**Web extra material**

**Supplement 1.** Summary of the included studies that assessed the 20mSRT performance of 9–17 year olds.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference** | **Country** | **Year of testing** | **Sex** | **Age range****(years)** | **Sample range** | **Total sample size** | **Sampling strategy** | **Sampling base** |
| ACHPER w1 | Australia | 1994 | B+G | 9–16 | 46–104 | 1140 | P | S |
| ASC w2 | Australia | 1993 | B+G | 12–16 | 301–542 | 3842 | NP | N |
| Booth et al. w3 | Australia | 1997 | B+G | 9–15 | 122–491 | 3934 | P | S |
| Booth et al. w4 | Australia | 2004 | B+G | 9–15 | 58–375 | 3143 | P | S |
| Cooley & McNaughton w5 | Australia | 1998 | B+G | 11–16 | 339–636 | 6161 | P | S |
| Hardy et al. w6 | Australia | 2010 | B+G | 9–15 | 114–720 | 5021 | P  | S |
| Jenner et al. w7 | Australia | 1988 | B+G | 11–12c | 264–283 | 1094 | NP | S |
| Lloyd & Antonas w8 | Australia | 1998? | B+G | 11–12 | 69–71 | 280 | NP | S |
| McIntyre w9 | Australia | 1999–00, 2009 | B+G | 10 | 41–48 | 178 | NP | C |
| Mulkearns et al. w10 | Australia | 1996–98 | G | 9–10 | 66–79 | 145 | NP | C |
| Okely et al. w11 | Australia | 1996 | B | 14a | 51–51 | 51 | NP | C |
| Vandongen et al. w12 | Australia | 1990 | B+G | 10–12b | 162 | 972 | NP | C |
| Baquet et al. w13 | Belgium | 1997 | B+G | 12–16 | 51–81 | 455 | NP | S |
| Beunen et al. w14 | Belgium | 1990 | B+G | 9–17 | 211–423 | 5281 | P | S |
| Cardon et al. w15 | Belgium | 2002? | B+G | 9–10c | 111–186 | 591 | P | S |
| Heyters & Marique w16 | Belgium | 1994, 2004 | B+G | 10–17 | 90–306 | 6418 | P | S |
| Lefèvre et al. w17 | Belgium | 1993, 1997 | B+G | 12–17 | 166–288 | 5535 | P | S |
| Ortega et al. w18 | Belgium | 2006–08 | B+G | 13–15 | 40–44 | 170 | P | C |
| Poortmans et al. w19 | Belgium | 1984–85 | B+G | 12–16 | 41–82 | 347 | P | S |
| Seghers & Rutten w20 | Belgium | 2007 | B+G | 11–12 | 69–90 | 318 | P | C |
| Telama et al. w21 | Belgium | 1994–95 | B+G | 12–15 | 423–700 | 2225 | NP | S |
| Vandendriessche et al. w22 | Belgium | 2010? | B+G | 9–11b | 132–235 | 1018 | P | S |
| Verstraete et al. w23 | Belgium | 2002, 2004 | B+G | 9–11c | 77–221 | 1000 | P | S |
| Hobold w24 | Brazil | 2001? | B+G | 9–17 | 92–136 | 951 | P | C |
| Pieta w25 | Brazil | 1998? | B+G | 9–14 | 83–108 | 585 | NP | C |
| Ribeiro et al. w26 | Brazil | 2006 | G | 9–17 | 54–236 | 1290 | P | C |
| Léger et al. w27 | Canada | 1981 | B+G | 9–17 | 155–404 | 5584 | NP | S |
| Leone et al. w28 | Canada | 2009–11 | B+G | 9–12 | 128–277 | 1828 | P | S |
| Massicotte w29 | Canada | 1989–90 | B+G | 9–17 | 75–402 | 5210 | P | N |
| Reed et al. w30 | Canada | 2004 | B+G | 10–11 | 51–59 | 219 | P | C |
| Veldhuizen et al. w31 | Canada | 2005–09 | B+G | 9–15c | 40–1012 | 15217 | P | C |
| Voss et al. w32 | Canada | 2005–07, 2011 | B+G | 10–15c | 49–189 | 951 | NP | S |
| Jurimae & Saar w33 | Estonia | 2001? | B+G | 10–16b | 44–62 | 419 | P | C |
| Jürimäe & Volbekiene w34 | Estonia | 1992 | B+G | 11–17 | 133–294 | 3188 | NP | S |
| Jürimäe et al. w35 | Estonia | 2002 | B+G | 11–17 | 108–234 | 2559 | NP | S |
| Kull & Jürimäe w36 | Estonia | 1992–93 | B+G | 16–17c | 43–131 | 339 | NP | C |
| Raudsepp & Jürimäe w37 | Estonia | 1994–95 | B | 10 | 55 | 55 | P | C |
| Raudsepp & Jürimäe w38 | Estonia | 1994–95 | G | 10 | 56 | 56 | P | C |
| Telama et al. w21 | Estonia | 1994–95 | B+G | 12–15 | 312–334 | 1290 | NP | S |
| Bauqet et al. w39 | France | 1992 | G | 10–10 | 49 | 49 | NP | C |
| Baquet et al. w40 | France | 1997 | B+G | 11–13 | 53–88 | 352 | P | C |
| Baquet et al. w41 | France | 1997, 2001 | B+G | 11c | 44–54 | 98 | NP | C |
| Brunet & Van Praagh w42 | France | 1984–85 | B+G | 9–10 | 40–43 | 83 | NP | C |
| Cazorla w43 | France | 1987 | B+G | 9–12 | 119–693 | 3642 | P | N |
| Cazorla et al. w44 | France | 1996–97 | B+G | 9–11 | 47–110 | 498 | P | S |
| Cazorla et al. w45 | France | 1999 | B+G | 11–14 | 92–212 | 951 | P | S |
| Ortega et al. w18 | France | 2006–08 | G | 13–14 | 44–46 | 90 | P | C |
| Georgiadis w46 | Greece | 1990–91 | B+G | 9–17 | 255–297 | 4814 | P | N |
