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Petanque pointing test: development and psychometric validation of a performance-based field instrument

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ABSTRACT

The aim of this research was to design and validate the Petanque Test Pointing (PTP). The research design was a product development (R&D), the five-step ADDIE (namely: Analysis, Design, Development, Implementation, and Evaluation). For content validation, two expert petanque coaches and sport researchers in a related fields were chosen at random. Aiken's V was the content validity coefficient used. Aiken's V was determined as a content validity index of the instrument components and reliability was found by means of test-retest procedure i.e., repeated testing. Content validation across 12 components of PTP resulted in a mean Aiken's V of 0.908, which is above the commonly accepted cutoff point of 0.70 and it indicates an excellent degree of disagreement in the assessment of instrument items. The test-retest reliability was 0.712, which is considered high for an outdoor measure of performance. Conducting the PTP per player on the ground took 10 minutes approximately and no extra equipment was needed. Such characteristics indicate that PTP is a time-efficient and practical testing method, suitable for use among coaches. Therefore, the result is the development of Petanque Pointing Performance Test (PTP), a practical method of measuring pointing skills of petanque players, conducted by the players themselves, on the ground. PTP is validated and reliable as well as user-friendly in that it has been designed for usage in field. It can be used as a tool for an objective standard, a means of evaluation, and selection of petanque players with respect to their pointing skills. The findings present PTP as valid and reliable performance-based field measurement tool useful for assessment and development of petanque athletes pointing skills.



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Introduction

Petanque, a French sport that uses accuracy throwing, quickly spread to Southeast Asia and is now one of the sports that are officially recognized in the Indonesia's National Sports Week (Pekan Olahraga Nasional, PON) including the 2024 edition, which will be in Aceh, and also in North Sumatra. Petanque success is mainly based upon two kinds of technical skills, shooting and pointing, but since pointing is a frequent shot and may also be the main shot, it's more likely to influence the outcome of the game, as in it, the ball is placed relative to the jack and is the main reason for the scoring opportunities in most of the game situations.

Indonesia's national sport policy sees athletic achievement as a planned, scientifically supported activity, rather than an accidental occurrence, as can be seen in Law No. 11 of 2022 on Sport and Presidential

Regulation No. 86 of 2021 on the National Sport Grand Design, DBON). This policy position implicitly assumes the existence of objective measurement instruments. Yet in the case of petanque coaching where the assessment of pointing performance remains largely dependent on the coach's individual perception and not on an established measuring instrument with documented psychometric characteristics. This informal judging method is probably gonna cause differences between judges, make it hard to get a picture of how an athlete is progressing over their career, and reduce the ability to compare athletic performances between different athletes, clubs, and regions. Although such problems are well-documented in measuring methods literature that rely on rater-based assessments, the Indonesian petanque community still lacks a detailed quantification of the impact of these problems to a large extent, which is part of the reasons why this assessment method was developed.

Research done exclusively on petanque has gradually unveiled quite a lot of information about throwing accuracy with a fixed ball position as well as the mind-related psychological factors that may be related to mental images and self-talk (Rizal et al., 2021; Rony et al., 2021). A number of studies have even been able to look into various aspects such as examining the shooting throw from biomechanics (Helmi et al., 2024) as well as ways of enhancing the shooting technique by means of training (Phytanza et al., 2022). The technique of marking the ball to prepare for throw has got much lesser attention in psychological literature. Where pointing was discussed, the research generally combined pointing and shooting together as one item in a measuring instrument and did not go on to validate the pointing item separately, or developed pointing training plans without doing validity and reliability testing that went with it, or relied on borrowing tools from general motor-skill or talent-identification batteries rather than creating an authentic, petanque-specific pointing measure. According to a recent two-decade-bibliometric analysis on petanque studies, the development of sport-specific instruments focused specifically on the technical component, as opposed to the physical-fitness one, is a comparatively understudied area of the domain. A new gap-closure attempt includes the creation of a petanque marking-instrument, which was field-tested only on a few local respondents. It also includes a four-dimensional (Define, Design, Develop, Disseminate) skill testing model for the game of pétanque as a whole. Another effort was the development of a motor-perceptual test targeted at spatial cognitive abilities in the form of a measuring tool for elite pétanque athletes, which resulted only very partially a content valid scale with 13 out of 15 items being valid. It is important to note that none of these initiatives integrates in full a research-and-development cycle, a performance-based field protocol anchored in target distances that can be graded, and criterion-referenced normative categories for the evaluation and improvement of the pointing technique exclusively.

