Теорія та методика фізичного виховання
Physical Education Theory and Methodology
Teorìâ ta Metodika Fìzičnogo Vihovannâ

ISSN 1993-7989 (print)
ISSN 1993-7997 (online)
ISSN-L 1993-7989

ORIGINAL SCIENTIFIC ARTICLE

DESIGN, VALIDATION, AND RELIABILITY OF A BASKETBALL SKILL AND PERFORMANCE TEST INSTRUMENT IN ADOLESCENT PLAYER

Muhammad Irvan Eva Salafi[1ABCDE], Wawan Sundawan Suherman[1AB], Bernadeta Suhartini[1AB], Muhammad Sigit Antoni[1,2BD], Kukuh Wahyudin Pratama[2BD], Risti Nurfadhila[1BC], Wisnu Nugroho[1BD] and Yulvia Miftachurohmah[1BC]

[1]Universitas Negeri Yogyakarta
[2]Institute of Advanced Science, Engineering, and Education (IASEE)

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Muhammad Irvan Eva Salafi, E-mail: irvan.salafi@uny.ac.id
Accepted for Publication: September 13, 2023
Published: October 30, 2023

DOI: 10.17309/tmfv.2023.5.03

Abstract

Study purpose. The assessment tools or skills tests, such as the AAHPERD basketball skill test and the Johnson basketball test, are all partial or separate. All these tests are old products, while the game of basketball is constantly evolving. The purpose of this study was to design and validate basketball skills and performance tests for players aged 14–16 years to shorten the test time, shorten the waiting time for results, and be comprehensive so that they can reflect real abilities and can be used as a reference when carrying out selection and evaluation.

Materials and methods. A total of 7 experts assessed the 11 elements (86 items) of the basketball skill and performance test (BSPT). Three academic experts and four basketball coach experts took part in the study. Data was collected using the Delphi technique and test-retest, and data was analyzed using Aiken's formula, intraclass correlation coefficients (ICC), and Cronbach's alpha.

Results. With a value of 0.91, the expert assessment tool shows that the content validity of the aspect is good. Cronbach's alpha was used to measure the reliability of every aspect of the basketball skill and performance test instrument, and the results were 0.918. The result of the ICC score agreement between raters is 0.912, while for one rater, the consistency is 0.596.

Conclusions. The implications of this study could prove that the BSPT can be used to assess the skill level of adolescent basketball players, benefiting not only basketball coaches but also physical education teachers.

Keywords: basketball, skill, performance, validation, reliability..

Introduction

Basketball is a dynamic sport, requiring movements constantly changing in the game and carrying out technical movements repeatedly, be it dribbling, shooting, passing, and so on. This is reinforced by the opinion (Stojanović et al., 2018), which states that basketball is a team sport characterised as a very non-sequential sport in which players constantly change their movements approximately every 1-3 seconds. Individual players must possess a variety of technical and tactical skills, in order to achieve peak performance (Bracco et al., 2019; Heemsoth et al., 2022; Levenberg et al., 2020; Waffak et al., 2022). Technical preparedness, which is laid at a young age, is especially important for improving basketball players' sport skills (Koryahin & Blavt, 2019; Koryahin & Hrebinka, 2023). Certain researchers believe that (Hugo et al., 2018; Koryahin & Blavt, 2019; Makarov, 2013) the problem of basketball players' technical training can be solved by determining the best way to distribute technical training at various stages of sports improvement and by emphasizing the importance of individual training.

A mandatory prerequisite for making a valid and reliable qualitative analysis is to use the organization of information by competent analysts (Ibáñez et al., 2019). During the selection process, sport-specific skills or performance levels are very important and depend on the right assessment norms, such as social, anthropometric, and physical/

© Salafi, M.I.E., Suherman, W.S., Suhartini, B., Antoni, M.S., Pratama, K.W., Nurfadhila, R., Nugroho, W., & Miftachurohmah, Yu., 2023.

physiological factors, as well as cognitive/psychological, tactical, and technical skills (Koopmann et al., 2020). Accurate skill assessment measurements are the right way to compare one player to another (Al-Gendy, 2012), so that the measuring instrument used is also expected to represent the individual's abilities. Having test standards makes these comparisons objective and more accurate. In the 1960s and 1980s, objective tests were the primary method for assessing motor skills (López-pastor et al., 2013). Therefore, the design of test instruments for team sports is becoming an increasingly important research topic.

Top athletes' high level of technical and tactical skills, as well as their training system, point to the need for new, nontraditional approaches to developing the most effective methods for increasing competitive activity efficiency in sports games (Doroshenko et al., 2020; Križan & Mikulič, 2018). Therefore, it is essential to use measurement techniques that can effectively reflect the actual skills of the players to properly evaluate the level of the players and then the level of the whole team (Al-Gendy, 2012). This follows the opinion (D. R. Hopkins, 2013) that a measurement programme related to each sport skill must be implemented. Various tests have been developed previously to measure basketball players' fitness levels; these tests focus on measuring aerobic and anaerobic athletes, while the skill level of players is rarely evaluated (Conte et al., 2019).

