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Does trunk range of motion during sitting Para cross-country skiing differ between classes?

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INTRODUCTION:
In sitting Para cross-country (XC) skiing, athletes compete in a seated position and thus rely predominantly on their arms and trunk for propulsion [1]. Double poling at higher work rates requires increased trunk motions [2], and it is likely that the trunk function of Para sit-skiers will influence their ability to produce high power output [3] and speeds. The classification of sitting XC-skiers is based on clinical trunk function tests, and athletes with higher trunk function are often allocated to higher classes. However, it is difficult to accurately estimate the functional trunk range of motion (ROM) of an athlete during sit-skiing based on these assessments. Modern inertial measurement unit (IMU) technology allows the estimation of the trunk ROM during on-snow competitions. This study therefore aimed at comparing the trunk ROM between classes of sitting para-XC skiers during competition.
METHODS:
A single IMU sensor (AdMos, ASI, Lausanne, Switzerland) was attached to the back of the race bib of 22 sitting para XC-skiers during a sprint race at a World Championship competition (9F, 13M, LW10=1, LW10.5=4, LW11=3, LW11.5=9, LW12=9). The IMU was placed between the scapulae and recorded gyroscope and accelerometer data at 200Hz, which was processed in Matlab (R2022b, MathWorks, Natick, MA, USA) to calculate joint angles. Data from the final 70-meter stretch of the race was extracted for analysis. Due to the low number of athletes in each class, the data was solely assessed descriptively. The differences in trunk ROM between classes were assessed by comparing the 95% Confidence Intervals (CI) around the mean. When these showed no overlap, it indicated 95% confidence of a difference between means.
RESULTS:
Since the dataset only had one LW10, this data point was excluded from the comparison (ROM: 6.3°). The 95%CI did not overlap for the comparison between the LW10.5 and LW12 classes (mean ROM ±95%CI: LW10.5 12.4°±6.4°, LW12: 28.7°±5.9°). The other comparisons had overlapping CI and quite a large variability in ROM (mean ROM ±95%CI: LW11: 25.6°±31.1°, LW11.5: 19.8°±14.0°).
CONCLUSION:
While we see a tendency towards larger functional trunk ROM in the higher classes, the 95%CI overlapped for all comparisons except for LW10.5 vs LW12. This overlap between adjacent classes, and in some cases also classes further apart suggests that the clinical assessment used in classification may sometimes fail to adequately identify the amount of trunk function a sit-skier uses during competition. The extent to which the functional trunk ROM differs between the classes remains unknown and should be subject to further research. This study suggests that assessing the functional trunk ROM alone may not provide sufficient information to differentiate between the classes during para sit-skiing.

REFERENCES
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