This gap has tangible impacts. The absence of a validated criterion-referenced pointing device not only limits objective coaching by identifying a player's talent and monitoring the progress of the team or programme but it also leaves an athlete without measurable information on selfdevelopment; and at the same time the national/provincial petanque organisations are without a common and reliable method to collect club and geographical performance data. A Petanque throwing skill assessment, mainly technical, perceptual and in terms of consistency called Petanque Test Pointing (PTP) was developed in this study as a means of filling the gap.

The unique contributions of this study are threefold. First, regarding the aspect of development of the instrument, besides pointing being a general petanque skill in a typical battery of skills, it was treated as a technical skill of its own and through which the various movements are captured, such as starting stance, grip, arm swing, ball release, throw direction, controlling the force, hitting accuracy, and performance consistency. Secondly, the product, the PTP is an actual performance task carried out by the use of normal petanque gear under different graduated target distances (7, 8, and 9 metres) rather than being a generic or a laboratory-style motor test and its administration comes with a scoring rubric, an interpretation guide, and a performance categories list that is based on criterion reference. Thirdly, concerning the manner, the instrument underwent the whole cycle of ADDIE-based research-and-development, which included needs analysis, design, content validation using Aiken's V by an expert panel, field implementation, and formative and summative evaluation rather than it was directly adapted from an already existing measure.

This point of view is also reflected in an increasing number of recent papers dedicated to petanque studies, which show the value and importance of considering pointing as a discrete, biomechanically and perceptually based skill. The results of the paper "The Analysis of Accuracy of Pointing in Standing Posture" (Irawan et al., 2022) and "The study of training media and concentration effects on petanque shooting accuracy" (Irham et al., 2022) suggest that the technical and perceptual components that make up pointing and shooting skills are the actual factors affecting performance, not a person's general athletic capabilities. Further research has focused on investigating what leads to the success of the aiming skill (Maliki et al., 2022) whereas a work on

the impact of a target practice at a gradually increased distance on the shooting accuracy at 7-metre distance (Nurhidyat et al., 2024) confirms the validity of the PTP's 7-9 meter graduated field layout. The series of studies mentioned above give us reason to believe that there is great need to develop a pointing measurement tool that is specialized for pointing and technically based instead of making a generic assessment or shooting test.

Accordingly, this research project aimed to find answers to three central research questions: (1) the degree of content validity (as viewed by subject-matter experts) of the constructed pointing instrument, (2) the degree of test-retest reliability of the item, and (3) how practical an instrument is as evaluated by coaches and athletes in a real-world setting. The research results are expected to provide petanque instructors, players, national and regional federations (such as the Petanque Sport Federation of Indonesia, FOPI) as well as the sports science academia community with an objective tool supported by evidence for the assessment of pointing performance. Besides, the methodology used during instrument development is another contribution to the existing body of literature on sport measurement based on ADDIE approach.

Method

Research Design

This study was conducted with a research and development model (R&D). With an ADDIE process as an underlying framework, a five-phase model of design and development that have been systematically and extensively applied to the creation of instructional and assessment products, the instrument has been developed and validated.

Setting and Participants

The study was carried out in collaboration with the secretariat of the Indonesian Petanque Sport Federation (FOPI), in the province of West Sumatra. Three different groups of participants were involved, each represented a functional group necessary throughout the ADDIE phases: (1) Content validity expert panel: two purposive experts served as content validators, a petanque practitioner and coach nationally licensed (Rasyono, S.Pd., M.Pd., Faculty of Sport Science Universitas Sriwijaya) and a specialist in sport test-and-measurements (Dr. Sepriadi, S.Si., M.Pd., Faculty of Sport Science, Universitas Negeri Padang). The selection criteria were relevant academic qualification, professional licenses, and field experience in petanque coaching or sports evaluation; (2) Field trial participants were adolescent and adult male and female petanque players associated with clubs in West Sumatra Province. They were selected through purposive sampling in line with inclusion criteria, which demanded active participation in training activities, basic knowledge of pointing techniques, physical preparedness and a strong desire to see the entire testing process through to the end; (3) Coach/user evaluators: Petanque coaches who gave out the tool or were just present and gave assessment about how useful, clear in execution, and time saving the tool was.