| Manios et al. w47 | Greece | 2001–02 | B+G | 11c | 52–61 | 113 | P | C |
| Ortega et al. w18 | Greece | 2006–08 | B+G | 13–14 | 41–60 | 212 | P | C |
| Tambalis et al. w48 | Greece | 1997, 2007 | B+G | 9 | 2253–15219 | 66573 | P | N |
| Tambalis et al. w49 | Greece | 2014 | B+G | 9–17 | 490–20149 | 196370 | P | N |
| Tokmakidis et al. w50 | Greece | 2004 | B+G | 9–11 | 43–68 | 300 | NP | C |
| Barabás w51 | Hungary | 1990? | G | 14–17 | 49–130 | 389 | NP | C |
| Ortega et al. w18 | Hungary | 2006–08 | B+G | 13–15 | 52–59 | 279 | P | C |
| Telama et al. w21 | Hungary | 1994–95 | B+G | 12–15 | 100–114 | 439 | NP | S |
| Welk et al. w52 | Hungary | 2013 | B+G | 12–17 | 110–197 | 1348 | P | N |
| Cilia & Bellucci w53 | Italy | 1992 | B+G | 12–14 | 189–259 | 1363 | NP | S |
| Cilia et al. w54 | Italy | 1995 | B+G | 12–14 | 85–120 | 659 | NP | S |
| Cilia et al.w55 | Italy | 1997 | B+G | 12–17 | 109–404 | 2621 | NP | S |
| Cilia et al. w56 | Italy | 1997 | B+G | 15–17 | 44–68 | 173 | NP | C |
| Council of Europe w57 | Italy | 1985–86 | G | 14–17 | 44–79 | 264 | NP | S |
| Grassi et al. w58 | Italy | 2001 | G | 14–17 | 42–53 | 95 | NP | C |
| Ortega et al. w18 | Italy | 2006–08 | G | 16 | 43 | 43 | P | C |
| MoECSSaT w59 | Japan | 1998 | B+G | 9–17 | 885–1120 | 18508 | P | N |
| MoECSSaT w60 | Japan | 1999 | B+G | 9–17 | 701–1059 | 15354 | P | N |
| MoECSSaT w61 | Japan | 2000 | B+G | 9–17 | 606–1060 | 14514 | P | N |
| MoECSSaT w62 | Japan | 2001 | B+G | 9–17 | 657–1123 | 15423 | P | N |
| MoECSSaT w63 | Japan | 2002 | B+G | 9–17 | 636–1126 | 14796 | P | N |
| MoECSSaT w64 | Japan | 2003 | B+G | 9–17 | 676–1126 | 15619 | P | N |
| MoECSSaT w65 | Japan | 2004 | B+G | 9–17 | 706–1126 | 15610 | P | N |
| MoECSSaT w66 | Japan | 2005 | B+G | 9–17 | 765–1121 | 16510 | P | N |
| MoECSSaT w67 | Japan | 2006 | B+G | 9–17 | 782–1128 | 16771 | P | N |
| MoECSSaT w68 | Japan | 2007 | B+G | 9–17 | 765–1127 | 16285 | P | N |
| MoECSSaT w69 | Japan | 2008 | B+G | 9–17 | 788–1119 | 16989 | P | N |
| MoECSSaT w70 | Japan | 2009 | B+G | 9–17 | 807–1124 | 16850 | P | N |
| MoECSSaT w71 | Japan | 2010 | B+G | 9–17 | 822–1117 | 17323 | P | N |
| MoECSSaT w72 | Japan | 2011 | B+G | 9–17 | 823–1113 | 17024 | P | N |
| MoECSSaT w73 | Japan | 2012 | B+G | 9–17 | 916–1125 | 18062 | P | N |
| MoECSSaT w74 | Japan | 2013 | B+G | 9–17 | 742–1089 | 15947 | P | N |
| MoECSSaT w75 | Japan | 2014 | B+G | 9–17 | 920–1125 | 18147 | P | N |
| Jürimäe & Volbekiene w34 | Lithuania | 1992 | B+G | 11–17 | 66–150 | 1601 | NP | S |
| Jürimäe et al. w35 | Lithuania | 2002 | B+G | 11–17 | 214–426 | 4878 | NP | S |
| Brouwer et al. w76 | Netherlands | 2005–07 | B+G | 15–16c | 126–144 | 540 | P | S |
| Slinger et al. w77 | Netherlands | 2002–05 | B+G | 12–15 | 53–308 | 1043 | P | C |
| van Mechelen et al. w78 | Netherlands | 1987 | B+G | 12–16 | 101–285 | 1874 | P | N |
| Bronikowski & Bronikowska w79 | Poland | 2007? | B | 13–14c | 84–115 | 314 | NP | C |
| Maciaszek & Osinski w80 | Poland | 1999? | B+G | 13–14 | 297–371 | 668 | P | C |
| Mleczko et al. w81 | Poland | 1991–92 | B+G | 15–17 | 198–303 | 1431 | P | C |
| Pilicz et al. w82 | Poland | 1999 | B+G | 13–17 | 2055–3470 | 20482 | P | N |
| Coelho-Silva et al. w83 | Portugal | 2008–09 | B+G | 9–16 | 61–143 | 1654 | P | S |
| Marques-Vidal et al.w84  | Portugal | 2000–02 | B+G | 11–17 | 80–250 | 2169 | NP | C |
| Marta et al. w85 | Portugal | 2011 | B+G | 10–11c | 47–105 | 201 | NP | C |
| Mota et al. w86 | Portugal | 1998–00 | B+G | 9c | 59–61 | 120 | P | C |
| Rodrigues et al. w87 | Portugal | 1997–00, 2006 | B+G | 9–15c | 52–168 | 835 | NP | C |
| Santos et al. w88 | Portugal | 2008 | B+G | 10–17 | 486–1695 | 19346 | P | N |
| Silva et al. w89 | Portugal | 2008–09 | B+G | 10–17 | 179–493 | 5532 | P | C |
| Bovet et al. w90 | Seychelles | 2004 | B+G | 11–16 | 174–658 | 5371 | P | N |
| Cazorla et al. w91 | Seychelles | 1990 | B+G | 11–16 | 142–258 | 2542 | P | N |
| du Preez w92 | South Africa | 2005 | B | 11–11 | 45 | 45 | NP | C |
| du Randt w93 | South Africa | 1995–96 | B+G | 11–16 | 45–210 | 1166 | P | N |
| Du Toit et al. w94 | South Africa | 2003? | G | 15–16 | 46–81 | 127 | NP | C |
