




# Development of Pencak Silat Defense Coordination and Hand Attack Skills Tests Age 8 – 12 Years

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**Abstract.** In the category of pencak silat sparring, martial artists must master pencak silat techniques to score points. The techniques used include attacks and defenses, which require a series of coordinated hand movements. However, the coach currently lacks an assessment guideline to evaluate the proficiency of these coordinated techniques. The aim of this research is to develop a test product for assessing the coordination skills of attacking and defending hand movements in pencak silat for children aged 8-12 years. This research adopts the Research and Development (R&D) method using the ADDIE research model with the following procedures: 1) needs analysis, 2) test product design, 3) content validation of the product, 4) improvement based on expert review, 5) pilot testing with a group, and 6) data processing and evaluation. Pencak silat experts have stated that the developed test is appropriate and suitable for testing. The initial validity test yielded a score of 0.736 (high), while the retest reliability produced a score of 0.907 (excellent). In conclusion, the test developed by the researcher is considered valid and suitable for use.

**Keywords:** pencak silat, coordination, validity, reliability

## 1 Introduction

### 1.1 Introduce the Problem

Pencak silat is a martial art that consists of several categories, one of which is the sparring category. In the sparring category, there are techniques that must be mastered by a silat fighter, namely attack and defense. Therefore, what needs to be done by the trainer is to observe and assess the ability of the attack and defense technique skills of the fighter. However, in the sport of pencak silat there are still frequent problems that are carried out by coaches to assess the skills of athletes, that is, many coaches choose athletes based on observations that are not based on a clear assessment of athlete skills (1). So to find out the ability of a pencak silat athlete, a trainer tends to give a makeshift test model without being based on a structured skill test (2). This is because the trainer does not have skill level data, because the trainer does not know the Pencak Silat skill test properly, one of which is a tool for assessing skill tests (3,4) .

As in the literature review conducted by (5) that the martial arts branch previously had a skills test, but the results of this study focused on physical assessment and did not include test eligibility and guidelines for assessing. However, not all sports are martial arts, such as pencak silat. Therefore, as explained by Lubis (6) that a skill test is needed in a sport as a benchmark for the development of movement techniques in pencak silat.

Based on the problems above, there have been several researchers conducting skills tests in the sport of pencak silat. But so far most of the skill tests carried out in the sport of pencak silat are foot attacks as the main support for getting points in pencak silat matches. Even though kicks are one of the attacks that contribute the most points, to get points in a pencak silat match there are also defenses and hand attacks. Because according to Lubis (6) defense is a movement technique in pencak silat that is carried out by fighters when competing to break attacks by parrying or dodging. Meanwhile, according to Rahayuni (7) punch is an attack technique in pencak silat to bring down an opponent, one of which is a hand attack (punch).

### *1.2 Explore Importance of the Problem*

In carrying out defenses and hand attacks in a match, it is necessary to carry out a series of movements simultaneously and successively to control the opponent (7). Defenses and hand attacks (punches) can be carried out when there is little chance for the opponent to strike back, for example the opponent attacks and then the fighter can catch the attack (defense) as a defense and then proceed with a hand attack (punches) with the right target and firmness to get points. This can be referred to as the coordination of defenses and hand attacks (punches) during a pencak silat match. Because the sport of pencak silat in the category of competing athletes is dominant using defense and attack coordination techniques, one of which is hand strikes to get points.

According to Nurrochmah (8) coordination is the ability to carry out movements precisely, quickly and efficiently at a certain level of difficulty. Thus, to carry out defense and attack movements, coordination skills are needed by body movements. This statement is reinforced by Hasyiyati & Winarno (9) that good coordination is the movement of a series of bodies without tension, the sequence of movements is in harmony, smooth without expending more strength.

### *1.3 Describe Relevant Scholarship*

From the description above, it can be said that a skill test in the sport of pencak silat, especially a series of coordinated defense movements and hand attacks (punches), needs to be carried out to determine the ability of a pencak silat athlete. As explained by Balyi et al (10) in the book LTAD that to train the coordination skills of a child who is better biologically is aged 8-11 years (women) and 9-12 years (men). At that age they have entered learning to train which is an early adaptation to the development of peak motor coordination speed (Peak Motor Coordinate Velocity/PMVC). Thus, a series of coordinated defense movements and hand attacks are properly carried out for that age.

