Test-retest reliability of soccer dribbling tests in children

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Running Head: Reliability of soccer dribbling

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The present study examined the test-retest reliability of the UGhent dribbling test and Bangsbo and Mohr (2011) short dribble test in a pediatric population. Fifty four boys aged 9-14 years (Mean ± SD = 11 ± 2 years) undertook the UGhent and Bangsbo and Mohr (2011) dribbling tests on two occasions separated by two weeks. Intraclass correlation coefficients (ICCs), coefficient of variation (CV) and 95% Limits of Agreement (LoA) were conducted for each test. ICCs and CV indicated good to excellent reliability, and relatively small variability for both dribbling tests. 95% LoA indicated relatively little bias UGhent dribbling test for both running alone and running with the ball components, and the Bangsbo and Mohr short dribble test. The results of the present study suggest, both dribbling tests examined in the present study demonstrate good reliability and low levels of systematic bias.

Introduction

From grassroots to elite levels, there remains a continual focus on developing soccer related skills in children and adolescence (Huijgen, et al., 2013), with the successful execution of skills being considered the most important aspect of soccer play (Ali, 2011). Technical skills such as passing, dribbling, and shooting are considered critical prerequisites for success in soccer and the measurement of soccer skills is commonplace from recreational to elite levels (Rampinini et al., 2009). Assessment of soccer skills is undertaken for a variety of reasons including: identification of talent, strategies for understanding skill acquisition and in gauging the effectiveness of interventions to enhance or maintain skill performance during or following match play (Ali, 2011). There are a number of skill-based assessments which have been employed to quantify aspects of soccer skill (see Ali, 2011 for a review). Reliability and validity data for the majority of these tests are available for adults, and while there is some work that has examined reliability of some specific soccer skill tests in adolescents (Mitrotasios, et al., 2018) little data appears to be available on children. This is surprising given that the development of technical skills is a cornerstone of game success and movement competence in children and adolescents at elite, subelite and recreational levels (Unnithan et al., 2012; Kokstejn, et al., 2019). The present study sought to address this issue by examining the test-retest reliability of two commonly used soccer dibbling skills tests.

Methods

Participants

Following institutional ethics approval, informed parental consent and child assent, 54 boys aged 9-14 years (Mean ± SD = 11 ± 2 years, 154.6 ±14.8 cm, 45.2 ± 13.7kg) who regularly

engaged (2-3 times/week for at least the year proceeding) in grassroots soccer participated in the study. The Fédération Internationale de Football Association (FIFA, 2011) define grassroots soccer as recreational soccer taking place, predominantly in children from the age of 6 years on to promote mass participation in soccer.

Procedures

All assessments took place on two occasions separated by two weeks. Participants undertook the University of Ghent dribbling test (Vandendriessche et al., 2012) and the Bangsbo and Mohr (2011) short dribble test. Both tests have been used to assess dribbling skill with children (Rommers, et al., 2018; Kokstejn, et al., 2019) but no data has been presented relating to the test-retest reliability of these skill assessments in this population. In constructing the test-retest design we were conscious of prior work questioning appropriate test-retest time intervals for reliability studies (Marx, et al., 2003) and followed recommendations on procedures for test-retest studies (Polit, 2014). This included a two-week test-retest period to minimise memory effects, response shift and rehearsal (Polit, 2014), as well as adhering to the COSMIN taxonomy for reliability assessment (Mokkink, et al., 2010). All testing was completed on a grass football pitch, with an average environmental temperature of 20°C (range 19-21°C). Administration of tests were counter balanced in each session, the same ball was used, no spectators were present, and testing took place at the same time of day for the test and retest.

UGhent Dribbling Test

The Ghent University (UGhent) dribbling test was administered as previously described by Vandendriessche et al. (2012) and Rommers et al (2018). The UGhent test has been widely used to assess dribbling performance in soccer for talent development purposes (Rommers, et al., 2018) as well as to determine effects of experimental manipulations (Fransen, et al., 2017). Participants completed a set circuit with four left and four right turns at different angles

with a distance between cones ranging between 1 and 2.2 metres (Vandendriessche et al., 2012). Following familiarisation and a practice trial, each participant undertook three attempts at the test. Each test was performed as quickly as possible in two steps per test: the first step was made without the ball and the second step with the ball. The time of each attempt was measured to the nearest 0.01 seconds with a handheld stopwatch as per Vandendriessche et al. (2012) and Rommers et al (2018). The fastest time taken to run the circuit without the ball and with the ball was taken for subsequent analysis.

Short Dribble Test

The Bangsbo and Mohr (2011) short dribbling test was administered as described by Bangsbo and Mohr (2011) and is used as a measure of dribbling skill with 11 year old children (Kokstejn, et al., 2019). Players are required to dribble around a series of cones without touching them, requiring 10 changes of direction and then stopping the ball in a defined square at the end of the dribbling track. If a cone was touched during the dribbling test, the test was considered void and was re run. Following familiarisation and a practice trial, each participant undertook three attempts at the test. Each test was performed as quickly as possible and was timed using telemetric photocell timing gates (Brower systems, Cranlea, UK). The fastest time was taken for subsequent analysis.

