INPLASY PROTOCOL

Corresponding author:
Filipe Manuel Clemente

filipe.clemente5@gmail.com

Author Affiliation:
Escola Superior Desporto e Lazer, Instituto Politécnico de Viana do Castelo, Rua Escola Industrial e Comercial de Nun'Álvares, 490

Support: None.

Review Stage at time of this submission: Piloting of the study selection process.

Conflicts of interest: None.

Validity and reliability of the inertial measurement unit for height jump estimation: A systematic review

Clemente, FM[1]; Silva, R[2]; Akyildiz, Z[3]; Pino-Ortega, J[4]; Rico-González, M[5].

Review question / Objective: This systematic review aimed to: (1) identify and summarize the studies that have examined the validity of wearable wireless IMU for measuring height of jump; and (2) identify and summarize the studies that have examined the reliability of wearable wireless IMU for measuring height of jump.

Condition being studied: Validity and reliability of IMU for measuring height of jumps.

Information sources: Electronic databases (Cochrane Library, EBSCO, PubMed, Scielo, Scopus, SPORTDiscus, and Web of Science) were searched for relevant publications prior to December 30, 2020. Additionally, the reference lists of the studies retrieved were manually searched to identify potentially eligible studies not captured by the electronic searches. Finally, an external expert has been contacted in order to verify the final list of references included in this scoping review in order to understand if there was any study that was not detected through our research. Possible errata was searched for each included study.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 December 2020 and was last updated on 27 December 2020 (registration number INPLASY2020120134).

INTRODUCTION

Review question / Objective: This systematic review aimed to: (1) identify and summarize the studies that have examined the validity of wearable wireless IMU for measuring height of jump; and (2) identify and summarize the studies that have examined the reliability of wearable wireless IMU for measuring height of jump.

Rationale: Inertial measurement unit (IMU) have been extensively used for measuring human motion. One of the particular outcomes of interest in sports is the height of jump that is assessed in specific performance tests or actions occurring in training or match scenarios. Therefore, is a need to understand the accuracy and precision of IMU for assessing the height of the jump.

Condition being studied: Validity and reliability of IMU for measuring height of jumps.

METHODS

Search strategy: Keywords and synonyms were entered in various combinations in the title, abstract or keywords: ("inertial measurement unit" OR "IMU" OR "acceleromet*" OR "inertial sensor" OR "wearable" OR "MEMS" or "magnetometer") AND ("Validity" OR "Accuracy" OR "Reliability" OR "Precision" OR "Varia*" OR "Repeatability" OR "Reproducibility" OR "Consistency" OR "noise") AND ("jump*").

Participant or population: Humans without injury or illness.

Intervention: Use of wearable IMU.

Comparator: Force plates.

Study designs to be included: Observational analytic

Eligibility criteria: Test of a wearable wireless IMU; Tests were conducted in humans in laboratory or field-based conditions; Estimation of height jump; In the case of validity, the IMU was compared with a force plate; In the case of validity, one of the following measures were included: (i) typical error; (ii) mean absolute error; In the case of reliability, one of the following measures were included: (i) intraclass correlation test; (ii) coefficient of variation; (iii) standardized typical error; and (iv) standard error of measurement; Only original and full-text studies written in English.

Information sources: Electronic databases (Cochrane Library, EBSCO, PubMed, Scielo, Scopus, SPORTDiscus, and Web of Science) were searched for relevant publications prior to December 30, 2020. Additionally, the reference lists of the studies retrieved were manually searched to identify potentially eligible studies not captured by the electronic searches. Finally, an external expert has been contacted in order to verify the final list of references included in this scoping review in order to understand if there was any study that was not detected through our research. Possible errata was searched for each included study.

Main outcome(s): The following information was extracted from the included original articles: (i) validity measure (e.g., typical error, absolute mean error); and (ii) reliability measure (e.g., intraclass correlation coefficient [ICC] and/or typical error of measurement [TEM] (%) and/or coefficient of variation [CV] (%) and/or standard error of measurement [SEM]).

Quality assessment / Risk of bias analysis: The STROBE checklist for cross-sectional studies will be used for assessing the risk of bias.

Strategy of data synthesis: The following information was extracted from the included original articles: (i) validity measure (e.g., typical error, absolute mean error); and (ii) reliability measure (e.g., intraclass correlation coefficient [ICC] and/or typical error of measurement [TEM] (%) and/or coefficient of variation [CV] (%) and/or standard error of measurement [SEM]). Additionally, the following data items were extracted: (i) type of study design, number of participants (n), age-group (youth, adults or both), sex (men, women or both), training level (untrained, trained); (ii) characteristics of the IMU and comparator (force plates); (iii) characteristics of the experimental approach to the problem, procedures and settings of each study.

Subgroup analysis: None.

Sensibility analysis: None.

Contributions of each author:
Author 1 - Filipe Manuel Clemente - FMC lead the project, established the protocol and wrote and revised the original manuscript.
Author 2 - Rui Silva - RS wrote and revised the original manuscript.
Author 3 - Zeki Akyildiz - ZA wrote and revised the original manuscript.
Author 4 - José Pino-Ortega - JPO wrote and revised the original manuscript.
Author 5 - Markel Rico-González - MRG run the data search and methodological assessment and wrote and revised the original manuscript.