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Validation Of A 3DMDbody5 System For The Extraction Of Surface Anthropometrics

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ABSTRACT

Introduction: Three-dimensional (3D) surface imaging captures the external geometry of the human body to create a - to scale - digital representation. The gross potential of this technology has resulted in a boom; driving down prices and increasing accessibility. Consequently, many systems are now commercially available, each using a variety of hardware, software and techniques - resulting in varying degrees of validity and making validation prior to use vital. The aim of this study was to validate a 3dMDbody5 3D surface imaging system for the extraction of surface anthropometrics. **Method:** This study examined 4 precision-engineered solid aluminium cylinders of known dimensions to establish the accuracy and repeatability of the system, and the right upper leg of 30 healthy recreationally active volunteers to establish the agreement and repeatability against manual measurement (ISAK Level 1). To explore the nature of differences, Bland-Altman plots were created alongside ordinary least squares and ordinary least products regression. To explore the repeatability Technical Error of Measurement was calculated for each anthropometric, calibration set and method, alongside the Minimum Detectable Change. **Results:** 3dMDbody5 system systematically underestimated the girth of geometric objects by 0.6%. When measuring human participants, the system demonstrated good agreement but small statistically significant negative fixed bias and positive proportional bias when compared to manual measurement. The system can detect differences greater than 0.67cm for girths, 0.48cm2 for cross sectional areas, 67.85ml for volumes and 0.99cm2 for surface areas. **Conclusions:** As the results of this study fall below the threshold set by international standards, ISO (ISO, 2010) and ISAK (Stewart et al., 2011), this study can recommend the use the 3dMDbody5 system for the extraction of anthropometrics. However, as these values exceed the manufacturer's suggested 'geometry accuracy' of < 0.05cm (3dMD, 2017) - the results of this study reinforce the importance of validation prior to use.

CONFLICT OF INTEREST

The authors of this document can confirm there is no conflict of interests.

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