Supplementary Information 4 Assessment of methodological quality based on the boxes 6 – 9a of the COSMIN checklist [21, 22]

Assessing Anaerobic Speed Reserve: A Systematic Review on the Validity and Reliability of Methods to Determine Maximal Aerobic Speed and Maximal Sprinting Speed in Running-based Sports

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Systematic Review

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Supplementary Information 4 Assessment of methodological quality based on the boxes 6 – 9a of the COSMIN checklist [29, 30]

	Akyildiz et al. [65]	Barbero-Alvarez et al. [32]	Barbero-Alvarez et al. [54]	Beato et al. [18]	Beato et al. [66]	Bellenger et al. [33]	Benham-mou et al. [51]	Bernard et al. [34]	Berthoin et al. [35]
Box 6. Reliability									
Design requirements									
1. Were patients stable in the interim period on the construct to be measured?	3	NA	NA	3	1	NA	3	NA	NA
2. Was the time interval appropriate?	3	NA	NA	3	1	NA	3	NA	NA
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	3	NA	NA	3	3	NA	3	NA	NA
Statistical methods									
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	3	NA	NA	1	3	NA	3	NA	NA
Other									
8. Were there any other important flaws in the design or statistical methods of the study?	3	NA	NA	3	3	NA	3	NA	NA
Box 7. Measurement error									
Design requirements									
1. Were patients stable in the interim period on the construct to be measured?	3	NA	NA	3	1	NA	3	NA	NA
2. Was the time interval appropriate?	3	NA	NA	3	1	NA	3	NA	NA
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	3	NA	NA	3	3	NA	3	NA	NA
Statistical methods									
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	3	NA	NA	2	3	NA	3	NA	NA
Other									

6. Were there any other important flaws in the design or statistical methods of the study?	3	NA	NA	3	3	NA	3	NA	NA
Box 8. Criterion validity									
Statistical methods									
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	3	3	3	3	3	3	3	3
Other									
3. Were there any other important flaws in the design or statistical methods of the study?	3	1	1	3	3	3	3	1	1
Box 9a. Convergent validity									
Design requirements									
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	2	3	3	3	3	3	3
2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	2	3	3	3	3	3	3
Statistical methods									
3 Were design and statistical methods adequate for the hypotheses to be tested?	3	3	3	3	3	3	3	3	3

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.**Supplementary Information 4** Continued.

	Berthon et al. [36]	Berthon et al. [37]	Billat et al. [6]	Cappa et al. [52]	Carminatti et al. [38]	Chahal et al. [67]	Ghigiarelli et al. [70]	Clark et al. [55]	Coutts and Duffield [68]	Čović et al. [14]	Da Silva and Machado [39]
Box 6. Reliability											
Design requirements											
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	3	NA	3	3	NA	3	3	NA
2. Was the time interval appropriate?	NA	NA	NA	1	NA	3	3	NA	3	3	NA
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	NA	NA	NA	3	NA	3	3	NA	3	3	NA
Statistical methods											

4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	NA	NA	NA	1	NA	3	3	NA	0	3	NA
Other											
8. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	3	NA	3	3	NA	1	3	NA
Box 7. Measurement error											
Design requirements											
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	3	NA	3	3	NA	3	3	NA
2. Was the time interval appropriate?	NA	NA	NA	1	NA	3	3	NA	3	3	NA
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	NA	NA	NA	3	NA	3	3	NA	3	3	NA
Statistical methods											
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	NA	NA	NA	2	NA	3	3	NA	0	3	NA
Other											
6. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	3	NA	3	3	NA	1	3	NA
Box 8. Criterion validity											
Statistical methods											
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	3	3	3	3	0	3	3	3	3	3
Other											
3. Were there any other important flaws in the design or statistical methods of the study?	3	3	3	3	3	3	3	1	0	3	3
Box 9a. Convergent validity											
Design requirements											
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	3	3	3	3	3	3	3	3	3

2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	3	3	3	2	3	3	3	3	3
Statistical methods											
3 Were design and statistical methods adequate for the hypotheses to be tested?	3	3	3	3	3	3	3	3	1	3	3

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.

Supplementary Information 4 Continued.

	Darendeli et al. [40]	Dillon et al. [41]	Dittrich et al. [42]	Djaoui et al. [19]	Ferro et al. [56]	Fleureau et al. [57]	Fornasier-Santos et al. [69]	Foster et al. [43]	Helland et al. [64]	Highton et al. [71]	Hoppe et al. [72]
Box 6. Reliability											
Design requirements											
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
2. Was the time interval appropriate?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
Statistical methods											
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	NA	NA	NA	NA	NA	NA	0	NA	1	0	0
Other											
8. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
Box 7. Measurement error											
Design requirements											
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
2. Was the time interval appropriate?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	NA	NA	NA	NA	NA	NA	3	NA	3	3	3

Statistical methods											
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	NA	NA	NA	NA	NA	NA	3	NA	2	3	2
Other											
6. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	NA	NA	NA	3	NA	3	3	3
Box 8. Criterion validity											
Statistical methods											
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	3	3	0	0	3	0	3	NA	3	0
Other											
3. Were there any other important flaws in the design or statistical methods of the study?	3	3	3	3	3	0	3	3	NA	3	3
Box 9a. Convergent validity											
Design requirements											
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	3	3	3	3	3	3	NA	3	3
2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	3	3	3	3	3	3	NA	3	1
Statistical methods											
3 Were design and statistical methods adequate for the hypotheses to be tested?	3	3	3	3	3	1	3	3	NA	3	3

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.

