Supplementary Materials

Table S1: Summary of all studies identified on physical quality measurement. V: Validity; R: Reliability; PWD: persons without disabilities; WA: Wheelchair athletes; WBA: Wheelchair basketball athletes; WRA: Wheelchair rugby athletes; SCI: Spinal Cord Injury; OA: Older adults; WTP: wheelchair tennis players; VH: vestibular hypofunction; CP: cerebral palsy; C: children and adolescents; SB: Spina Bifida; OI: osteogenesis imperfecta; PO: Power; kN: Kilo newton; kg: kilograms, m: meter; s: second; mn: minute; T: time requirement to complete assessment.

Assessment tool	Measurement properties	Measurement and material	Outcomes
STRENGTH			
Maximal isometric strength (objective) [1-4]	NA	Computer-controlled stationary; wheelchair ergometer; Motor driven treadmill T < 5 mn	Maximal isometric strength (top of WC rim)
Bench press (BP) (objective) [5]	V (PWD)	Bench press T < 5 mn	Maximal load with 1 repetition
Upper limb muscle strength (objective) [6-10]	V (PWD)	Handheld dynamometer 5 mn > T < 10mn	Strength (kN) elbow flexors/extensors shoulder flexors, external rotators and abductors) on both sides.
		Handheld dynamometer 5 mn > T < 10mn	Strength (kN), Elbow flexors/extensors, shoulder internal/external rotators, abductors.
		Load cells and straps T : NA	Area under the isometric strength kilogram-force-time curve (kg-f · s) using the trapezoidal numerical integration method.
		Handheld dynamometer T < 5 mn	Strength (kN) shoulder and elbow extension
Shoulder flexion/extension (objective) [11]	V (WA)	Load cells; Weighted platform T < 5 mn	Strength (kN) shoulder extensors on both sides
Elbow flexion/ extension (objective) [11]	V (WA)	Load cells; Weighted platform T < 5 mn	Strength (kN) of elbow extensors and flexors on both sides
Pull wheelchair test (objective) [11]	V (WA)	Load cells; Weighted platform T < 5 mn	Strength (kN) to pull handrim
One-repetition maximum and strength endurance (objective) [12]	Re (WA)	Bench press; Light sensor 5 mn > T < 10mn	Maximal load in 1 repetition Maximal number of repetitions
Isometric push Strength (objective) [11]	V (WA)	Load cell; Weighted platform T < 5 mn	Strength (kN) to push handrim
Grip strength test (objective) [9,13-26]	V (PWD; OA; ind. with SMA and ind. with ARSACS)	Handgrip dynamometer T < 5 mn	Maximal grip strength (kN) for each hand
		Hand-held dynamometer T < 5 mn	Full fist grip strength (kN) Lateral pinch grip strength (kN)
		Hand dynamometer T < 5 mn	Maximum grip strength during 30 seconds periods (kg)

Manual upper extremity muscle testing (subjective) [27 -30]	NA	Scale (0 to 5): 0: No muscle contraction; 1: Palpable/visible muscle contraction; 2: Active movement through full range of motion (ROM) with gravity eliminated; 3: Active movement through full ROM against gravity; 4: Active movement through full ROM against resistance; 5: Normal strength. T : NA	Sum of score for each hand: wrist extensors, elbow flexors/extensors, shoulder internal/external rotators, shoulder abductors
			Score: [(sum of graded scores)/(number of muscle tested/10)/100)
Upper extremity and trunk isokinetic muscle strength (objective) [31- 36]	NA	Isokinetic dynamometer 5 mn > T < 10mn	Strength (kN) Shoulder and wrist maximal flexion/extension at 60°/sec x5; Trunk extesor/flexor peak torques (kN) at 60°/sec x5
			Strength (kN) Shoulder and elbow maximal flexion/extension at 60°/sec x5; Strength (kN) Shoulder adductors/abductors; internal / external rotators
			Internal / external shoulder rotation
			Strength (kN) Shoulder flexion/extension abduction/adduction, internal/external rotation at 60°/sec
Isometric strength for wheelchair racing tests (objective) [37]	V (WA)	S-type load cells; Musclelab unit 5 mn > T < 10mn	Strength (kN): arm extension (right and left); combined arm extension+trunk flexion; isolated trunk flexion; combined forearm pronation with grip strength (right and left)
Isometric trunk strength (objective) [38, 39]	V (WPA)	hand-held dynamometer T < 5 mn	Trunk maximal flexion/extension (kN, kN/kg)
Maximum isometric arm strength and trunk strength (objective) [40]	NA	Custom-built rig + S-type load cells; MuscleLab unit 5 mn > T < 10mn	Arm isometric strength; Trunk isometric strength
SPEED			
Sprint test (objective) (3, 5, 10, 12, 15, 20, 75 m) [4, 11, 12,	V (WPA; WRA)	Chronometer T < 5 mn	Time (s) to complete the sprint