However, with the test standards, it would be easier to determine the player's overall performance level (Al-Gendy, 2012). Based on a systematic review (Koopmann et al., 2020) entitled Assessing Technical Skills in Talented Youth Athletes: A Systematic Review explains that technical skills can be operated and evaluated in different ways (focusing on results or processes). On the one hand, technical skills can be easily assessed by measuring time and accuracy. On the other hand, measuring movement techniques during the assessment can also effectively evaluate technical skills. Ultimately, the effectiveness and quality of team performance lie in the selection of basketball players who can leverage individual skills and abilities to earn points in a game situation. Another thing that becomes important is to distinguish the different levels of individual abilities for team development. Thus it can be a reference for the coach in making a valid assessment when selecting the team and acquiring knowledge about the level of potential playing athletes today and in the future.

The development of the form of basketball test is an essential aspect in the process of training athletes as well as the preparation of training programs, so it is essential and necessary to develop an assessment tool that corresponds to the characteristics of the athlete, resembles the situation at the time of the game, comprehensive (skills and performance), and easy to access. The importance of research and development of skills test instruments and basketball performance for players in the age group of 14-16 years is to (a) shorten test time, (b) reduce the waiting time for results, (c) be comprehensive so that it can reflect actual abilities, (d) be accessible, and (e) for coaches, can be a benchmark when carrying out the selection.

Materials and methods

Study participants

Seven experts took part in the study. Three of the seven experts are from the academic experts, four are from the professional basketball coaching experts. In this study, experts who meet the criteria for being experts are chosen to be part of the sample. These criteria are based on expert experience, reputation, availability, motivation to participate in research, discretion, and quality (Ibáñez et al., 2019; Skjong, 2001). The selected experts must meet at least three of the following six criteria: (i) have a Ph.D. degree in Sports Science; (ii) become or have ever been a university lecturer; (iii) have the highest license in a sports federation; (iv) have ten years of teaching experience as a faculty member; (v) have ten years of training experience; (vi) have ever published articles on sports topics or have achievements in training sports (Ibáñez et al., 2019; Ortega-toro et al., 2019; Villarejo & Ortega, 2014). All experts come from the same country (Indonesia) and have no direct contact with the research team.

Study organization

The test instrument development model carried out in the research adapted the test development model developed by (Mardapi, 2017; Oriondo & Dallo-Antonio, 1998). The model was chosen because it was relevant to the development of the test. However, to optimize, the three models were combined and modified to be simpler but not to reduce the completeness and in line with the purpose of this research to develop the test of basketball skills and performance. The study involved adolescent basketball players aged 14-16. Users of the instrument test skills and performance basketball are coaches and players aged 14-16 years.

Methodology

Description of the BSPT

The Basketball Skill and Performance Test (BSPT) is a new test for assessing basketball skills and performance (Fig. 1). The test consists of five items carried out simultaneously and is measured comprehensively on a process-based basis using work demonstration sections and results based on the time completed in performing the test.

The assessment of the BSPT test combines process-based assessment methods using free throw, variation of dribbling, passing, shooting, speed dribbling, and layup. For the measurement of results (outcome-based), use: (a) the time of completion; (b) the penalty time; (c) the performance time (completion time + penalty time).