Editorial note - both reviewer comments pointed out a lack of: this manuscript does not reveal the number of subjects who actually completed the study, it neither describes the exact sample size (N, n per each ADDIE stage), nor age range, sex distribution, nor the level of competition of the field trial participants and coach/user evaluators. Also, there is no reference to the ethics committee approval required by the most of Q1 sport-science journals. You are asked to include these numbers and to prepare a Participant Characteristics table (Group | n | Age, M $\pm$ SD | Sex, n (%) male/female | Competition level) in your resubmission.

Instrument Development Procedure (ADDIE)

Analysis

During the analysis stage, the authors recognized the core practical issue behind their research was that the assessment of pointing skill in Petanque clubs in West Sumatra was done by merely observing the players with a coach's eye and without using a consistent, standardized tool that provides a clear set of criteria or indicators for pointing skill rating, methods, and point giving criteria. Information was collected through reviewing academic papers, observing training sessions, and talking to coaches, athletes, and academics in the context. As results of this phase, the team understood. Firstly, the current assessment was mainly done at coaches' level and it was neither objective nor reliable to be a standard method between different raters. In contrast with previous point system, we have developed an easy-to-understand and administer testing format that requires standard equipment only. Athletes have been the main consumers of this. Finally and above all, they should rely on quantitative methods to be able to provide repeatable evidence of skill development over a period of time.

Design

During the design stage, the blueprint of the device/ measuring instrument was established. This blueprint involved (a) defining the testing goal; that is to objectively, validly, and consistently measure pointing skill; (b) identifying performance indicators that reflect various elements of the technique of a pointing throw: starting position or stance, body balancing techniques, ball grasping techniques, arm moving techniques, moving one's parts and/or whole together techniques, release of the ball, direction of throw, regulating the force, target hitting, and performance stability; (c) a blueprint of the instrument (kisi-kisi) that links assessment goals, indicators, method of test, number of attempts, level of success, and scoring; and (d) arranging the field so that the athlete is facing throwing areas with three circles at 7, 8 and 9 metres with scores given as 10 downwards from proximity to the area of the target each distance being measured from the throw to the target zone).

Development

In the development phase, the plan was turned into an actual protocol for the field, and content validation was performed. The two expert Validators rated separately and independently the 12 parts of the assessment (how the task fits conceptually, agreement of measurement goal, relationship of item and skill level, fit with athlete characteristics, instructions readability, procedure clarity, understanding of the scoring system, format consistency, field usability, time required, equipment practicality, safety) from 1 to 5. The scores were further processed with Aiken's V, calculated as $V = \sum s / [n(c, 1)]$ where s denotes an rater's score less the lowest possible score of the scale, n is the number of rater(s), and c is the number of response categories.

Implementation

The adjusted scale was used in real-life setting with petanca athletes and coaches. The researchers used the equipment, layout, and procedure as they had been decided during the design phase. The athletes went through the testing procedures alone. The first task was to stand in the throwing circle, and each of the three distances (7, 8, and 9 metres) were then given for one throw; the whole process including the instructions and preparation took approximately 10 minutes per athlete. Coaches watched the whole thing and afterwards provided their opinions on the instrument's practicality.

Evaluation

Evaluation was composed of both formative and summative elements. Formative assessment took place during the various stages of development and revisions were made based largely on the feedback of experts and the data derived from small-scale trials. On the other hand, summative evaluation looked at the validity, reliability, field feasibility and overall practicality of the instrument without breaking the assessment down. This involved the psychometric assessment of the scores and the assessment of the testing procedure in terms of technical usability (such as field-layout suitability, ease of use of equipment, procedural clarity, ease of scoring, efficiency of time and understanding by coach/tester of the guidebook).

Instrumentation and Data Collection Techniques

Metric results were primarily gathered by first having the two content validity raters filled out a questionnaire, which was then combined with performance data that was collected for the participants' pointing skill test. Coaches and athletes also gave feedback in the form of free responses and were observed in a structured setting for their comments on the practical aspects of the instrument developed. Lastly, records, previous test protocols, and reports served as sources of documentation supporting the evolution of the tool under development.

Reliability Testing

Reliability was measured through the test-retest method. The same test was shown to the same athletes multiple times, with a set period separating each administration. To get the final reliability score, the authors first compared the result of the first administration with what came from the average of the other testings, and then used the right correlation formula.