21, 22, 25, 26, 41–52]		Radar T < 5 mn	Maximal speed during the sprint (m/s)
Sprint test with a racket (objective) (5, 10, 20 m) [22]	NA	Chronometer T < 5 mn	Time (s) to complete the sprint with racket
Sprint test with a bouncing ball (objective) (10, 15, 20 m) [8, 21, 26, 50, 51]	V (WPA; WRA)	Chronometer T < 5 mn	Time (sec) to complete the sprint with a bouncing ball
Suicide test (objective) [8, 50, 51]	V (WPA)	Chronometer 5 mn > T < 10mn	Time (s) to complete the suicide test
Wheelchair racing performance measures (objective) [37]	NA	Laser device T < 5 mn	Maximal speed during 15m sprint (m/s); Maximal speed during 150m sprint (m/s)
10 * 5-meter sprint test (objective) [26]	V (WPA)	Photocell gates 5 mn > T < 10mn	Time (s) to complete the 10 sprints
Butterfly sprint test (objective) [42]	NA	IMU T < 5 mn	Time (s) to complete the butterfly test
3-6-9 m drill test (objective) [26]	V (elite male WPA)	Photocell gates T < 5 mn	Time (s) to complete the butterfly test
30 second sprint test (objective) [1, 26, 53]	V (WPA)	30-meter loop on a hard level surface with 15-meter between pylons, requiring two 180-degree turns) T < 5 mn	Distance performed the 30-second sprint (m)
		Computer-controlled stationary wheelchair ergometer T < 5 mn	Mean power output (W/kg) during the 30 s test period (sum of right and left side
POWER			
15-meter power sprint test (objective) [54]	V (SCI)	Instrumented wheel T < 5 mn	Highest mean unilateral power output
Maximal pass (objective) [8, 21, 25, 45, 50, 51, 55]	V (WPA)	Measuring tape T < 5 mn	Distance (m) between the participant and where the ball hits the floor is measured
Bar-Power output (objective) [41]	Good R (Brazilian WPA)	Bench press (BP), ; Shoulder press (SP); Prone bench pull (PBP); Smith machine; Linear position transducer 5 mn > T < 10mn	Mean propulsive power for the bench press, shoulder press and prone bench bull