Supplementary Information 4 Continued.

	Johnston et al. [73]	Johnston et al. [74]	Lacome et al. [15]	Lacour et al. [44]	Lopes et al. [45]	Lorenzen et al. [46]	Lundquist et al. [47]	Massard et al. [58]	Morin and Sève [59]	Ogris et al. [60]	Pallarés et al. [48]
Box 6. Reliability											
Design requirements											

1. Were patients stable in the interim period on the construct to be measured?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Was the time interval appropriate?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Statistical methods											
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other											
8. Were there any other important flaws in the design or statistical methods of the study?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Box 7. Measurement error											
Design requirements											
1. Were patients stable in the interim period on the construct to be measured?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Was the time interval appropriate?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Statistical methods											
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other											
6. Were there any other important flaws in the design or statistical methods of the study?	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Box 8. Criterion validity											
Statistical methods											
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	3	0	3	3	0	3	0	3	0	3
Other											

3. Were there any other important flaws in the design or statistical methods of the study?	0	0	0	3	3	3	3	3	1	1	3
Box 9a. Convergent validity											
Design requirements											
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	3	3	3	3	3	3	3	3	3
2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	3	3	3	3	3	3	3	3	3
Statistical methods											
3 Were design and statistical methods adequate for the hypotheses to be tested?	0	0	0	3	3	3	3	3	3	1	3

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.

Supplementary Information 4 Continued.

	Paradisis et al. [49]	Riboli et al. [7]	Riboli et al. [50]	Roe et al. [61]	Romero-Franco et al. [75]	Sagiroglu et al. [76]	Sandford et al. [12]	Sangan et al. [13]	Schnitzler et al. [53]	Simperingham et al. [17]
Box 6. Reliability										
Design requirements										
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	NA	3	3	NA	3	3	3
2. Was the time interval appropriate?	NA	NA	NA	NA	3	3	NA	3	3	3
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	NA	NA	NA	NA	3	3	NA	3	3	3
Statistical methods										
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	NA	NA	NA	NA	0	0	NA	3	3	3
Other										
8. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	NA	1	3	NA	3	3	3
Box 7. Measurement error										
Design requirements										

1. Were patients stable in the interim period on the construct to be measured?	NA	NA	NA	NA	3	3	NA	3	3	3
2. Was the time interval appropriate?	NA	NA	NA	NA	3	3	NA	3	3	3
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	NA	NA	NA	NA	3	3	NA	3	3	3
Statistical methods										
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	NA	NA	NA	NA	2	3	NA	2	2	3
Other										
6. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	NA	NA	1	3	NA	3	3	3
Box 8. Criterion validity										
Statistical methods										
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	3	3	3	3	3	3	3	3	NA
Other										
3. Were there any other important flaws in the design or statistical methods of the study?	3	3	3	0	1	3	1	3	3	NA
Box 9a. Convergent validity										
Design requirements										
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	3	3	3	3	3	3	3	NA
2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	3	3	3	3	3	3	3	NA
Statistical methods										
3 Were design and statistical methods adequate for the hypotheses to be tested?	3	3	3	1	1	3	1	3	3	NA

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.

Supplementary Information 4 Continued.

	Thron et al. [10]	Vescovi [62]	Willmott et al. [77]	Young et al. [63]	Zabaloy et al. [78]	Zabaloy et al. [79]
Box 6. Reliability						
Design requirements						
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	3	NA	3	3
2. Was the time interval appropriate?	NA	NA	3	NA	3	3
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	NA	NA	3	NA	3	3
Statistical methods						
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	NA	NA	3	NA	3	3
Other						
8. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	3	NA	3	3
Box 7. Measurement error						
Design requirements						
1. Were patients stable in the interim period on the construct to be measured?	NA	NA	3	NA	3	3
2. Was the time interval appropriate?	NA	NA	3	NA	3	3
3. Were the test conditions similar for the measurements? (e.g. type of administration, environment, instructions)	NA	NA	3	NA	3	3
Statistical methods						
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	NA	NA	3	NA	3	2
Other						
6. Were there any other important flaws in the design or statistical methods of the study?	NA	NA	3	NA	3	3
Box 8. Criterion validity						

Statistical methods						
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	3	0	3	3	3	0
Other						
3. Were there any other important flaws in the design or statistical methods of the study?	1	3	1	3	3	3
Box 9a. Convergent validity						
Design requirements						
1 Is it clear what the comparator instrument(s) measure(s)?	3	3	3	3	3	3
2 Were the measurement properties of the comparator instrument(s) sufficient?	3	3	3	3	3	3
Statistical methods						
3 Were design and statistical methods adequate for the hypotheses to be tested?	3	3	3	3	3	3

3 = very good; 2 = adequate; 1 = doubtful; 0 = inadequate, and NA = not applicable.