.90	14.53	37.70	14.84
25th	37.39	14.72	37.30	14.69	38.10	15.00
30th	37.69	14.84	37.70	14.84	38.60	15.20
35th	38.10	15.00	38.20	15.04	39.10	15.39
40th	38.51	15.16	38.70	15.24	39.50	15.55
45th	38.89	15.31	39.20	15.43	39.80	15.67
50th	39.29	15.47	39.50	15.55	40.20	15.83
55th	39.70	15.63	39.90	15.71	40.50	15.94
60th	40.21	15.83	40.30	15.87	40.90	16.10
65th	40.69	16.02	40.80	16.06	41.30	16.26
70th	41.20	16.22	41.30	16.26	41.80	16.46
75th	41.71	16.42	41.80	16.46	42.30	16.65
80th	42.39	16.69	42.60	16.77	42.80	16.85
85th	43.10	16.97	43.30	17.05	43.30	17.05
90th	43.99	17.32	44.20	17.40	44.10	17.36
95th	45.39	17.87	45.40	17.87	45.20	17.80
97th	46.30	18.23	46.50	18.31	46.00	18.11
98th	47.19	18.58	47.30	18.62	46.40	18.27
99th	48.11	18.94	48.50	19.09	47.50	18.70

Face Length (Menton-Sellion)

The distance between the menton landmark and the sellion landmark is measured with a sliding caliper. The teeth are lightly occluded.





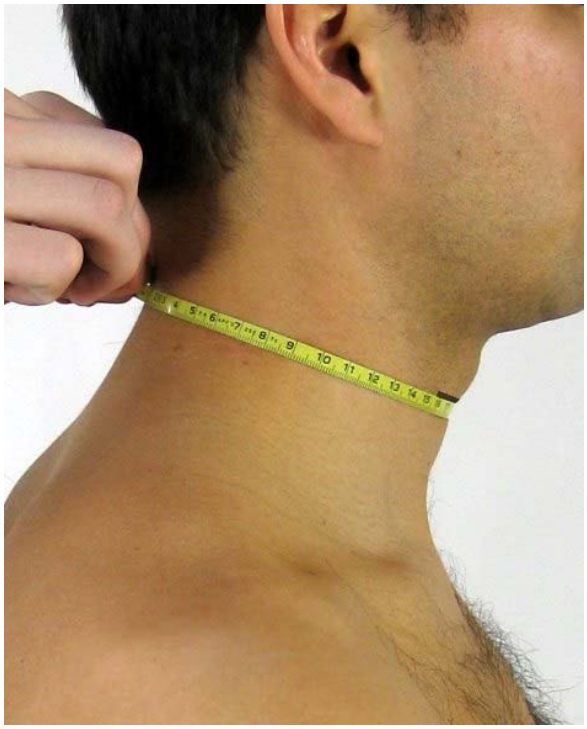
Face Length (Menton-Sellion)

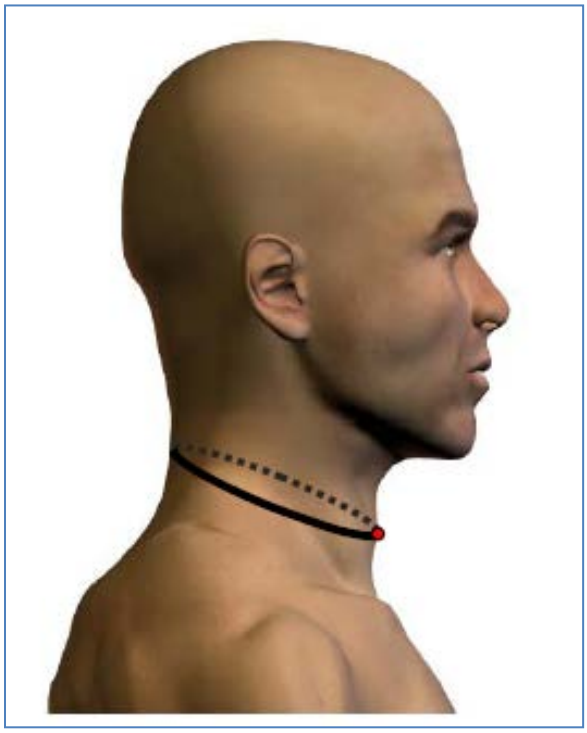
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	5.41	5.49	5.28
Symmetry – BETA I	0.22	0.11	0.06
Kurtosis – BETA II	0.01	-0.42	-0.05
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	11.40	4.49	11.30	4.45	12.27	4.83
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.62	0.24	0.62	0.24	0.65	0.26
Minimum	9.40	3.70	9.80	3.86	10.30	4.06
Maximum	13.59	5.35	13.50	5.31	14.40	5.67
Percentiles						
1st	10.11	3.98	10.00	3.94	10.80	4.25
2nd	10.31	4.06	10.10	3.98	11.00	4.33
3rd	10.31	4.06	10.20	4.02	11.10	4.37
5th	10.39	4.09	10.30	4.06	11.20	4.41
10th	10.59	4.17	10.50	4.13	11.40	4.49
15th	10.69	4.21	10.60	4.17	11.60	4.57
20th	10.80	4.25	10.70	4.21	11.70	4.61
25th	11.00	4.33	10.80	4.25	11.80	4.65
30th	11.10	4.37	11.00	4.33	11.90	4.69
35th	11.10	4.37	11.00	4.33	12.00	4.72
40th	11.20	4.41	11.10	4.37	12.10	4.76
45th	11.30	4.45	11.20	4.41	12.20	4.80
50th	11.40	4.49	11.30	4.45	12.30	4.84
55th	11.51	4.53	11.40	4.49	12.30	4.84
60th	11.61	4.57	11.50	4.53	12.40	4.88
65th	11.61	4.57	11.60	4.57	12.50	4.92
70th	11.71	4.61	11.60	4.57	12.60	4.96
75th	11.81	4.65	11.70	4.61	12.70	5.00
80th	11.91	4.69	11.80	4.65	12.80	5.04
85th	11.99	4.72	12.00	4.72	12.90	5.08
90th	12.19	4.80	12.20	4.80	13.10	5.16
95th	12.40	4.88	12.30	4.84	13.30	5.24
97th	12.60	4.96	12.50	4.92	13.50	5.31
98th	12.70	5.00	12.60	4.96	13.70	5.39
99th	12.90	5.08	12.70	5.00	13.80	5.43

Neck Circumference

The circumference of the neck at the level of the infrathyroid landmark (Adam's apple) is measured with a tape. The plane of the measurement is perpendicular to the long axis of the neck. The participant stands erect with the head in the Frankfurt plane. The shoulders and upper extremities are relaxed.





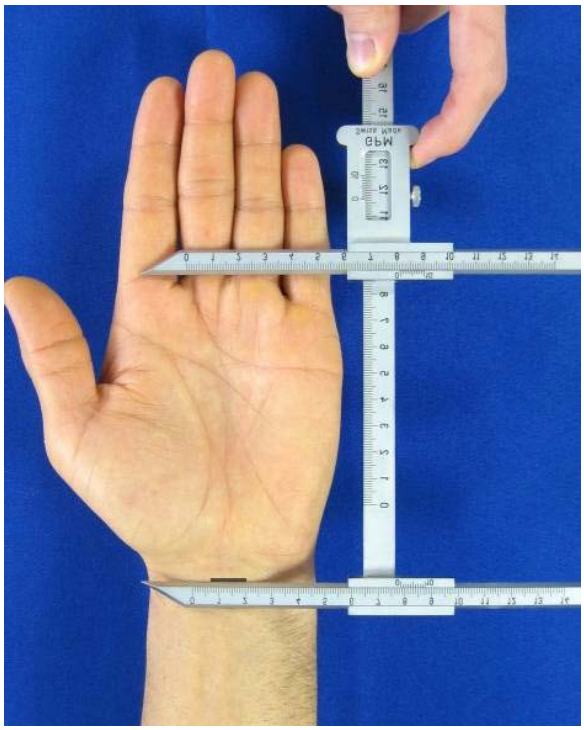
Neck Circumference

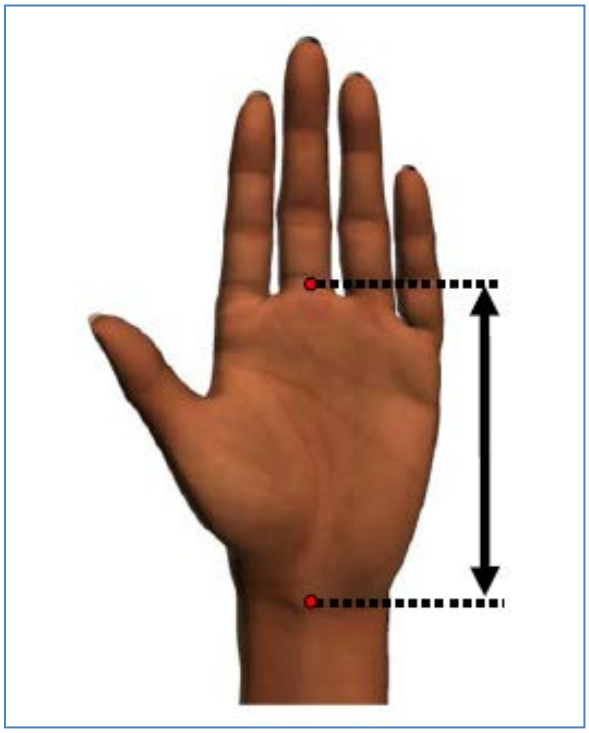
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	5.27	5.57	5.81
Symmetry – BETA I	0.42	0.56	0.40
Kurtosis – BETA II	0.26	0.83	0.05
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	32.75	12.89	32.76	12.90	39.09	15.39
SE (mean)	0.06	0.02	0.06	0.02	0.06	0.02
St Dev	1.73	0.68	1.83	0.72	2.27	0.89
Minimum	27.79	10.94	27.50	10.83	33.00	12.99
Maximum	39.19	15.43	42.40	16.69	47.30	18.62
Percentiles						
1st	29.39	11.57	29.20	11.50	34.70	13.66
2nd	29.59	11.65	29.50	11.61	35.00	13.78
3rd	29.90	11.77	29.80	11.73	35.20	13.86
5th	30.10	11.85	30.20	11.89	35.50	13.98
10th	30.71	12.09	30.70	12.09	36.30	14.29
15th	30.99	12.20	30.90	12.17	36.70	14.45
20th	31.19	12.28	31.20	12.28	37.10	14.61
25th	31.50	12.40	31.50	12.40	37.50	14.76
30th	31.70	12.48	31.70	12.48	37.80	14.88
35th	32.00	12.60	32.00	12.60	38.10	15.00
40th	32.21	12.68	32.10	12.64	38.40	15.12
45th	32.51	12.80	32.40	12.76	38.70	15.24
50th	32.69	12.87	32.50	12.80	39.00	15.35
55th	32.89	12.95	32.70	12.87	39.20	15.43
60th	33.10	13.03	33.00	12.99	39.50	15.55
65th	33.30	13.11	33.30	13.11	39.80	15.67
70th	33.60	13.23	33.60	13.23	40.10	15.79
75th	33.81	13.31	33.90	13.35	40.50	15.94
80th	34.11	13.43	34.20	13.46	40.90	16.10
85th	34.49	13.58	34.70	13.66	41.50	16.34
90th	35.00	13.78	35.20	13.86	42.20	16.61
95th	35.79	14.09	36.00	14.17	43.10	16.97
97th	36.30	14.29	36.50	14.37	43.70	17.20
98th	36.60	14.41	37.00	14.57	44.20	17.40
99th	37.01	14.57	37.70	14.84	45.00	17.72

Palm Length

The distance between the center of the crease at the base of the middle finger (digit III, base) and the ventral stylion landmark is measured with a Poech sliding caliper. The participant holds the right forearm horizontal with the hand straight, palm up. The fingers are together, and the thumb is abducted approximately 45°. The middle finger is parallel to the long axis of the forearm.