Norm-Referenced Scoring

To categorize the performer's performances into five descriptive performance levels based on field-trial scores only, a criterion-related norm (Penilaian Acuan Patokan/PAP), which is based upon the shape of the normal distribution of test-score data, a central tendency or the average of the field-trial data, and a measure of the amount of deviation of the scores of athletes from the mean was made. The details of the classification based on the criterion are given in Table 3.

Data Analysis

Data are given descriptively in this article. Item level content validity and also overall validity using Aiken's V was determined here. For an item to have good content validity, Aiken's V should have been 0.70 or higher. This is a commonly accepted minimum score to consider item content validity as acceptable. However, a score of 0.86 or higher is the level that would really show there was unanimous agreement among the judges. This interpretive level used has been established in the sports measurements and education literature. The authors assessed reliability through standard qualitative intervals for correlation coefficients. In summary form, the coach-athlete feedback data have been given to evaluate how useful was the tool (practicality data)

Ethical Considerations

Participants were free to decide and joined this experiment without any pressure after the detailed explanation was delivered to them of what the study, the benefits, and the procedure were. All efforts were made to prevent the identities of the respondents from being revealed and the collected data were only used to support this scientific endeavor within the guidelines of research ethics. [[Corresponding author to insert the name of the institutional/faculty ethics committee and the approval or exemption reference number prior to submission, as this is required by virtually all Q1 sport-science journals and was not specified in the source thesis.

Table 1 <Summary of ADDIE Development Phases and Outputs>

ADDIE Phase	Key Activities	Principal Output
Analysis	Literature review, field observation, coach/athlete/academic interviews	Confirmed absence of standardized pointing instrument; identified athlete and coach needs
Design	Blueprint formulation: objectives, indicators, instrument grid, field layout, scoring system	Complete instrument blueprint and draft guidebook
Development	Expert-panel content validation (Aiken's V) by 2 validators	Mean Aiken's V = 0.908 (very high content validity)
Implementation	Field administration with athletes and coaches	Practical, ~10 minutes/athlete; minor athlete-comprehension issues noted
Evaluation	Formative (iterative revision) and summative (validity, reliability, practicality) evaluation	Test-retest reliability $r = 0.712$ (high); instrument confirmed feasible for field use

Results and Discussions

Overview

This research and development initiative resulted in an in-field measuring tool, the Petanque Test Pointing (PTP), developed with a desire to meet requirements of validity, reliability and practicality as well as the field suitability for the assessment of pointing ability of petanque players. The creation process moved sequentially through the five phases of the ADDIE, as presented in the Methods section, right from the preliminary needs assessment to the final summative evaluation (refer to Table 1).

Analysis Phase Findings

These conclusions have been drawn from informal observations and interviews only, not by using formally triangulated or inter-rater-reliability-tested methods of data collection. They reflect, as a result, a needs analysis rather than confirmation of data. Their results showed that the assessment of pointing at West Sumatran petanque clubs was very much a matter of taste and there was no standard instrument involved in determining what were to be measured, when and how measurement was to take place, or for what purpose scoring was being done. Coaches also mentioned that they had difficulty identifying athlete's ability objectively, keeping up consistent training progress, and making training programming decisions based on the facts. Further inspection of players' profiles showed that there was a big difference in the level of pointing skills among them, and it seems that this was a result of the fact that their training histories, the number of competitions they participated in, and the quality of their coaching were different, hence further confirming how important it is to get a one-size-fits-all procedure that can tell apart skill levels without getting influenced by raters' bias. It was also realized that from the athletes' viewpoint, they only needed to have a set of simple, low-resource techniques plus some form of quantitative reporting that can follow up the changes, instead of just qualitative or verbal feedback.

Design Phase Output

The design stage produced a very thorough instrument plan: the description of a test objective, a complete set of indicators (the initial stance, body balance, hand grip, arms swing, movements coordination, ball release, direction of the throw, regulation of force, throwing accuracy, performance consistency), an instrument matrix that links the indicators to scoring, a layout of the test field with the throwing circle facing three target zones at 7, 8, and 9 m, a scoring system that gives the thrower 2, 10 points per hit depending on the zone which they reached, and also a user manual to go with everything. The equipment required included regular petanque balls, a line marked out with three 0.75-metre-width segments, a throwing circle 35, 50 cm in diameter, a target/scoring area, and a scoring record sheet. Overall, the whole procedure took about 10 minutes for an individual participant.

