

Table S1

MEDLINE/PsycINFO/Embase/CINAHL/AMED {Conducted on 18 January 2021}

1. Fitness Trackers/
2. Accelerometry/ or Actigraphy/
3. Wearable Electronic Devices/
4. (fitness tracker* or acceleromet* or actigraph* or wearable* or smartwatch* or "smart watch*" or "activity track*" or step or pedomet*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. 1 or 2 or 3 or 4
6. exercise/ or exp running/ or swimming/ or exp walking/
7. motor activity/ or freezing reaction, cataleptic/
8. (exercis* or "motor activit*" or "physical activit*" or "habitual activit*" or "ambulatory activit*" or walk* or gait* or locomoti*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. 6 or 7 or 8
10. exp aged/ or "aged, 80 and over"/
11. ("older adult*" or "senior citizen*" or "older people" or elderly).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12. 10 or 11
13. exp "reproducibility of results"/ or sample size/ or exp "sensitivity and specificity"/
14. ("reproducibility of result*" or clinimetr* or variabilit* or reliab* or valid* or responsiveness or qualit* or specificity or sensitivity).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. 13 or 14
16. 5 and 9 and 12 and 15
17. limit 16 to (english language and humans and yr="2010 - 2021")

WOS:

TOPIC:

("fitness tracker*" OR acceleromet* OR actigraph* OR wearable* OR smartwatch* OR "smart watch*" OR "activity track*" OR step OR pedomet*)

Databases= WOS, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan=2010-2020

Search language= English

TOPIC:

(exercis* OR "motor activit*" OR "physical activit*" OR "habitual activit*" OR "ambulatory activit*" OR walk* OR gait* OR locomoti*)

Databases= WOS, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan=2010-2020

Search language= English

TOPIC:

("older adult*" OR "senior citizen*" OR "older people" OR elderly)

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Search language= English

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Databases= WOS, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan=2010-2020

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SCOPUS:

(TITLE-ABS-KEY (("reproducibility of result*" OR clinimetr* OR variabilit* OR reliab* OR valid* OR responsiveness OR qualit* OR specificity OR sensitivity))) AND ((TITLE-ABS-KEY ("fitness tracker*" OR acceleromet* OR actigraph* OR wearable* OR smartwatch* OR "smart watch*" OR "activity track*" OR step OR pedomet*)) AND (TITLE-ABS-KEY ((exercis* OR "motor activit*" OR "physical activit*" OR "habitual activit*" OR "ambulatory activit*" OR walk* OR gait* OR locomoti*)))) AND (TITLE-ABS-KEY (("older adult*" OR "senior citizen*" OR "older people" OR elderly)))) AND (PUBYEAR > 2009) AND (LIMIT-TO (LANGUAGE , "English"))

IEEE

((("fitness tracker" OR acceleromet* OR actigraph OR actigraphy OR wearable OR smartwatch OR "smart watch" OR "activity tracker" OR step OR pedometer) AND (exercise OR "motor activit*" OR "physical activit*" OR "habitual activit*" OR "ambulatory activit*" OR walk OR gait OR locomotion)))) AND (((("older adult" OR "senior citizen" OR "older people" OR elderly) AND ("reproducibility of result" OR "reproducibility of results" OR clinimetr* OR variability OR reliab* OR validity OR responsiveness OR quality OR specificity OR sensitivity)))
[Date range: 2010 - 2021]

MEDLINE/PsycINFO/Embase/CINAHL/AMED {Conducted on 25 November 2022}

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Search language= English

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IEEE

((("fitness tracker" OR acceleromet* OR actigraph OR actigraphy OR wearable OR smartwatch OR "smart watch" OR "activity tracker" OR step OR pedometer) AND (exercise OR "motor activit*" OR "physical activit*" OR "habitual activit*" OR "ambulatory activit*" OR walk OR gait OR locomotion)))) AND ((("older adult" OR "senior citizen" OR "older people" OR elderly) AND ("reproducibility of result" OR "reproducibility of results" OR clinimetr* OR variability OR reliab* OR validity OR responsiveness OR quality OR specificity OR sensitivity)))

[Date range: 2020 - 2022]

Supplementary Table S2. Acceptability and adherence of tools/instruments of studies included in the systematic review