#### *1.4 State Hypotheses and Their Correspondence to Research Design*

The foundation for the development of hand-to-hand defense and attack coordination skill tests is to carry out tests and measurements as benchmarks. This is because the scope of sports tests and measurements is simply a study of a series of tests used as a measure of the success of physical abilities and skills in sports (11). So that tests and measurements are needed as a benchmark for skills in defense coordination techniques and hand attacks (punches) as a basis for the long-term ability and sustainability of athletes at the learning to train stage at the pencak silat college in Malang City. However, information was obtained from interviews with pencak silat trainers aged 8-12 years that they still did not have an assessment instrument to test their defense coordination skills and hand attacks. Therefore, the researcher developed an assessment guide in the form of a test instrument for the coordination of defense skills and hand attacks of pencak silat aged 8-12 years as a benchmark for testing coordination skills.

## **2 Method**

### *2.1 Identify Subsections*

The method used in this research is ADDIE which is an adaptation of the Research and Development (R&D) model. According to Dick (2005) cited by Maydiantoro (13) there are 5 stages used in the ADDIE research model consisting of; analysis, design, development, implementation, evaluation. It can be seen that the procedure for conducting this research was carried out in stages, starting with analyzing the needs until the final evaluation of the product being developed. As well as techniques for obtaining subjects, data collection instruments, and analytical techniques using questionnaires and questionnaires.

### *2.2 Participant (Subject) Characteristics*

This research was conducted on children who took part in the pencak silat extracurricular in Malang City, because in that extracurricular there were children aged 8-12 years.

### *2.3 Sampling Procedures*

The researchers used a random sampling technique on children who participated in pencak silat and according to research needs as many as 20 children. So that the research data obtained in the form of qualitative and quantitative data.

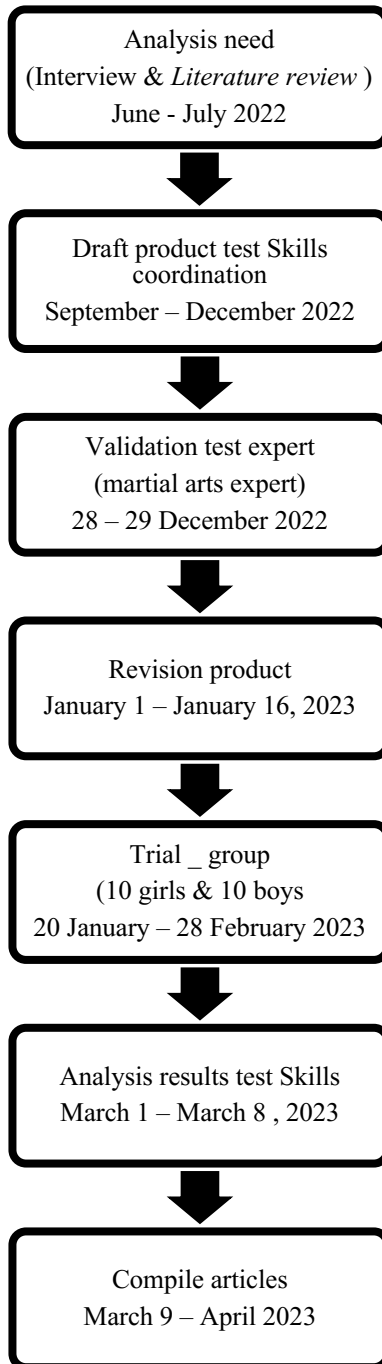


Figure 1. Flowchart of the research and development of the 8-12 Years Old Pencak Silat Defense and Hand Attack Coordination Skills Test.

2.3.1 Sample Size, Power, and Precision

The subjects in this study were 2 Pencak Silat Experts, to validate the content in the products developed by researchers to be tested. The research trials conducted were group trials resulting from the first test and second test ( re-test ). The trial involved 10 boys from MI Al-Fattah Malang City aged 8-12 years and 10 girls from SD Muhammadiyah 5 Malang City who took part in the pencak silat extracurricular activity in Malang City.

2.3.2 Measures and Covariates

Qualitative data were obtained from open questionnaires and questionnaires that had been filled out by pencak silat validators during FGDs ( Forum Group Discussions ) to obtain content validation results for the products being developed. Meanwhile, quantitative data was obtained from assessing the validity of skills tests conducted by children aged 8-12 years.

2.3.3 Research Design

Quantitative data that has been obtained, then analyzed using the formula according to Budiwanto (2015) to obtain a correlation between the observations and the judgment of the judges (judge rating) to obtain validity as a criterion test, namely:

$$r_{XY} = \frac{N \times \sum X_1 X_2 - (\sum X_1)(\sum X_2)}{\sqrt{\{N \times \sum X^2 - (\sum X)^2\} \{N \times \sum Y^2 - (\sum Y)^2\}}}$$

Information:

N = Number of respondents

X = The result of the hand attack and defense coordination skills test

Y = Results of the judges' or observers' assessment

From the data generated, there are classification criteria to make it easier to give conclusions, namely:

Table 1. Criteria for the validity coefficient.

