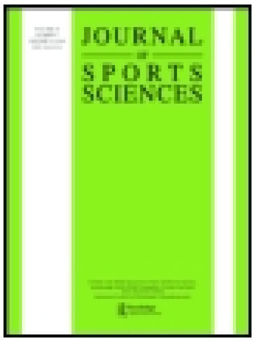

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Reliability and concurrent validity of a motor skill competence test among 4- to 12-year old children

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ABSTRACT

The purpose of this study was to examine the test-retest reliability, internal consistency and concurrent validity of the Athletic Skills Track (AST). During a regular PE lesson, 930 4- to 12-year old children (448 girls, 482 boys) completed two motor skill competence tests: (1) the Körperkoordination-Test für Kinder (KTK) and (2) an age-related version of the AST (age 4–6 years: AST-1, age 6–9 years: AST-2, and age 9–12 years: AST-3). The test-retest reliability of the AST was high (AST-1: ICC = 0.881 (95% CI: 0.780–0.934); AST-2: ICC = 0.802 (95% CI: 0.717–0.858); and AST-3: ICC = 0.800 (95% CI: 0.669–0.871). The internal consistency, concerning the three age-bands of the AST was above the acceptable level of Cronbach's $\alpha > 0.70$ (AST-1: $\alpha = 0.764$; AST-2: $\alpha = 0.700$; and AST-3: $\alpha = 0.763$). There was a moderate to high correlation between the time to complete the AST, and the age- and gender-related motor quotients of the KTK (AST-1: $r = -0.747$, $p = 0.01$; AST-2: $r = -0.646$, $p = 0.01$; and AST-3: $r = -0.602$, $p = 0.01$). The Athletic Skills Track is a reliable and valid assessment tool to assess motor skill competence among 4- to 12-year old children in the PE setting.

ARTICLE HISTORY
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KEYWORDS
Physical education; child; fundamental movement skills; physical activity; motor skill competence

Introduction

Being motor competent allows children to be active in a diversity of physical activities (Clark & Metcalfe, 2002; Seefeldt, 1980). Motor competence is a global term used to describe goal-directed human movement (Robinson et al., 2015). According to Clark and Metcalfe (2002) and Stodden et al. (2008) the development of fundamental movement skills (FMS) in early childhood is the precursor of motor skill competence. Different categories of FMS are: locomotive skills (e.g., hopping and sliding), manipulative skills (e.g., throwing and kicking), also referred to as object control skills, and stability skills (e.g., balance and body rolling) (Gallahue, Ozmun, & Goodway, 2012). Several studies have shown that children's motor skill competence is positively associated with their physical activity level (Lubans, Morgan, Cliff, Barnett, & Okely, 2010; Robinson et al., 2015). Motor skill competence is also positively related to people's physical activity level in adolescence (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2009; Lima et al., 2017). In a longitudinal study, a relationship has been found between motor skill competence at age 6 and physical activity at age 26 (Lloyd, Saunders, Bremer, & Tremblay, 2014). A high level of motor skill competence in youth is also associated with several health-related parameters such as lower body mass index (D'Hondt et al., 2011) and better cardiorespiratory fitness (Okely, Booth, & Patterson, 2001).

Even though an active lifestyle is related to well-known health effects (Janssen & LeBlanc, 2010; Pate et al., 1995), physical activity levels among children and adolescents seem to be decreasing in many countries (Hallal et al., 2012; Tremblay et al., 2014). In the Netherlands physical activity levels are also decreasing (Van Mechelen, Twisk, Post, Snel, & Kemper, 2000). Motor skills levels appear to have dropped as well over the last decades among Dutch youth (Runhaar et al., 2010). To increase our understanding of the development of motor skill competence during childhood and factors that can influence the development, a reliable and valid assessment tool is needed. In recent decades, several motor skill competence tests have been developed. Some tests have a quantitative outcome and are product orientated (i.e., number of jumps in a specific time) such as the Körperkoordination-Test für Kinder (KTK) (Kiphard & Schilling, 2007). Other tests are process orientated and have a qualitative outcome (i.e., demonstrating specific components while jumping) such as the Movement Assessment Battery for Children-2 (Movement-ABC-2) (Henderson, Sugden, & Barnett, 2007), and the Test of Gross Motor Development (TGMD) (Ulrich, 2000). Empirical evidence shows a moderate to strong association between process and product orientated assessments (Logan, Barnett, Goodway, & Stodden, 2017; Miller, Vine, & Larkin, 2007). Most of the motor skill competence tests have been developed for clinical purposes, and are used to identify children with motor impairment or medical deficits, such as developmental coordination disorder (DCD) (Lenoir et al., 2014; Tidén, Lundqvist, & Nyberg, 2015). These clinically based tests are not very feasible in a physical education (PE) setting (Cools, De Martelaer, Samaey, & Andries, 2009). Most clinically based motor skill competence tests are very time-consuming since it takes at least 20 minutes to measure one child (Cools et al., 2009). This makes it difficult to integrate the measurement of all children