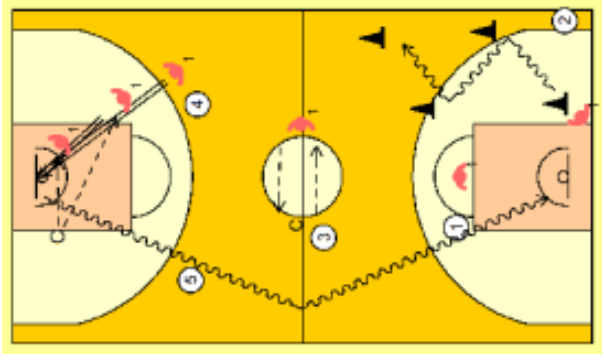

Fig. 1. Basketball skill and performance test Scheme

Table 1. BSPT performance (process-based) assessment rubric

Variabel	Factor	Indicator	Sub-sub Indicator
Performance/ Process Based	Free Throw	Prefix	Legs straight and stretched over the shoulder.
			The knee is flexed and bent to gain an initial lift.
			Relaxing shoulder and balanced body
			Focus on the ring.
		Preparation	The ball is held with both hands above the head or in front of the chest, between the ears and shoulders, or in the front of your chest.
			The shooter's hand is behind the ball, and the balance hand is next to the ball.
			The shooter's arms form a 90-degree angle.
			Elbows tucked in and fingers relaxed with palms off the ball.
		Implementation	The legs and arms move up at the same time.
			Spread your legs, shoulders, and elbows.
			The wrist slides, and the fingers point forward.
			Off-hand shooters remain holding the ball until the ball is released.
		Followthrough	The shooting movement ends with a wrist stroke until the fingers face down and release on the index finger.
			Hold the motion until the ball goes in.
			Index finger pointing at target.
			Keep your arms straight until the ball enters the hoop.
	Dribble	Prefix	The focus ahead.
			The ball is held with both hands on the side of the waist.
		Preparation	Hands on the ball
			The balancing hand is beside the ball.
			Knees bent and body relaxed
			The back legs are prepared.
		Implementation	Release the ball before the pivot foot leaves the court.
			(crossover) The ball changes hands by crossing the ball to form a V in front of the body.
			(between the leg) The ball changes hands by crossing the ball in a V shape between the legs.
			(behind the back) The ball changes hands by crossing the ball to form a V behind the body.
			Hands that are not dribbling and the body are used to protect the ball.
		Followthrough	Stop in a balanced condition, either with a jump stop or one-two stop.
			Hands gripping the ball firmly
	Passing & Catching	Prefix	Ready position.
			Balance in body position
			Looking toward the target.
		Preparation	(Chest pass) Hold the ball tightly with both hands in front of the chest.
			The position of the fingers is on the side of the ball, and the thumb is on the back, resembling a handshake position.
			The elbows are bent equally on both sides, and the knees are bent.
			(One-hand Sidearm Bounce Pass) The active hand position is placed next to the body.
			Passive hand protects the ball
			The ball is between the shoulder and hip.
			The elbows are bent, and the knees are bent.
		Implementation	(Chest Pass) Push the ball by straightening the elbow, followed by wrist and finger movements.
			The direction of the ball's backspin is toward the target at chest height.
			Explosive moves
			(One-hand Sidearm Bounce Pass) The footsteps moved obliquely forward towards the target of the pass.
			Open the elbow spread to the front side, and push the ball by straightening the elbows, followed by wrist and finger movements.
			The ball bounces at two-thirds of the distance from the receiver.
			Explosive moves
		Followthrough	Stop in a balanced state with either a jump stop or a one-two stop.
			Hands gripping the ball firmly

Table 1 (continued). BSPT performance (process-based) assessment rubric

	Shooting	Prefix	Focus on the ring.
			The feet are stretched over the shoulder width with the toes forward.
			Shoulders relaxed, posture balanced.
		Preparation	The shooter's hand is behind the ball, and the balance hand is next to the ball.
			The elbows of the shooter's arms form a 90-degree angle.
			Elbows tucked in and fingers relaxed with palms off the ball.
		Implementation	Legs and arms move up together.
			The wrists are flexible, and the fingers point forward.
			The hand not used for the shooting remains to hold the ball until the ball is released.
		Followthrough	The shooting movement ends with a wrist stroke until the fingers face down and release on the index finger.
			Keep your arms straight until the ball enters the hoop.
			Land with both feet together.
	Speed Dribble-Layup	Prefix	Looking toward the target.
			Stepping with a balanced body position.
			Bend the knees
			The hind legs become repulsive.
		Preparation	Run at full speed of waist-deep.
			The ball is always in front of the body.
			Take a short step with your inner leg before the last dribble.
		Implementation	Catch the ball simultaneously with long strides.
			Vertical jump.
			Point the shooter's hand toward the basketball hoop at a 45- to 60-degree angle.
		Followthrough	Keep eye contact with the basketball ring target.
			The shooting is completed by slashing the wrist to the fingers.
			Land with both legs in balance.

Table 2. BSPT outcome-based measurement rubric

Variabel	Indicator	Reward/ penalty time (s)	Sub Indicator
Skill/ Outcome Based	Free Throw	-2 s	Go all in without hitting the ring.
		-1 s	Go all in with one or both of them hitting the ring.
		+1 s	Only once entered the basketball hoop.
		+2 s	None of the shots made it into the basketball hoop.
	Dribble (Ball Control)	-1 s	Using all dribble techniques (crossover, between the legs, and behind the back) correctly
		+1 s	Missed one or more dribbles
	Passing	-1 s	The direction of passing right on the receiver's chest
		+1 s	The direction of passing is not on target.
	Shooting	-3 s	All shoot made it to the basket. (3pt, medium shoot, under basket)
		-1 s	Only two of the three shots have made it to the basket.
		+3 s	Only one or none of the shots have made it to the basket.
	Speed dribble-layup	-1 s	The ball is entered in one attempt.
		+1 s	The ball was entered in more than one attempt.
		+3 s	Turnover (travelling/ carrying the ball/double dribble/out of bounds)

Testing procedures

The test begins with two free throws, followed by dribbling the ball (crossover between the leg – behind the back), then passing (chest pass and one-hand side bounce pass), shooting (three-point shoot, medium shoot, and under-basket) then speed dribble ending with a lay-up. The assessment from the BSPT test combines the performance assessment method (process based) using the free throw, dribbling, passing, shooting, slide defense, and lay-up performance rubrics (Table 1). Meanwhile, for outcome-based measurement, it uses (a) completion time; (b) penalty or reward time; (c) performance time (completion time + penalty time) (Table 2).

Statistical analysis

In order to conduct an in-depth study, this research applied a developmental method supported by qualitative and quantitative approaches (Creswell, 2016; Harrison et al., 2020; Terwee et al., 2018). Three academic experts and four basketball coach experts approved the data collection. The empirical and content validity of the basketball skill and performance test were used to evaluate its validity. One of the most typical methods for determining the content validity of a questionnaire is expert judgment, which can either suggest which items the instrument should include to define the construct to be measured, or, as in this case, evaluate the items already created based on a series of quantitative or qualitative criteria (giving scores) and suggesting, or adding any changes to their wording if they believe it is necessary (Garrote & del Carman Rojas, 2015; Guillot-Valdés et al., 2022). This procedure is widely used by researchers to assess the content validity of newly created instruments or adaptations of existing instruments (Leyton-Román et al., 2021).