| Du Toit et al. w95 | South Africa | 2002 | G | 11c | 44 | 44 | NP | C |
| Pienaar & Viljoen w96 | South Africa | 2000–01 | B | 11–15 | 83–134 | 503 | P | S |
| Pienaar et al. w97 | South Africa | 2012 | B+G | 15–16c | 45–81 | 182 | P | C |
| Stadler w98 | South Africa | 2005 | G | 11–12 | 40–51 | 91 | NP | C |
| Van Gent et al. w99 | South Africa | 2000–01 | G | 11–15 | 92–117 | 510 | P | S |
| Brito Ojeda et al. w100 | Spain | 1993? | B+G | 12–17 | 41–50 | 388 | P | S |
| Castro-Pinero et al. w101 | Spain | 2006–07 | B+G | 9–17 | 45–171 | 1898 | P | S |
| Chillón et al. w102 | Spain | 1999–00 | B+G | 9–16 | 75–206 | 2224 | P | C |
| García Baena w103 | Spain | 1999 | B+G | 13–16 | 46–70 | 364 | P | S |
| Gulías-González et al. w104 | Spain | 2010 | B+G | 9–16 | 52–142 | 1494 | P | S |
| Ortega et al. w105 | Spain | 2001–02 | B+G | 13–17 | 78–290 | 2026 | P | S |
| Ortega et al. w18 | Spain | 2006–07 | B+G | 15 | 44 | 44 | P | C |
| Prat et al. w106 | Spain | 1984–85 | B+G | 10–17 | 199–267 | 3932 | P | S |
| Rivas w107 | Spain | 1987 | B+G | 9–17 | 88–303 | 3849 | NP | C |
| Sainz w108 | Spain | 1986–89 | B+G | 10–15 | 69–180 | 1300 | NP | S |
| Sainz w109 | Spain | 1990–94 | B+G | 9–17 | 54–671 | 6658 | P | S |
| Tercedor & Delgado-Fernandez w110 | Spain | 1995 | B+G | 10 | 124–160 | 284 | P | C |
| Torrijos-Nino et al. w111 | Spain | 2010 | B+G | 9–10c | 93–347 | 876 | P | S |
| Ureña w112 | Spain | 1995–96 | B+G | 14–16 | 99–106 | 613 | NP | C |
| Boddy et al. w113 | UK (England) | 1999–2010 | B+G | 9–10b | 104–1213 | 27942 | P | C |
| Boreham et al. w114 | UK (N Ireland) | 1989–90 | B+G | 12–15 | 251–258 | 1015 | P | S |
| Lewitt et al. w115 | UK (Wales) | 2007 | B+G | 13 | 97–141 | 238 | P | C |
| Liverpool City Council w116 | UK (England) | 2000–03 | B+G | 11–12b | 610–1123 | 3466 | NP | C |
| Mahoney w117 | UK (N Ireland) | 1990–91 | B+G | 12 | 50–53 | 103 | NP | C |
| Mahoney & Boreham w118 | UK (N Ireland) | 1989? | B+G | 9–11c | 57–87 | 299 | P | S |
| Nichols & Riddoch w119 | UK (N Ireland) | 1986 | B+G | 12–15c | 44–163 | 474 | P | S |
| Ranson et al. w120 | UK (Wales) | 2009–10 | B+G | 9–11c | 95–164 | 821 | NP | S |
| Riddoch et al. w121 | UK (N Ireland) | 1988–89 | B+G | 11–16 | 208–237 | 2407 | P | N |
| Sandercock et al. w122 | UK (England) | 1998, 2008 | B+G | 10c | 145–158 | 618 | NP | C |
| Sandercock et al. w123 | UK (England) | 2006–10 | B+G | 10–16 | 60–933 | 7354 | NP | S |
| Sandercock et al. w122 | UK (England) | 2014 | B+G | 10c | 150–157 | 307 | NP | C |
| Twisk et al. w125 | UK (N Ireland) | 1992–93 | B+G | 15 | 229–230 | 459 | P | S |
| Watkins w126 | UK (N Ireland) | 1989–90, 1999–01 | B+G | 12–15 | 251–532 | 3032 | P | N |
| Beets & Pitetti w127 | USA | 1999–01 | B+G | 10–17 | 41–63 | 365 | NP | S |
| Beets et al. w128 | USA | 2001–02 | B+G  | 10–15 | 71–2787 | 34524 | P | C |
| Carrel et al. w129 | USA | 2008–10 | B+G | 9–17 | 132–2015 | 17634 | NP | S |
| Chun et al. w130 | USA | 1997 | B+G | 12 | 116–120 | 236 | NP | C |
| Liu et al. w131 | USA | 2010? | B+G | 11–13c | 103–121 | 672 | NP | C |
| Lloyd et al. w132 | USA | 2001? | B+G | 11 | 44–67 | 111 | NP | C |
| Mahar et al. w133 | USA | 1995 | B+G | 10c | 98–111 | 209 | NP | C |
| Welk et al. w134 | USA | 2002? | B+G | 9–16b | 43–68 | 519 | NP  | C |
| Welk et al. w135 | USA | 2009–10 | B+G | 11–17 | 62–187 | 1504 | NP | C |
| Welk et al. w136 | USA | 2011–14 | B+G | 10–17 | 1897–12143 | 110931 | NP | S |
| Wolford w137 | USA | 1997 | B+G | 10–11c | 43–57 | 195 | NP | C |

Note: aIndicates multinational study; bAge reported as an age range; cAge reported as a mean and standard deviation; ?=indicates year of testing not reported; MoECSSaT= Ministry of Education, Culture, Sports, Science and Technology; B=boys; G=girls; P=Probability sampling; NP=non-probability sampling; N=national sample; S=state/provincial sample; C=community sample (e.g. local, city or school level); some studies reported data for children outside of the target age range (e.g. <9 and >17 years of age), however this table only reports the data for 9–17 year olds.