Initial Maximum Push-Rim Propulsion (One stroke push test) (objective) [49, 56]	V (elite WRA)	Linear encoder; Software T < 5 mn	Power during one push rim
Basketball chest pass test, medicine ball (3 kg) (objective) [14, 21, 26, 55]	V (elite WPA)	Measuring tape T < 5 mn	Distance covered by the ball, the best out of three attempts
Incremental testing (objective) [57]	V (SCI)	Wheelchair ergometer (WERG) and arm crank ergometer (ACE) T : NA	Maximal power attains (start 15 W, increase of 15 W each 5 minutes)
		Treadmill (NA) T : NA	Maximal power when participant attain his maximum inclination (Start: 0-degree inclination; 0.36 degree increase each 5 min)
Muscle Power Sprint Test (objective) [19]	V (youth with CP)	Formula: power = (total mass × distance2)/(time3) T < 5 mn	Peak power: highest power of 6 attempts Mean power: mean power of 6 attempts
The Wingate Anaerobic Test (objective) [4, 14, 26, 58–61]	V (SCI; WPB; PWD)	Arm crank ergometer 10 mn > T < 30mn	Peak power (PP), the highest 5-s power output; mean power (MP), the average power sustained throughout the 30-s period; Relative peak power (rPP; scaled to individual body mass (kg); Relative mean power (rMP; scaled to individual body mass(kg).
POWER AND CARDIOVASCULAR ENDURANCE			
Graded maximal wheelchair exercise test (incline increase) (objective) [2, 8, 27, 52, [62–65]	V (SCI)	Treadmill; Gas analyser; Wheelchair 10 mn > T < 30mn	POpeak (W); V˙O2 peak (lmin-1)
Anaerobic performance test (objective) [57, 66]	V (SCI; elite WPA)	Wheelchair ergometer; Gas analyser 10 mn > T < 30mn	POpeak in 30-second period; V˙O2 peak (lmin-1)
Arm cranking graded maximal exercise test (objective) [67]	NA	Wheelchair ergometer; Gas analyser 10 mn > T < 30mn	Highest V˙O2 value on averaged over 30 s; Power output (PO watts)
Arm cranking graded continuous maximal exercise test (resistance increase) ($V0^2$ + PO) (objective) [1, 24, 53, 62, 68–75]	V (MWC user)	Arm crank ergometer; Gas analyser 10 mn > T < 30mn	POpeak in 30-second period or final power output; V˙O2 peak (lmin-1)
Graded maximal wheelchair exercise	V (SCI)	Motor-driven treadmill; Gas	PO peak in 30-second period; $V˙O^2$ peak (lmin-1)

test (power increase) (objective) [1]		analyser 10 mn > T < 30mn	
JUMP test: Discontinuous graded exercise test on a wheelchair (resistance increase and speed increase) (objective) [76]	R (MWC user)	Wheelchair ergometer; Gas analyser 10 mn > T < 30mn	VO^2 max P peak
Multistage-field test (speed increase) (objective) [21, 22, 45, 55, 77-80]	V (WPA)	A floor space of 15 m ×15 m. four main sides of the octagon were 11 m long; Auditory feedback; Gas analyser; Formula: **V˙O2max = 18,03 + 0,78 * MFT score (number of stages);** Chronometer 10 mn > T < 30mn	Number of octagonal courses completed Predictive V˙O2max (with formula)
CARDIOVASCULAR ENDURANCE			
Arm cranking graded continuous maximal exercise test (resistance increase) (VO^2 max) (objective) [61, 81–87]	V (SCI)	Treadmill; Gas analyzer; Arm ergometer 10 mn > T < 30mn	V˙O2max
12-minute wheelchair aerobic test (objective) [78]	NA	25×15-meter rectangular course with a perimeter of 75.32 metres **V˙O2max (ml/kg/min) = (29.623×distances m) −10.916** 10 mn > T < 15mn	V˙O2max (with distance and formula)
A progressive V˙O2max test (incline increase) (objective) [88]	NA	Wheelchair roller consisted of 2 freewheeling drums and a speedometer, with computer-based analysis of the person's push stroke. Gas analyzer. 10 mn > T < 30mn	V˙O2max
incremental speed field test (objective) [89–91]	V (WA; PWD)	Gas analyzer; 400 m tartan field marked off every 50 m with pylons; Sports wheelchair on a motorized treadmill 10 mn > T < 30mn	V˙O2max