There are three steps to content validity: The authors first gathered relevant research sources, then conducted a preliminary participatory observation study to develop a test, and finally evaluated the data obtained. Second, the researchers used the Delphi technique (Wilpers et al., 2020). The Delphi technique is used to reach expert opinions on a specific subject in a gradual and iterative process (Hasson et al., 2000). The third step was to analyze the data obtained in the form of quantitative results from the evaluation of 7 experts on a 4-point scale and qualitative suggestions from 7 experts (Yudhistira & Tirtawirya, 2021). To calculate the content validity through Aiken's V coefficient, was used to

Table 3. Result of Aiken Validity

Aspect	Rater							S_1	S_2	S_3	S_4	S_5	S_6	S_7	Σs	n(c-1)	V	Ket
	1	2	3	4	5	6	7											
1	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
2	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
3	4	4	3	3	4	3	4	3	3	2	2	3	2	3	18	21	0.85	VALID
4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
5	3	4	3	3	4	3	3	2	3	2	2	3	2	2	16	21	0.76	VALID
6	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
7	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
8	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
9	4	3	4	4	3	4	4	3	2	3	3	2	3	3	19	21	0.90	VALID
10	4	3	3	4	3	3	4	3	2	2	3	2	2	3	17	21	0.80	VALID
11	3	4	3	3	4	3	3	2	3	2	2	3	2	2	16	21	0.76	VALID
12	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
13	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
14	3	4	3	4	4	3	3	2	3	2	3	3	2	2	17	21	0.80	VALID
15	4	4	3	3	4	3	4	3	3	2	2	3	2	3	18	21	0.85	VALID
16	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
17	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
18	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
19	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
20	4	4	2	3	4	3	4	3	3	1	2	3	2	3	17	21	0.80	VALID
21	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
22	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
23	4	3	4	4	3	4	4	3	2	3	3	2	3	3	19	21	0.90	VALID
24	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
25	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
26	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
27	3	4	4	4	4	4	3	2	3	3	3	3	3	2	19	21	0.90	VALID
28	4	3	4	3	3	4	4	3	2	3	2	2	3	3	18	21	0.85	VALID
29	4	4	2	3	4	3	4	3	3	1	2	3	2	3	17	21	0.80	VALID
30	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
31	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
32	4	3	4	4	3	4	4	3	2	3	3	2	3	3	19	21	0.90	VALID
33	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
34	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
35	3	4	3	3	4	4	3	2	3	2	2	3	3	2	17	21	0.80	VALID
36	3	4	3	3	4	4	3	2	3	2	2	3	3	2	17	21	0.80	VALID
37	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID

Table 3 (continued). Result of Aiken Validity

Aspect	Rater							S_1	S_2	S_3	S_4	S_5	S_6	S_7	Σs	n(c-1)	V	Ket
	1	2	3	4	5	6	7											
38	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
39	4	3	4	4	3	4	4	3	2	3	3	2	3	3	19	21	0.90	VALID
40	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
41	3	3	3	4	3	3	3	2	2	2	3	2	2	2	15	21	0.71	NOT VALID
42	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
43	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
44	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
45	3	3	3	3	3	4	3	2	2	2	2	2	3	2	15	21	0.71	NOT VALID
46	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
47	4	4	2	4	4	3	4	3	3	1	3	3	2	3	18	21	0.85	VALID
48	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
49	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
50	3	4	3	3	4	4	3	2	3	2	2	3	3	2	17	21	0.80	VALID
51	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
52	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
53	4	4	3	3	4	4	4	3	3	2	2	3	3	3	19	21	0.90	VALID
54	3	4	3	3	4	4	3	2	3	2	2	3	3	2	17	21	0.80	VALID
55	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
56	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
57	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
58	3	4	3	4	4	3	3	2	3	2	3	3	2	2	17	21	0.80	VALID
59	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
60	4	3	3	4	3	3	4	3	2	2	3	2	2	3	17	21	0.80	VALID
61	4	3	3	4	3	3	4	3	2	2	3	2	2	3	17	21	0.80	VALID
62	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
63	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
64	4	3	3	4	3	3	4	3	2	2	3	2	2	3	17	21	0.80	VALID
65	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
66	3	4	3	3	4	4	3	2	3	2	2	3	3	2	17	21	0.80	VALID
67	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
68	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
69	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
70	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
71	4	4	3	3	4	4	4	3	3	2	2	3	3	3	19	21	0.90	VALID
72	4	4	3	4	4	3	4	3	3	2	3	3	2	3	19	21	0.90	VALID
73	4	4	4	3	4	4	4	3	3	3	2	3	3	3	20	21	0.95	VALID
74	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
75	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
76	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
77	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
78	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
79	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
80	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
81	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
82	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
83	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
84	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
85	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
86	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
87	4	4	4	4	4	4	4	3	3	3	3	3	3	3	21	21	1	VALID
																	0.91	VALID

determine the criteria for the modification or elimination of the variables (Aiken, 1985, 1980; Penfield & Giacobbi, 2009; Torres-Luque et al., 2020).