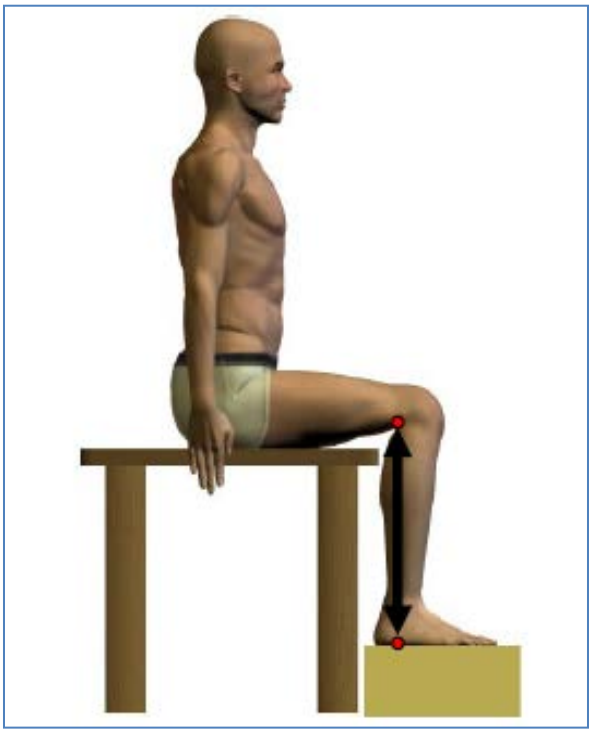
Palm Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.81	5.41	5.34
Symmetry – BETA I	0.29	0.29	0.29
Kurtosis – BETA II	0.00	0.10	0.24
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	10.92	4.30	10.91	4.29	11.73	4.62
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.52	0.21	0.59	0.23	0.63	0.25
Minimum	9.50	3.74	9.30	3.66	9.50	3.74
Maximum	12.90	5.08	13.00	5.12	13.70	5.39
Percentiles						
1st	9.70	3.82	9.70	3.82	10.40	4.09
2nd	9.91	3.90	9.70	3.82	10.60	4.17
3rd	10.01	3.94	9.80	3.86	10.70	4.21
5th	10.11	3.98	10.00	3.94	10.80	4.25
10th	10.31	4.06	10.20	4.02	11.00	4.33
15th	10.39	4.09	10.30	4.06	11.10	4.37
20th	10.49	4.13	10.40	4.09	11.20	4.41
25th	10.49	4.13	10.50	4.13	11.30	4.45
30th	10.59	4.17	10.60	4.17	11.40	4.49
35th	10.69	4.21	10.70	4.21	11.50	4.53
40th	10.69	4.21	10.70	4.21	11.50	4.53
45th	10.80	4.25	10.80	4.25	11.60	4.57
50th	10.90	4.29	10.90	4.29	11.70	4.61
55th	11.00	4.33	11.00	4.33	11.70	4.61
60th	11.00	4.33	11.00	4.33	11.80	4.65
65th	11.10	4.37	11.10	4.37	11.90	4.69
70th	11.20	4.41	11.20	4.41	12.00	4.72
75th	11.30	4.45	11.30	4.45	12.10	4.76
80th	11.40	4.49	11.40	4.49	12.30	4.84
85th	11.40	4.49	11.50	4.53	12.40	4.88
90th	11.61	4.57	11.70	4.61	12.50	4.92
95th	11.81	4.65	11.90	4.69	12.80	5.04
97th	11.91	4.69	12.10	4.76	13.10	5.16
98th	11.99	4.72	12.30	4.84	13.20	5.20
99th	12.29	4.84	12.40	4.88	13.40	5.28

Popliteal Height

The vertical distance from a footrest surface to the back of the right knee (the popliteal fossa at the dorsal juncture of the calf and thigh) is measured with an anthropometer. The participant sits with the thighs parallel, the feet in line with the thighs, and the knees flexed 90°.



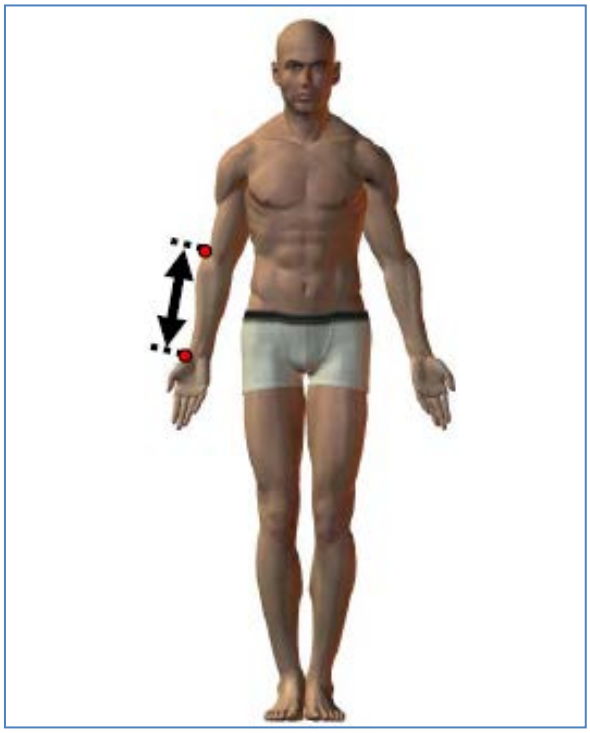
Popliteal Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	5.01	5.91	5.62
Symmetry – BETA I	0.12	0.14	0.09
Kurtosis – BETA II	0.55	-0.07	0.19
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	39.64	15.61	39.24	15.45	43.79	17.24
SE (mean)	0.07	0.03	0.07	0.03	0.07	0.03
St Dev	1.99	0.78	2.32	0.91	2.46	0.97
Minimum	32.41	12.76	32.10	12.64	34.60	13.62
Maximum	47.09	18.54	47.60	18.74	52.30	20.59
Percentiles						
1st	35.20	13.86	34.10	13.43	38.20	15.04
2nd	35.71	14.06	34.90	13.74	38.90	15.31
3rd	35.89	14.13	35.20	13.86	39.30	15.47
5th	36.40	14.33	35.50	13.98	39.80	15.67
10th	37.21	14.65	36.30	14.29	40.70	16.02
15th	37.59	14.80	36.80	14.49	41.30	16.26
20th	38.10	15.00	37.20	14.65	41.70	16.42
25th	38.40	15.12	37.60	14.80	42.20	16.61
30th	38.71	15.24	38.00	14.96	42.50	16.73
35th	38.81	15.28	38.30	15.08	42.80	16.85
40th	39.09	15.39	38.50	15.16	43.10	16.97
45th	39.40	15.51	38.80	15.28	43.40	17.09
50th	39.70	15.63	39.20	15.43	43.80	17.24
55th	39.90	15.71	39.50	15.55	44.10	17.36
60th	40.11	15.79	39.90	15.71	44.40	17.48
65th	40.31	15.87	40.20	15.83	44.70	17.60
70th	40.69	16.02	40.50	15.94	45.00	17.72
75th	40.79	16.06	40.80	16.06	45.30	17.83
80th	41.20	16.22	41.20	16.22	45.80	18.03
85th	41.71	16.42	41.70	16.42	46.30	18.23
90th	42.01	16.54	42.20	16.61	46.90	18.46
95th	42.90	16.89	43.20	17.01	47.90	18.86
97th	43.69	17.20	43.70	17.20	48.50	19.09
98th	44.20	17.40	44.00	17.32	49.00	19.29
99th	44.60	17.56	44.70	17.60	49.80	19.61

Radiale-Stylion Length

The distance between the radiale landmark and the stylion landmark is measured with a beam caliper held parallel to the long axis of the forearm. The participant stands with the arms relaxed at the sides. The hand and fingers are held straight in line with the long axis of the forearm with the palm facing forward.



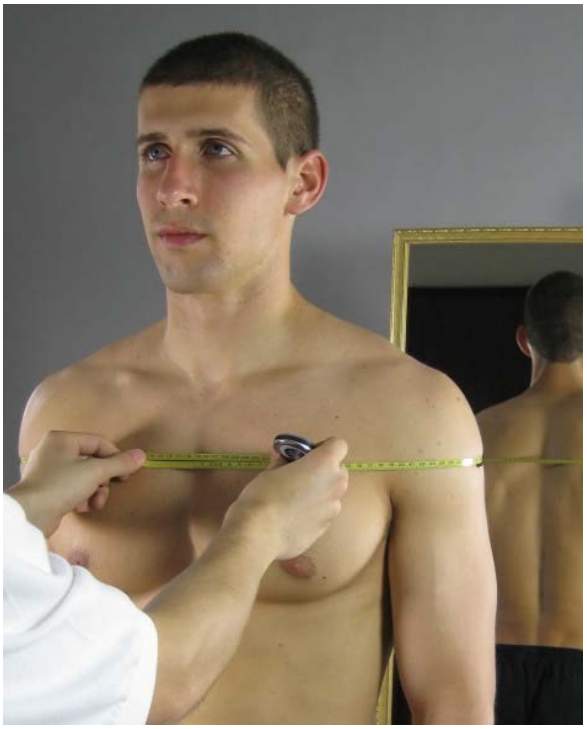
Radiale-Stylion Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.97	6.24	5.68
Symmetry – BETA I	0.13	0.35	0.17
Kurtosis – BETA II	0.22	0.20	0.29
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	24.33	9.58	24.29	9.56	27.11	10.67
SE (mean)	0.04	0.02	0.05	0.02	0.04	0.02
St Dev	1.21	0.48	1.52	0.60	1.54	0.61
Minimum	21.01	8.27	19.90	7.83	21.60	8.50
Maximum	28.80	11.34	29.70	11.69	32.30	12.72
Percentiles						
1st	21.49	8.46	21.10	8.31	23.60	9.29
2nd	21.69	8.54	21.30	8.39	24.10	9.49
3rd	22.00	8.66	21.60	8.50	24.30	9.57
5th	22.40	8.82	21.90	8.62	24.60	9.69
10th	22.91	9.02	22.50	8.86	25.20	9.92
15th	23.19	9.13	22.70	8.94	25.60	10.08
20th	23.39	9.21	23.10	9.09	25.90	10.20
25th	23.50	9.25	23.30	9.17	26.10	10.28
30th	23.70	9.33	23.50	9.25	26.30	10.35
35th	23.80	9.37	23.60	9.29	26.50	10.43
40th	24.00	9.45	23.80	9.37	26.70	10.51
45th	24.21	9.53	24.00	9.45	26.90	10.59
50th	24.31	9.57	24.20	9.53	27.00	10.63
55th	24.41	9.61	24.30	9.57	27.20	10.71
60th	24.51	9.65	24.50	9.65	27.40	10.79
65th	24.69	9.72	24.70	9.72	27.60	10.87
70th	24.89	9.80	25.00	9.84	27.80	10.94
75th	25.10	9.88	25.30	9.96	28.00	11.02
80th	25.40	10.00	25.50	10.04	28.30	11.14
85th	25.60	10.08	25.90	10.20	28.70	11.30
90th	26.01	10.24	26.30	10.35	29.10	11.46
95th	26.39	10.39	27.00	10.63	29.80	11.73
97th	26.59	10.47	27.50	10.83	30.20	11.89
98th	26.70	10.51	27.70	10.91	30.50	12.01
99th	27.10	10.67	28.30	11.14	31.10	12.24

Shoulder Circumference

The circumference of the shoulders at the level of the right and left deltoid point landmarks is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed with the palms facing the thighs. The measurement is taken at the maximum point of quiet respiration.



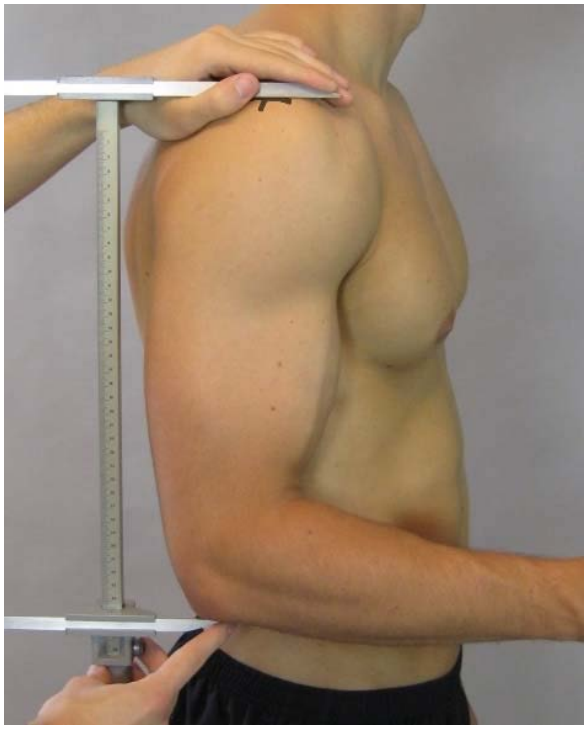
Shoulder Circumference

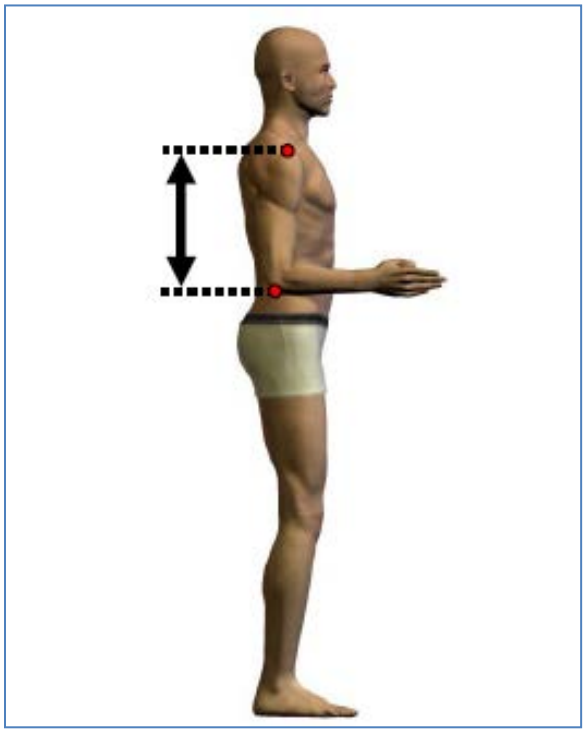
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.91	5.06	5.10
Symmetry – BETA I	0.09	0.26	0.06
Kurtosis – BETA II	-0.02	0.18	0.11
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	102.67	40.42	102.69	40.43	116.70	45.95
SE (mean)	0.17	0.07	0.16	0.06	0.16	0.06
St Dev	5.05	1.99	5.20	2.05	5.95	2.34
Minimum	88.11	34.69	87.10	34.29	96.10	37.83
Maximum	120.40	47.40	121.70	47.91	139.50	54.92
Percentiles						
1st	91.80	36.14	92.20	36.30	103.20	40.63
2nd	92.61	36.46	93.10	36.65	105.00	41.34
3rd	93.09	36.65	93.70	36.89	105.70	41.61
5th	94.11	37.05	94.50	37.20	106.80	42.05
10th	96.01	37.80	96.10	37.83	109.00	42.91
15th	97.31	38.31	97.30	38.31	110.50	43.50
20th	98.30	38.70	98.10	38.62	111.60	43.94
25th	99.21	39.06	99.00	38.98	112.50	44.29
30th	100.20	39.45	99.80	39.29	113.50	44.69
35th	100.81	39.69	100.50	39.57	114.60	45.12
40th	101.40	39.92	101.20	39.84	115.30	45.39
45th	102.11	40.20	102.00	40.16	116.10	45.71
50th	102.69	40.43	102.70	40.43	116.80	45.98
55th	103.20	40.63	103.20	40.63	117.50	46.26
60th	103.81	40.87	103.80	40.87	118.30	46.57
65th	104.39	41.10	104.50	41.14	118.90	46.81
70th	105.21	41.42	105.40	41.50	119.70	47.13
75th	105.99	41.73	105.90	41.69	120.50	47.44
80th	106.81	42.05	106.70	42.01	121.60	47.87
85th	107.70	42.40	108.00	42.52	122.70	48.31
90th	109.19	42.99	109.50	43.11	124.20	48.90
95th	111.40	43.86	111.60	43.94	126.30	49.72
97th	112.19	44.17	112.70	44.37	128.20	50.47
98th	113.21	44.57	114.10	44.92	129.40	50.94
99th	115.09	45.31	115.90	45.63	131.40	51.73

Shoulder-Elbow Length

The distance between the right acromion landmark and the olecranon bottom landmark is measured with a beam caliper parallel to the long axis of the upper arm. The participant stands with the right upper arm hanging at the side and the elbow flexed 90°. The hand is straight, and the palm faces inward.