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Supplemental data for this article can be accessed here.

in one class in a single, one-hour, PE lesson. In addition, special test materials are needed for some tests, for example; to execute the KTK you will need specialized material, such as three balance beams with different widths. Despite the fact that PE teachers would like to monitor the motor skill competence of children more objectively (Lander, Morgan, Salmon, & Barnett, 2016), the mentioned shortcomings seem to be the reason many PE teachers currently do not use motor skill competence tests structurally.

When selecting an assessment tool, the possibility of negative experiences of children being tested also needs to be taken into account. A negative test experience can have a negative impact on the motivation of the children with a negative experience, especially those most in need of encouragement (Cale, Harris, & Chen, 2014). Cale et al. (2014) formulated a number of recommendations to be taken into account when testing children in the PE setting, in order to reduce this potential negative impact of testing. They recommend testing within the context of a regular PE lesson instead of in an externally arranged test lesson. They also state that it is important that the test is a positive experience for all children (Cale et al., 2014).

To address those shortcomings, a novel, quick, convenient, and low-cost motor skill competence test, the Athletic Skills Track (AST), has been developed to assess motor skill competence among 4- to 12-year-old children in a PE setting (Hoeboer et al., 2016). The AST makes it possible to assess 25–30 children in a one-hour PE lesson. The AST is fundamentally different than most conventional motor skill competence tests. Rather than assessing isolated movements, the track consists of a series of 5–7 concatenated FMS (e.g., hopping and balancing), providing a motor skill assessment of children's motor skill competence. This idea is based on the concept that motor coordination (e.g., coupling, spatial orientation, and balance ability) is crucial in developing motor competence (Wormhoudt, Teunissen, & Savelsbergh, 2012). Motor coordination can be defined as the ability to have body segments work together in an organized manner (Turvey, 1990) and are considered an underlying component of FMS (Barnett et al., 2016).

The track is constructed using equipment available in every gymnasium in The Netherlands. Children are asked to complete the track as fast as possible. The AST has a quantitative measurement outcome, i.e., the time a child needs to complete the track. A previous study among 463 6- to 12-year old children has shown that the AST is a valid motor skill competence test in a PE setting (Hoeboer et al., 2016). In this study the time to complete the AST was correlated to the Motor Quotient (MQ) of the KTK. When spilt up by age group, the associations ranged between $r = -0.502$ ($P < 0.01$) and $r = -0.767$ ($P < 0.01$). So, the faster a child completed the AST, the higher their MQ on the KTK. However, a ceiling effect was found among the oldest children. Therefore, the purpose of the present study was to examine the reliability (test-retest reliability and internal consistency) and concurrent validity of an age-related version of the AST (age 4–6 years: AST-1, age 6–9 years: AST-2, and age 9–12 years: AST-3) to assess motor skill competence of children aged 4–12 years in a PE setting.

Methods

This study consisted of two sub-studies. In the first study (study 1), the test-retest reliability of the three age-bands of the AST was examined. In the second study (study 2), the internal consistency and concurrent validity of the age-related AST were investigated. Permission for this study was granted by the Medical Ethical Committee of the Faculty of Human Movement Sciences, VU University Amsterdam, The Netherlands (ECB 2015-31).