**Supplement 2.** Included study references.

1. Australian Council for Health, Physical Education and Recreation. Australian fitness education award: User's manual and curriculum ideas. Adelaide, SA: Australian Council for Health, Physical Education and Recreation; 1996.
2. Australian Sports Commission. Norms for sport related fitness tests in Australian students aged 12–17 years. Belconnen, ACT: Australian Sports Commission; 1994.
3. Booth M, Macaskill P, McLellan L, et al. NSW schools fitness and physical activity survey 1997. Sydney: NSW Department of Education and Training; 1997.
4. Booth M, Okely AD, Denney-Wilson E, et al. NSW Schools Physical Activity and Nutrition Survey (SPANS) 2004: Full report. Sydney: NSW Department of Health; 2006.
5. Cooley D, McNaughton L. Aerobic fitness of Tasmanian secondary school children using the 20-m shuttle run test. *Percept Mot Skills.* 1999; 88: 188–98.
6. Hardy LL, King L, Espinel P, et al. NSW Schools Physical Activity and Nutrition Survey (SPANS) 2010: full report. Sydney: NSW Ministry of Health; 2010.
7. Jenner DA, Vandongen R, Beilin L. Relationships between blood pressure and measures of dietary energy intake, physical fitness, and physical activity in Australian children aged 11–12 years. *J Epidemiol Community Health.* 1992; 46: 108–13.
8. Lloyd KC, Antonas KN. Nutritional habits and fitness levels of schoolchildren. In: Proceedings of the Nutrition Society of Australia—Twenty-fourth annual scientific meeting, Fremantle, WA, 3-6 December. Adelaide, SA: Nutrition Society of Australia; 2000: 138.
9. McIntyre S. Trends in aerobic fitness from 1994 to 2009 in 10– and 11-year-old Australian children [thesis]. Notre Dame (IN): University of Notre Dame; 2009.
10. Mulkearns S, Naughton G, Carlson J, et al. The effects of additional physical education on health-related fitness measures of circumpubertal females. Unpublished manuscript; 2000.
11. Okely AD, Gray T, Cotton WG. Effect of an extended stay outdoor education program on aerobic fitness. In: Gray T, Hayllar B, eds. Catalysts for change: Proceedings from the 10th National Outdoor Education Conference. Sydney, Australia; 1997: 206–10.
12. Vandongen R, Jenner DA, Thompson C, et al. A controlled evaluation of a fitness and nutrition intervention program on cardiovascular health in 10– to 12-year-old children. *Prev Med.* 1995; 24: 9–22.
13. Baquet G, Berthoin S, Padovano C, et al. Effects d’un cycle de course de duree de type intermittent (court-court) sur la condition physique des adolescents. *Revue de l’Education physique.* 2000; 40(2): 51–60.
14. Beunen G, Borms J, Vrijens J, et al. Fysieke fitheid en sportbeoefening van de Vlaamse jeugd. Volumen 1: Fysieke fitheid van de jeugd van 6 tot 18 jaar. Brussels: Bloso; 1991.
15. Cardon G, De Bourdeaudhuij I, De Clercq D, et al. Physical fitness, physical activity, and self-reported back and neck pain in elementary schoolchildren. *Pediatr Exerc Sci.* 2004; 16: 147–57.
16. Heyters C, Marique T. Le baromètre de la condition physique. Bruxelles: Ministère de la Communauté française, Direction Générale du Sport; 2004.
17. Lefèvre J, Bouckaert J, Duquet W. De barometer van de fysieke fitheid van de Vlaamse jeugd 1997. *De resultaten. Sport (Bloso Brussel).* 1998; 4: 16–22.
18. Ortega FB, Artero EG, Ruiz JR, et al. Physical fitness levels among European adolescents: the HELENA study. *Brit J Sports Med.* 2011; 45: 20–9.
19. Poortmans J, Vlaeminck M, Collin M, et al. Estimation indirecte de la puissance aérobie maximale d'une population Bruxelloise masculine et féminine âgée de 6 à 23 ans. Comparaison avec une technique directe de la mesure de la consommation maximale d'oxygène. *J Physiol (Paris).* 1986; 81: 195–201.