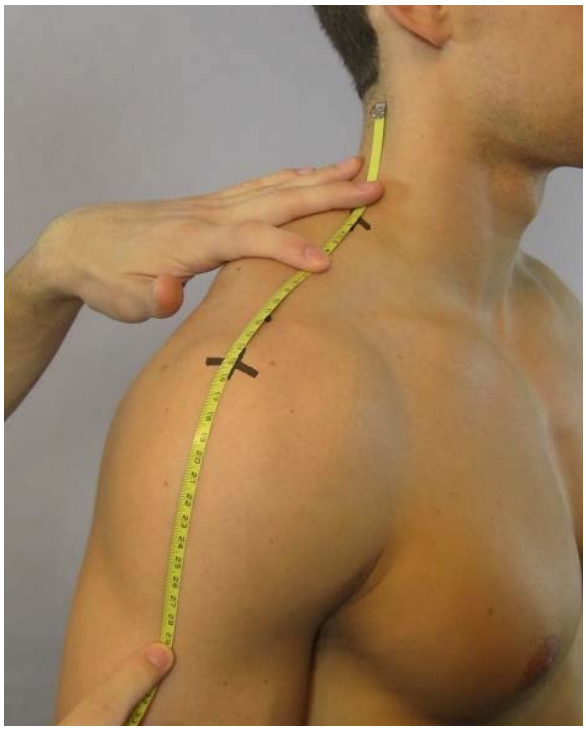
Shoulder-Elbow Length

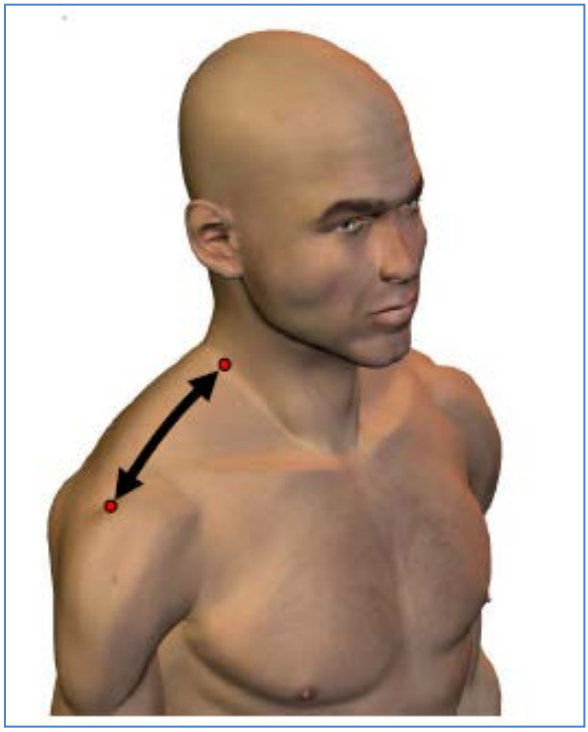
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.43	5.16	4.90
Symmetry – BETA I	0.09	0.05	-0.01
Kurtosis – BETA II	0.16	-0.12	0.06
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	34.19	13.46	33.75	13.29	36.82	14.50
SE (mean)	0.05	0.02	0.05	0.02	0.05	0.02
St Dev	1.51	0.60	1.74	0.69	1.80	0.71
Minimum	29.39	11.57	29.00	11.42	31.00	12.20
Maximum	39.29	15.47	39.80	15.67	43.10	16.97
Percentiles						
1st	30.71	12.09	30.00	11.81	32.60	12.83
2nd	31.09	12.24	30.40	11.97	33.10	13.03
3rd	31.29	12.32	30.50	12.01	33.40	13.15
5th	31.70	12.48	30.80	12.13	33.70	13.27
10th	32.31	12.72	31.40	12.36	34.60	13.62
15th	32.59	12.83	31.90	12.56	35.00	13.78
20th	32.99	12.99	32.20	12.68	35.40	13.94
25th	33.20	13.07	32.50	12.80	35.60	14.02
30th	33.40	13.15	32.80	12.91	35.90	14.13
35th	33.60	13.23	33.10	13.03	36.10	14.21
40th	33.81	13.31	33.30	13.11	36.40	14.33
45th	34.01	13.39	33.50	13.19	36.60	14.41
50th	34.19	13.46	33.80	13.31	36.80	14.49
55th	34.39	13.54	34.00	13.39	37.00	14.57
60th	34.49	13.58	34.20	13.46	37.30	14.69
65th	34.80	13.70	34.40	13.54	37.50	14.76
70th	35.00	13.78	34.70	13.66	37.80	14.88
75th	35.20	13.86	35.00	13.78	38.10	15.00
80th	35.51	13.98	35.20	13.86	38.40	15.12
85th	35.79	14.09	35.50	13.98	38.70	15.24
90th	36.09	14.21	35.90	14.13	39.10	15.39
95th	36.60	14.41	36.50	14.37	39.70	15.63
97th	37.11	14.61	36.90	14.53	40.20	15.83
98th	37.49	14.76	37.20	14.65	40.50	15.94
99th	37.80	14.88	37.80	14.88	41.10	16.18

Shoulder Length

The surface distance between the right trapezius landmark and the right acromion landmark is measured with a tape. The participant stands erect, looking straight ahead. The shoulders and upper extremities are relaxed.





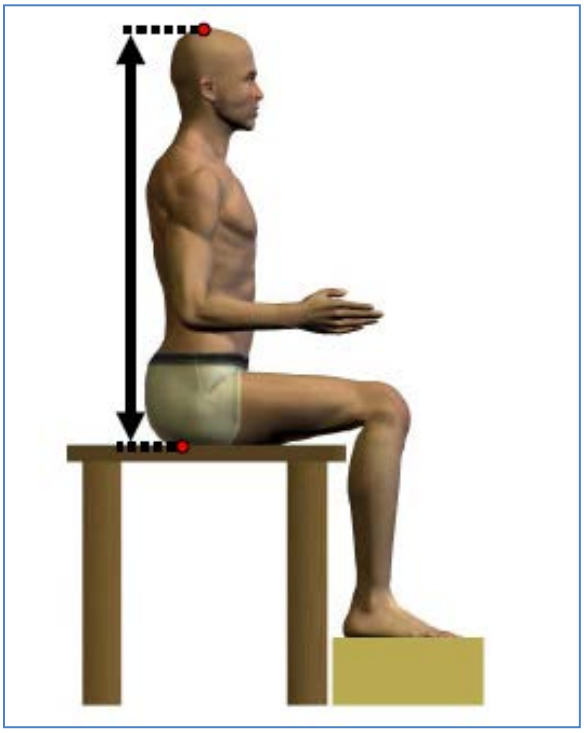
Shoulder Length

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.09	7.52	7.06
Symmetry – BETA I	0.20	0.15	0.08
Kurtosis – BETA II	0.23	0.10	0.19
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	13.74	5.41	13.65	5.37	15.10	5.95
SE (mean)	0.03	0.01	0.03	0.01	0.03	0.01
St Dev	0.97	0.38	1.03	0.40	1.07	0.42
Minimum	10.80	4.25	10.70	4.21	11.50	4.53
Maximum	17.50	6.89	17.50	6.89	18.90	7.44
Percentiles						
1st	11.61	4.57	11.50	4.53	12.50	4.92
2nd	11.91	4.69	11.60	4.57	13.00	5.12
3rd	11.99	4.72	11.80	4.65	13.20	5.20
5th	12.09	4.76	12.00	4.72	13.50	5.31
10th	12.50	4.92	12.30	4.84	13.80	5.43
15th	12.70	5.00	12.50	4.92	14.00	5.51
20th	12.90	5.08	12.80	5.04	14.20	5.59
25th	13.11	5.16	13.00	5.12	14.40	5.67
30th	13.21	5.20	13.10	5.16	14.50	5.71
35th	13.41	5.28	13.20	5.20	14.70	5.79
40th	13.49	5.31	13.40	5.28	14.80	5.83
45th	13.59	5.35	13.50	5.31	15.00	5.91
50th	13.69	5.39	13.60	5.35	15.10	5.94
55th	13.79	5.43	13.80	5.43	15.20	5.98
60th	14.00	5.51	13.90	5.47	15.30	6.02
65th	14.10	5.55	14.00	5.51	15.50	6.10
70th	14.20	5.59	14.20	5.59	15.60	6.14
75th	14.40	5.67	14.30	5.63	15.80	6.22
80th	14.50	5.71	14.50	5.71	16.00	6.30
85th	14.71	5.79	14.70	5.79	16.20	6.38
90th	15.01	5.91	14.90	5.87	16.50	6.50
95th	15.29	6.02	15.40	6.06	16.90	6.65
97th	15.60	6.14	15.60	6.14	17.10	6.73
98th	15.90	6.26	15.80	6.22	17.40	6.85
99th	16.21	6.38	16.20	6.38	17.70	6.97

Sitting Height

The vertical distance between a sitting surface and the top of the head is measured with an anthropometer. The participant sits erect with the head in the Frankfurt plane. The shoulders and upper arms are relaxed, and the forearms and hands are extended forward horizontally with the palms facing each other. The thighs are parallel, and the knees are flexed 90° with the feet in line with the thighs. The measurement is taken at the maximum point of quiet respiration.



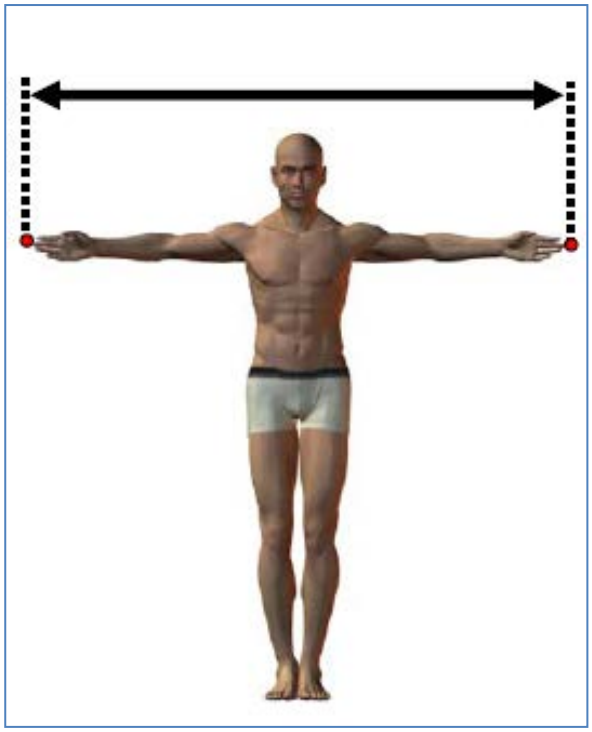
Sitting Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.25	3.88	3.65
Symmetry – BETA I	-0.11	-0.06	0.00
Kurtosis – BETA II	0.02	-0.32	0.00
Number of Subjects	913	1013	1418

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	88.15	34.70	86.58	34.09	92.75	36.52
SE (mean)	0.09	0.04	0.11	0.04	0.09	0.04
St Dev	2.86	1.13	3.36	1.32	3.39	1.33
Minimum	78.69	30.98	78.00	30.71	81.10	31.93
Maximum	96.39	37.95	96.10	37.83	103.00	40.55
Percentiles						
1st	81.41	32.05	78.90	31.06	85.00	33.46
2nd	82.09	32.32	79.60	31.34	85.80	33.78
3rd	82.80	32.60	79.90	31.46	86.30	33.98
5th	83.39	32.83	80.60	31.73	87.20	34.33
10th	84.40	33.23	82.30	32.40	88.40	34.80
15th	85.09	33.50	83.10	32.72	89.30	35.16
20th	85.80	33.78	83.80	32.99	89.90	35.39
25th	86.31	33.98	84.30	33.19	90.50	35.63
30th	86.69	34.13	84.80	33.39	90.90	35.79
35th	87.00	34.25	85.20	33.54	91.40	35.98
40th	87.50	34.45	85.70	33.74	91.80	36.14
45th	87.81	34.57	86.20	33.94	92.30	36.34
50th	88.11	34.69	86.60	34.09	92.80	36.54
55th	88.49	34.84	87.00	34.25	93.30	36.73
60th	88.90	35.00	87.40	34.41	93.70	36.89
65th	89.20	35.12	88.00	34.65	94.00	37.01
70th	89.69	35.31	88.50	34.84	94.50	37.20
75th	90.20	35.51	89.00	35.04	95.00	37.40
80th	90.60	35.67	89.60	35.28	95.60	37.64
85th	91.11	35.87	90.20	35.51	96.30	37.91
90th	91.69	36.10	91.00	35.83	97.00	38.19
95th	92.71	36.50	91.80	36.14	98.30	38.70
97th	93.60	36.85	92.40	36.38	98.90	38.94
98th	93.80	36.93	93.20	36.69	99.90	39.33
99th	94.49	37.20	93.90	36.97	100.70	39.65

Span

The distance between the tips of the middle fingers (dactylion III) of the horizontally outstretched arms is measured on a wall chart. The participant stands erect with the back against a wall-mounted scale and the heels together. Both arms and hands are stretched horizontally along the wall with the tip of the middle finger of one hand just touching a side wall. A block is placed at the tip of the middle finger of the other hand to establish the measurement on the scale. The measurement is taken at the maximum point of quiet respiration.