Cronbach Alpha was used to assess the internal consistency and reliability of BSPT, with less than 0.70 indicating acceptable reliability (Rahayu & Arovah, 2022; Sharma, 2016). Also calculated one-week test and retest reliability on BSPT by calculating each item's intra-class correlation (ICC) (single one-way model) (Schreiber et al., 2006). Reliability was classified as fair (0.5), good (0.5–0.75), very good (0.75-0.9), and excellent (>0.9) based on the ICC value (Koo & Li, 2016; Olaya-Cuartero et al., 2022).

Results

Content Validity

Expert judgment is used to evaluate aspects of basketball skill and performance test instruments designed specifically for adolescent athletes. The expert's evaluation uses a scale of 1 to 4. The assessment criteria are only relevant if the assessment is close to a one on a scale. The closer the assessment is to a four on a scale, the more relevant the assessment criteria. The expert assessment data was then quantitatively analyzed using Aiken's formula.

Using seven raters with four categories to choose from, the V index equals 0.76. From the results obtained from expert judgment, two items were invalid, including items 41 (0.71), and items 45 (0.71). On average, a value of 0.91 is obtained so that the instruments that have been compiled are declared valid.

Reliability

Cronbach's Alpha was used to see how reliable the raters were. The results are shown in Table 4.

Table 4. Result of Cronbach alpha analysis

Cronbach's Alpha	N of Items
0.918	7

In this study, the test-retest reliability correlation coefficient produced positive results. According to (Heale & Twycross, 2015), Cronbach's alpha values > 0.7 indicate high reliability.

Table 5 shows the results of the interrater agreement test or interrater reliability using Intraclass Correlation Coefficients (ICC).

The average agreement between raters is 0.912, while for one rater, the consistency is 0.596. The results of the ICC score, according to (Portney & Watkins, 2009), are included in the excellent reliability category, so it can be concluded that agreement between raters is very strong and each rater has a fairly good level of consistency.

Discussion

The purpose of this research was to examine the content validity and reliability of the basketball skill and performance instrument test. This study determined that the BSPT has high content validity and can be used to evaluate the skill and performance of adolescent basketball athletes. Testing consistency across a number of trials is required for reliable data collection when evaluating sporting performance (W. G. Hopkins, 2000; Lockie et al., 2013; Radman et al., 2016). When compared to previous skill tests that were similarly designed in terms of performance time, penalty time, and number of errors, our results demonstrated greater relative reliability than the Loughborough Soccer Passing Test (LSPT) (ICC: 0.58-0.70) (Ali, 2011; Wen et al., 2018) and Loughborough Soccer Shooting Test (LSST) (ICC = 0.26-0.58) (Ali, 2011; Conte et al., 2019).

Based on the Aikens analysis used to measure the content's validity, the expert assessment instrument achieves a value of 0.91, indicating that the aspect has good content validity. Cronbach's Alpha was used to measure the reliability of every aspect of the basketball skill and performance test instrument, and the results were 0.918. Cronbach's alpha reliability level of 0.70 is the bare minimum. If the Cronbach's Alpha value is greater than 0.7, the aspects of the national development category aerobic gymnastic flexibility test instrument are very reliable (Tavakol & Dennick, 2011).

Meanwhile, because there are more than two raters, this study used Intraclass Correlation Coefficients (ICC) analysis to test the reliability of each rater and the consistency of each rater. Based on the ICC results (table 5), it is feasible to determine that the raters' agreement is very strong and that each rater has a reasonably good consistency (moderate reliability). As a result, the structure of the test was considered feasible for measuring basketball skill and performance in adolescent athletes. This developed test is an adapted or specified test with several basketball techniques because it is similar to the movement of the technique during the game.

Conclusions

Based on the results and discussion, it is possible to conclude that the basketball skill and performance test (BSPT) is valid and reliable for assessing adolescent basketball athletes. As a result, the BSPT can be used to assess the skill level of adolescent basketball players, benefiting not only basketball coaches but also physical education teachers.

Acknowledgement

The author would like to thank to basketball coaches in Indonesia and Universitas Negeri Yogyakarta for the opportunity to conduct this research and their cooperation in the study.

Table 5. Intraclass Correlattion Coefficient analysis result

	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	0.596	0.510	0.682	12.227	87	522	0.000
Average Measures	0.912	0.879	0.938	12.227	87	522	0.000

Conflict of interest

The authors declare that there are no conflicts of interest.

References

Stojanović, E., Stojiljković, N., Scanlan, A. T., Dalbo, V. J., Berkelmans, D. M., & Milanović, Z. (2018). The Activity Demands and Physiological Responses Encountered During Basketball Match-Play: A Systematic Review. *Sports Medicine, 48*(1), 111-135. https://doi.org/10.1007/s40279-017-0794-z

Bracco, E., Lodewyk, K., & Morrison, H. (2019). A case study of disengaged adolescent girls' experiences with teaching games for understanding in physical education. *Curriculum Studies in Health and Physical Education, 10*(3), 207-225. https://doi.org/10.1080/25742981.2019.1632724

Heemsoth, T., Boe, L., Bükers, F., & Krieger, C. (2022). Fostering pre-service teachers' knowledge of 'teaching games for understanding' via video-based vs. Text-based teaching examples. *Physical Education and Sport Pedagogy, 27*(1), 77-90. https://doi.org/10.1080/17408989.2020.1850668