Participants

Fourteen primary schools spread over the The Hague region took part in this study. The random selected schools are internship schools of the The Hague University of Applied Sciences (THUAS). For study 1, ten PE teachers from ten different elementary schools were recruited. For study 2, four other elementary schools were recruited. Written informed consent was obtained from the parents of the children (grade 1–8). All parents were informed about the purpose and nature of the study, and that their children could withdraw from the study at any time.

Procedure

All measurements were executed between February and March 2015. In both studies children performed the AST. Three age-related tracks (AST-1, AST-2 and AST-3) were developed with a team of 10 PE teachers. In 4 sessions of 2 hours the tracks were designed based on the experience of PE teachers and the former study on the AST (Hoeboer et al., 2016). The validation study of Hoeboer et al. (2016) laid the foundations of the new tracks. The tracks include a string of different FMS (AST-1: n = 5, AST-2: n = 7, and AST-3: n = 7) to be completed as quick as possible. In all three tracks the same FMS are tested, with the difficulty of the tasks ascending from AST-1 to AST-3 (see supplementary material). AST-1 has been designed for the youngest children in the age of 4–6 years and consists of the following skills: (1) Walking, (2) Traveling jumps, (3) Alligator crawl, (4) Slaloming, and (5) Clambering. Children between 6 and 9 years performed AST-2. In this track the following skills had to be performed: (1) Walking, (2) Traveling jumps, (3) Hopscotch, (4) Alligator crawl (backwards), (5) Running (backwards), (6) Pencil roll, and (7) Clambering. Children in the age of 9–12 years completed AST-3 consisting of: (1) Walking (backwards), (2) Traveling jumps, (3) Bunny hopping, (4) Alligator crawl (backwards), (5) Slaloming (backwards), (6) Forward roll, and (7) Clambering. The age-related tracks were designed because the former study, with one track for all age groups, showed a ceiling effect in the older age groups (Hoeboer et al., 2016). In both studies, the PE teacher (study 1) and research assistant (study 2) showed how to complete the track. After the example of the teacher or assistant the children completed three try-out trials. During the try-out trials the PE teacher (study 1) or the research assistant (study 2) gave feedback to the children about how the skills should be performed so that the children were ready to execute the measurement trial independently. The children performed one (study 1, n = 717) or two (study 2, n = 213) measurement trials on each measurement day. More information about the procedure of the AST can be found in the test manual which is presented in the supplementary material.

Measurements

To examine the test-retest reliability (study 1) of the AST, all children performed the AST twice between February and March 2015 two weeks apart. The PE teacher conducted the measurements during a regular PE lesson in one-third of the PE classroom. In the other two-thirds, the PE lesson was conducted as planned by the PE teacher. The PE teacher used a stopwatch to assess the time children needed to complete the track. All PE teachers who participated as test leaders in study 1 were trained in conducting the test according to the AST protocol (see supplementary material) by the corresponding author during a two-hour training session where they practiced the performance of the track and the measurement.

To examine the internal consistency of the AST (study 2) a Freelap Timing® system was used. With an accuracy of 2/100″, this system was used to measure split times of different movement skill tasks in the track automatically in addition to the total time to complete the track. Besides the AST, children also performed the KTK in study 2 to examine the concurrent validity of the AST. The origin of the KTK can be found in Germany (Kiphard & Schilling, 2007; Vandorpe et al., 2011). For the KTK, the test protocol for the Dutch language area (Lenoir et al., 2014) was followed. The KTK contains four subtests, i.e., moving across the floor in 20 seconds by stepping from one plate to the next, jumping from one leg over an increasing pile of pillows, jumping laterally as many times as possible over a wooden slat and walking backwards on a balance beam. Both the AST and the KTK were conducted in a separate section of the gym by a team of four research assistants (fourth year PE students of THUAS). All research assistants were trained in conducting the KTK and the AST according to the protocols by the corresponding author in four meetings of approximately 45 minutes. Testing was spread out over a two-week time period in February 2015. To measure all the children in this period a uniform schedule was developed: during the first week, the children conducted the AST, based on their age. Next, the children completed the KTK within this two-week time period.