Statistical analysis

Intraclass correlation coefficients (two-way mixed model, Koo and Li, 2016) for each dribbling test were used to determine two week test-retest reliability and the coefficient of variability was calculated to reflect the extent of variability in the data. A threshold for 'good' reliability was set as $R = .8$ as per recommended suggestions, where $R = .7$ is considered acceptable and .9 is excellent (Polit, 2014). Test-retest agreement for measures from the UGhent and Bangsbo and Mohr (2011) dribbling tests were determined using 95% Limits of Agreement

(LoA) (Atkinson and Nevill, 2008). All analysis was performed using IBM SPSS Statistics (V.26).

Results

Intraclass correlation coefficients and coefficient of variation (CV) indicated good to excellent reliability, and relatively small variability for the UGhent dribbling test running (R =.870 (.787-.923), CV = 3.9%), UGhent dribbling test with ball (R = .923 (.871-.955), CV = 4.5%) and Bangsbo and Mohr short dribble test (R =.852 (.758-.911), CV = 6.2%).   Likewise, 95% limits of agreement indicated relatively little bias for the UGhent dribbling test running only component (Bias = .49, Figure 1), UGhent dribbling test with ball component (Bias = .69, Figure 2) and Bangsbo and Mohr short dribble test (Bias = .34, Figure 3). Data for UGhent dribbling test running also demonstrated heteroscedasticity. Subsequent reanalysis using log transformed data did not however markedly change the LoA. Mean ± SD, Mean ± SD, bias and coefficient of variation for the UGhent and Bangsbo and Mohr dribbling tests at test and retest are presented in Table 1.

Discussion

This study presents test-retest reliability data for two commonly used tests of soccer dribbling performance in children aged 9-14 years. This addresses a noted gap in the literature in relation to the lack of data examining reliability in soccer skill tests in children (Ali, 2013). Given the use of skill tests in sporting contexts to identify talent, monitor effectiveness of specific interventions and to inform improved practice and training complexity, it is important that any measure demonstrates acceptable measurement properties in the population it is intended to be used with (Robertson, Burnett, & Cochrane, 2014). Consequently, it has been recommended that researchers using sport specific skill tests ensure they demonstrate satisfactory reliability (Robertson, et al., 2014). The results of the present study suggest both

the dribbling tests examined in the present study demonstrate good reliability and low levels of systematic bias. The UGhent dribbling test and Bangsbo and Mohr short dribble tests can therefore be advocated for the assessment of soccer dribbling in children. This is important as dribbling skill is recognised as a key prerequisite for soccer performance (Fransen, et al., 2017, Rowat, et al., 2017, Duncan, et al., 2021) and alongside shooting and passing is recognised as the most important skill in soccer (Rampinini et al., 2009).

The coefficients of variation for the tests in the current study are somewhat larger than those reported for other soccer dribbling tests in adult populations (CVs 2.4-3.95) (Ali, 2013, Russel, et al., 2010). However, this would not be unexpected given the aforementioned work examined adults and greater variability might be expected in children. It is also important to note that the participants in the present study were regularly engaged in grassroots football, as such, the results of the current study represent children playing soccer at recreational rather than elite levels. In the present study we employed two timing methods (stopwatch for the UGhent test and timing gates for the short dribble test), based on the methods used to originally validate the tests in question. This would not preclude use of stopwatch timing for both tests in field settings where timing gate technology is not available. It is also important to consider what the tests used in the current study measure. The two tests of dribbling skill assess the performer's ability to successfully navigate a dribbling pattern in the quickest time possible. While such an approach is commonplace in the testing of sport skills (see Robertson, et al., 2014 for a review), it does not entirely follow that the fastest performer is the better soccer player. Rather the tests used in the current study, as well as many commonly employed 'skill' tests assess technique rather than skill per se. There is an acknowledgement in the literature that technique, or the performance of a movement pattern, is different to skill, and that perceptual attunement to affordances open up possibilities to execute technique in different ways in game situations (Araoujo, et al., 2019). We are conscious that the data presented here only reflect dribbling performance meaning there is a need for future work presenting reliability data for soccer skill assessment in children and adolescents which reflect

the variety of different skill tests available in the literature and the main skill components needed for success in soccer (e.g., shooting, passing). It is also important to consider ecological dynamics perspectives (Araoujo, et al., 2019) in future work contextualising movement performance within sport-specific situations.