Levenberg, M., Armstrong, T., & Johnson, I. (2020). Teaching Dance for Understanding: Reconceptualizing Dance in Physical Education. *Journal of Physical Education, Recreation & Dance, 91*(6), 3-7. https://doi.org/10.1080/07303084.2020.1770519

Waffak, M. N., Sukoco, P., & Sugiyanto, F. X. (2022). Developing a basketball learning model using the teaching game for understanding (tgfu) approach to improve the effectiveness of hots in elementary schools. *Physical Education Theory and Methodology, 22*(3s), 21-29. https://doi.org/10.17309/tmfv.2022.3s.03

Koryahin, V., & Blavt, O. (2019). Study of the Technical Training System of Young Athletes. *Physical Education Theory and Methodology, 19*(2), 64-68. https://doi.org/10.17309/tmfv.2019.2.02

Koryahin, V., & Hrebinka, H. (2023). Content and Structure of Competitive Activities of Young Basketball Players Aged 13-14. *Physical Education Theory and Methodology, 23*(1), 143-147. https://doi.org/10.17309/tmfv.2023.1.20

Hugo, V., Okazaki, A., Luiz, A., & Rodacki, F. (2018). Basketball jump shot performed by adults and children. *Human Movement, 19*(1), 71-79. https://doi.org/10.5114/hm.2018.73615

Makarov, Y. (2013). Concept of the gaming activity formation in sports games. Uchenye zapiski universiteta imeni P.F. Lesgafta, 101, 78-83. https://doi.org/10.5930/issn.1994-4683.2013.07.101.p78-83

Ibáñez, S. J., Martinez-Fernández, S., Gonzalez-Espinosa, S., García-Rubio, J., & Feu, S. (2019). Designing and Validating a Basketball Learning and Performance Assessment Instrument (BALPAI). *Frontiers in Psychology, 10*(JULY), 1-9. https://doi.org/10.3389/fpsyg.2019.01595

Koopmann, T., Faber, I., Baker, J., & Schorer, J. (2020). Assessing Technical Skills in Talented Youth Athletes: A Systematic Review. *Sports Medicine, 50*(9), 1593-1611. https://doi.org/10.1007/s40279-020-01299-4

Al-Gendy, T. M. (2012). 11_Designing New Groups of Tests for Measuring the Technical Performance of the Basketball Players.pdf. *Trends in Applied Sciences Research, 7*(8), 673-682. https://doi.org/10.3923/tasr.2012.673.682

López-Pastor, V. M., Kirk, D., Lorente-Catalán, E., MacPhail, A., & Macdonald, D. (2013). Alternative assessment in physical education: A review of international literature. *Sport, Education and Society, 18*(1), 57-76. https://doi.org/10.1080/13573322.2012.713860

Doroshenko, E., Sushko, R., Shamardin, V., Prykhodko, V., Shapovalova, I., Yelisieieva, D., Demidova, O., & Yakovenko, A. (2020). Analysis of the competitive activity structure Prydniprovska State Academy of Physical Culture and Sports. *Physical Education Theory and Methodology, 20*(4), 219-227. https://doi.org/10.17309/tmfv.2020.4.04

Križan, M., & Mikulič, M. (2018). Dependence of the Result on the Effectiveness of Performance in the World Women's Handball Championship 2016. *Physical Education Theory and Methodology, 18*(2), 63-68. https://doi.org/10.17309/tmfv.2018.2.02

Hopkins, D. R. (2013). Factor analysis of selected basketball skill tests. *Research Quarterly of the American Alliance for Health, Physical Education and Recreation, 48*(3), 535-540. https://doi.org/10.1080/10671315.1977.10615459

Conte, D., Smith, M. R., Santolamazza, F., Favero, T. G., Tessitore, A., & Coutts, A. (2019). Reliability, usefulness and construct validity of the Combined Basketball Skill Test (CBST). *Journal of Sports Sciences, 37*(11), 1205-1211. https://doi.org/10.1080/02640414.2018.1551046

Skjong, R. (2001). Expert judgment and risk perception. Det Norske Verita, January 2001.

Ortega-Toro, E., García-Angulo, A., Giménez-Egido, J. M., García-Angulo, F. J., & Palao, J. M. (2019). Design, Validation, and Reliability of an Observation Instrument for Technical and Tactical Actions of the Offense Phase in Soccer. Frontiers in Psychology, 10, 22. https://doi.org/10.3389/fpsyg.2019.00022

Villarejo, D., Ortega, E., Gómez, M.-Á., & Palao, J.-M. (2014). Design, validation, and reliability of an observational instrument for ball possessions in rugby union. *International Journal of Performance Analysis in Sport, 14*(3), 955-967. https://doi.org/10.1080/24748668.2014.11868771

Mardapi, D. (2017). *Pengukuran, penilaian, dan evaluasi pendidikan 2nd ed (Second)*. Parama Publishing.

Oriondo, L., & Dallo-Antonio. (1998). *Evaluating educational outcomes (test, Measurement, and evaluation)*, 5th (5th ed.). REX Printing Company, Inc.