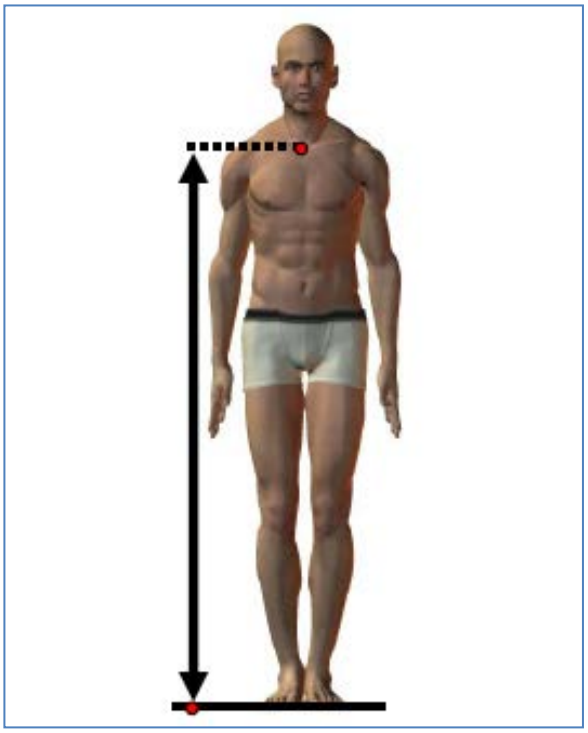
Span

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.06	4.91	4.56
Symmetry – BETA I	0.07	0.18	0.13
Kurtosis – BETA II	0.03	-0.10	0.03
Number of Subjects	911	1008	1415

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	168.01	66.15	167.29	65.86	183.29	72.16
SE (mean)	0.23	0.09	0.26	0.10	0.22	0.09
St Dev	6.83	2.69	8.21	3.23	8.36	3.29
Minimum	149.91	59.02	146.50	57.68	155.10	61.06
Maximum	193.29	76.10	193.80	76.30	210.90	83.03
Percentiles						
1st	152.60	60.08	150.20	59.13	164.50	64.76
2nd	154.41	60.79	151.40	59.61	167.00	65.75
3rd	154.99	61.02	152.30	59.96	168.10	66.18
5th	156.90	61.77	153.30	60.35	169.70	66.81
10th	158.90	62.56	156.70	61.69	172.80	68.03
15th	160.81	63.31	158.80	62.52	174.90	68.86
20th	162.00	63.78	160.10	63.03	176.50	69.49
25th	163.20	64.25	161.30	63.50	177.60	69.92
30th	164.49	64.76	162.80	64.09	178.90	70.43
35th	165.40	65.12	164.10	64.61	180.00	70.87
40th	166.29	65.47	165.20	65.04	181.10	71.30
45th	167.49	65.94	166.30	65.47	181.90	71.61
50th	168.30	66.26	167.20	65.83	182.90	72.01
55th	169.09	66.57	168.20	66.22	183.90	72.40
60th	169.90	66.89	169.30	66.65	184.90	72.80
65th	170.79	67.24	170.50	67.13	186.00	73.23
70th	171.60	67.56	171.50	67.52	187.40	73.78
75th	172.80	68.03	172.75	68.01	188.90	74.37
80th	173.61	68.35	173.80	68.43	190.30	74.92
85th	174.60	68.74	175.50	69.09	192.10	75.63
90th	176.40	69.45	178.10	70.12	194.30	76.50
95th	178.69	70.35	181.00	71.26	197.60	77.80
97th	180.80	71.18	184.30	72.56	199.60	78.58
98th	182.40	71.81	185.00	72.83	200.60	78.98
99th	184.99	72.83	187.70	73.90	204.20	80.39

Suprasternale Height

The vertical distance between a standing surface and the suprasternale landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



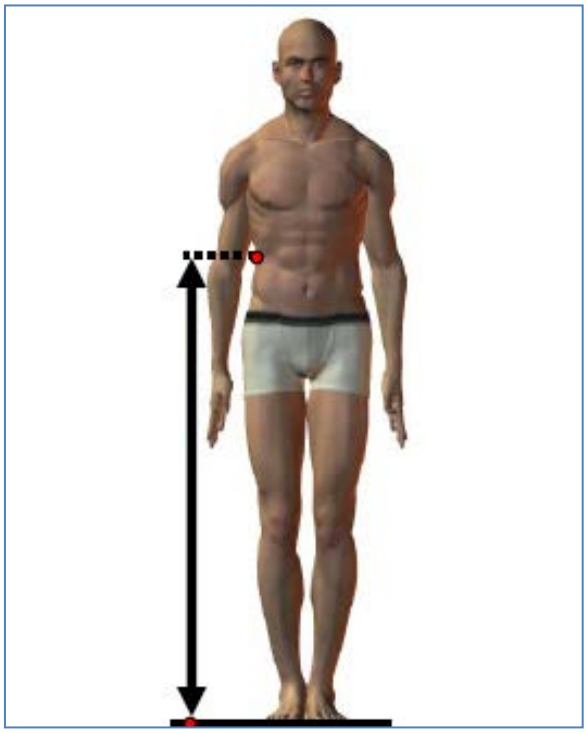
Suprasternale Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.51	4.28	4.10
Symmetry – BETA I	0.00	0.02	-0.01
Kurtosis – BETA II	0.35	-0.23	0.15
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	136.04	53.56	134.17	52.82	145.56	57.31
SE (mean)	0.16	0.06	0.18	0.07	0.16	0.06
St Dev	4.78	1.88	5.75	2.26	5.96	2.35
Minimum	120.19	47.32	118.30	46.57	126.80	49.92
Maximum	151.61	59.69	150.60	59.29	165.00	64.96
Percentiles						
1st	124.41	48.98	121.10	47.68	131.40	51.73
2nd	125.70	49.49	122.40	48.19	133.50	52.56
3rd	126.39	49.76	123.30	48.54	134.50	52.95
5th	127.79	50.31	124.90	49.17	135.80	53.46
10th	130.10	51.22	126.30	49.72	137.90	54.29
15th	131.50	51.77	128.00	50.39	139.30	54.84
20th	132.59	52.20	129.20	50.87	140.70	55.39
25th	133.20	52.44	130.40	51.34	141.60	55.75
30th	133.71	52.64	131.10	51.61	142.50	56.10
35th	134.29	52.87	132.00	51.97	143.20	56.38
40th	134.70	53.03	132.90	52.32	144.10	56.73
45th	135.31	53.27	133.40	52.52	144.90	57.05
50th	135.79	53.46	134.20	52.83	145.80	57.40
55th	136.40	53.70	134.90	53.11	146.40	57.64
60th	137.01	53.94	135.50	53.35	147.10	57.91
65th	137.80	54.25	136.40	53.70	147.80	58.19
70th	138.40	54.49	137.40	54.09	148.60	58.50
75th	139.19	54.80	138.10	54.37	149.50	58.86
80th	140.00	55.12	139.00	54.72	150.40	59.21
85th	140.79	55.43	140.20	55.20	151.60	59.69
90th	142.09	55.94	141.60	55.75	153.00	60.24
95th	144.09	56.73	143.70	56.57	155.00	61.02
97th	145.29	57.20	145.20	57.17	157.10	61.85
98th	146.00	57.48	146.00	57.48	158.30	62.32
99th	147.19	57.95	147.30	57.99	159.60	62.83

Tenth Rib Height

The vertical distance between a standing surface and the tenth rib landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



Tenth Rib Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	3.89	4.67	4.76
Symmetry – BETA I	0.11	0.08	0.04
Kurtosis – BETA II	0.45	-0.22	-0.05
Number of Subjects	912	1012	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	107.58	42.36	106.54	41.95	113.55	44.70
SE (mean)	0.14	0.05	0.16	0.06	0.14	0.06
St Dev	4.19	1.65	4.98	1.96	5.40	2.13
Minimum	94.79	37.32	93.90	36.97	96.80	38.11
Maximum	121.89	47.99	121.80	47.95	131.40	51.73
Percentiles						
1st	97.69	38.46	95.90	37.76	101.00	39.76
2nd	98.81	38.90	96.60	38.03	102.40	40.31
3rd	99.39	39.13	97.10	38.23	103.50	40.75
5th	100.61	39.61	98.30	38.70	104.70	41.22
10th	102.69	40.43	100.00	39.37	106.70	42.01
15th	103.71	40.83	101.40	39.92	107.80	42.44
20th	104.19	41.02	102.30	40.28	109.00	42.91
25th	104.90	41.30	103.00	40.55	110.00	43.31
30th	105.59	41.57	103.80	40.87	110.70	43.58
35th	105.99	41.73	104.60	41.18	111.40	43.86
40th	106.50	41.93	105.20	41.42	112.20	44.17
45th	107.01	42.13	105.90	41.69	112.80	44.41
50th	107.49	42.32	106.50	41.93	113.60	44.72
55th	107.90	42.48	107.20	42.20	114.30	45.00
60th	108.51	42.72	107.90	42.48	115.00	45.28
65th	109.09	42.95	108.60	42.76	115.60	45.51
70th	109.60	43.15	109.30	43.03	116.30	45.79
75th	110.21	43.39	109.95	43.29	117.00	46.06
80th	110.90	43.66	110.80	43.62	118.00	46.46
85th	111.61	43.94	111.60	43.94	119.10	46.89
90th	112.80	44.41	112.80	44.41	120.60	47.48
95th	114.91	45.24	115.00	45.28	122.60	48.27
97th	116.00	45.67	116.20	45.75	124.10	48.86
98th	116.69	45.94	116.80	45.98	124.70	49.09
99th	118.11	46.50	118.20	46.54	126.30	49.72

Thigh Circumference

The circumference of the right thigh at the gluteal furrow landmark is measured with a tape. The measurement is taken perpendicular to the long axis of the thigh. The participant stands erect with the weight distributed equally on both feet. The legs are spread apart just enough so that the thighs do not touch.