6-Minute Wheelchair Propulsion Test (objective) [56, 61, 78, 92]	V (SCI; C with CP	Measuring tape; 30 m loop marked by two cones spaced 15 m apart (30 m loop) 5 mn > T < 10mn	Maximal distance in 6 minutes
Incremental discontinuous test (frequency increase) (objective) [91]	NA	Ergometer; Gas analyser 10 mn > T < 30mn	V˙O2
Incremental wheelchair exercise (speed + incline increase) (objective) [93–95]	R (SCI)	Motorized treadmill; Gas analyzer 10 mn > T < 30mn	V˙O2max (calculated by averaging the values in the final 30 seconds of the final stage)
Continuous incremental test (resistance increase) (objective) [4, 25, 35, 96–99]	NA	Non-motorized ergometer; Gas analyzer 10 mn > T < 30mn	V˙O2max
Continuous Submaximal exercise test (Resistance increase) (objective) [1], [72]	NA	Braked arm ergometer; Gas analyser T : NA	V˙O2max means 30 sec after each stage
Respiratory endurance test (VE target increase) (objective) [82]	NA	Gas analyser 10 mn > T < 15 mn	Maximum ventilatory level
Field exercise test (objective) [82]	NA	Straight, flat (for wheelchair athletes) or steep (4 % slope on average, for Nordic skiers) tarred roads 4 to 9 km long 10 mn > T < 15 mn	Time
Yo-Yo maximum test (objective) [21, 45, 55, 100, 101]	V (WPA)	Chronometer; Cones 5 mn > T < 20 mn	Total distance
Six-Minute Arm Test (objective) [68]	V (SCI)	Gas analyser; Braked arm ergometer 5 mn > T < 10 mn	V˙O2 means
10 km Treadmill Trial (objective) [97]	NA	Treadmill; Gas analyser 20 < T < 60 mn	V˙O2 means at 500 m, 3000 m, 6000 m, and 9000 m for 60 s
4 min maximal push (objective) [83]	NA	140 m straight synthetic track; Telemetric system > T < 5mn	Total distance covered during the test
Discontinuous graded exercise test on a wheelchair (resistance increase) (objective) [102]	NA	Wheelchair ergometer; Gas analyser T = NA	V˙O2max

Discontinuous submaximal test (speed increase) (objective) [103]	NA	Motorized treadmill; Gas analyser 5 < T < 10mn	V˙O2peak
10- or 25-meter Shuttle ride test (speed increase) (objective) [2, 19, 46, 56, 104–106]	V (C; A with CP, youth MWU with OI; MWU; Youth SP	Gas analyser 5 < T < 15 mn	Exercise time (minute) V˙O2peak
Hit and turn tennis test (objective) [22]	V (WTP)	Cones 5 < T < 10mn	Period reached by each player
MUSCULAR ENDURANCE			
Repeated Sprint Ability (objective) [5]	NA	Time gates; sprint decrement index (RSASdec)using the equation: $Sdec = (\frac{RSAtotal}{RSA\ best\ X\ 12} \times 100) - 100.$ T < 5 mn	Fatiguability index Sdec
One Repetition Maximum and Strength Endurance (objective) [12]	R (WPB)	Bench press Smith machine; Light sensor T < 5mn	Maximal load in 1 repetition Maximal number of repetitions
30 sec arm curl test (objective) [20]	V and R (OA)	4- or 5-pound weight (for women); 8-pound weight (for men); A chair without armrests T < 5mn	Number of bicep curls in 30 s holding dumbbell
Isometric and isotonic muscular endurance in the shoulder joint (objective) [23]	NA	5 kg dumbbell T < 5mn	Isometric: Time maintaining 45° of abduction while holding a 5 kg dumbbell
			Isotonic: Number of repetitions in 30 seconds 45° abduction with a 5 kg dumbbell
MUSCULAR ENDURANCE AND COORDINTION			
Repetitive movement test (objective) [46]	V (WRA)	Video registration T < 5mn	Number of correct repetitions in 20 seconds
COORDINATION			
Pick-up the ball (objective) [21], [55], [107]	V (WPA)	Photocells T = NA	Total time taken to complete the test
505 CODA (objective) [5]	NA	Photocells T < 5 mn	Total time taken to complete the test
Agility drill test (objective) [26], [52]	V (elite male WPA)	Photocells T < 5 mn	Total time taken to complete the test