20. Seghers, J Rutten C. Clustering of multiple lifestyle behaviours and its relationship withweight status and cardiorespiratory fitness in a sample of Flemish 11– to 12-year olds. *Public Health Nutr.* 2010; 13: 1838–46.
21. Telama R, Naul R, Nupponen H, et al. Physical fitness, sporting lifestyles and Olympic ideals: Cross-cultural studies on youth sport in Europe. Schorndorf, Germany: Verlag Karl Hofmann; 2002.
22. Vandendriessche JB, Vandorpe BFR, Vaeyens R, et al. Variation in sport participation, fitness and motor coordination with socioeconomic status among Flemish children. *Pediatr Exerc Sci.* 2012; 24: 113–28.
23. Verstraete SJ, Cardon GM, De Clercq DL, et al. A comprehensive physical activity promotion programme at elementary school: the effects on physical activity, physical fitness and psychosocial correlates of physical activity. *Public Health Nutr.* 2007; 10(5): 477–84.
24. Hobold, E. Indicadores de aptidão física relacionada à saúde de crianças e adolescentes do município de Marechal Cândido Rondon [dissertation]. Paraná (Brasil): Universidade Federal de Santa Catarina; 2003.
25. Pieta S. Estudio de la aptitud física de una muestra de la población escolar del estado de Paraná mediante la bateria Eurofit [dissertation]. León, Brasil: Universidad de León; 2000.
26. Ribeiro RR, Santos KD, Carvalho WCG, et al. Aerobic fitness and biological and sociodemographic indicators in female school children. *Rev Bras Cineantropom Desempenho Hum.* 2013; 15(4): 448–57.
27. Léger L, Lambert J, Goulet A, et al. Capacité aérobie des Québécois de 6 à 17 ans—Test navette de 20 mètres avec paliers de 1 minute. *Can J Appl Sport Sci.* 1984; 9(2): 64–9.
28. Leone M, Kalinova E, Comtois AS. Global motor skill assessment from the UQAC-UQAM test battery: Canadian normative values by age and gender. Québec: Université du Québec à Chicoutimi; 2011.
29. Massicotte D. Partial curl-ups, push-ups and multistage 20 meter shuttle run, national norms for 6 to 17 year-olds. Final report submitted to Canadian Association for Health, Physical Education and Recreation (CAHPER) and Fitness and Amateur Sport Canada. Montréal: University of Quebec at Montréal; 1990.
30. Reed KE, Warburton DER, Whitney CL, et al. Secular changes in shuttle-run performance: A 23-year retrospective comparison of 9– to 11-year-old children. *Pediatr Exerc Sci.* 2006; 18: 364–73.
31. Veldhuizen S, Cairney J, Hay J, et al. Relative age effects in fitness testing in a general school sample: how relative are they? *J Sports Sci.* 2014; 33(2): 109–15.
32. Voss C, Sandercock G, Higgins JW, et al. A cross-cultural comparison of body composition, physical fitness, and physical activity between regional samples of Canadian and English children and adolescents. *Can J Public Health.* 2014; 104(4): e245–e250.
33. Jürimäe T, Saar M. Self-perceived and actual indicators of motor abilities in children and adolescents. *Percet Mot Skills.* 2003; 97: 862–6.
34. Jürimäe T, Volbekiene V. Eurofit test results in Estonian and Lithuanian 11 to 17-year-old children: A comparative study. *Eur J Phys Educ.* 1998; 3(2): 178–84.
35. Jürimäe T, Volbekiene V, Jürimäe J, et al. Changes in Eurofit test performance of Estonian and Lithuanian children and adolescents (1992–2002). In: Tomkinson GR, Olds TS, eds. Pediatric Fitness: Secular Trends and Geographic Variability. Basel: Karger; 2007: 129–42.
36. Kull M, Jürimäe T. Using the Eurofit test battery in Estonian 16–18 years old adolescents. *Acta et Commentationes Universitatis Tartuensis.* 1994; 967: 49–52.
37. Raudsepp L, Jürimäe T. Relationships between somatic variables, physical activity, fitness and fundamental motor skills in prepubertal boys. *Biol Sport.* 1996; 13: 279–89.
38. Raudsepp L, Jürimäe T. Relationships of physical activity and somatic characteristics with physical fitness and motor skill in prepubertal girls. *Am J Hum Biol.* 1997; 9: 513–21.
39. Baquet G, Berthoin S, Gerbeaux M, et al. Assessment of the maximal ærobic speed with the incremental running field tests in children. *Biol Sport.* 1999; 16: 23–30.
40. Baquet G, Berthoin S, Gerbeaux M, et al. High-intensity aerobic training during a 10 week one-hour physical education cycle: Effect on physical fitness of adolescents aged 11 to 16. *Int J Sports Exerc Med.* 2001; 22: 295–300.
41. Baquet G, Twisk JWR, Kemper HCG, et al. Longitudinal follow-up of fitness during childhood: Interaction with physical activity. *Am J Hum Biol.* 2006; 18: 51–8.
42. Brunet J, Van Praagh E. Batterie experimentale de tests moteurs Eurofit: Rapport d'Activitie de la Région Auvergne—1984–1985. Clermont-Ferrand, France: Université de Clermont-Ferrand; 1985.
43. Cazorla G. Batterie France-Éval: Mesures, épreuves et barêmes: Évaluation des qualités physiques des jeunes Français d’âge scolaire: 7–11 ans. Rapport pour le Secrétariat d’Etat Auprès du Premier Ministre Chargé de la Jeunesse et de Sports. Paris: Ministère de la Jeunesse et de Sports; 1987.