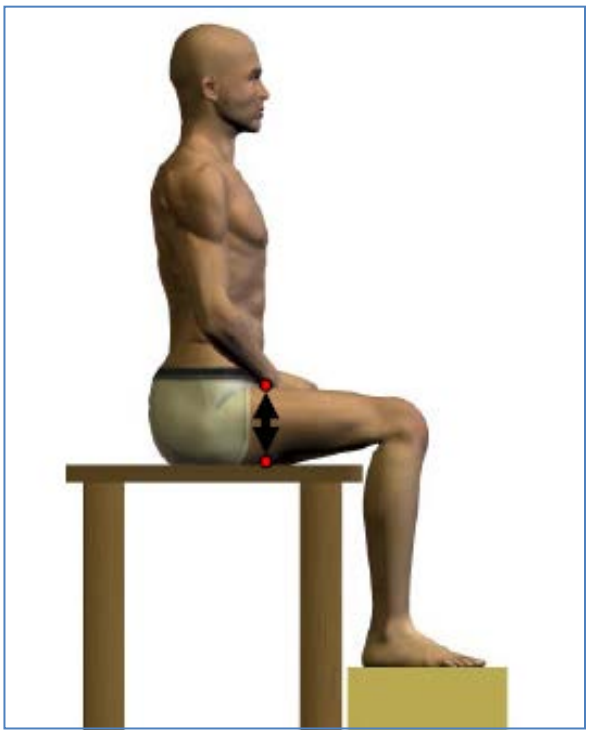
Thigh Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	8.82	9.01	8.79
Symmetry – BETA I	0.22	0.26	0.06
Kurtosis – BETA II	-0.23	-0.14	-0.08
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	60.88	23.97	60.96	24.00	61.05	24.04
SE (mean)	0.18	0.07	0.17	0.07	0.14	0.06
St Dev	5.37	2.11	5.49	2.16	5.37	2.11
Minimum	47.80	18.82	46.50	18.31	45.20	17.80
Maximum	79.20	31.18	80.30	31.61	82.50	32.48
Percentiles						
1st	49.30	19.41	49.90	19.65	49.50	19.49
2nd	50.80	20.00	50.80	20.00	50.30	19.80
3rd	51.51	20.28	51.50	20.28	51.10	20.12
5th	52.50	20.67	52.20	20.55	52.30	20.59
10th	54.20	21.34	54.00	21.26	54.20	21.34
15th	55.30	21.77	54.80	21.57	55.30	21.77
20th	56.21	22.13	56.10	22.09	56.30	22.17
25th	57.10	22.48	57.20	22.52	57.40	22.60
30th	57.81	22.76	57.90	22.80	58.20	22.91
35th	58.50	23.03	58.60	23.07	58.90	23.19
40th	59.11	23.27	59.30	23.35	59.80	23.54
45th	59.89	23.58	60.10	23.66	60.50	23.82
50th	60.60	23.86	60.80	23.94	61.10	24.06
55th	61.19	24.09	61.50	24.21	61.80	24.33
60th	62.00	24.41	62.10	24.45	62.50	24.61
65th	62.89	24.76	63.00	24.80	63.10	24.84
70th	63.70	25.08	63.80	25.12	63.80	25.12
75th	64.49	25.39	64.50	25.39	64.60	25.43
80th	65.51	25.79	65.60	25.83	65.60	25.83
85th	67.01	26.38	66.80	26.30	66.80	26.30
90th	68.10	26.81	68.20	26.85	68.00	26.77
95th	70.10	27.60	70.30	27.68	69.80	27.48
97th	71.40	28.11	71.80	28.27	71.00	27.95
98th	72.29	28.46	72.40	28.50	72.10	28.39
99th	73.30	28.86	74.40	29.29	73.50	28.94

Thigh Clearance

The vertical distance between a sitting surface and the thigh point, top landmark is measured with an anthropometer. The participant sits with the thighs parallel, knees flexed 90°, and the feet in line with the thighs.



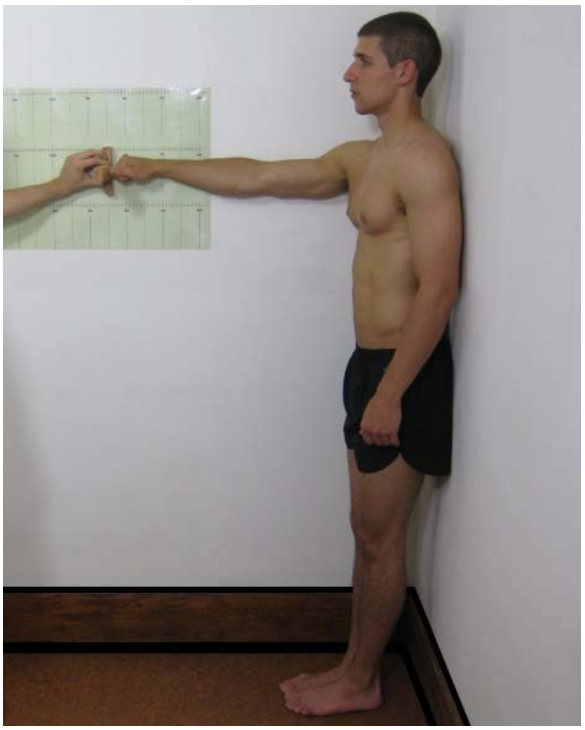
Thigh Clearance

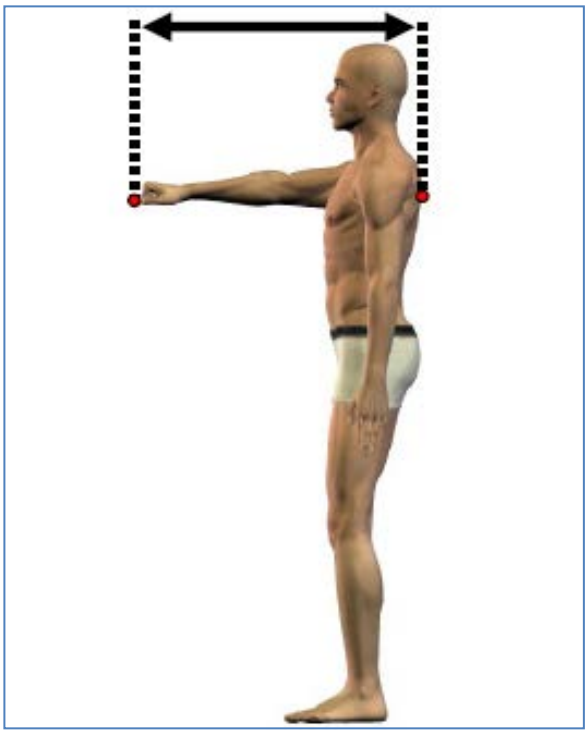
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	7.94	8.31	7.99
Symmetry – BETA I	0.21	0.40	0.29
Kurtosis – BETA II	-0.21	0.28	-0.01
Number of Subjects	913	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	16.71	6.58	16.63	6.55	17.72	6.97
SE (mean)	0.04	0.02	0.04	0.02	0.04	0.01
St Dev	1.33	0.52	1.38	0.54	1.42	0.56
Minimum	13.41	5.28	12.10	4.76	13.90	5.47
Maximum	20.80	8.19	21.70	8.54	23.00	9.06
Percentiles						
1st	14.00	5.51	13.90	5.47	14.80	5.83
2nd	14.20	5.59	14.20	5.59	15.10	5.94
3rd	14.30	5.63	14.30	5.63	15.30	6.02
5th	14.61	5.75	14.50	5.71	15.50	6.10
10th	15.01	5.91	14.90	5.87	15.90	6.26
15th	15.29	6.02	15.20	5.98	16.30	6.42
20th	15.60	6.14	15.50	6.10	16.50	6.50
25th	15.80	6.22	15.70	6.18	16.70	6.57
30th	15.90	6.26	15.80	6.22	16.90	6.65
35th	16.21	6.38	16.00	6.30	17.10	6.73
40th	16.31	6.42	16.20	6.38	17.30	6.81
45th	16.51	6.50	16.40	6.46	17.50	6.89
50th	16.69	6.57	16.50	6.50	17.70	6.97
55th	16.89	6.65	16.70	6.57	17.90	7.05
60th	16.99	6.69	16.90	6.65	18.00	7.09
65th	17.20	6.77	17.10	6.73	18.20	7.17
70th	17.30	6.81	17.30	6.81	18.40	7.24
75th	17.60	6.93	17.40	6.85	18.60	7.32
80th	17.81	7.01	17.70	6.97	18.80	7.40
85th	18.21	7.17	18.00	7.09	19.20	7.56
90th	18.49	7.28	18.50	7.28	19.60	7.72
95th	19.00	7.48	19.10	7.52	20.20	7.95
97th	19.41	7.64	19.60	7.72	20.60	8.11
98th	19.61	7.72	19.90	7.83	20.80	8.19
99th	19.89	7.83	20.20	7.95	21.20	8.35

Thumbtip Reach (TTR)

The horizontal distance from a back wall to the tip of the right thumb is measured on a wall scale. The participant stands erect in a corner, looking straight ahead with the feet together and the heels 20 cm from the back wall. The buttocks and shoulders are against the wall. The right arm and hand, palm down, are stretched forward horizontally along a scale on the side wall. The thumb continues the horizontal line of the arm, and the fingers curve around to form a fist.





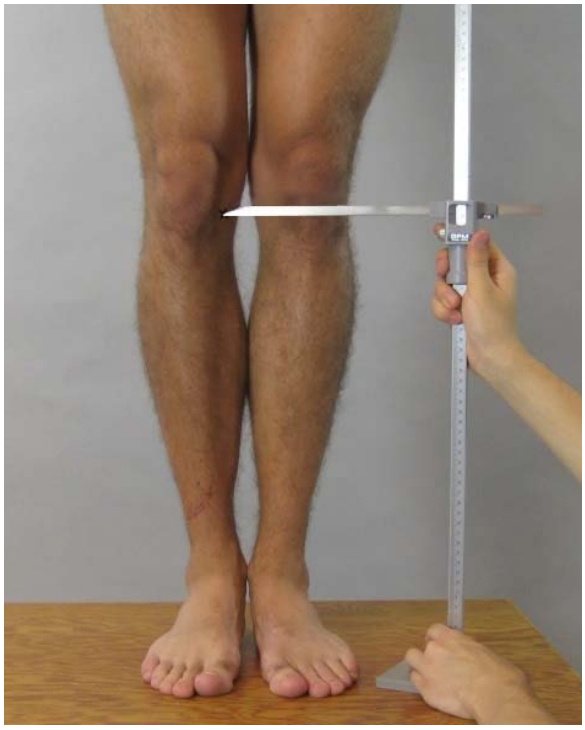
Thumbtip Reach (TTR)

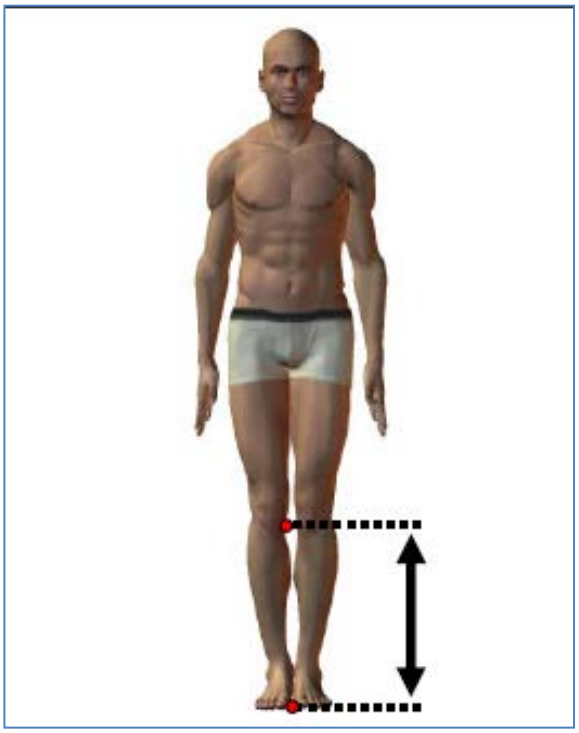
Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.89	5.66	5.21
Symmetry – BETA I	0.18	0.12	0.30
Kurtosis – BETA II	0.06	-0.08	0.14
Number of Subjects	913	1013	1418

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	74.91	29.49	74.85	29.47	81.74	32.18
SE (mean)	0.12	0.05	0.13	0.05	0.11	0.04
St Dev	3.66	1.44	4.23	1.67	4.26	1.68
Minimum	64.39	25.35	61.90	24.37	69.60	27.40
Maximum	87.50	34.45	89.40	35.20	96.20	37.87
Percentiles						
1st	67.21	26.46	65.50	25.79	72.70	28.62
2nd	67.79	26.69	66.40	26.14	73.70	29.02
3rd	68.20	26.85	67.00	26.38	74.30	29.25
5th	69.01	27.17	68.00	26.77	75.10	29.57
10th	70.21	27.64	69.50	27.36	76.50	30.12
15th	70.89	27.91	70.50	27.76	77.40	30.47
20th	71.81	28.27	71.20	28.03	78.20	30.79
25th	72.49	28.54	71.90	28.31	78.80	31.02
30th	72.90	28.70	72.50	28.54	79.40	31.26
35th	73.41	28.90	73.00	28.74	79.90	31.46
40th	73.89	29.09	73.60	28.98	80.50	31.69
45th	74.50	29.33	74.20	29.21	81.00	31.89
50th	74.80	29.45	74.80	29.45	81.55	32.11
55th	75.31	29.65	75.30	29.65	82.10	32.32
60th	75.79	29.84	75.90	29.88	82.60	32.52
65th	76.30	30.04	76.40	30.08	83.00	32.68
70th	76.91	30.28	77.10	30.35	83.70	32.95
75th	77.29	30.43	77.70	30.59	84.50	33.27
80th	78.00	30.71	78.40	30.87	85.20	33.54
85th	78.59	30.94	79.30	31.22	86.20	33.94
90th	79.50	31.30	80.30	31.61	87.40	34.41
95th	81.20	31.97	81.90	32.24	89.20	35.12
97th	81.99	32.28	82.70	32.56	90.10	35.47
98th	83.01	32.68	83.90	33.03	91.60	36.06
99th	83.90	33.03	84.90	33.43	92.20	36.30

Tibial Height

The vertical distance between a standing surface and the tibiale landmark is measured with an anthropometer. The participant stands erect on a table with the feet together and the weight distributed equally on both feet.





