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Reliability and Validity of Measuring Energy Expenditure in Inline and Shuttle Running with Honor and Lifesense Fitness Wristbands

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Objective Energy expenditure is an indicator that comprehensively reflects the amount of physical activity. Fitness wristbands are used to monitor the energy expenditure of human activities in the fitness field. Among the fitness wristbands popular in China, Honor and Lifesense rank in the top list. However, there was no research on the reliability and validity of these two wristbands in measuring the energy expenditure. This study aims to evalute the reliability and validity of the two fitness wristbands (Honor and Lifesense) in measuring the energy expenditure in inline and shuttle running.
Methods 18 male collegiate students (age: 22.4±2.5yrs, height: 177±7cm, mass: 69.3.±8.4kg) volunteered to participate in two four-stage incremental inline running tests (8km/h, 10km/h, 12km/h, 14km/h) and two 20m four-stage incremental shuttle running test (6km/h, 8km/h, 10km/h, 12km/h). The duration of each stage was 5 min, and intermittent per stage was 1 min. Honor B3（GMN-BX9, Honor, China） and Lifesense Mombo2（LS417-B, Lifesense, China）fitness wristbands was utilized to measure the energy expenditure of each stage in incremental inline and shuttle running. A portable spirometric system (K4b^2, Cosmed, Italy) was utilized to measure the ventilator information during the test. The energy expenditure was converted into equivalent units (kcal) according to the measured respiratory quotient coefficient. The repeat measurementedreliability test was carried out on the energy expenditure indicators measured by the fitness wristbands in the twice incremental inline running and the shuttle running. The energy expenditure calculated by the portable gas metabolic instrument was comparedwith those measured by Honor and Lifesense fitness wristbands.
Results The result test-retest reliability found that the Honor and Lifesense fitness wristbands had well correlations between the two tests at a speed of 8km/h, 10km/h, 12km/h in inline running, and 8km/h, and 10km/h in shuttle running ($r=0.44\sim0.93$, $P<0.05$), but the correlation was not well at 6km/h in shuttle running ($r<0.43$, $P>0.05$). The Honor wristband correlation ($r=0.83\sim0.93$, $P<0.05$) was higher than the Lifesense fitness wristbands ($r=0.44\sim0.60$, $P<0.05$) at 8km/h, 10km/h, and 12km/h in inline running and at 8km/h, and 10km/h in shuttle running. The correlation coefficients of the two fitness wristbands at 8km/h and 10km/h in inline running ($r=0.52\sim0.93$, $P<0.05$) were both higher than those in shuttle running ($r=0.44\sim0.83$, $P<0.05$). The energy expenditure measured by K4b^2 and the two kinds fitnees wristband was significantly different ($P<0.05$), except at 12km/h in inline running and 10km/h in shuttle running ($P > 0.05$).
Conclusions Honor and Lifesense wristbands have acceptable reliability in measuring energy expenditure at 8, 10, 12km/h in inline and shuttle running, with the fore slightly higher than the after. The two wristbands have higher reliability in measuring the energy expenditure in inline running than in shuttle running. The validity of measuring the energy expenditure with the two fitness wristbands is acceptable at 12km/h in inline running and at 10km/h in shuttle running, but not at other speed.