Criteria	Information
<i>Excellent</i>	0.80 – 1.00
<i>high</i>	0.70 – 0.79
<i>Average or Fair</i>	0.50 – 0.69
<i>Unacceptable</i>	0.00 – 0.49

Source: (Budiwanto, 2015)

### 3 Results

This research was produced in accordance with the ADDIE research and development method with 5 stages of the developed procedure. Needs analysis from trainer interviews and literature review resulted that there were still no test instruments for coordination of defense and hand attack skills for early childhood, adolescents, or adults.

### 3.1 Recruitment

The results of the literature review needs analysis can be seen in the following table.

Table 2. Results of the analysis of the needs of *the literature review* skills test on pencak silat.

<i>Re-searcher</i>	<i>Johansyah Lubis (2014)</i>	<i>Kemenpora (2018)</i>
<i>Test items performed</i>	<ol style="list-style-type: none"> <li>1. The basic attitude of martial arts</li> <li>2. Kick speed</li> <li>3. Kick agility</li> <li>4. Coordination of kicks and punches</li> </ol>	<ol style="list-style-type: none"> <li>1. Kick speed</li> <li>2. Kick resistance</li> <li>3. Kick accuracy</li> <li>4. Drop</li> <li>5. Scythe kick agility</li> <li>6. Sparring</li> </ol>
<i>Superiority</i>	<ol style="list-style-type: none"> <li>1. There are indicators of procedures for conducting skills tests (objectives, equipment, officers, implementation).</li> <li>2. There is an example of a skills test assessment form.</li> <li>3. There are stages before and after the test.</li> <li>4. There are examples of norms for assessing test scores.</li> </ol>	<ol style="list-style-type: none"> <li>1. The number of tests is more diverse.</li> <li>2. The test model that was carried out was tested with the tests in the manual book.</li> <li>3. The tests are carried out sequentially according to the needs of the implementation to be tested.</li> <li>4. There are procedures for carrying out what is needed, such as: objectives, tools, implementation.</li> <li>5. There is a description of how to assess the tests performed.</li> <li>6. There is an example of filling out the skills test score form.</li> </ol>
<i>Weakness</i>	<ol style="list-style-type: none"> <li>1. There is no specified age for the skills test</li> <li>2. There is no way to calculate scores statistically ( correlation analysis results) in terms of validity (compassion) and reliability (determination)</li> <li>3. Lack of explanation on the procedures for implementing skills tests.</li> <li>4. There are no results that state the validity and reliability .</li> </ol>	<ol style="list-style-type: none"> <li>1. The skills test does not have an intended age specification,</li> <li>2. There is no way to calculate scores statistically ( results of correlation analysis) in terms of validity (compassion) and reliability (determination), and</li> <li>3. There is no example of assessing the score of the test results.</li> </ol>

4. There are no results that state the validity and reliability .

Source: (6, 15)

After the needs analysis is obtained, the researcher designs the product that was developed, namely the researchers developed a product series of movements in the coordination of defense techniques and hand attacks of pencak silat aged 8-12 years. Then, the initial product design was tested for validation by a martial arts expert. The results of product validation that have been obtained as qualitative data analysis from pencak silat experts based on open questionnaires and questionnaires filled with essays to obtain content (content) validation, and it is said that the skills test developed is appropriate. So that it can be said to be valid and feasible to use.

### 3.2 Statistics and Data Analysis

At the time of validation, there were inputs and suggestions for researchers as improvements which would be continued at a later stage, namely product revisions being developed. With the aim that the product is better and can be used during group trials.





Table 3. Results of product validation by martial arts experts.

Martial Arts Expert	Results
Expert 1	<ol style="list-style-type: none"> <li>1. The product developed is precise and easy to understand, due to an update in the pencak silat skill test.</li> <li>2. The biomotor component is a different discussion from the research being developed.</li> <li>3. However, it is necessary to clarify the evaluation norms for movement techniques.</li> <li>4. Suggestion: In collecting data, it only needs to be repeated 5 times, because the assessment focuses on justifying movement techniques. Product results will be more attractive if packaged in <i>blended learning</i>, to make it easier for trainers to carry out test procedures</li> </ol>
Expert 2	<ol style="list-style-type: none"> <li>1. The product developed is precise and easy to understand.</li> </ol>



2. Assessment of the physical component (biomotirk) is not necessary, because it is a different discussion from movement techniques.