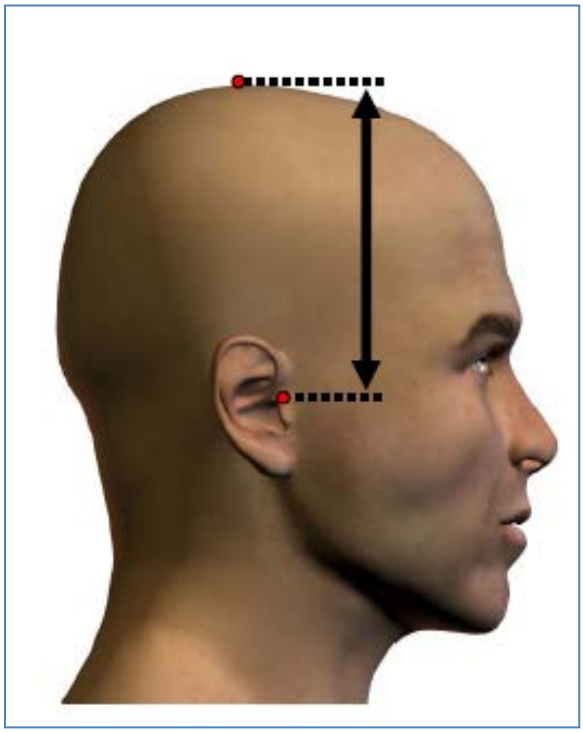
Tibial Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.75	5.63	5.57
Symmetry – BETA I	0.08	0.18	0.14
Kurtosis – BETA II	0.27	-0.12	0.39
Number of Subjects	912	1012	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	44.78	17.63	44.15	17.38	47.56	18.72
SE (mean)	0.07	0.03	0.08	0.03	0.07	0.03
St Dev	2.13	0.84	2.49	0.98	2.65	1.04
Minimum	37.90	14.92	36.60	14.41	37.80	14.88
Maximum	52.10	20.51	52.70	20.75	58.40	22.99
Percentiles						
1st	39.90	15.71	38.80	15.28	41.50	16.34
2nd	40.41	15.91	39.40	15.51	42.30	16.65
3rd	40.89	16.10	39.60	15.59	42.60	16.77
5th	41.30	16.26	40.20	15.83	43.40	17.09
10th	42.19	16.61	41.00	16.14	44.30	17.44
15th	42.70	16.81	41.60	16.38	44.90	17.68
20th	43.10	16.97	42.00	16.54	45.40	17.87
25th	43.31	17.05	42.40	16.69	45.80	18.03
30th	43.69	17.20	42.70	16.81	46.20	18.19
35th	43.89	17.28	43.00	16.93	46.50	18.31
40th	44.20	17.40	43.40	17.09	46.80	18.43
45th	44.50	17.52	43.70	17.20	47.10	18.54
50th	44.81	17.64	44.10	17.36	47.50	18.70
55th	45.01	17.72	44.40	17.48	47.80	18.82
60th	45.29	17.83	44.70	17.60	48.10	18.94
65th	45.49	17.91	45.10	17.76	48.50	19.09
70th	45.80	18.03	45.40	17.87	48.80	19.21
75th	46.20	18.19	45.90	18.07	49.20	19.37
80th	46.61	18.35	46.30	18.23	49.70	19.57
85th	46.99	18.50	46.90	18.46	50.30	19.80
90th	47.50	18.70	47.40	18.66	51.10	20.12
95th	48.11	18.94	48.20	18.98	51.90	20.43
97th	48.69	19.17	48.90	19.25	52.60	20.71
98th	49.20	19.37	49.30	19.41	53.40	21.02
99th	50.01	19.69	50.00	19.69	54.20	21.34

Tragion to Top of Head (TTOH)

The vertical distance between the right tragion landmark and the horizontal plane tangent to the top of the head is measured with a beam caliper with a paddle blade. The participant sits with the head in the Frankfurt plane. For female participants with braids or cornrows, the measurement includes the styled hair.



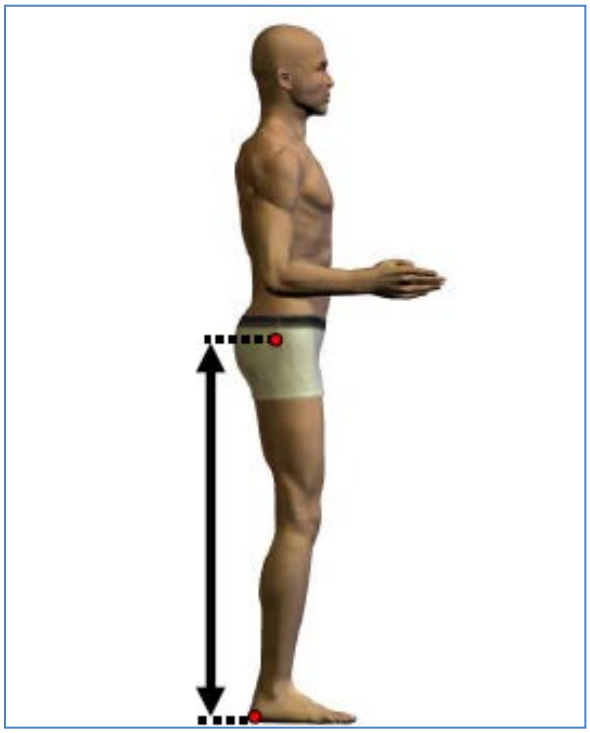
Tragion to Top of Head (TTOH)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.89	5.09	4.62
Symmetry – BETA I	-0.01	-0.01	-0.12
Kurtosis – BETA II	0.03	0.01	0.14
Number of Subjects	913	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	12.66	4.98	12.68	4.99	13.16	5.18
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.62	0.24	0.64	0.25	0.61	0.24
Minimum	10.69	4.21	10.50	4.13	11.00	4.33
Maximum	14.81	5.83	14.70	5.79	15.00	5.91
Percentiles						
1st	11.20	4.41	11.20	4.41	11.60	4.57
2nd	11.40	4.49	11.40	4.49	11.80	4.65
3rd	11.51	4.53	11.50	4.53	12.00	4.72
5th	11.61	4.57	11.60	4.57	12.10	4.76
10th	11.91	4.69	11.80	4.65	12.40	4.88
15th	11.99	4.72	12.00	4.72	12.60	4.96
20th	12.09	4.76	12.10	4.76	12.70	5.00
25th	12.19	4.80	12.20	4.80	12.80	5.04
30th	12.29	4.84	12.30	4.84	12.90	5.08
35th	12.40	4.88	12.50	4.92	12.90	5.08
40th	12.50	4.92	12.50	4.92	13.00	5.12
45th	12.60	4.96	12.60	4.96	13.10	5.16
50th	12.70	5.00	12.70	5.00	13.10	5.16
55th	12.70	5.00	12.80	5.04	13.20	5.20
60th	12.80	5.04	12.80	5.04	13.30	5.24
65th	12.90	5.08	12.90	5.08	13.40	5.28
70th	13.00	5.12	13.00	5.12	13.50	5.31
75th	13.11	5.16	13.10	5.16	13.60	5.35
80th	13.21	5.20	13.20	5.20	13.70	5.39
85th	13.31	5.24	13.30	5.24	13.80	5.43
90th	13.41	5.28	13.50	5.31	14.00	5.51
95th	13.69	5.39	13.80	5.43	14.20	5.59
97th	13.89	5.47	13.90	5.47	14.30	5.63
98th	14.00	5.51	14.00	5.51	14.40	5.67
99th	14.10	5.55	14.20	5.59	14.50	5.71

Trochanterion Height

The vertical distance between a standing surface and the trochanterion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet.



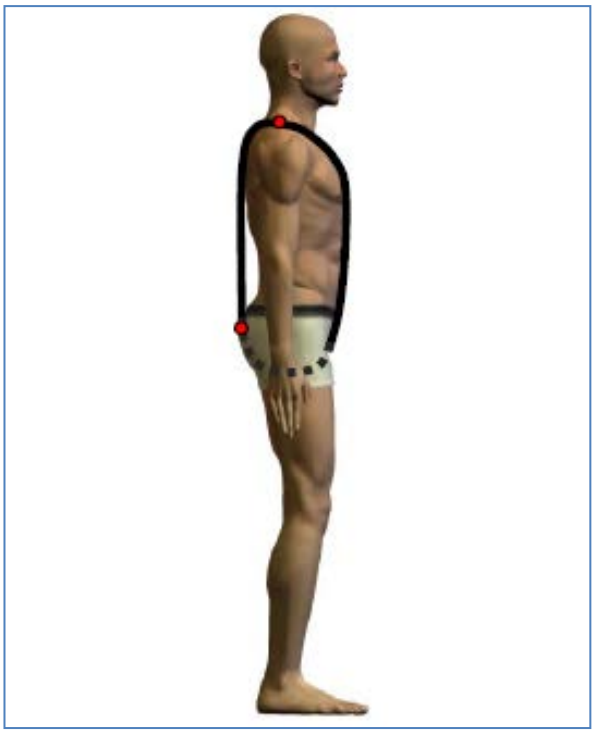
Trochanterion Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.34	5.23	5.48
Symmetry – BETA I	0.13	0.20	0.09
Kurtosis – BETA II	0.27	0.13	0.01
Number of Subjects	912	1013	1421

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	86.23	33.95	85.17	33.53	91.47	36.01
SE (mean)	0.12	0.05	0.14	0.06	0.13	0.05
St Dev	3.74	1.47	4.45	1.75	5.02	1.97
Minimum	75.90	29.88	72.90	28.70	74.80	29.45
Maximum	99.80	39.29	99.80	39.29	109.00	42.91
Percentiles						
1st	77.50	30.51	76.10	29.96	80.00	31.50
2nd	78.69	30.98	76.70	30.20	81.50	32.09
3rd	79.20	31.18	77.10	30.35	82.30	32.40
5th	79.91	31.46	78.00	30.71	83.70	32.95
10th	81.51	32.09	79.20	31.18	85.10	33.50
15th	82.40	32.44	80.30	31.61	86.40	34.02
20th	83.31	32.80	81.40	32.05	87.30	34.37
25th	83.79	32.99	82.10	32.32	88.00	34.65
30th	84.30	33.19	82.80	32.60	88.60	34.88
35th	84.71	33.35	83.40	32.83	89.40	35.20
40th	85.19	33.54	84.10	33.11	90.10	35.47
45th	85.70	33.74	84.60	33.31	90.80	35.75
50th	86.21	33.94	85.20	33.54	91.40	35.98
55th	86.69	34.13	85.70	33.74	92.00	36.22
60th	87.20	34.33	86.30	33.98	92.60	36.46
65th	87.71	34.53	86.80	34.17	93.20	36.69
70th	88.19	34.72	87.30	34.37	94.00	37.01
75th	88.70	34.92	88.10	34.69	94.70	37.28
80th	89.31	35.16	88.80	34.96	95.70	37.68
85th	90.09	35.47	89.60	35.28	96.80	38.11
90th	91.01	35.83	90.70	35.71	98.10	38.62
95th	92.10	36.26	92.30	36.34	99.80	39.29
97th	92.99	36.61	94.00	37.01	101.50	39.96
98th	94.11	37.05	95.20	37.48	102.10	40.20
99th	95.81	37.72	97.10	38.23	102.90	40.51

Verticial Trunk Circumference

The vertical circumference of the torso is measured with a tape passing over the buttock point posterior landmark, to the right of the genitalia, midway between the sternum and the anterior axillary fold, and across the midshoulder landmark. The participant stands erect, looking straight ahead with the right arm hanging relaxed at the side. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.



Verticial Trunk Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.54	4.91	4.99
Symmetry – BETA I	0.21	0.07	0.05
Kurtosis – BETA II	0.02	-0.23	-0.05
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	158.25	62.30	156.39	61.57	165.64	65.21
SE (mean)	0.24	0.09	0.24	0.09	0.22	0.09
St Dev	7.19	2.83	7.68	3.02	8.27	3.26
Minimum	138.61	54.57	135.50	53.35	140.20	55.20
Maximum	184.10	72.48	182.80	71.97	196.30	77.28
Percentiles						
1st	142.70	56.18	139.10	54.76	147.70	58.15
2nd	144.60	56.93	141.50	55.71	149.20	58.74
3rd	145.21	57.17	142.40	56.06	150.00	59.06
5th	146.61	57.72	143.70	56.57	151.80	59.76
10th	149.20	58.74	146.50	57.68	154.90	60.98
15th	150.80	59.37	148.30	58.39	156.80	61.73
20th	151.99	59.84	149.80	58.98	158.60	62.44
25th	153.39	60.39	151.20	59.53	159.80	62.91
30th	154.41	60.79	152.10	59.88	161.40	63.54
35th	155.30	61.14	153.20	60.31	162.50	63.98
40th	156.11	61.46	154.20	60.71	163.60	64.41
45th	157.00	61.81	155.10	61.06	164.60	64.80
50th	157.91	62.17	156.20	61.50	165.65	65.22
55th	158.80	62.52	157.50	62.01	166.70	65.63
60th	159.79	62.91	158.40	62.36	167.60	65.98
65th	160.71	63.27	159.60	62.83	168.70	66.42
70th	161.59	63.62	160.60	63.23	169.80	66.85
75th	163.30	64.29	161.80	63.70	171.10	67.36
80th	164.69	64.84	162.90	64.13	172.70	67.99
85th	165.81	65.28	164.60	64.80	174.40	68.66
90th	167.21	65.83	166.30	65.47	176.40	69.45
95th	170.10	66.97	168.50	66.34	179.30	70.59
97th	172.39	67.87	171.10	67.36	181.30	71.38
98th	173.41	68.27	172.60	67.95	182.70	71.93
99th	175.21	68.98	174.50	68.70	184.40	72.60

Waist Breadth

The horizontal breadth of the waist at the level of omphalion is measured with a beam caliper. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.