Creswell, J. W. (2016). Reflections on the MMIRA The Future of Mixed Methods Task Force Report. *Journal of Mixed Methods Research, 10*(3), 215-219. https://doi.org/10.1177/1558689816650298

Harrison, R. L., Reilly, T. M., & Creswell, J. W. (2020). Methodological Rigor in Mixed Methods: An Application in Management Studies. *Journal of Mixed Methods Research, 14*(4), 473-495. https://doi.org/10.1177/1558689819900585

Terwee, C. B., Prinsen, C. A. C., Westerman, A. C. M. J., Alonso, D. L. P. J., & Bouter, L. M. (2018). COSMIN methodology for evaluating the content validity of patient-reported outcome measures: a Delphi study. *Quality of Life Research, 27*(5), 1159-1170. https://doi.org/10.1007/s11136-018-1829-0

Garrote, P., & del Carman Rojas, M. (2015). Garrote and del Carmen Rojas, 2015.pdf. *Revista Nebrija de Linguistica Aplicada,* 18, 1-16.

Guillot-Valdés, M., Guillén-Riquelme, A., & Buela-Casal, G. (2022). Content Validity through Expert Judgment for the Depression Clinical Evaluation Test. *International Journal of Clinical and Health Psychology, 22*(2), 100292. https://doi.org/10.1016/j.ijchp.2022.100292

Leyton-Román, M., Mesquita, S., & Jiménez-Castuera, R. (2021). Validation of the Spanish Healthy Lifestyle Questionnaire. *International Journal of Clinical and Health Psychology, 21*(2), 100228. https://doi.org/10.1016/j.ijchp.2021.100228

Wilpers, A., Bahtiyar, M. O., Wall, D., Kobler, K., Sadler, L. S., Dixon, J. K., & Kennedy, H. P. (2021). Modified Delphi Study on Nursing Practice and Science in Fetal Care. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 50*(1), 55-67. https://doi.org/10.1016/j.jogn.2020.09.158

Hasson, F., Keeney, S., & Mc Kenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32*(4), 1008-1015. https://doi.org/10.1046/j.1365-2648.2000.t01-1-01567.x

Yudhistira, D., & Tirtawirya, D. (2021). Development of Agility Test Construction: Validity and Reliability of Karate Agility Test Construction in Kata Category. *International Journal of Human Movement and Sports Sciences, 9*(4), 697-703. https://doi.org/10.13189/saj.2021.090413

Aiken, L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and psychological measurement, 45*(1), 131-142. https://doi.org/10.1177/0013164485451012

Aiken, L. R. (1980). Content Validity and Reliability of Single Items or Questionnaires. *Educational and Psychological Measurement, 40*(4), 955-959. https://doi.org/10.1177/001316448004000419

Penfield, R. D., & Giacobbi, Jr., P. R. (2004). Applying a Score Confidence Interval to Aiken's Item Content-Relevance Index. Measurement in Physical Education and Exercise Science, 8(4), 213-225. https://doi.org/10.1207/s15327841mpee0804_3

Torres-Luque, G., Blanca-Torres, J. C., Giménez-Egido, J. M., Cabello-Manrique, D., & Ortega-Toro, E. (2020). Design, Validation, and Reliability of an Observational Instrument for Technical and Tactical Actions in Singles Badminton. Frontiers in Psychology, 11, 582693. https://doi.org/10.3389/fpsyg.2020.582693

Rahayu, A., & Arovah, N. I. (2022). The Validity and Reliability of the Physical Activity Questionnaires (PAQ-A) among Indonesian Adolescents during Online and Blended Learning Schooling. *Physical Education Theory and Methodology, 22*(2), 173-179. https://doi.org/10.17309/tmfv.2022.2.04

Sharma, B. (2016). Focus on reliability in developmental research through Cronbach's Alpha among medical, dental, and paramedical professionals. *Asian Pacific Journal of Health Sciences, 3*(4), 271-278. https://doi.org/10.21276/apjhs.2016.3.4.43

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research, 99*(6), 323-338. https://doi.org/10.3200/JOER.99.6.323-338

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine, 15*(2), 155-163. https://doi.org/10.1016/j.jcm.2016.02.012

Olaya-Cuartero, J., Villalon-Gasch, L., & Penichet-Tomás, A. (2022). Original Article Validity and Reliability of the VmaxPro IMU for back squat exercise in multipower machine. *Journal of Physical Education and Sport, 22*(11), 2920-2926. https://doi.org/10.7752/jpes.2022.11369

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence Based Nursing, 18*(3), 66-67. https://doi.org/10.1136/eb-2015-102129

Portney, L. G., & Watkins, M. P. (2009). *Foundations of clinical research: applications to practice.*

Hopkins, W. G. (2000). Measures of Reliability in Sports Medicine and Science. *Sports Med, 30*(1), 1-15.

Lockie, R. G., Schultz, A. B., Callaghan, S. J., Jeffriess, M. D., & Simon, P. (2013). Reliability and Validity of a New Test of Change-of-Direction Speed for Field-Based Sports: the Change-of-Direction and Acceleration Test (CODAT). *Journal of Sports Science and Medicine,* December 2012, 88-96.

Radman, I., Ruzic, L., Padovan, V., Cigrovski, V., & Podnar, H. (2016). Reliability and validity of the inline skating skill test. *Journal of Sports Science and Medicine, 15*(3), 390-396.

