# ANDROID APPLICATION PHYSICAL FITNESS TEST INSTRUMENT FOR CHILDREN AGED 10-12 YEARS

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## Abstract

Nowadays, technology and information technology are developing more rapidly, making people compete to build technology both in education and technology. The existing physical fitness test instrument has not yet been developed for an Android application. The instrument referred to in this research is a measuring tool, namely an Android-based physical fitness measuring tool specifically for the health of children aged 10-12 years. It is hoped that this instrument will be able to provide knowledge and skills about measuring physical fitness and Android-based health components for children aged 10-12 years. The research method used is research and development with 10 research stages with research subjects of children aged 10-12 years. By using a physical fitness instrument that consists of 5 components, namely the Body Mass Index (BMI) test, V Sit and Reach Test, Handgrip Dynamometer, 30-second sit-up, and Bleep Test. The data was analyzed using validity and reliability tests using the Content Validity Index (CVI) and Cronbach's alpha SPSS 25. This research produced an Android application that can help measure the physical fitness level of children aged 10-12 years with a validity value of 90 in the valid category. Conclusion: The development of an Android-based physical fitness test instrument can be applied to children aged 10-12 years to be able to see the level of physical fitness. Using this application will make it easier for users to measure the physical fitness level of students aged 10-12 years.

**Keywords:** Instruments, Physical Fitness, Android Application.

## INTRODUCTION

Fitness is a condition where a person does not feel tired when doing work or physical tasks (Bile, Tapo, & Desi, 2021; Dimitri, Joshi, &, & Jones, 2020; Fahmi & Wellis, 2020; Khairuddin, Masrun, Baktiar, & Syahruddin, 2023; Khan & Jose, 2021; Putro, Suherman, & Sultoni, 2018; Safarina;, Athar;, &, & Kahr, 2021; Sepriadi, S., & Eldawaty, 2019; Sepriadi, Syafruddin, Khairuddin, Ihsan, et al., 2023). Physical fitness consists of components that are grouped into groups related to health (Health Related Physical Fitness) and skills (Skill Related Physical Fitness) (Weiyun Chen, Hammond-Bennett, Hypnar, & Mason, 2018; Safarina; et al., 2021).

Health-related physical fitness is related to cardiovascular endurance, muscle strength and endurance, flexibility, and body composition. Meanwhile, fitness related to motor skills is related to agility, balance, coordination, reaction time, speed, and accuracy (W. Chen, Mason, Hammond-Bennett, &, & Zalmout, 2016; Sukamti, E. R., Zein, M. I., & Budiarti, 2016). From the expert opinion above, we can see that physical fitness not only benefits skills but also benefits health. The main aim of physical training in the physical fitness component related to health is fitness, while that related to motor skills is to improve performance in certain sports (Bafirman & Wahyuri, 2019). Physical fitness can be obtained through regular and continuous exercise (Caspersen, C. J., Powell, K. E., & Christenson, 1985; Khairuddin;, Alnderal;, Komaini;, Syahrastani;, & Masrun, 2022; King et al., 2013; Sepriadi et al., 2022; Sepriadi, Syafruddin,

Khairuddin, Alnedral, et al., 2023; Sookermany;, &, & Sand, 2019). So, regular and continuous exercise can improve physical fitness.

Physical fitness is not only needed by adults but also children. For children, the main goal in doing physical activity is to achieve good health. If a child has good physical fitness, it will make it easier for him to carry out his duties even in difficult circumstances. This is because physical fitness is the ability of the body's organs to carry out work without experiencing significant fatigue so that they can still carry out subsequent activities.

To find out a child's physical fitness level, physical fitness can be measured directly. Currently, in Indonesia, there are measuring devices or instruments for measuring physical fitness starting from the age of 6 years to the age of 19 years or from elementary school age to high school age. Children aged 10-12 years are the age of children included in childhood (Hurlock, 2005). So at this age, children will enjoy physical activities in the form of games.

Smartphones or smart cell phones are cell phones that have high-level capabilities with functions that can resemble a computer or laptop. A smartphone is a device that allows communication (calling or SMS) but it also has a PDA (Personal Digital Assistant) function and computer-like capabilities (Widodo, 2012). One of the operating systems used on smartphones today that is very popular is the Android system.