Waist Breadth

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	10.84	10.96	9.94
Symmetry – BETA I	0.46	0.44	0.26
Kurtosis – BETA II	0.18	0.11	-0.27
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	29.98	11.80	29.82	11.74	31.74	12.50
SE (mean)	0.11	0.04	0.10	0.04	0.08	0.03
St Dev	3.25	1.28	3.27	1.29	3.15	1.24
Minimum	21.31	8.39	21.90	8.62	23.60	9.29
Maximum	40.89	16.10	40.90	16.10	43.50	17.13
Percentiles						
1st	23.90	9.41	23.50	9.25	25.40	10.00
2nd	24.41	9.61	24.10	9.49	26.00	10.24
3rd	24.79	9.76	24.40	9.61	26.40	10.39
5th	25.20	9.92	25.00	9.84	26.90	10.59
10th	25.91	10.20	25.70	10.12	27.80	10.94
15th	26.59	10.47	26.40	10.39	28.40	11.18
20th	27.10	10.67	27.00	10.63	28.90	11.38
25th	27.51	10.83	27.50	10.83	29.30	11.54
30th	28.09	11.06	27.80	10.94	29.80	11.73
35th	28.60	11.26	28.30	11.14	30.30	11.93
40th	29.01	11.42	28.80	11.34	30.80	12.13
45th	29.39	11.57	29.30	11.54	31.20	12.28
50th	29.69	11.69	29.70	11.69	31.50	12.40
55th	30.00	11.81	30.00	11.81	32.00	12.60
60th	30.51	12.01	30.40	11.97	32.50	12.80
65th	30.99	12.20	30.90	12.17	32.90	12.95
70th	31.39	12.36	31.40	12.36	33.40	13.15
75th	32.00	12.60	31.90	12.56	34.00	13.39
80th	32.59	12.83	32.50	12.80	34.60	13.62
85th	33.50	13.19	33.00	12.99	35.30	13.90
90th	34.39	13.54	34.10	13.43	36.00	14.17
95th	35.61	14.02	35.70	14.06	37.00	14.57
97th	36.70	14.45	36.70	14.45	37.60	14.80
98th	37.39	14.72	37.40	14.72	38.20	15.04
99th	38.89	15.31	38.60	15.20	39.00	15.35

Waist Circumference (Omphalion)

The horizontal circumference of the waist, passing over all omphalion landmarks, is measured with a tape. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.

Waist Circumference (Omphalion)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	11.52	11.58	11.00
Symmetry – BETA I	0.49	0.50	0.34
Kurtosis – BETA II	-0.02	0.19	-0.27
Number of Subjects	913	1011	1415

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	84.96	33.45	85.06	33.49	90.63	35.68
SE (mean)	0.32	0.13	0.31	0.12	0.27	0.10
St Dev	9.79	3.85	9.85	3.88	9.97	3.92
Minimum	61.11	24.06	61.50	24.21	68.30	26.89
Maximum	117.40	46.22	117.50	46.26	130.60	51.42
Percentiles						
1st	67.01	26.38	66.50	26.18	72.20	28.43
2nd	68.61	27.01	67.90	26.73	73.20	28.82
3rd	69.19	27.24	68.80	27.09	74.40	29.29
5th	70.51	27.76	70.30	27.68	75.70	29.80
10th	73.10	28.78	72.80	28.66	78.00	30.71
15th	74.90	29.49	75.10	29.57	79.80	31.42
20th	76.20	30.00	76.90	30.28	81.45	32.07
25th	77.80	30.63	78.20	30.79	82.80	32.60
30th	79.10	31.14	79.50	31.30	84.10	33.11
35th	80.39	31.65	80.50	31.69	85.90	33.82
40th	81.41	32.05	81.60	32.13	87.40	34.41
45th	82.60	32.52	82.80	32.60	88.50	34.84
50th	84.00	33.07	84.20	33.15	90.20	35.51
55th	85.19	33.54	85.40	33.62	91.50	36.02
60th	86.51	34.06	86.80	34.17	93.00	36.61
65th	87.91	34.61	88.00	34.65	94.40	37.17
70th	89.61	35.28	89.50	35.24	95.90	37.76
75th	91.11	35.87	91.00	35.83	97.40	38.35
80th	93.09	36.65	92.70	36.50	99.15	39.04
85th	95.50	37.60	95.40	37.56	101.50	39.96
90th	97.99	38.58	98.20	38.66	104.70	41.22
95th	102.79	40.47	103.20	40.63	107.50	42.32
97th	105.51	41.54	105.70	41.61	110.20	43.39
98th	107.59	42.36	108.50	42.72	111.30	43.82
99th	110.59	43.54	112.50	44.29	112.80	44.41

Waist Depth (Omphalion)

The horizontal distance between the anterior and posterior omphalion landmarks is measured with a beam caliper. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The measurement is taken at the maximum point of quiet respiration.

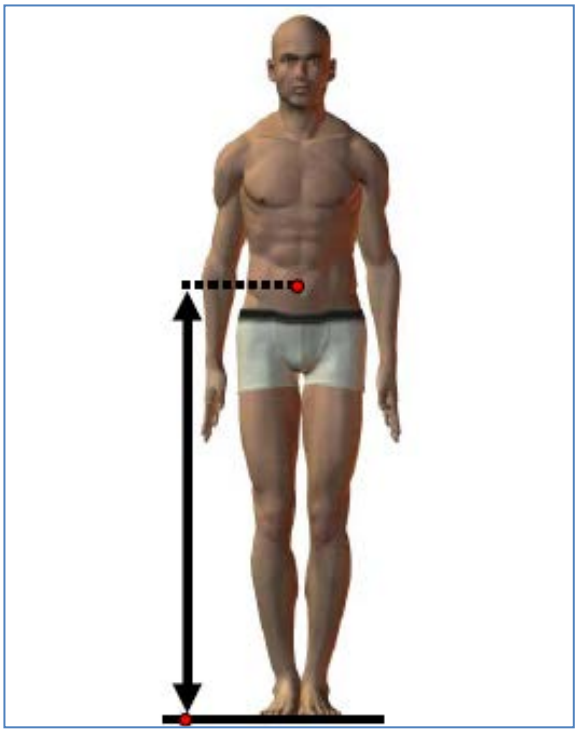
Waist Depth (Omphalion)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	14.33	14.58	13.10
Symmetry – BETA I	0.68	0.72	0.56
Kurtosis – BETA II	0.38	0.59	0.20
Number of Subjects	912	1013	1422

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	20.40	8.03	20.80	8.19	22.68	8.93
SE (mean)	0.10	0.04	0.10	0.04	0.08	0.03
St Dev	2.92	1.15	3.03	1.19	2.97	1.17
Minimum	13.79	5.43	13.80	5.43	16.70	6.57
Maximum	32.00	12.60	33.20	13.07	36.20	14.25
Percentiles						
1st	15.49	6.10	15.50	6.10	17.30	6.81
2nd	15.80	6.22	16.00	6.30	17.60	6.93
3rd	16.00	6.30	16.10	6.34	17.90	7.05
5th	16.31	6.42	16.40	6.46	18.40	7.24
10th	16.99	6.69	17.20	6.77	19.10	7.52
15th	17.50	6.89	17.70	6.97	19.60	7.72
20th	17.81	7.01	18.30	7.20	20.10	7.91
25th	18.29	7.20	18.70	7.36	20.50	8.07
30th	18.59	7.32	19.00	7.48	20.90	8.23
35th	18.90	7.44	19.40	7.64	21.20	8.35
40th	19.20	7.56	19.80	7.80	21.60	8.50
45th	19.61	7.72	20.10	7.91	22.00	8.66
50th	19.99	7.87	20.40	8.03	22.30	8.78
55th	20.40	8.03	20.80	8.19	22.70	8.94
60th	20.80	8.19	21.10	8.31	23.20	9.13
65th	21.21	8.35	21.50	8.46	23.60	9.29
70th	21.59	8.50	21.90	8.62	24.10	9.49
75th	22.20	8.74	22.50	8.86	24.60	9.69
80th	22.81	8.98	23.20	9.13	25.20	9.92
85th	23.50	9.25	23.90	9.41	25.90	10.20
90th	24.41	9.61	24.90	9.80	26.60	10.47
95th	26.01	10.24	26.60	10.47	28.10	11.06
97th	26.59	10.47	27.80	10.94	28.90	11.38
98th	27.51	10.83	28.40	11.18	29.50	11.61
99th	28.30	11.14	29.30	11.54	30.40	11.97

Waist Height (Omphalion)

The vertical distance between a standing surface and the anterior omphalion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead. The heels are together with the weight distributed equally on both feet. The shoulders and upper extremities are relaxed. The measurement is taken at the maximum point of quiet respiration.



Waist Height (Omphalion)

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.11	5.04	4.81
Symmetry – BETA I	0.10	0.04	0.02
Kurtosis – BETA II	0.11	-0.40	0.10
Number of Subjects	913	1003	1415

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	100.50	39.57	99.04	38.99	107.46	42.31
SE (mean)	0.14	0.05	0.16	0.06	0.14	0.05
St Dev	4.13	1.63	4.99	1.97	5.17	2.04
Minimum	89.41	35.20	86.50	34.06	89.40	35.20
Maximum	114.20	44.96	112.70	44.37	124.50	49.02
Percentiles						
1st	91.21	35.91	88.30	34.76	95.10	37.44
2nd	91.80	36.14	89.30	35.16	96.80	38.11
3rd	92.61	36.46	89.80	35.35	97.70	38.46
5th	93.70	36.89	90.80	35.75	99.00	38.98
10th	95.30	37.52	92.30	36.34	101.10	39.80
15th	96.29	37.91	93.60	36.85	102.30	40.28
20th	97.10	38.23	94.80	37.32	103.20	40.63
25th	97.69	38.46	95.60	37.64	104.00	40.94
30th	98.30	38.70	96.30	37.91	104.70	41.22
35th	98.91	38.94	97.00	38.19	105.40	41.50
40th	99.39	39.13	97.60	38.43	106.00	41.73
45th	100.00	39.37	98.30	38.70	106.70	42.01
50th	100.61	39.61	99.10	39.02	107.40	42.28
55th	100.99	39.76	99.80	39.29	108.10	42.56
60th	101.50	39.96	100.40	39.53	108.70	42.80
65th	102.01	40.16	100.90	39.72	109.50	43.11
70th	102.69	40.43	101.80	40.08	110.10	43.35
75th	103.20	40.63	102.50	40.35	110.90	43.66
80th	103.91	40.91	103.40	40.71	111.70	43.98
85th	104.70	41.22	104.50	41.14	112.80	44.41
90th	105.51	41.54	105.50	41.54	114.30	45.00
95th	107.29	42.24	107.30	42.24	115.90	45.63
97th	108.71	42.80	108.40	42.68	117.40	46.22
98th	109.60	43.15	109.30	43.03	118.10	46.50
99th	111.20	43.78	110.10	43.35	119.90	47.20

Weight

The weight of the participant is taken to the nearest tenth of a kilogram. The participant stands on the platform of a scale with the weight distributed evenly on both feet.

Weight

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	15.37	15.37	14.51
Symmetry – BETA I	0.50	0.54	0.32
Kurtosis – BETA II	0.23	0.21	0.03
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	KG	LB	KG	LB	KG	LB
Mean	67.83	149.54	66.18	145.91	82.62	182.15
SE (mean)	0.34	0.76	0.32	0.70	0.32	0.70
St Dev	10.42	22.98	10.17	22.43	11.98	26.42
Minimum	40.00	88.18	43.09	95.00	46.72	103.00
Maximum	108.20	238.54	104.33	230.00	127.01	280.00
Percentiles						
1st	48.20	106.26	47.63	105.00	58.97	130.00
2nd	49.30	108.69	48.99	108.00	61.23	135.00
3rd	50.80	111.99	49.90	110.00	62.14	137.00
5th	52.16	115.00	51.26	113.00	63.50	140.00
10th	55.20	121.70	54.43	120.00	68.04	150.00
15th	57.40	126.55	55.79	123.00	70.31	155.00
20th	58.80	129.63	57.15	126.00	72.57	160.00
25th	59.90	132.06	58.97	130.00	74.84	165.00
30th	61.40	135.36	59.87	132.00	76.20	168.00
35th	63.10	139.11	61.23	135.00	77.11	170.00
40th	64.60	142.42	62.60	138.00	79.38	175.00
45th	65.90	145.28	63.50	140.00	80.29	177.00
50th	67.10	147.93	65.77	145.00	81.65	180.00
55th	68.50	151.02	66.22	146.00	83.91	185.00
60th	69.60	153.44	68.04	150.00	84.82	187.00
65th	70.90	156.31	69.40	153.00	86.18	190.00
70th	72.40	159.61	70.31	155.00	88.45	195.00
75th	74.20	163.58	72.57	160.00	90.72	200.00
80th	76.00	167.55	74.84	165.00	92.99	205.00
85th	78.30	172.62	77.11	170.00	95.25	210.00
90th	82.30	181.44	79.83	176.00	97.52	215.00
95th	86.40	190.48	83.91	185.00	103.42	228.00
97th	91.00	200.62	88.45	195.00	107.05	236.00
98th	92.00	202.83	90.72	200.00	109.32	241.00
99th	95.00	209.44	93.44	206.00	113.40	250.00

Wrist Circumference

The circumference of the wrist, perpendicular to the long axis of the forearm, is measured with a tape passing over the stylion landmark. The participant extends the right arm forward with the palm up.

