On the use of self-reported anthropometric measurements in ergonomics

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Introduction:
Anthropometry plays a great role in ergonomics. One application of anthropometric measurement in ergonomics is the design of working space and the development of industrialized products such as furnishing, cars, tools, etc. Anthropometric measurements can either be directly measured or self-reported. Direct measurements that are used in ergonomic design, are often taken using anthropometric tools such as anthropometers, calipers, tapes, weighs etc. However, self-reported measurements are frequently given orally or in writing, and mainly used in nutritional, epidemic and medical studies. This study aims to answer the following questions:

1. What's self-reported anthropometry?
2. How valid is self-reported anthropometry?
3. How to increase validity of self-reported anthropometry?
4. How self-reported anthropometry is used in ergonomic designs?

Method: A literature search will be conducted, using a variety of keywords (anthropometry, self-reported anthropometry, validity, ergonomic design). This search is conducted as follows: Initially, an electronic search in the following data bases: Ergonomics Abstracts, Scopus, and Science Direct, is conducted using key words self-reports and self-report anthropometry. In addition, manual searches are carried out in Journals such as The American Journal of Clinical Nutrition, Applied Ergonomics, Ergonomics, and International Journal of Industrial Ergonomics etc., conference proceedings, books and internet sites.

Results:
First, as to the definition of self-reported anthropometry, it has been found that it is a type of anthropometry where measurements aren’t directly measured but gained through participants’ responses.

Second, as to how valid is self-reported anthropometry, some authors (McAdams, et al. 2007) believe they aren’t as accurate as the directly measured ones. In many studies, coefficient of correlation (Pearson’s coefficient of correlation) between self-reported and empirically measured values is calculated as an index of validity. The interval between collections of the two types of data varies from the same day to some months.

Third, regarding how to increase validity of self-reported anthropometry, it has been found that there is a number of strategies that help to increase self-reports. Some are considering the Questions to be asked and ethical considerations.

Fourth, as to how self-reported anthropometry is used in ergonomic designs, It is suggested that with some precautions self-reported anthropometric data can be used in designs as measured ones.

Discussion:

1) Definition: Subjective measurements are common in ergonomic research for years. They have been emphasized by many authors. Kelly (1955), argue that researchers should ask participants for their own views unless there are compelling reasons not to do so.

2) Validity: Opposing what some people think about self-reported anthropometry that it isn't valid, recent research (Burton, et al., 2010) has confirmed the effectiveness of such self-reported anthropometry.

3) Increasing validity of self-reported anthropometry: To increase validity of self-reported anthropometry, researchers are to take many precautions. Stock et al (2005) found that low measured
validity of self-reports may often be due to the poor formulation of questions, which limits the ability of the study population to accurately report their exposures. Data collection tools are also to be carefully built. Weak reliability and validity reduce validity of self-reports. Ethical considerations are another way to increase validity of self-reported anthropometry.

4) Using self-reported anthropometry in ergonomic designs: It is suggested to use self-reported anthropometry in the subsequent two types of design (Molenbroek & de Bruin, 2005):

**Design for adjustable ranges:** From an ergonomic point of view, designing for an adjustable range, is optimum strategy in the work place. Since many workstations must accommodate an array of workers, adjustability gives the designer the mechanism by which to fit the workstation to a wide range of individuals (Buckle, 1985).

**Design for all:** In the design of adjustable ranges, designers often use limits of 5th % female and 95th % male. This design aims to cater for as many users as possible. Its underlying premise is that it should enable rather than exclude different users.

In these two types of design, self-reported anthropometric values whether overestimated or underestimated, will not negatively affect the product design.

**Keywords:** self-report study, self-reported anthropometry, ergonomic design.

**References:**