Android is a software platform and operating system based on the Linux kernel. This platform was first developed by Android Inc. which was founded by Andy Rubin (Zahid, 2018). Android applications are useful for helping us in carrying out daily work (Gore, 2017). Android applications are a developer opportunity offered by the rapid development of information and communication technology. Complete components embedded in Android include the boot loader, device driver, and library functions, to the API (Software Development Kit) and Android SDK application development is available (Alfiani, Djamaludin, & Mahmudin, 2021). It can be concluded that Android is software that can be used on every mobile device such as smartphones, tablets, and Smart TVs. This Android device aims to make it easier for users in their daily lives.

The Android application system is a free operating system and can be customized by configuring hardware and software (Adekotujo, Odumabo, Adedokun, & Aiyeniko, 2020; Sepriadi, Syafruddin, Khairuddin, Ihsan, et al., 2023). Several features in Android such as WiFi hotspot, Multi-touch, Multitasking, GPS, and Java support, support many networks (GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, and WiMAX) and also basic capabilities of cell phones in general (Efendi & Junaidi, 2018).

In its development, advances in technology and information will bring benefits if they can be used properly, including in efforts to improve physical fitness. Currently, technological advances have a huge effect on children's physical fitness, therefore, it is necessary to intensify physical education and health in schools. To find out a child's physical fitness level, we can measure physical fitness directly.

Indonesia has a measuring tool or instrument for measuring physical fitness starting from the age of 6 years to the age of 19 years or starting from elementary school age to high school age and equivalent, however, this instrument only measures skill-based

fitness components and does not yet measure as a whole, the components of physical fitness that are related to health.

The existing physical fitness test instrument has not yet been developed for an Android application. Applications on Android can make it easier to assess and determine a person's physical fitness category. Therefore, the existence of an Android-based physical fitness measurement application will make it easier to carry out assessments so it needs to be developed.

The instrument referred to in this research is a measuring tool, namely an Android-based physical fitness measuring tool specifically for the health of children aged 10-12 years. An instrument is a tool used to observe and collect data so that activities become systematic to make it easier for someone to carry out tasks more effectively and (Arikunto, 2019; Sugiyono, 2022). One of the most important things in developing a tool or instrument that is used as a means of measuring an object is selecting and constructing the designed instrument or test (Ali, 2019). In designing a test instrument, one of the things that must be designed is the meaning of the data obtained through the interpretation of the resulting scores (Sukardi, 2021).

Instruments cannot be used directly but must go through a validity test so that the instrument used is truly valid or can be trusted and accurately used as an appropriate instrument or measuring tool. A measurement is said to have high validity if it produces data that accurately provides the measured variable as desired by the purpose of the measurement" (Arikunto, 2019).

Based on the problems found, to maintain and improve physical fitness, it is necessary to solve problems through the development of measuring tools or instruments that are expected to be able to measure physical fitness, especially those related to Android-based health. This instrument was created specifically to measure physical fitness components related to health for children aged 10-12 years. It is hoped that this instrument will be able to provide knowledge and skills about measuring physical fitness and Android-based health components for children aged 10-12 years. The final result of this research is the creation of an Android-based instrument that can measure physical fitness related to health for children aged 10-12 years.

## METHOD

This research is research and development using the Borg & Gall model with 10 research stages, namely Research and information collecting (research and data collection), (2) Planning (planning), (3) Develop preliminary form of product (development of initial product draft), (4) Expert validation, (5) Revision of expert validation results, (6) Main filed testing (main field testing), (7) Operational product revision (revision of the product), (8) Operational field testing (conducting trials operational field), (9) Final product revision, (10) Dissemination and implementation (dissemination and implementation) (Sugiyono, 2022). The subjects of this research were elementary school children aged 10-12 years. The instruments used are tests for each indicator, namely cardiovascular endurance, muscle strength and endurance, flexibility, and body composition. Where this test is the result of previous developments that have been validated by experts with 6 validators from different fields of science, namely the fields of Physical Education Measurement and Evaluation Tests, Sports Education, Physical Fitness, and Sports Physiology. The validity test of the draft instrument for developing physical fitness tests was assessed using a questionnaire

with a Guttmann scale. Data collection techniques through questionnaires, interviews, and written tests. The data was analyzed by conducting validity and reliability tests, namely using the Content Validity Index (CVI) and Cronbach's alpha using SPSS 25.

## RESULT AND DISCUSSION

The experts selected to validate the instruments that have been prepared are people who are competent in their fields and have knowledge both academically and experientially. Expert validation testing was carried out by directly providing a draft physical fitness instrument for children aged 10-12 years which was designed and consulting directly with experts either by Focus Group Discussion (FGD) or face to face.