Therefore, product specifications have been developed, namely a series of skills tests for coordination of defense and hand attack of pencak silat aged 8-12 years. The following product specifications are produced. Product results developed can be seen via the following Google Drive link: <https://drive.google.com/file/d/1uM-HZAIzb9kJECJl6sZoRb8NkvYI4iJWh/view?usp=sharing>

Table 4. A series of skills tests for the coordination of defense and hand attack of pencak silat aged 8-12 years.

No	Test Series	Movement Visualization	Assessment Procedure	Procedure
1.	Edge and Punch	<ul style="list-style-type: none"> <li>• edge</li> </ul>  <ul style="list-style-type: none"> <li>• Blow</li> </ul> 	<p>[4] Posture, right throw, right punch, right pose.</p> <p>[3] Up stance, right ward, wrong punch, up stance.</p> <p>[2] Posture, wrong throw, right punch, high stance.</p> <p>[1] Up stance, wrong throw, wrong punch, wrong stance.</p>	<p>Testing gets ready to stand in front of the punching bag held by the tester with the punching distance parallel to the testing shoulder. When the whistle is blown the tester kicks to provide reaction testing. Then testing carried out a series of coordinated defense movements and blows towards the punching bag held by the tester, with 5 repetitions. The tester moves the punching in a free direction. The test is carried out 2 times, the value is taken by a series of</p>
2.	Dodge and Punch	<ul style="list-style-type: none"> <li>• Avoid</li> </ul>  <ul style="list-style-type: none"> <li>• Blow</li> </ul> 	<p>[4] Posture, dodge properly, punch correctly, mount stance.</p> <p>[3] Attitude, dodge right, hit wrong, attitude tide.</p> <p>[2] Good attitude, avoid wrong, hit</p>	<p>of</p>



			correctly, good attitude. [1] High attitude, avoid wrong, wrong shot high attitude.	coordinated movements of defenses and punches according to a predetermined scoring rubric.
3.	Dodge and Hit	<ul style="list-style-type: none"> <li>● Avoidance</li> </ul>  <ul style="list-style-type: none"> <li>● Hit</li> </ul> 	<p>[4] Tide, dodge properly, strike properly, mount.</p> <p>[3] Tide, correct dodge, wrong shot, tote.</p> <p>[2] Tide attitude, wrong dodge, right shot, Tide attitude.</p> <p>[1] Bad attitude, wrong dodge, bad shot, bad attitude.</p>	

In the series of skill tests above, there are criteria as guidelines for giving scores for the coordination of defense movements and hand attacks carried out from Rahayuni's book (7), namely:

1. The bank is done correctly if the athlete can parry the attack (kick) given by the opponent with an open palm.
2. Evasion is performed correctly if the athlete can move the body position without taking a step to avoid an attack (kick).
3. Evasion is done correctly if the athlete can avoid the opponent's attack by stepping.
4. The punch is done correctly if the athlete hits with a clenched fist and a straight punch parallel to the shoulder.

### 3.3 Ancillary Analyses

After conducting validation tests by martial arts experts and improvements to the products developed. Furthermore, the product will be tested which includes; initial group trial and continued with a re-test (retest).

### First Test (Validity)

In the first test to produce a validity value that was tested on subjects as many as 20 children aged 8-12 years who took part in pencak silat in Malang City, with the provision that 10 girls and 10 boys. There are several aspects to assessing the coordination of defense and hand attack skills tests that were tested in the first stage, namely: (1) Performing a series of coordination movements that have been validated by experts, (2) Being able to carry out a series of coordination movements for hand defense and attacks correctly, (3) ) A series of coordinated defense movements and hand attacks on target. After the value is generated in the first test, the data calculation is used using the judge rating correlation coefficient to produce a validity value , the result obtained is 0.736 which is included in the high category and the product is feasible to use. The results of the validity test raw data can be seen via the following Google Drive link: [https://drive.google.com/file/d/1aAb\\_jm6t\\_CkJI\\_Uh6gzRBlsKaTnKw1mR/view?usp=share\\_link](https://drive.google.com/file/d/1aAb_jm6t_CkJI_Uh6gzRBlsKaTnKw1mR/view?usp=share_link)

Table 5. Results of the validity of the defense coordination skill test and hand attack.

Results	Category
0.736	high

### Second Test *Re-Test* (Reliability)

After doing the first test, then proceed with the second test by doing a re-test. According to Budiwanto (2015) a re-test is a test conducted on the same subject and test at intervals, to produce a reliability coefficient that is carried out between the first test and the second test. In the second test there are aspects that become provisions for getting a score, namely: (1) The test is carried out on the same subject, (2) The value obtained is steady (not too high or not too low).