Data analysis

Of the 1284 children who participated in the studies, 930 children met the inclusion criteria (i.e., age: between 4 and 12 years; all tests completed). The data were at first registered in Excel (Microsoft Office professional plus, 2013) and then analysed using the SPSS software (IBM SPSS 22.0 64-bit edition). To check for normality of the outcome parameters in the sample (i.e., time and split-time to complete the AST), histograms were plotted and the kurtosis and skewness values for each of the outcome parameters were assessed.

An Independent Samples T-test was used to investigate possible differences between boys and girls. Values were considered statistically significant at $p < 0.05$. To examine the test – retest reliability of the AST the intraclass correlation coefficient (ICC) was calculated (Altman, 1991). ICC values below 0.20 reflect poor agreement, between 0.21 and 0.40 fair agreement, between 0.41 and 0.60 moderate agreement, between 0.61 and 0.80 good agreement, and higher than 0.80 very good agreement (Altman, 1991). In addition, a "quality control" of the level of agreement between the two trials of the AST was performed by constructing Bland and Altman plots (Bland & Altman, 1986). In these plots the difference between the two trials is plotted against the mean of the two trials. The limits of agreement (LoA), proposed as a parameter of measurement error by Bland and Altman (1986), were represented in the plots as well as the change with increasing mean values (Bland & Altman, 1999).

The internal consistency of the AST was examined by computing Cronbach's α and the corrected item-total correlation regarding the split time to complete the five to seven different tasks within the AST. The values of Cronbach's α can be interpreted as follows: <0.50 as unacceptable, 0.50–0.60 as poor, 0.60–0.70 as questionable, 0.70–0.80 as acceptable, 0.80–0.90 as good, and >0.90 as excellent (Cronbach, 1951). Since a very small amount of time was required to complete task six and seven within AST-2 and AST-3 the split times of the sixth and seventh task have been added together. It is recommended that the item-total correlation is above 0.20, indicating that the level of item redundancy is acceptable and that the same construct is measured by the other items included (Everitt & Skrondal, 2010; Field, 2005).

The concurrent validity of the AST was examined by calculating Pearson's correlation coefficients between the time to complete the AST and the age- and gender-related motor quotients (MQ) of the KTK (Vandorpe et al., 2011). The values of the correlation coefficient (*r*) can be interpreted as follows: negligible: <0.30; low: 0.30–0.50; moderate: 0.50–0.70; high: 0.70–0.90; and very high: 0.90–1.00 (Hinkle, Wiersma, & Jurs, 2003).

Results

In total, 717 children (344 girls and 373 boys) participated in study 1 and 213 other children (104 girls and 109 boys) in study 2. Table 1 shows the number of participating children and the mean age of these children for each study per track.

As shown in Table 2, in both studies the children completed the AST within 1 minute, independent of the version of the AST. In study 1, the time to complete the track ranged between 14.0 and 35.0 seconds for AST-1, 17.2–57.3 seconds for AST-2 and 17.2–54.4 seconds for AST-3. In study 2, the time to complete the track ranged between 14.4 and 35.0 seconds for AST-1, 20.1–49.8 seconds for AST-2 and 17.0–42.3 seconds

Table 1. Age and gender of participants per Athletic Skills Track for each study.

			Study 1			Study 2		
			N	Mean	(SD)	N	Mean	(SD)
AST-1	Age (years)	Boys	27	6	(1)	23	5	(1)
		Girls	26	6	(1)	16	5	(1)
		Total	53	6	(1)	39	5	(1)
AST-2	Age (years)	Boys	171	8	(1)	34	8	(1)
		Girls	159	8	(1)	38	7	(1)
		Total	330	8	(1)	72	8	(1)
AST-3	Age (years)	Boys	175	11	(1)	52	10	(1)
		Girls	159	11	(1)	50	10	(1)
		Total	334	11	(1)	102	10	(1)
		Overall	717	9	(2)	213	9	(2)

AST-1 = Athletic Skills Track 1; AST-2 = Athletic Skills Track 2; AST-3 = Athletic Skills Track 3.

Table 2. Time to complete the Athletic Skills Tracks per track for each study.