Slalom Test (objective) [18, 21, 25, 47, 55, 102, 107, 108]	V (SCI;female; WPA)	7 heavy, bright-colored cones with flags mounted on a 1.5-m pole, aligned in a straight line and set 3 m, 2m, and 1m apart from one another; Chronometer T < 5mn	Total time taken to complete the test
Slalom Test with a ball (objective) [21, 25, 55, 107]	V (WPA)	Chronometer; Photocells T < 5mn	Total time taken to complete the test
Box and block test (objective) [13, 109]	V (healthy and neurological C populations)	Coloured blocks of 2.5 cm3 2 compartments (wooden box) T < 5mn	Number of blocks moved in 1 minute
Shooting test (objective) [21, 25, 55, 107]	V (WPA)	Basketball ball; Basketball hoop T < 5mn	Number of successful baskets
Turning capacity tests (objective) [104]	NA	Two photocells placed at 2.5 m and 3.5 m from the target line T < 5mn	Time taken to complete the test
Spot shot (objective) [50, 51, 107]	V (WPA)	Basketball ball; Basketball hoop T < 5mn	Sum of the points of the 20 shots (range: 0–60)
Lay ups (objective) [50, 51, 107]	V (WPA)	Basketball ball; Basketball hoop T < 5mn	Sum of the points for 1 minutes
Spider test (objective) [36, 42]	V (WTP)	Chronometer T < 5mn	Time taken to complete the test
T-test (objective) [110]	V (WBP)	Chronometer T < 5mn	Time taken to complete the T-test
Spiral test (objective) [111]	V (WPA)	Width of 1 cm was printed on an A4 size paper T < 5mn	Time seconds needed from the start of the movement, until the middle of the spiral
Finger nose test (objective) [111, 112]	V (WPA; MWU)	Camera T < 5mn	Number of correct repetitions counted in the video registration
Serve velocity test (objective) [22]	NA	Radar gun T < 5mn	Maximum velocity directed to the wide area of the service box
Figure 8 with and without the ball test (objective) [45]	V (elite WPA females)	Chronometer T < 5mn	The time taken to complete five laps
Pass-for-accuracy (objective) [51], [107]	V (WPA)	Target; Basketball ball T < 5mn	Sum of scores of 10 passes (range: 0–30)

Free-throw shooting (objective) [51], [107]	V (WPA)	Basketball ball; Basketball hoop T < 5mn	Total score is calculated (range: 0–30)
Linear mobility drill (objective) [52]	NA	Cones T < 5mn	Time taken to complete the test
10 m and 5 m back (objective) [33], [47]	NA	Kinematic analysis system T < 5mn	Time taken to complete the test
Lower Extremity Motor Coordination Test (objective) [112]	V (MWC user with ARSACS)	Target T < 5mn	Number of targets touched in 20 s
TACT Procedure (objective) [109]	V (PWD; OA and C unilateral CP)	TACT model; Counter attached to the tracer automatically records the number of times the participant goes out of the star pattern T = NA	Number of errors
Assisting Hand Assessment (subjective) (AHA) [109]	V (CP)	Video on 22 items with a 4-point criterion-reference. T = NA	Scored in AHA-units (percentage of log odds units), ranging from 0 (lower hand use) to 100
FLEXIBILITY			
Apley's scratch test flexibility or Back scratch test [20, 32]	NA	Measuring tape T < 5mn	The distance between the second fingers
Range of motion of shoulder, elbow, and wrist joint (objective) [7, 20, 30]	NA	Peak Flow Meter 5 < T < 10mn	Range of motion of each joint between the initial position and final position for the dominant arm
FLEXIBILITY AND EQUILIBRIUM			
Multi-directional reach test (objective) [39]	Re and V (PWD; OA; SCI)	Telemetric laser distance meter T < 5mn	The vertical and horizontal displacements between the initial and final trunk positions
BALANCE			
Berg balance scale (subjective) [13]	V and Re (OA)	14 balance tasks with varying difficulty 5 < T < 10mn	Number of items completed
Static sitting balance test (objective) [34]	NA	Force platform T < 5mn	Center of pressure sway underneath the seat and feet support; Total displacement of COP in the anteroposterior and mediolateral
Adapted functional reach test (objective) [113]	Re (OA; VH)	A yardstick; Four strain gauges; Biopotential amplifier 5 < T < 10mn	Mean reaching distance; Total displacement of center of gravity

Limits-of-stability test performed (objective) [38]	V (WPA)	Balance Master T < 5mn	Maximum distance travelled by the center of gravity toward the target, expressed as a percentage of target distance

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