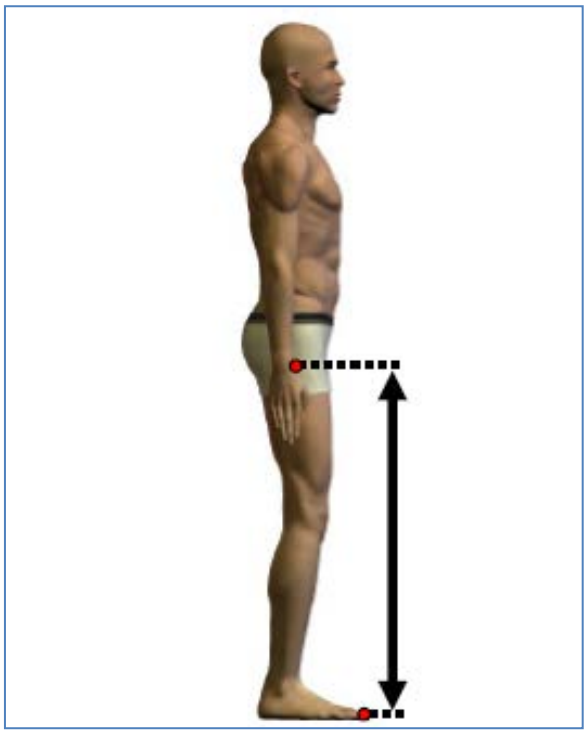
Wrist Circumference

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.58	5.00	4.77
Symmetry – BETA I	0.12	0.17	0.21
Kurtosis – BETA II	0.05	0.23	0.11
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	15.61	6.15	15.48	6.09	17.53	6.90
SE (mean)	0.02	0.01	0.02	0.01	0.02	0.01
St Dev	0.71	0.28	0.77	0.30	0.84	0.33
Minimum	13.41	5.28	12.40	4.88	15.00	5.91
Maximum	18.21	7.17	18.10	7.13	20.60	8.11
Percentiles						
1st	14.00	5.51	13.80	5.43	15.70	6.18
2nd	14.20	5.59	14.00	5.51	15.90	6.26
3rd	14.30	5.63	14.10	5.55	16.00	6.30
5th	14.50	5.71	14.30	5.63	16.20	6.38
10th	14.71	5.79	14.50	5.71	16.50	6.50
15th	14.91	5.87	14.70	5.79	16.70	6.57
20th	15.01	5.91	14.80	5.83	16.80	6.61
25th	15.19	5.98	15.00	5.91	16.90	6.65
30th	15.19	5.98	15.00	5.91	17.00	6.69
35th	15.29	6.02	15.20	5.98	17.20	6.77
40th	15.39	6.06	15.30	6.02	17.30	6.81
45th	15.49	6.10	15.40	6.06	17.40	6.85
50th	15.60	6.14	15.50	6.10	17.50	6.89
55th	15.70	6.18	15.50	6.10	17.60	6.93
60th	15.80	6.22	15.60	6.14	17.70	6.97
65th	15.90	6.26	15.70	6.18	17.90	7.05
70th	16.00	6.30	15.80	6.22	18.00	7.09
75th	16.10	6.34	16.00	6.30	18.10	7.13
80th	16.21	6.38	16.10	6.34	18.20	7.17
85th	16.41	6.46	16.30	6.42	18.40	7.24
90th	16.51	6.50	16.50	6.50	18.60	7.32
95th	16.79	6.61	16.80	6.61	18.90	7.44
97th	16.99	6.69	17.00	6.69	19.10	7.52
98th	17.09	6.73	17.20	6.77	19.30	7.60
99th	17.30	6.81	17.40	6.85	19.70	7.76

Wrist Height

The vertical distance between a standing surface and the stylion landmark is measured with an anthropometer. The participant stands erect, looking straight ahead with the heels together and the weight distributed equally on both feet. The shoulders are relaxed, and the arms are extended downwards with the elbow, wrist, and fingers held rigidly straight. The arms lightly touch the sides. The measurement is taken at the maximum point of quiet respiration.



Wrist Height

Summary Statistics	Female Aircrew	Female Non-Aircrew	Male Non-Aircrew
Coeff. Of Variation	4.14	4.81	4.82
Symmetry – BETA I	0.15	0.07	0.06
Kurtosis – BETA II	0.30	0.02	0.19
Number of Subjects	913	1013	1423

Summary Statistics	Female Aircrew		Female Non-Aircrew		Male Non-Aircrew	
	CM	IN	CM	IN	CM	IN
Mean	81.76	32.19	80.15	31.56	85.58	33.69
SE (mean)	0.11	0.04	0.12	0.05	0.11	0.04
St Dev	3.39	1.33	3.86	1.52	4.13	1.63
Minimum	70.31	27.68	68.60	27.01	70.40	27.72
Maximum	94.11	37.05	91.80	36.14	100.90	39.72
Percentiles						
1st	73.89	29.09	71.60	28.19	76.00	29.92
2nd	75.21	29.61	72.20	28.43	76.70	30.20
3rd	75.79	29.84	72.70	28.62	77.80	30.63
5th	76.40	30.08	73.80	29.06	79.00	31.10
10th	77.70	30.59	75.20	29.61	80.40	31.65
15th	78.51	30.91	76.20	30.00	81.40	32.05
20th	78.89	31.06	76.90	30.28	82.20	32.36
25th	79.40	31.26	77.60	30.55	82.80	32.60
30th	79.91	31.46	78.10	30.75	83.40	32.83
35th	80.29	31.61	78.70	30.98	84.00	33.07
40th	80.80	31.81	79.20	31.18	84.50	33.27
45th	81.31	32.01	79.70	31.38	85.00	33.46
50th	81.71	32.17	80.10	31.54	85.50	33.66
55th	82.19	32.36	80.60	31.73	86.10	33.90
60th	82.50	32.48	81.10	31.93	86.60	34.09
65th	82.91	32.64	81.50	32.09	87.10	34.29
70th	83.31	32.80	82.10	32.32	87.70	34.53
75th	83.90	33.03	82.70	32.56	88.30	34.76
80th	84.51	33.27	83.20	32.76	89.00	35.04
85th	85.29	33.58	84.00	33.07	89.90	35.39
90th	86.11	33.90	85.00	33.46	90.90	35.79
95th	87.50	34.45	86.60	34.09	92.30	36.34
97th	88.39	34.80	87.60	34.49	93.50	36.81
98th	89.31	35.16	88.30	34.76	93.90	36.97
99th	90.09	35.47	89.80	35.35	95.00	37.40

Appendix B
Observer and Allowable Error; According to ANSUR-II

The ANSUR (Gordon 1989) survey established an allowable observer error for each dimension prior to the commencement of data collection. Inter-observer data was also collected weekly in order to monitor performance. The following tables show the means of the absolute values of the deltas for each measured dimension. The right-hand columns show the allowable error for each dimension. Dimensions are grouped by type.

Observer Error for Standing Heights[2]
(values in mm)

	Males		Females		
Dimension	n	Observer* Error	n	Observer Error	Allowable Error
Acromial Height	337	3.6	174	3.4	7
Axilla Height	337	4.2	174	4.8	7
Buttock Height	354	2.4	201	2.3	4
Cervicale Height	337	2.8	174	3.0	7
Chest Height	354	4.9	201	6.0	9
Crotch Height	354	6.2	201	5.8	10
Iliocristale Height	337	2.6	174	3.1	5
Knee Height, Midpatella	354	2.8	201	2.2	6
Lateral Femoral Epicondyle Height	354	1.6	201	1.7	3
Lateral Malleolus Height	300	1.1	161	1.2	2
Stature	337	3.1	174	2.8	6
Suprasternale Height	337	3.5	174	3.4	5
Tenth Rib Height	337	2.6	174	2.3	5
Tibial Height	354	1.9	201	1.9	2
Trochanterion Height	354	2.5	201	2.6	4
Waist Height (Omphalion)	337	3.6	174	4.0	7
Wrist Height	337	6.4	174	5.8	11

*MAD

Observer Error for Sitting Heights
(values in mm)

	Males		Females		
Dimension	n	Observer Error	n	Observer Error	Allowable Error
Elbow Rest Height	345	5.5	166	5.5	10
Eye Height, Sitting	345	3.9	166	4.4	8
Knee Height, Sitting	345	1.8	166	2.1	2
Popliteal Height	345	2.2	166	2.6	6
Sitting Height	345	2.7	166	3.1	6
Thigh Clearance	345	1.7	166	1.8	3
Waist Front Length, Sitting	345	5.3	166	5.5	7

Observer Error for Lengths
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Acromion-Radiale Length	337	2.5	174	2.7	4
Buttock-Knee Length	345	5.1	166	5.1	6
Buttock-Popliteal Length	345	5.8	166	5.8	7
Crotch Length (Omphalion)	354	11.6	201	8.1	18
Crotch Length, Posterior (Omphalion)	354	8.6	201	7.4	11
Forearm-Center of Grip Length	337	4.1	174	4.8	7
Forearm-Hand Length	337	2.4	174	2.3	4
Functional Leg Length	345	7.8	166	13.0	17
Interscye I	337	5.3	174	5.7	10
Interscye II	337	5.1	174	5.2	13
Radiale-Stylion Length	337	3.4	174	3.5	6
Shoulder-Elbow Length	337	2.5	174	2.7	6
Shoulder Length	337	2.2	174	2.4	3
Sleeve Length: Spine-Wrist	337	5.3	174	3.7	9
Sleeve Outseam	337	3.8	174	3.7	6
Waist Back Length (Omphalion)	337	3.0	174	2.9	5

Observer Error for Breadths
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Biacromial Breadth	345	3.4	166	4.3	8
Bicristal Breadth	354	4.3	201	5.7	8
Bideltoid Breadth	345	4.6	166	5.0	8
Bimalleolar Breadth	300	1.2	161	1.0	2
Chest Breadth	354	5.0	201	4.9	7
Forearm-Forearm Breadth	345	8.4	166	10.4	17
Hip Breadth	354	2.4	201	3.2	6
Hip Breadth, Sitting	345	3.8	166	4.9	6
Waist Breadth	354	3.5	201	3.9	6

Observer Error for Depths and Weight
(values in mm and kg)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Abdominal Extension Depth, Sitting	345	4.5	166	4.8	10
Buttock Depth	354	4.9	201	5.0	8
Chest Depth	354	3.5	201	3.5	4
Waist Depth	354	3.7	201	3.5	6
Weight	337	0.1	174	0.1	0.3

Observer Error for Large Circumferences
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Buttock Circumference	354	5.6	201	4.8	12
Chest Circumference	354	8.2	201	8.5	14
Shoulder Circumference	338	5.6	172	5.1	12
Vertical Trunk Circumference (USA)	354	16.8	201	11.8	24
Waist Circumference (Omphalion)	338	5.9	172	5.9	12

Observer Error for Small Circumferences
(values in mm)

Dimension	Males		Females		Allowable Error
	n	Observer Error	n	Observer Error	
Ankle Circumference	300	1.8	161	2.0	4
Biceps Circumference, Flexed	337	3.2	174	4.8	6
Calf Circumference	300	1.8	161	1.8	4
Forearm Circumference, Flexed	337	3.5	174	3.7	5
Heel-Ankle Circumference	300	2.0	161	1.9	4
Lower Thigh Circumference	334	2.2	163	3.0	4
Neck Circumference	337	3.0	174	3.5	6
Neck Circumference, Base	337	3.6	174	4.4	8
Thigh Circumference	354	5.1	201	4.3	6
Wrist Circumference	337	1.9	174	2.0	3

Observer Error for Head Dimensions
(values in mm)

Dimension	Males n	Males Observer Error	Females n	Females Observer Error	Allowable Error
Bitragion Chin Arc	300	3.0	161	3.0	8
Bitragion Submandibular Arc	300	3.4	161	4.3	6
Bizygomatic Breadth	300	1.2	161	1.3	2
Ear Breadth	300	1.2	161	1.2	2
Ear Length	300	1.4	161	1.3	2
Ear Protrusion	300	1.0	161	1.2	3
Head Breadth	300	0.9	161	1.1	2
Head Circumference	300	1.8	161	2.0	3
Head Length	300	1.0	161	1.6	2
Interpupillary Breadth	300	0.8	161	0.9	2
Menton-Sellion Length	300	1.7	161	1.8	3
Tragion-Top of Head	300	1.8	161	2.1	4

Observer Error for Hand Dimensions
(values in mm)

Dimension	Males N	Males Observer Error	Females n	Females Observer Error	Allowable Error
Hand Breadth	300	1.3	161	1.3	2
Hand Circumference	300	1.6	161	1.7	3
Hand Length	300	1.6	161	1.6	3
Palm Length	300	1.4	161	1.5	2

Observer Error for Foot Dimensions
(values in mm)

Dimension	Males N	Males Observer Error	Females n	Females Observer Error	Allowable Error
Ball of Foot Circumference	300	1.9	161	1.9	4
Ball of Foot Length	299	1.4	161	1.3	2
Foot Breadth, Horizontal	299	1.3	161	1.4	2
Foot Length	299	1.2	161	1.3	3
Heel Breadth	300	1.2	161	1.3	2

Observer Error for Reach Dimensions
(values in mm)

Dimension	Males N	Males Observer Error	Females n	Females Observer Error	Allowable Error
Overhead Fingertip Reach, Sitting	345	7.7	166	10.1	20
Span	345	7.6	166	9.7	10
Thumbtip Reach	345	8.6	166	11.0	20