Measuring physical fitness in persons with profound intellectual and multiple disabilities.

Hanze University Groningen
Applied Sciences

A. Waninge, Ruud van Wijck, Bert Steenbergen, C.P. van der Schans

Research and Innovation Group in Health Care and Nursing

Visio

Content

- Background (1 t/m 4)
- Aim
- Method
- Results
- Conclusion and discussion

Background (1)
Physical fitness (ACSM, 2006)

'Ability to perform physical activity'

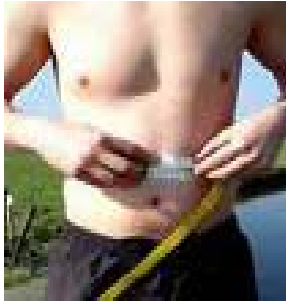Hanze University Groningen
Applied Sciences

Persons with profound intellectual and multiple disabilities (PIMD)

-   IQ < 20

-   92 % visual impairment (Van den Broek et al, 2006)

-   75% loco motor disabilities (Nakken & Vlaskamp,2007)

-   GMFCS I - V (Palisano et al, 2000)

Visio

Background (3)
Relevance of Physical fitness

Health

(Bouchard, 1994)

Quality of life

(Kramer, 1999;

Colcombe, 2003)

Participation in ADL

(Hilgenkamp, 2010)

Research and Innovation Group in Health Care and Nursing

Components of Physical fitness
(Hilgenkamp et al, 2010)

Bouchard et al. (1994)	ACSM (1995)	Waninge et al (2007-2011)
Motor	Coordination, Reaction time, **Balance**	**Physical fitness of persons with Profound Intellectual and Multiple Disabilities**
Muscular	Strength, endurance, flexibility	
Cardiorespiratory	**Cardiorespiratory**	
Morphological Metabolic	**Body composition**	

Aims

Feasibility and test-retest reliability of:

- Bodycomposition measurements

  Body Mass Index (BMI), waist circumference, tibia length (to estimate body height)

- Motor and cardiorespiratory tests

  modified Berg Balance test

  adapted Shuttle Run Test / 6-minute walking distance

- Muscle strength:

  No feasible tests available

Method (1)

Adapted protocols: some examples

- Bodycomposition measurements

  Body Mass Index (BMI) ⟹ tibia length

- Cardiorespiratory and Motor tests

  Walking distance/adapted Shuttle Run Test

  ⟹ motivation scores and practice sessions

  modified Berg Balance test (mBBS)

  ⟹ exclusion of tasks and practice sessions

Method (2)

Visio

Hanze University Groningen
Applied Sciences

- Participants with PIMD (45 GMFCS I,II, III; 45: IV-V)

- Test-retest studies

- Data analyses:

• Paired T-test, Wilcoxon signed rank test

• Feasibility: percentage of successful measurements (Lemmink, 1996)

• Limits of agreement

  (Bland & Altman, 1986)

• ICC (Portney & Watkins, 2000)

• Multiple regression analysis

Results (1)

Variables of physical fitness	% Feasibility	P value Wilcoxon	LOA % of mean	ICC
BMI (kg/m2) – GMFCS I - V	95%	0.554	5.8%	0.98
Tibia length (cm) – GMFCS I - V	100%	0.527	5.2%	0.99
Waist Circumference (cm) – GMFCS I - V	95%	0.372	5.3%	0.97
6-MinuteWalking Distance (m) – GMFCS I / II	96%	0.990	30%	0.92
Adapted Shuttle Run Test (levels) – GMFCS I	96%	0.422	23%	0.96
Modified Berg Balans Scale (points) – GMFCS I / II (total score)	95%	0.521	-	0.95

Results (2)

(P < 0.01; R/R2: 0.926/0.857;Durbin/Watson: 1.945):

For men, 74.008 + (1.841 x tibialength) + (0.389 x weight) - (3.787 x 0);

For women, 74.008 + (1.841 x tibialength) + (0.389 x weight) - (3.787).

Results – BMI (3)

Hanze University Groningen
Applied Sciences

	Whole group	Men	Women
N	45	28	17
Underweight	4 %	7%	0
Healthy weight	65 %	79%	41%
Overweight	27 %	14%	47%
Obese	4 %	-	12%
Totaal	100%	100%	100%

Visio

Results – waist circumference (4)

	Whole group	Men	Women
N	45	28	17
Underweight	16%	25%	-
Healthy weight	42%	61%	12%
Risk weight	24%	11%	47%
Abdominal obese	18%	3%	41%
Totaal	100%	100%	100%

Results – performance tests (5)

- Mean distance (SD) on the 6MWD:

• participants PIMD: 389 m (107)

• healthy elderly persons: 631 m (93)

• persons with heart failure: 419 m (120)

• persons with COPD: 369 m (18)

- For mBBS no cut-off values are available

Conclusion and discussion

Hanze University Groningen
Applied Sciences

- Feasibility and test–retest reliability of physical fitness measurements and tests acceptable

- Calculating body height from tibia length feasible and reliable alternative

Limitations:

- Validity

- Cut off scores and standards lack

Visio

Thanks for your attention

Questions?