Ali, A. (2011). Measuring soccer skill performance: A review. *Scandinavian Journal of Medicine and Science in Sports, 21*(2), 170-183. https://doi.org/10.1111/j.1600-0838.2010.01256.x

Wen, D., Robertson, S., Hu, G., Song, B., & Chen, H. (2018). Measurement properties and feasibility of the Loughborough soccer passing test: A systematic review. Journal of Sports Sciences, 36(15), 1682-1694. https://doi.org/10.1080/02640414.2017.1409611

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2,* 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd

РОЗРОБКА, ПІДТВЕРДЖЕННЯ ВАЛІДНОСТІ ТА НАДІЙНІСТЬ ІНСТРУМЕНТУ ТЕСТУВАННЯ БАСКЕТБОЛЬНИХ НАВИЧОК І РЕЗУЛЬТАТИВНОСТІ ГРАВЦІВ-ПІДЛІТКІВ

Мухаммад Ірван Ева Салафі[1ABCDE], Ваван Сундаван Сухерман[1AB], Бернадета Сухартіні[1AB], Мухаммад Сігіт Антоні[1,2BD], Кукух Вахюдін Пратама[2BD], Рісті Нурфаділа[1BC], Вішну Нугрохо[1BD], Юльвія Міфтахурохмах[1BC]

[1]Джок'якартський державний університет

[2]Інститут передової науки, техніки та освіти

Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 6 с., 5 табл., 1 рис., 48 джерел.

Мета дослідження. Усі засоби оцінювання або тести навичок, такі як тест баскетбольних навичок AAHPERD (Американський альянс із питань охорони здоров'я, фізичного виховання, відпочинку та танців) і баскетбольний тест Джон-

сона, є частковими або окремими. Усі ці тести є старими продуктами, тоді як гра в баскетбол постійно розвивається. Метою цього дослідження була розробка та підтвердження валідності тестів баскетбольних навичок і результативності для гравців віком 14–16 років, призначених скоротити час тестування, скоротити час очікування результатів, і які будуть комплексними, щоб вони могли відображати реальні здібності та їх можна було використовувати як еталон під час проведення відбору та оцінки.

Матеріали та методи. Загалом 7 експертів оцінювали 11 елементів (86 пунктів) тесту баскетбольних навичок і результативності (ТБНР). У дослідженні взяли участь три академічні експерти та чотири експерти з баскетбольних тренерів. Збір даних здійснювали за допомогою методу Дельфі та повторення тесту, а для аналізу даних використовували формулу Ейкена, коефіцієнти внутрішньогрупової кореляції (КВК) та альфу Кронбаха.

Результати. Зі значенням 0,91 засіб експертної оцінки показує, що валідність аспекту за змістом є відповідною. Альфу Кронбаха використовували для вимірювання надійності кожного аспекту інструменту тестування баскетбольних навичок і результативності, і результати становили 0,918. Результат узгодження оцінок КВК між оцінювачами становить 0,912, тоді як для одного оцінювача показник стабільності становить 0,596.

Висновки. Висновки, які випливають із цього дослідження, можуть доводити, що ТБНР можна використовувати для оцінки рівня навичок підлітків-баскетболістів, що буде на користь не лише баскетбольним тренерам, але й учителям фізичного виховання.

Ключові слова: бакетбол, навичка, результативність, підтвердження валідності, надійність.

Information about the authors:

Salafi, Muhammad Irvan Eva: irvan.salafi@uny.ac.id; https://orcid.org/0000-0003-0186-6597; Department of Sport Coaching Education, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Suherman, Wawan Sundawan: wansuherman@uny.ac.id; https://orcid.org/0000-0002-5565-0751; Department of Sport Science, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Suhartini, Bernadeta: bernadeta_suhartini@uny.ac.id; https://orcid.org/0000-0002-3661-9820; Department of Sport Science, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Antoni, Muhammad Sigit: sigitantoni@uny.ac.id; https://orcid.org/0000-0002-0944-6987; Department of Sport Science, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Pratama, Kukuh Wahyudin: kukuh.pratama@iasee.org; https://orcid.org/0000-0003-4518-6358; Sport Science Research and Development, Institute of Advanced Science, Engineering, and Education, Tempelsari 004/035 Maguwoharjo, Depok Sleman, Yogyakarta 55282, Indonesia.

Nurfadhila, Risti: risti.n@uny.ac.id; https://orcid.org/0000-0001-5612-8896; Department of Sport Coaching Education, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Nugroho, Wisnu: wisnu.nugroho@uny.ac.id; https://orcid.org/0009-0007-1623-6252; Department of Sport Coaching Education, Faculty of Sport Science, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Miftachurohmah, Yulvia: yulfiamiftachurochmah.2022@student.uny.ac.id; https://orcid.org/0000-0002-2690-6762; Health Sport Centre, Universitas Negeri Yogyakarta, Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.

Cite this article as: Salafi, M.I.E., Suherman, W.S., Suhartini, B., Antoni, M.S., Pratama, K.W., Nurfadhila, R., Nugroho, W., & Miftachurohmah, Yu. (2023). Design, Validation, and Reliability of A Basketball Skill and Performance Test Instrument in Adolescent Player. *Physical Education Theory and Methodology, 23*(5), 668-677. https://doi.org/10.17309/tmfv.2023.5.03

Received: 28.03.2023. Accepted: 13.09.2023. Published: 30.10.2023

This work is licensed under a Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0).