44. Cazorla G, Portes A, James F. Opération Martinique-Eval. Centre d’Evaluation Sport Santé, Fort de France (Martinique). Rapport pour L’Inspection d’Académie de la Martinique. Fort de france, Martinique: L’Education d’Académie de la Martique; 1997.
45. Cazorla G, Colin JP, Léger L. Condition physique des jeunes collégiens et lycéens de la région Aquitaine (France). Unpublished manuscript; 1999.
46. Georgiadis G. Evaluation of physical fitness of Greek youth aged 6–18 years [dissertation]. Athens (Greece): University of Athens; 1993.
47. Manios Y, Yiannakouris N, Papoutsakis C. Behavorial and physiological indices related to BMI in a cohort of primary schoolchildren in Greece. *Am J Hum Biol.* 2004; 16: 639–47.
48. Tambalis K, Panagiotakos D, Sidossis L. Greek children living in rural areas are heavier but fitter compared to their urban counterparts: A comparative, time-series (1997–2008) analysis. *J Rural Health.* 2011; 27: 270–7.
49. Tambalis KD, Panagiotakos DB, Psarra G, et al. Physical fitness normative values for 6–18-year-old Greek boys and girls, using the empirical distribution and the lambda, mu, and sigma statistical method. *Eur J Sport Sci.* 2016; 16:736–46.
50. Tokmakidis SP, Kasambalis A, Christodoulos AD. Fitness levels of Greek primary schoolchildren in relationship to overweight and obesity. *Eur J Pediatr.* 2006; 165: 867–74.
51. Barabás, A. Measurement of aerobic power by field tests. In: Coudert J, Van Praagh E, eds. Pediatric work physiology: Children and exercise XVI. Paris: Masson; 1992: 39–41.
52. Welk GJ, Saint-Maurice PF, Csányi T. Health-related physical fitness in Hungarian youth: Age, sex, and regional profiles. *Res Q Exerc Sport.* 2015; 86: S45–S57.
53. Cilia G, Bellucci M. Eurofit: Tests Europei di attitudine fisica. Roma: Istituto Superiore Statale di Educazione Fisica; 1993.
54. Cilia G, Bellucci M, Riva M. Eurofit 1995. Roma: Istituto Superiore Statale di Educazione Fisica; 1996.
55. Cilia G, Bellucci M, Bazzano C, et al. Eurofit 1997: Banche dati per la scuola. *Alcmeone.* 1997; 3: 13–32.
56. Cilia G, Bazzano C, Bellucci M, et al. I risultati dei test Eurofit nella scuola Matteuccii di Roma. *Alcmeone.* 1998; 2: 16–20.
57. Council of Europe. Évaluation de l'aptitude physique: Eurofit batterie expérimentale. Rome: Council of Europe; 1986.
58. Grassi GP, Turci M, Sforza C. Aerobic fitness and somatic growth in adolescents: a cross sectional investigation in a high school context. *J Sports Med Phys Fitness.* 2006; 46: 412–18.
59. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 1999.
60. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2000.
61. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2001.
62. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2002.
63. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2003.
64. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2004.
65. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2005.
66. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2006.
67. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2007.
68. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2008.
69. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2009.
70. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2010.
71. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2011.
72. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2012.
73. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2013.
74. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2014.
75. Ministry of Education, Culture, Sports, Science and Technology. Report book on the survey of physical fitness and athletic ability. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; 2015.
76. Brouwer SI, Stol RP, Liem ET et al. The role of fitness in the association between fatness and cardiometabolic risk from children to adolescence. *Pediatr Diabetes.* 2013; 14: 57–65.
77. Slinger J, van Breda E, Kuipers H. Aerobic fitness data for Dutch adolescents (2002–2005). *Pediatr Exerc Sci.* 2009; 21: 10–8.
78. van Mechelen W, van Lier WH, Hlobil H, et al. Eurofit: Handleiding met referentieschalen voor 12– tot en met 16-jarige jongens en meisjes in Nederland. Haarlem: Uitgeverij de Vrieseborch; 1991.
79. Bronikowski M, Bronikowska M. Salutogenesis as a framework for improving health resources of adolescent boys. *Scand J Public Health.* 2009; 37: 525–31.
80. Maciaszek J, Osinski W. Poziom sprawnosci fizycznej u chlopców i dziewczat Poznanskich w wieku 10–14 lat. *Roczniki Naukowe AWF w Poznaniu.* 2001; 50: 3–17.
81. Mleczko E, Ozimek M. Rozwój somatyczny i motoryczny mlodziezy Krakowskiej miedzy 15 a 19 rokiem zycia z uwzglednieniem czynników srodowiskowych. Kraków: Akademia Wychowania Fizycznego; 2000.
82. Pilicz S, Przeweda R, Dobosz J, et al. Punktacja sprawnosci fizycznej mlodziezy Polskiej wg miedzynarodowego testu sprawnosci fizycznej: Kryteria pomiaru wydolnosci organizmu testem Coopera. Warszawa: Akademia Wychowania Fizycznego Józefa Pilsudskiego; 2003.
83. Coelho-Silva MJ, Ronque ERV, Cyrino ES, et al. Nutritional status, biological maturation and cardiorespiratory fitness in Azorean youth aged 11–15 years. *BMC Public Health.* 2013; 13: 495
84. Marques-Vidal P, Marcelino G, Ravasco P, et al. Increased body fat is independently and negatively related with cardiorespiratory fitness levels in children and adolescents with normal weight. *Eur J Cardiovasc Prev and Rehabil.* 2010; 17: 649–654.
85. Marta CC, Marinho DA, Barbosa TM. Physical fitness differences between prepubescent boys and girls. *J Strength Cond Res.* 2012; 26(7): 1756–66.