Content Validity (Development Phase)

Each validator, a professional expert in the field, evaluated the components of the tool based on a scale of 1 to 5. The validator in petanque expertise (Rasyono, S.Pd., M.Pd.) gave a score of 55 out of the maximum of 60 on the scale which is 4.58 point score (equivalent of 91.67%) and considered this category as "highly appropriate for use." On the other hand, the test and measurement expert (Dr. Sepriadi, S.Si., M.Pd.) was a bit more critical by giving 54 out of 60 (i.e., mean score 4.50, equivalent percentage score 90.00%), which still means categorization of "highly appropriate for use." Table 2 gives a breakdown of the item-level assessments made by two experts as well as the computed values of Aiken's V coefficients from the two sets of item-level assessments.

Table 2 <Item-Level Content Validity (Aiken's V)>

Instrument Component	V1	V2	Aiken's V
Conceptual fit with the pointing technique	5	5	1.00
Fit with the measurement objective	4	4	0.80
Fit between indicators and pointing skill	4	5	0.90
Fit with athlete characteristics	4	4	0.80
Clarity of implementation instructions	5	5	1.00
Clarity of implementation procedure	5	5	1.00
Clarity of the scoring system	4	4	0.80
Format consistency of the instrument	4	4	0.80
Ease of field use	5	5	1.00
Time efficiency of implementation	5	4	0.90
Practicality of equipment	5	5	1.00
Safety of implementation	5	4	0.90
Mean Aiken's V			0.908

The mean of Aiken's V for all 12 components together was 0.908, this shows the content validity of the instrument is very good. Each component was judged to be above the minimum accepted level. The highest level of agreement ($V = 1.00$) was found in the conceptual fit with the pointing technique and clarity of instructions & procedures, ease of field use and practicality of the equipment. On the other hand, lowest one ($V = 0.80$) were measurement objective fit, athlete characteristics fit, scoring system clarity, and format consistency. These outcomes show raters considered items, implementation processes and scoring of the tool to be conceptually and practically good so it is ready to go for testing its reliability in the field.

Reliability

Test-retest reliability coefficient was found to be a high value of $r = 0.712$ (Table 3). This result suggests that the scores from the repeated administration of the measure under similar conditions remain consistent thus allowing for a more stable use of the instrument rather than being influenced by fluctuations that are chance or errors which is a more unstable condition.

In the field, the PTP was proven to a large extent to be possible to execute in an identical manner by different clubs when the standard petanque equipment is employed, by the reason that setting up the throwing-circle-to-target layout didn't appear especially complicated. Coaches, after their first experience with the test procedure, declared both that it was easy to get familiar with the new approach and to be able to put it into practice as well, and that, thanks to the numbers the test produced, the evaluation became much more explicit about the technical talents of individual athletes vs shortcomings than was the case with the previously conducted purely qualitative analysis. Limitations were discovered regarding physical implementation as well: some athletes were not clear about or took the test lightly in which case

testing was disturbed. With the formative evaluation, we incorporated this reaction into making the handbook's explanations more elaborate and plain.

Table 3. Test-Retest Reliability

Variable	Reliability Coefficient (r)	Interpretation
Petanque Test Pointing (PTP)	0.712	High

Criterion-Referenced Norm

Besides the distribution of field-trial scores, they also came up with their five- category criterion-referenced norm (PAP). These are briefly described in Table 4 here.

Table 4. Criterion-Referenced Norm Categories

Score Interval	Category
17–21	Very good
13–16	Good
9–12	Moderate
5–8	Poor
0–4	Very poor

Implementation and Practicality

The iterative revision before full scale field testing was guided by formative evaluation which involved collecting data of validator feedback and observation of small-scale trial. The summative evaluation carried out after completion stage of development cycle of item pool indicated that the instrument is valid, reliable and practical and also the procedure of testing, viz., layout of field, handling of equipment, scoring, time efficiency and clarity of the test manual could be implemented with little or no problems.

Discussion

Our primary aim is to produce a measuring device to assess the accuracy in throwing stones that petanque players achieve and, in this way, replace the dependence on coaches' personal judgments, which are common in Indonesian petanque coaching. The newly developed tool is called Petanque Test Pointing (PTP) which turned out to be content validity as high as 0.908 (mean Aiken's V) and test-retest reliability is 0.712 along with a practicality rating based on field data implementation.