The results of the first test and the second test were then correlated using the product moment correlation statistical technique. It is known that the value of  $r$  is 0.907 which is included in the excellent category (very high).

Table 6. Reliability results of defense coordination skills tests and hand attacks.

Results	Category
0.907	Excellent

## 4 Discussion

In martial arts, defenses and attacks are carried out to parry or dodge, attack the opponent and knock the opponent down on the right target. The attacks and defenses used by the fighter include; parry, dodge, hit, strike at the target and take down the opponent. According to Rahayuni (7) and Subekti (16) to avoid an opponent's attack, a fighter must be able to defend himself using defense. Thus, to get points in a pencak silat match, a fighter must be able to carry out attacks and defenses in succession without being hindered by the opponent's counter (17). This defense and attack technique usually results in the sale and purchase of attack and defense that occurs during the

sparring category of pencak silat matches. This statement is confirmed by Kriswanto and Muhammad (18, 19) that the sale and purchase of attacks and defenses can be declared valid if the fighter starts with a high tide and no more than 6 attacks are carried out and then ends with a high tide. Therefore, the techniques that must be mastered by a fighter are a series of defenses and attacks to bring down the opponent, one of which is the coordination of defenses and hand attacks.

the learn to train age stage because this stage is the ideal time to introduce test and supervision methods (20). Therefore, researchers use the age limit of 8-12 years to introduce skill tests in sports, especially pencak silat as a test of defense coordination and hand attack skills for long-term scale in pencak silat. The skill test is carried out using an approach to the justification of pencak silat movements (techniques).

Based on the description above, a test product for the coordination of defense and hand attack skills of pencak silat aged 8-12 years was developed. According to the results of the qualitative data analysis that has been carried out, according to the expert martial arts validator, this development is appropriate and feasible for testing. While the results of quantitative data analysis that has been carried out using the product moment correlation coefficient as a reliability value, the resulting  $r$  is 0.907 which is included in the excellent category (very high). This development has similarities with Sutopo's research in that research discusses skills tests in pencak silat that use a re-test (21). However, there are differences from this study, because the results of the study are in the form of a survey of pencak silat skills tests. While the research that the researchers developed was in the form of test instruments for coordination of defense skills and hand attacks.

Development of a test for coordination of defense and hand attack skills of pencak silat aged 8-12 years, namely developing test instruments that can be applied by pencak silat trainers in Malang City. This product can be used to help coaches measure how well an athlete aged 8 – 12 years old performs a test of defense coordination skills and hand attacks. Because this product has been reviewed and validated by pencak silat experts, and has been tested and resulted in very good category eligibility, so that it can be used by all pencak silat trainers.

This product has the following advantages: (1) The test product for hand defense and attack skills developed by the researcher is a novelty because it does not yet exist, so the researcher develops a product for ages 8-12 years, (2) There is an explanation regarding the hand defense and attack coordination skills test in the assessment guidelines, (3) there is a picture of a series of movements for the coordination of defense and hand attack skills tests that are quite clear, (4) there is an assessment form as an assessment blank for the coordination of hand defense and attack skills tests.

However, during the trial the researchers had the following limitations: (1) When conducting the test the athlete conducted the test based on mood (psychological side), (2) The time required during the test could be longer, due to defense coordination and Hand attack requires patching displacement during the test. Because according to Pratama (2019) that there are four supporting elements for achieving achievements in the sport of pencak silat; 1) physical 2) mental 3) technique, and 4) tactics. This statement is reinforced by Ediyono & Widodo and Subekti (16, 23) that the basis for practicing pencak silat is physical and mental readiness. This needs to be trained so that

pencak silat athletes have the power to attack and are able to hit the right target when carrying out a series of coordinated defenses and hand attacks (punches).

## 5 Conclusion

Based on the results of the research above, it can be seen that the product of the test for coordination of defense skills and hand attacks developed by the researchers has been declared appropriate and suitable for use by martial arts experts. This product has also been tested and the results obtained show that the resulting assessment is steady (fixed). So, it was concluded that the development of a test of coordination of defense and hand attack skills of pencak silat aged 8-12 years can be used to help trainers determine the ability of movement skills obtained from a series of coordinated movement of hand defense and attack.

Thus, the suggestion from the researcher is that it is necessary to carry out tests of defense coordination skills and hand attacks by coaches to determine the benchmarks of the athlete's abilities. As for further research, if you are going to do a defense skill test and hand attack, you must pay attention to the physical and mental conditions of the fighter who will be tested. This test can be redeveloped by involving trainers according to aspects of training needs, further researchers can also develop test products for coordination of defense skills and hand attacks packaged in the form of blended learning.

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