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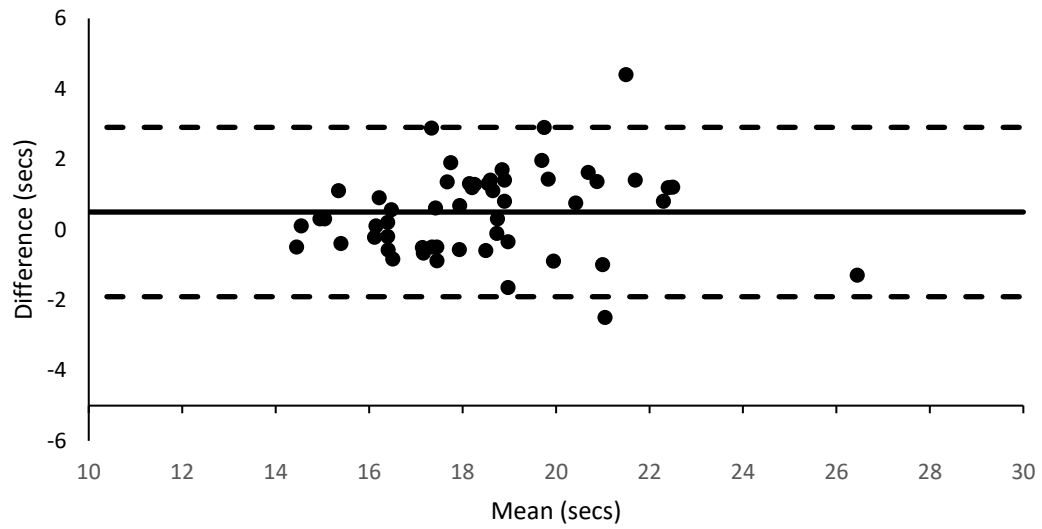
Figure 1. 95% limits agreement for the University of Ghent Dribbling Test (running component)
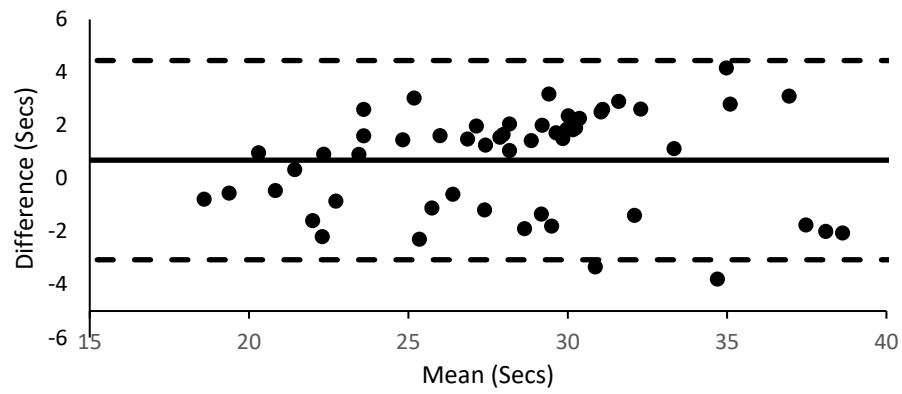
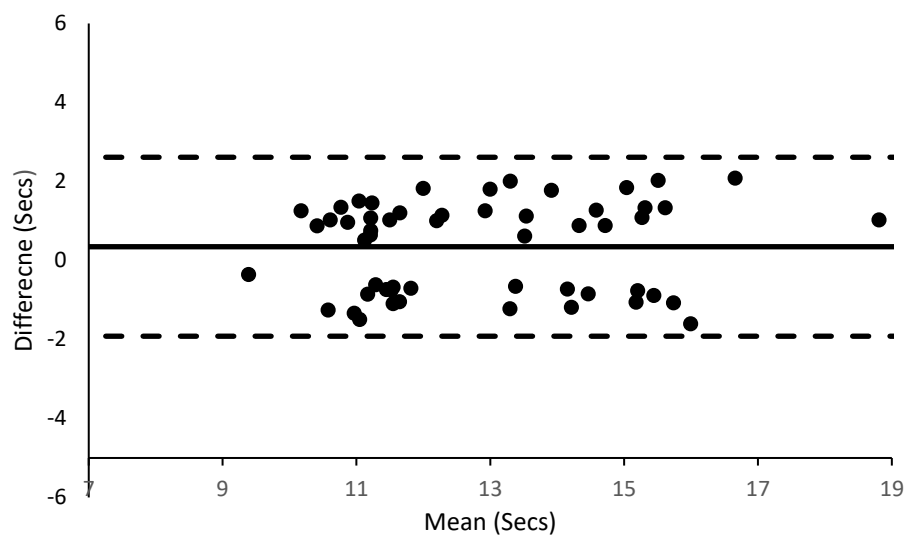Figure 2. 95% limits agreement for the University of Ghent Dribbling Test (dribbling with the ball component)

Figure 3. 95% limits agreement for the Bangsbo and Mohr (2011) Short Dribbling Test

Table 1. Mean ± SD of scores for the UGhent and Bangsbo and Mohr dribbling tests at test and retest

	Test		Retest			
	Mean	SD	Mean	SD	Bias	CV (%)
UGhent Dribbling Test without the ball (Secs)	18.6	2.5	18.2	2.3	0.49	3.9
UGhent Dribbling Test with the ball (Secs)	28.6	4.9	28.3	4.6	0.69	4.5
Bangsbo and Mohr Short Dribble Test (Secs)	13.0	2.2	12.9	2.0	0.34	6.2