The content-validity result is not only in line with, but also even surpasses, the validity thresholds cited in the sport and educational measurement literature elsewhere. In that literature, Aiken's V values at, or slightly beyond, 0.70, 0.78 are usually taken as good signs for content validity, and those approaching or beyond 0.86, 0.90 suggest that experts completely support the instrument. The Aiken's V mean of the PTP instrument, at 0.908, is pretty high, nearly reaching the very top of that range. It seems the instrument's inter-rater agreement has a high level which is also shown in other recently developed instruments related to sport-skills, safety, and talent- identification (Aryanto et al., 2018; Abdullah, 2022; Matas et al., 2024). This points to the set of performance indicators obtained from describing the technical components of the throwing movement, from the position one takes before throwing, the grip and the swing of the arm, to the coordination between all these, the release, the direction and how well the hand is moving at the moment of releasing the ball, then the force regulating the accuracy and the consistency, as a good set, one that could really get to the heart of what is being measured. The petanque practitioner and the general sport-measurement expert agreed on this.

A reliability coefficient of 0.712 means that the device can be trusted and will give the same result most of the time; however, not quite up to a perfect level. This generally aligns with the test-retest and intraclass reliability levels reported for new, field-based sport-skill measurement tools (e.g. Höner et al. 2023; Aryanto et al. 2018) where coefficients ranging from a little below to quite a bit more than 0.70 are commonly found for performance tasks that are exposed to natural variation from one trial to another, such as in accuracy tests for ball throwing. This finding allows one to argue that PTP scores are primarily driven by performance factors and are not influenced to a large extent by luck, even so that further modifications (e.g., increasing the number of trials per distance, standardizing environmental conditions (surface, lighting, wind exposure for outdoor courts), adding internal-consistency or inter-rater reliability indices to test-retest evidence in future work) are also advisable.

By viewing the results alongside petanque literature one can discern PTP as a distinctive element. The bulk of psychometric and training-focused studies in petanque technique has primarily focused on shooting rather than pointing, such as the role of mental imagery and self-talk in shooting precision or the

biomechanics of the shooting throw. When research has been focused on pointing, prior work has largely been oriented toward training methods rather than measuring tools, or has tested instruments on relatively small local groups without carrying through a complete cycle of research and development. A new motor-perceptual test for elite pétanque players has recently come to light that content-wise has been judged as appropriate for most, but not all, of the questions in the test, and the results were very explicitly framed as an initial stage of psychometric work in need of further reliability and construct-validity analysis. With that in mind, the PTP has made it possible to create an instrument, through a whole ADDIE development process, that is suitable to point and that can be measured against criteria. It was the result of a detailed analysis of data at the item level as well as presentation of validation and reliability evidence. In addition, it has a field layout with minimal specialized equipment only, that is easily replicable in practice.

Methodologically, the findings support the continued use of the ADDIE model for developing sport instruments. The effectiveness of this model in providing a systematic method to design educational material is well recognized through its utilization not only in this area but other realms such as education where structured analyses leading to evaluation have proven to be effective in building a better content validity through expert review and revisions done at different stages of development. Therefore, validation is not an event which comes at the end after an instrument has been made.

In general, the research outcomes indicate that it is possible to develop a purpose-built, task-authentic measurement which is based on the particular requirements of the pointing throw and refined with a well-conceived cycle of R&D activities, such a measurement should be characterized by psychometric properties that either match or are superior to typical references in the sport-measurement literature; simultaneously the tool should be user-friendly so that it can be routinely applied in club-level coaching.

Several strands of the international literature can be identified. They provide further support for these results beyond the theoretical and methodological level. Methodologically, the validity of a test based on a diagnostic tool for an elite youth soccer decision-making instrument (Höner et al., 2023) is compared with content validation by expert panels and field-based evaluation. They are almost the same methods as the present study's validation, which suggests that the staged validation logic applies to a range of sports, not only pétanque.

In the realm of perceptual-motor activities, investigations into the eye-hand coordination mechanism involving cortico-cerebellar loops (Rizzo et al., 2020) could offer evidence for the neuromotor aspect of why the precision of a pointer is not only a trainable but also a measurable skill. It therefore supports the PTP's indicators through a theoretical lens. As to reliability, in sports medicine and exercise science, there is a recent critical review of commonly used reliability indices (Warneke et al., 2025) warning about single-coefficient reliability evidence, for example, just a test-retest value should be compared to and ideally confirmed by other complementary indices. That point of view is consistent with the one mentioned here with respect to the need for additional reliability analyses in the research area. Timmerman et al. (2025) guidelines to report norm-referenced and criterion-referenced scores are very useful. A future development of the new norm tables for the PTP will definitely benefit from following them. Hidayah et al.'s (2024) android-based application to run pétanque training programs and Putra et al.'s (2024) pétanque match-statistics analysis apps, on the other hand, are the clear examples that show that the digitalization in pétanque sport science is spreading out very quickly. A digital or app-based scoring system for the PTP will therefore be an intriguing and timely innovation.