		Study 1				Study 2	
		Trial 1 (baseline)		Trial 2 (2–3 weeks later)			
		Mean	(SD)	Mean	(SD)	Mean	(SD)
AST-1 (sec)	Boys	19.9	(4.9)	18.6	(3.9)	22.0	(4.6)
	Girls	18.7	(3.7)	18.4	(4.1)	21.9	(4.1)
	Total	19.3	(4.4)	18.5	(3.9)	22.0	(4.3)
AST-2 (sec)	Boys	31.2	(6.1)	29.6	(6.1)	30.3	(7.0)
	Girls	33.3	(6.5)	31.8	(6.4)	33.0	(6.8)
	Total	32.2	(6.4)	30.7	(6.3)	31.7	(7.0)
AST-3 (sec)	Boys	27.2	(6.1)	25.8	(5.6)	23.2	(4.0)
	Girls	29.4	(6.1)	27.4	(5.2)	27.8	(4.5)
	Total	28.3	(6.3)	26.6	(5.5)	25.4	(4.8)

AST-1 = Athletic Skills Track 1; AST-2 = Athletic Skills Track 2; AST-3 = Athletic Skills Track 3.

for AST-3. In both studies, there were no significant differences found in time to complete the AST between boys and girls.

A high degree of test-retest reliability of the AST was found. The intraclass correlation coefficient between the first and second trial was 0.881 (95% CI: 0.780–0.934) for AST-1, 0.802 (95% CI: 0.717–0.858) for AST-2 and 0.800 (95% CI: 0.669–0.871) for AST-3.

The Bland and Altman plots for test-retest reliability of AST-1 (mean = 0.79, [LoA] −3.02 and 4.60), AST-2 (mean = 1.47, [LoA] −6.12 and 9.06), and AST-3 (mean = 1.68, [LoA] −5.14 and 8.50) show that the differences between the test-retest do not change with increasing mean values. This indicates that there is no systematic bias (see Figure 1). In addition, the test-retest reliability difference (test 2 − test 1) and the mean of the trials [(trial 2 + trial 1)/2)] shows no evidence of proportional bias between the two trials (AST-1: B = 0.108, p = 0.10; AST-2: B = 0.014, p = 0.69), except for AST-3 (B = 0.142, p = 0.00).

The internal consistency of the AST, as represented by the Cronbach's α, was at or above the acceptable level of 0.70 (Cronbach, 1951) i.e., for AST-1: α = 0.764, for AST-2: α = 0.700 and for AST-3: α = 0.763 (see also Table 3). Next, corrected item-total correlations were computed. All movement skill tasks in AST-1, AST-2 and AST-3 proved to be relevant for the reliability of the tracks. Table 3 shows that the Cronbach's α is lower if items are deleted except for the second split time (task "traveling jumps") on AST-1. When examining the item redundancy of the AST in more detail, Table 3 shows a corrected item-total correlation of the split time of the movement skill tasks of AST-1 between 0.342 and 0.687, for AST-2 between 0.356 and 0.678, and for AST-3 between 0.407 and 0.627, indicating that the items measure the same construct (Everitt & Skrondal, 2010; Field, 2005).

With respect to the concurrent validity of the AST, a moderate to high correlation was found between the time to complete the AST and the MQ KTK (i.e., AST-1: r = −0.747, p = 0.01; AST-2: r = −0.646, p = 0.01; and AST-3: r = −0.602, p = 0.01).

Discussion

This is the first study to examine the test-retest reliability, internal consistency, and concurrent validity of an age-related version of the AST in a PE setting.

The findings show that the Athletic Skills Track is a reliable and valid motor skill competence test that can be used to assess the FMS of 4- to 12-year old children in three age-bands in the PE setting. The results show a high level of test-retest reliability of the AST. Intraclass correlation coefficients of the three age-bands are all above 0.800. Bland and Altman plots show a high level of agreement between two trials of the AST completed within two weeks (Shrout & Fleiss, 1979) and the concurrent validity of the AST shows a moderate to high correlation with the KTK (Hinkle et al., 2003).