86. Mota J, Guerra S, Leandro C. Association of maturation, sex, and body fat in cardiorespiratory fitness. *Am J Hum Biol.* 2002; 14: 707–12.
87. Rodrigues LP, Leitao R, Lopes, VP. Physical fitness predicts adiposity longitudinal changes over childhood and adolescence. *J Sci Med Sport.* 2013; 16: 118–23.
88. Santos R, Mota J, Santos DA, et al. Physical fitness percentiles for Portuguese children and adolescents aged 10–18 years. *J Sports Sci.* 2014; 32: 1510–81.
89. Silva G, Aires L, Mota J, et al. Normative and criterion-related standards for shuttle run performance in youth. *Pediatr Exerc Sci.* 2012; 24: 157–69.
90. Bovet P, Auguste R, Burdette H. Strong inverse association between physical fitness and overweight in adolescents: a large school-based survey. *Int J Behav Nutr Phys Act.* 2007; 4: 24.
91. Cazorla G, Rousseau G, Dudal J, et al. Évaluation des capacités motrices de l’enfant, de l’adolescent et du jeune seychellois: 7–18 ans et plus. Rapport pour le Ministère Seychelle de l’Education et pour le Ministère Français de la Coopération. Paris, France: Ministère Seychellois de l’Education et Ministrère Français de la Coopération; 1990.
92. Du Preez SM. The effect of physical activity on the body composition and health related fitness of 9 to 13 year old boys [thesis]. Potchefstroom (South Africa): North-West University; 2008.
93. Du Randt R. The 1996 South African sport talent identification project: Report prepared for the Sports Information and Science Agency. Pretoria: South African Sports Commission; 1996.
94. Du Toit L, Venter RE, Potgieter JR. The relationship between cardiorespiratory fitness, body composition and physical self-perception of adolescent girls. *J Hum Mov Stud.* 2005; 48: 353–64.
95. Du Toit D, Pienaar AE, Truter L. Relationship between physical fitness and academic performance in South African children. *S Afr J Res Sport PH.* 2011; 33(3): 23–35.
96. Pienaar AE, Viljoen A. Physical and motor ability, anthropometrical and growth characteristics of boys in the northwest province of South Africa: A sport talent perspective. *S Afr J Res Sport Phys Educ Recreation.* 2010; 32(2): 71–93.
97. Pienaar C, Coetzee B, Monyeki AM. The use of anthropometric measurements and the influence of demographic factors on the prediction of VO2max in a cohort of adolescents: the PAHL study. *Ann Hum Biol.* 2015; 42: 135–43.
98. Stadler MC. The influence of a physical activity intervention program (PAI) on the physical fitness levels, body composition and health risk behaviour of 9 to 13 year old girls [dissertation]. Potchefstroom (South Africa):North-West University; 2007.
99. Van Gent M, Malan DDJ, Pienaar AE. A comparison of the anthropometric, physical and motor growth characteristics of 12–15 year old girls in the North West province with Australian girls. *Afr J Phys Health Educ Recr Dance.* 2002; 8(2): 309–20.
100. Brito Ojeda EM, Navarro Valdivielso M, García Afonso D, et al. La condición física en la población escolar de gran Canaria (10–19 años). Las Palmas de Gran Canaria, Spain: Excmo. Cabildo Insular de Gran Canaria; 1995.
101. Castro-Pinero J, González-Montesinos JL, Mora J, et al. Percentile values for muscular strength field tests in children aged 6 to 17 years: Influence of weight status. *J Strength Cond Res.* 2009; 23: 2295–310.
102. Chillón P, Ortega FB, Ferrando JA, et al. Physical fitness in rural and urban children and adolescents from Spain. *J Sci Med Sport.* 2011; 14: 417–23.
103. García Baena, J. La condición fisica en la educación secundaria. Trabajo de investigación [thesis]. Madrid (Spain): Universidad Nacional de Educacion a Distancia; 1999.
104. Gulías-González R, Martínez-Vizcaíno V, García-Prieto JC, et al. Excess of weight, but not underweight, is associated with poor physical fitness in children and adolescents from Castilla-La. *Eur J Pediatr.* 2014; 173: 727–35.
105. Ortega FB, Ruiz JR, Castillo MJ, et al. Low level of physical fitness in Spanish adolescents. Relevance for future cardiovascular health (AVENA Study). *Rev Esp Cardiol.* 2005; 58(8): 898–909.
106. Prat JA, Casamort J, Balagué N, et al. Eurofit: La batería Eurofit en Catalunya. Barcelona: Secretaria General de l'Esport; 1998.
107. Rivas FJ. Valoracion de la evolucion anthropoetrica y de las caracteristicas motrices en la poblacion escolar de un centro de E.G.,B. mediante un estudio transversal. In: II Congreso Galego da Educacion Fisica e o Deporte. La Coruña: Escola Galega do Deporte de la Xunta de Galicia; 1987.
108. Sainz RM. Aptitudes psiquicas y fisicas: Estudio ed la aptitud fisica de los adolescentes de la provincia de Vizcaya y su relacion con la personalidad [dissertation]. Bilboa (Spain): Universidad de Deusto; 1992.
109. Sainz RM. La batería Eurofit en Euskadi. Vitoria-Gasteiz: Instituto Vasco de Educación Fisica; 1996.
110. Tercedor P, Delgado-Fernandez M. Condicion fisica relacionada con la salud en escolares de 10 anos de edad de Granada. In Proceedings of the II congreso internacional sobre la enseñanza de la educación física y el deporte escolar (second international congress about teaching physical education and school sport); 1998.
111. Torrijos-Niño C, Martínez-Vizcaíıno V, Pardo-Guijarro MJ, et al. Physical fitness, obesity, and academic achievement in schoolchildren. *J Pediatr.* 2014; 165: 104–9.