Practical Implications: (1) For coaches: this testing tool gives an efficient, reliable ground for judging an athlete's aim performance, which can then be used to develop an athlete's particular program, and, at the same time, it lessens the differences when two individuals are assessing based purely observation; (2) Quantitative, criterion-referenced feedback is highly beneficial to athletes as it allows them to keep record of their technical skills improvement over time, which is a motivator and keeps their self-direct training target in sight; (3) The instrument is an excellent reference tool when it comes to the identification of talent, selection of athletes, monitoring the progress made during the development process as well as evaluating the results of sports coaching programs conducted at various clubs and regions by sport organizations (e.g., FOPI); (4) Academics and physical education instructors can use PTP in pétanque education and training plans as both a teaching tool and a way of measuring progress, allowing a more organized, standardized way to teach pointing technique.

Limitations. The article does not give details on sample characteristics of the group for field-trial that included sample size, age range, or percentage of male and female members, or their division by the level of competition. Readers who will use this article in their study or work will want to know if results can be applied more generally or if the article describes only a narrow group of people. Such readers will need the detailed description of the characteristics of the individuals on whom the measurements were made to judge whether the findings have validity and reliability for people outside of this group, apart from the field-trial group

In the study they did a content validation with two subject matter experts only, both were credentialed experts and were intentionally selected, which is fine. However, most of the Q1 sport measurement researches will normally take a panel (team of subject matter experts) comprising at least a team of 5-6 members. Having a bigger panel makes the Aikens's V coefficient (a statistic for evaluating content validity) and also it helps to minimize the impact of a single rater's subjectivity

This measurement's reliability was only evaluated based on test-retest reliability with a single pair of testing. The other types of the reliability (e.g., ICCs, internal consistency where applicable, or inter-rater agreement among different testers) were not given, and that if they reported, they could have contributed better to the psychometric profile.

Although a content validation process with two expert validators had yielded a valid tool, the measures of external validation like, concurrent validities (comparison against existing pointing or a general petanque skills assessment) and a known-groups comparison construct validation (elite vs. novice athletes comparison) had not been investigated and were not part of the evidence provided which could have significantly increased the body of evidence for their argument.

The field experiments were conducted only within West Sumatra region. The applicability of results among petanque athletes living in other regions who may have different levels of competitiveness or even be different in age is not yet known. The criteria-referenced norm categories were obtained by aggregating the data of field trials scores and no consideration has been paid yet in stratification by sex, age, or level of competition. Such absence has made the normative categories less precise and hence their usefulness in making the comparisons with the sub-populations, if at some other time or place, has been greatly limited.

Conclusions

Through a systematic ADDIE-based research and development process, this study resulted in the creation of the Petanque Test Pointing (PTP), a performance-based field instrument for measuring pointing skill among petanque athletes. During the needs-analysis phase it was confirmed that pointing in West Sumatra petanque clubs is still primarily subjective and unstandardized. Design phase produced a full instrument plan incorporating indicators, field setup, scoring, and a user guide. Expert validation resulted in a mean Aiken's V of 0.908, meaning very high content validity, while test-retest gave a reliability coefficient of 0.712 high. During field implementation it was noticed that the instrument was quite practical, fast to administer, was well accepted by coaches, and surfaced minor administration issues about understanding and engagement of athletes which were solved later on during iteration revisions. In a nutshell, based on these West Sumatran clubs and the expert panel and field-trial cohort, our results show that the PTP reaches acceptable standards of content validity, test-retest reliability, and field practicality, and may become a highly reliable standard tool for player assessment and training planning, talent selection, and petanque-related research. No results have been shown that it could be generalized to other regions, levels of competition, and demographic groups so it has to be taken with caution until it is supported by further studies. Future research should involve testing on the larger and socio-culturally more varied samples with explicit age, sex, and competitive-level categorization, collecting validity evidence, and looking into digital or video-scoring techniques. Other fundamental petanque techniques that go beyond pointing (e.g., shooting) could be parallelly addressed with their corresponding PTP.

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