There is no sign of systematic or proportional bias for AST-1 and AST-2. Only AST-3 shows a proportional bias. When looking at the Bland and Altman plot of AST-3 the proportional bias might be caused by the outliers. The test – retest results are in line with Hoeboer et al. (2016) in which an ICC of 0.891 (95% CI: 0.870–0.908) was found between two trials that were completed within one day. The results are slightly lower than the test-retest reliability of the Canadian Agility and Movement Skill Assessment (CAMSA) (Lander, Morgan, Salmon, Logan, & Barnett, 2017; Longmuir et al., 2015). The test-retest reliability of the CAMSA was 0.91 in a sample of 34 adolescent girls (Lander et al., 2017).

The internal consistency of the AST is acceptable, with Cronbach's Alphas ranging from 0.700 up to 0.764 for the three age-bands (Cronbach, 1951). Except for the task "Traveling jumps" in AST-1, deleting tasks did not lead to higher Cronbach's Alphas.

The concurrent validity of the AST is decreasing with age (AST-1: r = −0.747, p = 0.01; AST-2: r = −0.646, p = 0.01; and AST-3: r = −0.602, p = 0.01), but the correlation coefficient is still above the threshold of a moderate to high correlation (Hinkle et al., 2003). The small decrease of the correlation

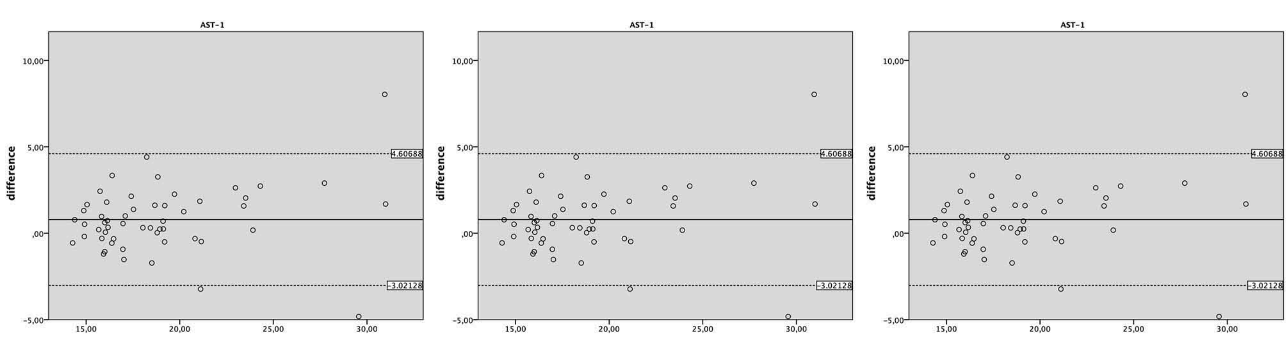

Figure 1. Bland and Altman plots of AST-1, AST-2 and AST-3 (AST-1 = Athletic Skills Track 1; AST-2 = Athletic Skills Track 2; AST-3 = Athletic Skills Track 3).

Table 3. Internal consistency of the Athletic Skills Track.

	Item	N	Mean (sec)	(SD)	Corrected Item-total Correlation	Cronbach's Alpha If item deleted
AST-1	1	39	6.6	(1.3)	.687	.663
	2	39	4.2	(1.2)	.342	.783
	3	39	3.4	(1.3)	.543	.719
	4	39	3.2	(0.7)	.675	.712
	5	39	4.4	(1.4)	.556	.718
	Total	39	22.0	(4.3)		.764
AST-2	1	72	6.9	(2.8)	.520	.651
	2	72	4.9	(1.3)	.678	.609
	3	72	4.7	(1.2)	.411	.674
	4	72	4.5	(1.7)	.390	.673
	5	72	3.5	(1.5)	.356	.683
	6	72	7.4	(2.0)	.415	.667
	Total	72	31.7	(7.0)		.700
AST-3	1	102	4.6	(1.5)	.627	.694
	2	102	3.8	(0.9)	.611	.711
	3	102	3.8	(0.7)	.446	.749
	4	102	3.5	(1.0)	.568	.714
	5	102	4.1	(1.1)	.407	.753
	6	102	5.6	(1.5)	.489	.743
	Total	102	25.4	(4.9)		.763

