INPLASY PROTOCOL

To cite: Bao et al. Reliability and validity of the International Fitness Scale (IFIS): A Systematic Review and Meta-analysis. Inplasy protocol 202310093. doi: 10.37766/inplasy2023.1.0093

Received: 31 January 2023

Published: 31 January 2023

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Support: **None.**

Review Stage at time of this submission: **Formal screening of search results against eligibility criteria.**

Conflicts of interest:
None declared.

Reliability and validity of the International Fitness Scale (IFIS): A Systematic Review and Meta-analysis

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Review question / Objective: **This systematic review and meta-analysis aimed to (1) synthesise the reliability and validity of IFIS in different populations; (2) explore the possible moderators of the reliability and validity of IFIS.**
Information sources: **A comprehensive literature search will be conducted using Web of Science, EBSCO, Elsevier, MEDLINE, SPORTDiscus, SOCOLAR, Wiley Online Library, and PubMed online databases. Before the literature searches, the details of the search strategy were discussed and confirmed by reviewers.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 31 January 2023 and was last updated on 31 January 2023 (registration number INPLASY202310093).

INTRODUCTION

Review question / Objective: **This systematic review and meta-analysis aimed to (1) synthesise the reliability and validity of IFIS in different populations; (2) explore the possible moderators of the reliability and validity of IFIS.**

Rationale: **The accuracy data of an instrument tool is determined by reliability and validity. Particularly in self-administered study designs, lower reliability and validity of the measurement tool may distort the accuracy of the data and increase the probability of type II error. Reliability can be evaluated by internal consistency, test-retest stability, and inter-**

rater reliability. Validity can be evaluated by content validity (logical validity), criterion validity, and construct validity. Therefore, before being used in large-scale investigations, newly developed instruments should be evaluated for reliability and validity in different settings. To the best of the authors' knowledge, no systematic review has examined the measurement properties (reliability and validity) of IFIS. Therefore, to address the concerns mentioned above, this review sought to synthesize the extant literature, and comprehensively assess the reliability and validity of the IFIS in a certain population.

Condition being studied: None.

METHODS

Search strategy: The keywords were: "International Fitness Scale" AND "valid* OR reliab* OR repeatab* OR reproducib* OR accura* OR measurement propert* OR consistenc* OR feasib* OR agreement OR precision".

Participant or population: No limitation for population subgroups of the included studies.

Intervention: Not applicable.

Comparator: Not applicable.

Study designs to be included: No limitation for study design.

Eligibility criteria: Studies satisfying the following criteria were included in this review; first, the included studies were published in English; second, the included studies investigated the validity or reliability of the international fitness scale; third, no limitation for population subgroups of the included studies.

Information sources: A comprehensive literature search will be conducted using Web of Science, EBSCO, Elsevier, MEDLINE, SPORTDiscus, SOCOLAR, Wiley Online Library, and PubMed online databases. Before the literature searches, the details of the search strategy were discussed and confirmed by reviewers.

Main outcome(s): The reliability, and validity of the International fitness Scale (IFIS) are the main outcomes.

Quality assessment / Risk of bias analysis: The risk of bias of the included studies was assessed through the latest version of the COSMIN (Consensus-based Standards for the selection of health Measurement Instruments) Risk of Bias checklist, which was developed to improve the credibility of selected health measurement instruments (Mokkink LB, et al., 2018). According to the "COSMIN methodology for systematic reviews of PROMs—user manual" (Mokkink LB, et al., 2018), box 6 (reliability), box 8 (criterion validity), and box 9a (construct validity) were used to evaluate the methodological quality of the included studies in this review. The items were rated as inadequate, doubtful, adequate, very good. Furthermore, four GRADE factors need to consider for the quality level (including high, moderate, low, and very low) of the included studies, including the risk of bias (e.g., the methodological quality of the studies), inconsistency (e.g., unexplained inconsistency of results across studies), imprecision (e.g., sample size below 100, or 50), indirectness (e.g., evidence from different populations than the population of interest in the review) [38]. Evaluate these four indicators one by one, when the included studies have related issues, the quality level will be downgraded from high to lower grades. Two reviewers separately evaluated the quality of the included studies, and disagreements between the two reviewers were discussed with and resolved by, a third reviewer.

Strategy of data synthesis: The following attributes of the included studies were extracted and synthesized; general characteristics, including the authors of the study, country, target population, sample size, study design, method(s) of measurement, statistical methods, and main findings(s) (Table 1). Moreover, measurement properties, including

coefficients of reliability and validity (95% confidence interval). Agreement measures using Cohen's kappa/weighted kappa (κ) were reported in the reliability and validity studies. The kappa coefficients were interpreted following the Landis and Koch (Landis JR, et al., 1977) benchmarks (Table 4), 0–0.20 = poor coefficients, 0.21-0.40 = fair coefficients, 0.41-0.60 = moderate/ acceptable coefficients, 0.61-0.80 = substantial coefficients, 0.81-1.0 = almost perfect coefficients. Notably, construct validity was reported in the most of included studies, the qualitative results of validity were extracted from the included studies. Meta-analyses will be conducted in STATA (Version 13; StataCorp. 2013, TX: StataCorp LP). We will use random effects meta-analysis to provide a summary effect using correlation coefficients and standardised regression coefficients. Correlations between variables will be interpreted as follows: 0.1–0.29 (weak), 0.3–0.49 (moderate) and 0.5–1.0 (strong). Heterogeneity will be determined by Cochrane's Q statistic and I^2 values, with values of 25, 50 and 75 % considered low, moderate and high, respectively. Publication bias will be analysed using Rosenthal's classic fail-safe N, which provides an indication of the number of studies needed with a mean effect of zero before the overall effect would no longer be statistically significant.

Subgroup analysis: Subgroup moderator analysis will be conducted to determine if reliability and validity differ according to age (i.e., children, adolescents, young adults, older adults) and sex (i.e., male, female). Moderator effects will be considered significant at $p < .1$.

Sensitivity analysis: None.

Language restriction: English.

Country(ies) involved: China, Australia.

Keywords: IFIS, reliability, validity, systematic review, meta-analysis.

Contributions of each author:

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