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Performance-determining variables of a full sprint cross-country skiing competition

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INTRODUCTION:
Sprint cross-country skiing involves repeated ~3 min efforts during a ~3-4 h competition, starting with a qualifying time-trial (TT) followed by three subsequent knock-out heats (quarterfinals [QF], semifinals [SF], and final [F]). Although the physiological demands and performance-determining variables of time-trials have been investigated in detail, there exist limited data on how the relationship between performance-determining variables and the different efforts evolve throughout a sprint competition. Therefore, this study investigated lab-derived performance-determining variables and the relationship with performance during a full sprint cross-country skiing competition.
METHODS:
Eighteen national-level male junior skiers performed a simulated on-snow sprint competition in the skating technique consisting of an individual TT followed by 3 heats (QF, SF, and F) for a total of four efforts. A promotion-relegation system was used instead of the regular elimination system so that each skier completed all heats. Within ~3 weeks from the competition, the skiers performed laboratory tests of performance and physiological variables in roller-ski skating, including sub-maximal efforts and an incremental test to exhaustion as well as upper- and lower-body strength and power tests.
RESULTS:
We found longer time spent during the QF compared to the SF (2.6±3.2 seconds $p < 0.01$) and shorter time spent during the SF compared to the F (-6.8±9.5 seconds $p < 0.05$). Peak velocity and peak oxygen uptake (VO2peak) achieved during the incremental test, showed increasing correlations with performance as the sprint competition progressed. Correlation coefficients (r-values) for peak velocity and VO2peak were -0.73 and -0.51, -0.80 and -0.68, -0.82 and -0.73, and -0.86 and -0.77 in the TT, QF, SF and F, respectively (all $p < 0.05$). Gross efficiency demonstrated consistently large correlations with performance across all efforts (average r: -0.58±0.09), while 30-second poling-ergometer sprint power output demonstrated moderate correlations with performance (r: -0.37±0.22).
CONCLUSION:
The gradually increasing correlations observed between peak velocity, VO2peak and performance in the subsequent efforts of a simulated sprint cross-country skiing competition indicate that aerobic power is increasingly important as the competition day progresses.

Topic: **Training and Testing**

Presentation **Poster**

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