AST-1 = Athletic Skills Track 1; AST-2 = Athletic Skills Track 2; AST-3 = Athletic.

coefficient could be explained by the fact that crucial development in the fundamental motor pattern period is related to further development of motor skill competence as shown in the mountain of motor development (Clark & Metcalfe, 2002; Seefeldt, 1980). Because the AST focusses on the fundamental motor pattern period AST-3 might not discriminate enough between children of different age groups from 9 till 12 years. Future research should focus on more profound research on different age groups of AST-3. Despite the decrease of the correlation, the correlation coefficients are higher than in the previous study on the AST in which the correlation between the time to complete a non-age-related version of the AST and the KTK ranged between r = −0.474 and r = −0.502 (Hoeboer et al., 2016). In addition, the concurrent validity of the AST is within the range of the validity of other motor skill competence tests. For example, the correlation between the CAMSA and the Victorian FMS assessment in a sample of 34 adolescent girls was r = 0.680 (p = 0.05) (Lander et al., 2017).

In summary, the results show that the clinimetric quality of the age-related version of the AST was higher than the previous version of the AST (Hoeboer et al., 2016). In addition, the reliability and concurrent validity of the three age-bands of the AST are comparable with other, motor skill competence tests (Cools et al., 2009). However, most existing motor skill competence assessments are not feasible in the daily PE practice. In this study, it was investigated if it is possible to administer the AST during a regular PE lesson. A complete class of 24–30 children can be measured within one regular PE lesson of one hour. In addition, no special equipment is required for the AST. The only outcome measure is time which seems to be a reliable outcome. Another advantage of the AST is that the track can be used for children aged 4- to 12-years old, a critical phase in the development of children's motor competence (Clark, 2005).

Besides, rather than assessing isolated movements, the AST consists of a series of 5–7 concatenated FMS providing an assessment that more closely mimics how movement skills are performed in real life. Tidén et al. (2015) argued that one of the shortcomings of most motor skill competence test is the fact that they show low ecological validity. Since the skills in the AST are completed one after another and change according to the various constraints of the environment, the ecological validity of the AST might be better than that of other motor skill competence tests.

Despite the advantages of the AST it is important to keep the purpose of the assessment in mind and the reason for choosing one assessment over the other. Time, effort and level of experience required to execute a motor skill assessment contributes to the choice of the assessment (Logan et al., 2017). It seems that process (or a combination of process and product) orientated assessments are more time consuming than a product orientated assessment as the AST which only has time as outcome measurement (Cools et al., 2009). The AST gives an opportunity to screen complete school populations of children. To get a more detailed idea of the motor competence of a subgroup it might be comprehensive to add a follow-up process-orientated assessment. By including both types of assessments (product- and process orientated), a more detailed image of motor skill competence could yield (Logan et al., 2017).

This research has some limitations. The influence of children's BMI on the score on the AST needs to be studied, since previous research showed that childhood overweight results in poorer performances on a motor competence test (Vandorpe et al., 2011). In addition, sports participation was not controlled for. Although the track consisted of FMS rather than sport-specific tasks, participating in certain sports might have been advantageous. For example, a child participating in gymnastics might score better on the AST, because the skills in the track are closely related to certain gymnastics skills. Registration of sports participation and physical activity might provide insight in the ecological validity of the AST. Finally, a relatively small number of children completed AST-1 compared to AST-2 and AST-3. Therefore, the clinimetric results of this version of the test should be considered with some caution.

Conclusions

In conclusion, the Athletic Skills Track seems to be a reliable and valid motor skill competence test that can be used to assess motor skill competence of 4- to 12-year children in a PE setting. The track measures motor skill competence of elementary school children in three age-bands. The AST provides a general indication of motor skill competence that can be compared to a reference norm.

By implementing the AST into the PE setting it becomes possible to compare motor skill competence of children, groups of children, schools and even regions in an objective way, just like periodic test for arithmetic, reading, grammar, etc. This could lead to more objectively insight of PE teachers in motor skill competence of children which could support PE teachers and other professionals to (re)define PE lessons and interventions with more focus on motor skill competence in the PE setting based on the test results of the AST.

Disclosure statement

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