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Title: Validity and reliability of field-based measures for assessing movement skill competency in lifelong physical activities: a systematic review

Running title: Validity and reliability of lifelong physical activity measures

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### **Key Points**

- Lifelong physical activities are typically performed individually or in small groups, involve minimal structure and minimal physical contact, are characterized by varying levels of intensity and competitiveness and may be easily carried into adulthood and old age.
- Additional research is needed to establish the validity and reliability of lifelong physical activity movement skill tests for activities not included in this review, such as yoga, Pilates, tai chi, aerobics and running.
- Future research would benefit from determining the predictive validity of competency in lifelong physical activities to ascertain the strength and direction of association between competency levels and future physical activity.

### **Abstract**

*Background:* It has been suggested that young people should develop competence in a variety of 'lifelong physical activities' to ensure that they can be active across the lifespan.

*Objective:* The primary aim of this systematic review is to report the methodological properties, validity, reliability and test duration of field-based measures which assess movement skill competency in lifelong physical activities. A secondary aim was to clearly define those characteristics unique to lifelong physical activities.

*Data Sources:* A search of four electronic databases (Scopus, SPORTDiscus, ProQuest and PubMed) was conducted between June 2014 and April 2015 with no date restrictions.

*Study Selection:* Studies addressing the validity and/or reliability of lifelong physical activity tests were reviewed. Included articles were required to assess lifelong physical activities using process-oriented measures, as well as report either one type of validity or reliability.

*Study Appraisal and Synthesis Methods:* Assessment criteria for methodological quality were adapted from a checklist used in a previous review of sport skill outcome assessments.

*Results:* Movement skill assessments for eight different lifelong physical activities (badminton, cycling, dance, golf, racquetball, resistance training, swimming and tennis) in 17 studies were identified for inclusion. Methodological quality, validity, reliability and test duration (time to assess a single participant), for each article were assessed. Moderate to excellent reliability results were found in 16 of 17 studies with 71% reporting inter-rater reliability and 41% reporting intra-rater reliability. Only four studies in this review reported test-retest reliability. Ten studies reported validity results, of which content validity was cited in 41% of these studies. Construct validity was reported in 24% of studies, while criterion validity was only reported in 12% of studies.

*Limitations:* Numerous assessments for lifelong physical activities may exist, yet only assessments for eight lifelong physical activities were included in this review. Generalizability of results may be more applicable if more heterogeneous samples are used in future research.

*Conclusion:* Moderate to excellent levels of inter- and intra-rater reliability were reported in the majority of studies. However, future work should look to establish test-retest reliability. Validity was less commonly reported than reliability and further types of validity other than content validity need to be established in future research. Specifically, predictive validity of 'lifelong physical activity' movement skill competency is needed to support the assertion that such activities provide the foundation for a lifetime of activity.

## **1 Introduction**

Developing adequate movement skill competency across a broad range of activities is important for individuals of all ages [1-3] and competency in a range of fundamental movement skills (FMS) in childhood has been found to be a predictor of physical activity in adolescence [4]. Movement skills are often learned and developed throughout childhood [5-7], initially, in the form of FMS, of which there are three types: locomotor (i.e., running, jumping), object-control (i.e., catching, kicking) and stability (i.e., balancing, twisting) [8]. If children fail to develop competency in FMS [9, 10] they may find it difficult to learn and master more refined movement skills, such as sport-specific skills (i.e., pitching a ball, serving in tennis) [7].

Previous movement skill competence theory [7, 11] posits that individuals ascend a hypothetical mountain of motor development, whereby more advanced movement acquisition is dependent upon the foundation established in the previous level. The proposed levels of movement skill acquisition are: a) reflexive b) preadapted c) fundamental motor patterns d) specialized sports skills [11] and e) skillful [7]. These models are based on the premise that individuals cannot be physically active throughout the lifespan without achieving proficiency in FMS. Some lifelong physical activities, however, do not require a foundation in FMS that are often assessed, meaning children who are not competent in FMS may alternatively perform lifelong physical activities to be physically active. As such, it has been suggested that young people need to be exposed to, and develop competency in, a range of movement skills associated with 'lifelong physical activities' that can be easily carried into adulthood [12-17].

Schools may present a possible setting for learning and testing competency in lifelong physical activities, as they may have access to personnel and resources, such as qualified teachers, equipment, space and the ability through physical education to provide exposure to

