Measurement Properties

Reliability, Validity & Responsiveness

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It is important for measures (questionnaire, tool or device) to be established as:

- reliable,
- valid,
- responsive,

prior to their utilization in scientific research or clinical practice.

Reliability

- **Test-retest reliability**: When repeated measurements produce similar results in participants who experience no changes in conditions.

  *For example, a researcher measures a firefighter’s resting heart rate on Monday, and again on Thursday using the same device under similar conditions.*

- **Inter-rater reliability**: When measurements are taken by multiple observers or evaluators and they report consistent scores.

  *Example: A physiotherapist and a kinesiologist use the same work injury risk assessment tool to analyze a firefighter lifting a high-rise pack.*
Validity

- Trueness of a measure.
- Ability of a device to measure what it is supposed to measure.
- Gold Standard device: provides the best measure [Electrocardiogram (ECG)].

Example: To assess the validity of the Zephyr BioHarness heart rate measure, the Zephyr was compared against ECC device, in healthy participants during a workout session. On average, the two devices reported similar heart rates throughout the workout.
Responsiveness

- The ability of a questionnaire, tool or device to detect change over time.

*Example:* A firefighter with a shoulder injury scores high (7/10) on a pain survey that was administered at an initial physiotherapy visit. After 3 months of rehabilitation, the firefighter scores (3/10) on the same pain survey.
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