Hanze University Groningen
Applied Sciences

Visio

References
- American College of Sports Medicine, Wilder et al, 2006
-

Hanze University Groningen
Applied Sciences

Research and Innovation Group in Health Care and Nursing

Prediction equation
(P < 0.001; R/R2: 0.982/0.964)

Corrected erect waist circumference:

$1.017 - 1.961 *$ gender $+ 1.016 *$ supine waist circumference (♂=0; ♀=1)

♂$= 1.016 *$ supine waist circumference $+ 1.017$

♀$= 1.016 *$ supine waist circumferen

Example

Test and retest supine waist circumference measurements
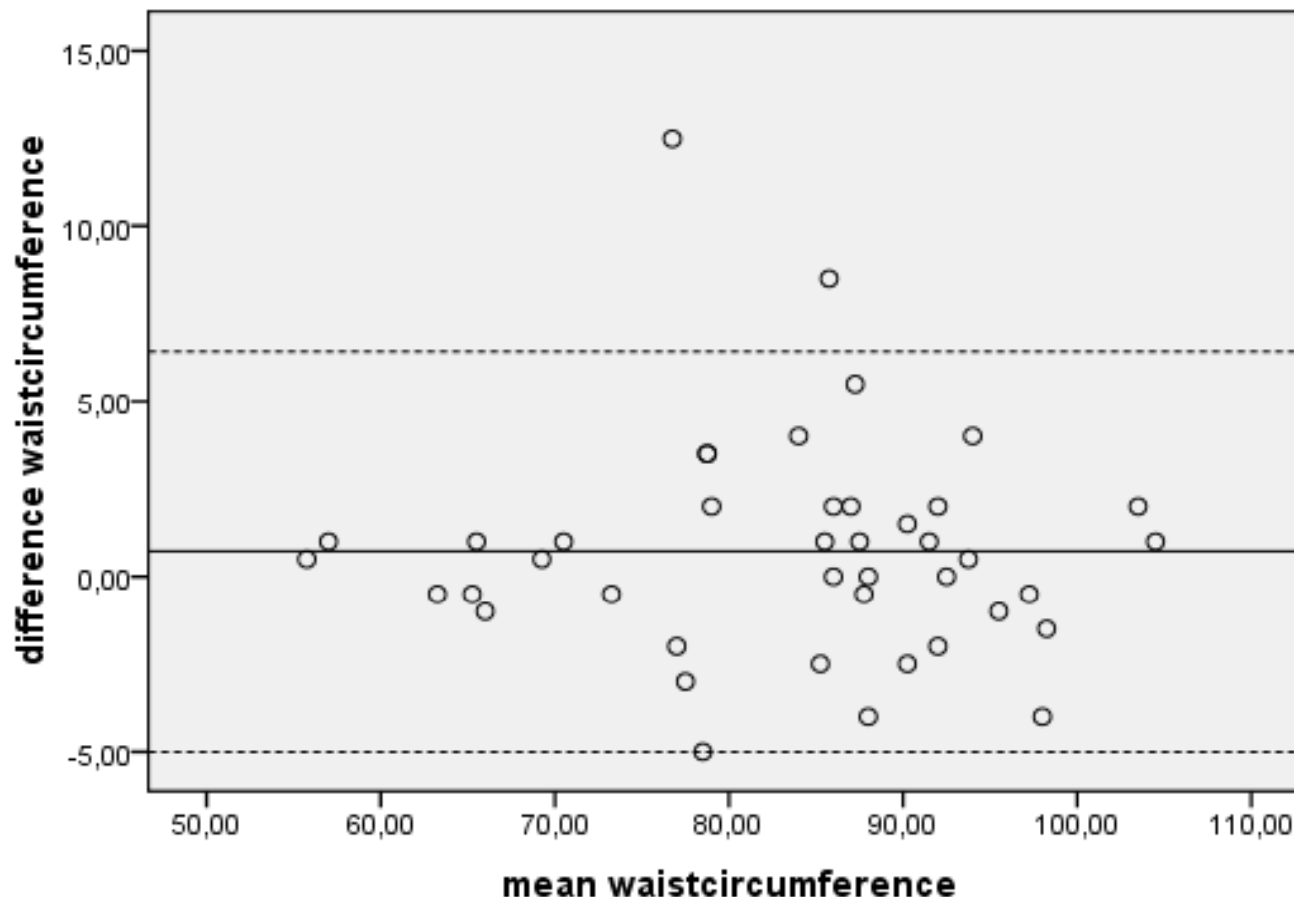
Mean difference: 0.73 ±6.36 (LOA) (-5.63; 7.09) (Bland & Altman)