112. Ureña F. Valoración y baremación de la aptitud física en el alumnado de segundo ciclo de educación secundaria obligatoria de la comunidad autonoma de Murcia. Su utilización según los postulados de la reforma [dissertation]. Murcia (Spain): Universidad de Murcia; 1996.
113. Boddy L, Fairclough SJ, Atkinson G, Stratton G. Changes in cardiorespiratory fitness in 9– to 10.9-year-old children: Sports Linx 1998–2010. *Med Sci Sports Exerc.* 2012; 44: 481–86.
114. Boreham C, Twisk J, Murray L, et al. Fitness, fatness, and coronary heart disease risk in adolescents: The Northern Ireland Young Hearts Project. *Med Sci Sports Exerc.* 2001; 33(2): 270–4.
115. Lewitt MS, Baker JS, Mooney GP, et al. Pubertal stage and measures of adiposity in British schoolchildren. *Ann Hum Biol.* 2012; 39(5): 440–7.
116. Liverpool City Council. Liverpool Sports Linx Project 01–03: Report on the health and fitness of Liverpool primary and secondary school children. Liverpool, UK: Liverpool City Council; 2003.
117. Mahoney C. 20-MST and PWC170 validity in non-Caucasian children in the UK. *Br J Sports Med.* 1992; 26(1): 45–7.
118. Mahoney CA, Boreham CAG. Eurofit in Belfast primary schools. *Scot J Phys Educ.* 1991; 19(2): 1–4.
119. Nichols AK, Riddoch CJ. The development of fitness test batteries for use in higher education. In Trends and developments in physical education: Proceedings of the VIII Commonwealth and International Conference on Sport, Physical Education, Dance, Recreation and Health. London: E & FN Spon; 1986: 378–84.
120. Ranson R, Stratton G, Taylor S. Digit ratio (2D:4D) and physical fitness (Eurofit test battery) in school children. *Early Hum Dev.* 2015; 91: 327–31.
121. Riddoch C, Savage JM, Murphy N, et al. Long term health implications of fitness and physical activity patterns. *Arch Dis Chil.* 1991; 66: 1426–33.
122. Sandercock G, Voss C, McConnell D. Ten year secular declines in the cardiorespiratory fitness of affluent English children are largely independent of changes in body mass index. *Arch Dis Child.* 2010; 95: 46–7.
123. Sandercock G, Voss C, Cohen D, et al. Centile curves and normative values for the twenty metre shuttle-run test in English schoolchildren. *J Sports Sci.* 2012; 30(7): 679–87.
124. Sandercock G, Ogunleye A, Voss C. Six-year changes in body mass index and cardiorespiratory fitness of English schoolchildren from an affluent area. *Int J Obes.* 2015; 39: 1504–7.
125. Twisk JWR, Boreham C, Cran G, et al. Clustering of biological risk factors for cardiovascular disease and the longitudinal relationship with lifestyle of an adolescent population: The Northern Ireland Young Hearts Project. *J Cardiovasc Risk.* 1999; 6: 355–62.
126. Watkins DC. Ten year trends (1990–2000) in biological and behavioural risk factors for coronary heart disease in northern Irish adolescents [thesis]. Belfast(UK): The Queen's University of Belfast; 2001.
127. Beets MW, Pitetti KH. A comparison of shuttle-run performance between mid-western youth and their national and international counterparts. *Pediatr Exerc Sci.* 2004; 16: 94–112.
128. Beets MW, Pitetti KH, Cardinal BJ. Progressive aerobic cardiovascular endurance run and body mass index among an ethnically diverse sample of 10–15 year olds. *Res Q Exerc Sport.* 2005; 76(4): 389–97.
129. Carrel AL, Bowser J, White D, et al. Standardized childhood fitness percentiles derived from school-based testing. *J Pediatr.* 2012; 161: 120–4.
130. Chun DM, Corbin CB, Pangrazi RP. Validation of criterion-referenced standards for the mile run and progressive aerobic cardiovascular endurance tests. *Res Q Exerc Sport.* 2000; 71: 125–34.
131. Liu W, Zillifro TD, Nichols RA. Tracking of health-related physical fitness for middle school boys and girls. *Pediatr Exerc Sci.* 2012; 24: 549–62.
132. Lloyd LK, Bishop PA, Walker JL, et al. The influence of body size and composition on FITNESSGRAM® test performance and the adjustment of FITNESSGRAM® test scores for skinfold thickness in youth. *Meas Phys Educ Exerc Sci.* 2003; 7(4): 205–26.
133. Mahar MT, Rowe DA, Parker CR, et al. Criterion-referenced and norm-referenced agreement between the mile run/walk and PACER. *Meas Phys Educ Exerc Sci.* 1997; 1(4): 245–58.
134. Welk GJ, Schaben JA, Shelley M. Physical activity and physical fitness in children schooled at home and children attending public schools. *Pediatr Exer Sci.* 2004; 16: 310–23.
135. Welk GJ, De Saint-Maurice Maduro PF, Laurson KR, Brown DD. Field evaluation of the new FITNESSGRAM criterion-referenced standards. *Am J Prev Med.* 2011; 41(4S2): S131–42.
136. Welk GJ, Bai Y, Saint-Maurice PF, Allums-Featherston K, Candelaria N. Design and Evaluation of the NFL PLAY 60 FITNESSGRAM Partnership Project. *Res Q Exerc Sport.* 2016; 87: 1–13.
137. Wolford N. The difference in physical fitness levels of fifth graders according to socioeconomic groups and genders [dissertation]. Ann Arbor(MI): University Microforms International; 1998.