Study	Instrument type	Placement of instrument	Length of wear	Sampling frequency (Hz)	Justification for location of wear	Adherence Level
Awais et al. [1]	tri-axial accelerometer, gyroscope and magnetometer	Chest, L5 and thigh (uSense); non-dominant wrist (Shimmer3)	Approximately 100 minutes	100	ND	ND
Brand et al. [2]	tri-axial accelerometer	Wrist	Up to 10 days	25 (Garmin), 100 (AX3)	Wrist-worn sensors are widely used in research studies and clinical trials to quantify movement.	ND
Briggs et al. [3]	tri-axial accelerometer	Garmin and ActiGraph – nondominant wrist ActiGraph – nondominant hip	Minimum of 48 hours	30 (ActiGraph), ND (Garmin)	Wrist-worn consumer accelerometry devices are more popular now.	ND
Burton et al. [4]	tri-axial accelerometer	Wrist	14 days	GENEactiv recorded movement in 30hz and collapsed into 60s epochs	ND	16 of the 30 fitness trackers for 14-day collection had some missing data.
Chigateri et al. [5]	tri-axial accelerometer	Lower back (L5)	Scripted tasks – Duration of scripted tasks. walking time (s) (20.3 ± 6.9), non-walking time (80.0 ± 25.1) Unscripted tasks – walking time (s) (115.4 ± 89.7), non-walking time (s) (500.4 ± 96.1)		Wearable sensors placed on the waist provide highest accuracy in predicting human body movements since they are closest to the body's centre of mass.	ND

* ND – not described.

Supplementary Table S2. Acceptability and adherence of tools/instruments of studies included in the systematic review – continued

Study	Instrument type	Placement of instrument	Length of wear	Sampling frequency (Hz)	Justification for location of wear	Adherence Level
Dijkstra et al. [6]	tri-axial accelerometer	lower back	30 minutes	100	ND	ND
Farina et al. [7]	tri-axial accelerometer	Fitbit Charge HR – dominant wrist Misfit Shine – dominant wrist and waist ActiGraph GT3X+ – dominant waist NL2000i – above midpoint of dominant kneecap	7 days	ActiGraph recorded in 10s epochs, Fitbit Charge HR recorded in 60s epochs	ND	Device wear time (min/day): 843 ± 65. Nine participants had missing data from at least 1 activity monitor due to loss of device, error in set up and device repositioning. Four participants had evidence of at least one day of non-wear ActiGraph data, and 7 had at least one day of ActiGraph data less than 10 hrs. Three participants were excluded as they had less than 4 days valid ActiGraph data.
Geraedts et al. [8]	3D-MEMS accelerometer with barometric pressure sensor	Around the neck (worn as a necklace)	Standardized movement protocol: for the period the duration of the standardized activities Free movement protocol: 30 minutes User evaluation: 7 days	Accelerometry data – 50; Barometric data – 25	"Least" intrusive to the user; more suitable for daily wearing	Participants wore the sensor over 1 week and provided feedback on comfort, weight, size and usability via questionnaire – scored between 1 and 5 (1 meaning "Do not agree at all" and 5 meaning "Completely agree"). The average score on the user evaluation questionnaire was 4.4 (SD ± 0.6; range 2.4–5.0) on a scale of 1 to 5. All participants wore the sensor during daytime hours of all requested days, 16 (i.e., 80%) wore it while sleeping.

* ND – not described.

Supplementary Table S2. Acceptability and adherence of tools/instruments of studies included in the systematic review - continued

Study	Instrument type	Placement of instrument	Length of wear	Sampling frequency (Hz)	Justification for location of wear	Adherence Level
Kastelic et al. [9]	tri-axial accelerometer	Polar Vantage M (wrist); Garmin Vivoactive 4s (wrist); Garmin Vivosport (wrist); ActiGraph wGT3X-BT (waist)	Group baseline protocol – 6 days; Group extended protocol – 12 days (each wearable over 4 days)	ActiGraph GT3X+ – 30; Polar Vantage M (ND); Garmin Vivoactive 4s (ND); Garmin Vivosport (ND)	ND	The wear time compliance with the Polar Vantage M, Garmin Vivoactive 4s and Garmin Vivosport was as high as 24.0 ± 0.1 h/day, 23.9 ± 0.5 h/day and 23.9 ± 0.5 h/day, respectively
Paul et al. [10]	tri-axial accelerometer	Right hip	7 days	ActiGraph GT3X+ – 30	ND	ND
Soltani et al. [11]	tri-axial accelerometer	GENEactiv Original (wrist); ActiGraph GT9X (shank)	Around 12 hours (within one day)	GENEactiv Original – 40 ,ActiGraph GT9X – 50	It offers comfort, high usability and discreet monitoring thus, increasing user compliance.	ND
Taylor et al. [12]	tri-axial accelerometer	Lower back	Scripted – 4 to 6 minutes. Unscripted – 5 to 9 minutes	100	ND	ND
Yamada et al. [13]	Actimarker – tri-axial accelerometer; Lifecorder – uniaxial accelerometer	Back of the waist	14 days	ND	ND	ND

* ND – not described.

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