As a result of expert validation, a physical fitness test instrument was obtained that was used for children aged 10-12 years, which consisted of 5 test components, namely: 1) Body composition by measuring Body Mass Index, 2) Flexibility with the V Sit and Reach test, 3) Strength with handgrip dynamometer, 4) muscle endurance with a sit-up test for 30 seconds, and 5) cardiovascular endurance with a bleep test at a distance of 15 meters. The order of the tests is from easiest to hardest. So the test sequence starts with Body Composition, flexibility, muscle fitness, abdominal endurance test, and Cardiorespiratory Fitness Test (Mendonça et al., 2022).

The Android application developed can be used to assist in the process of assessing the physical fitness of children aged 10-12 years. This can be seen in the image below.
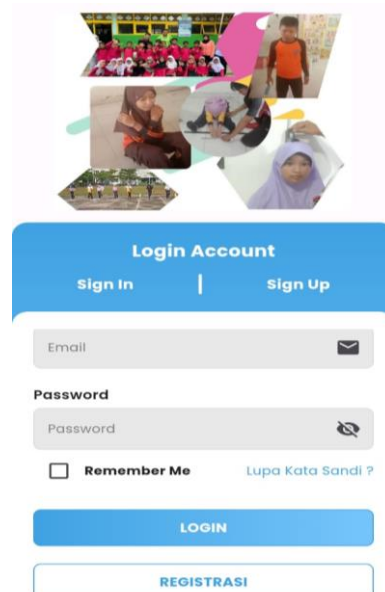


**Figure 1: Application Home Page**

At the beginning, this is the section for registering and also the section for signing in for those who already have an account. For those who don't have an account, you can register by pressing the registration section and after that, you can fill in the required data to complete. After the account is registered, you can start using the application by entering the registered account email and also the password used. After that, press login and the user will enter the application.
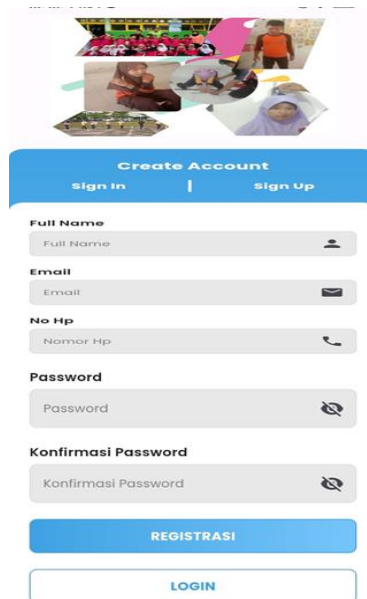
**Figure 2: Registration Page**

On the next page in the application is the registration page for creating an account. This page contains data that must be filled in to create an account, such as personal data from the user. On this page, users are asked to fill in their name, email, cell phone number, and also the password used to run this application. After logging in, several pages will appear in the application section. This profile page contains data from the user's profile. Where here users can also edit data such as email and password. On this page, users can also exit or log out of the application if they want to leave the application. The profile page display can be seen in the image below.
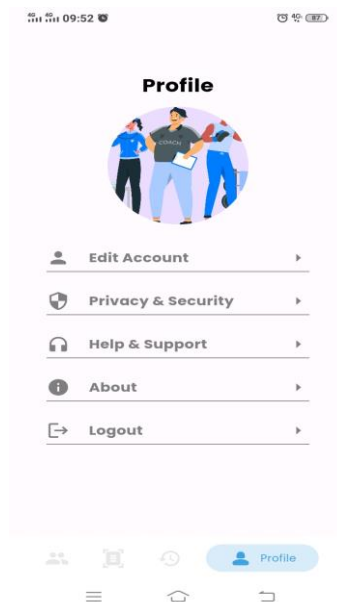


**Figure 3: Profile Page**

On the next page in the application is the info page. This info page contains information or explanations of the forms of tests in this application. This page has a detailed explanation of the complete test implementation, so this page is important to read for

users who still don't know about this physical fitness test. The info page display can be seen in the image below.



**Figure 4: Participant List Page**

In this section, users can add a list of test participants they want to add by filling in the participant's name and date of birth. After that, the user can determine the gender of the test participant and after that, he can save the participant data by clicking "save data". Next, the user can start inputting test result data by selecting the test participant data whose data will be entered on the participant page. The add participant form page can be seen in the image below.
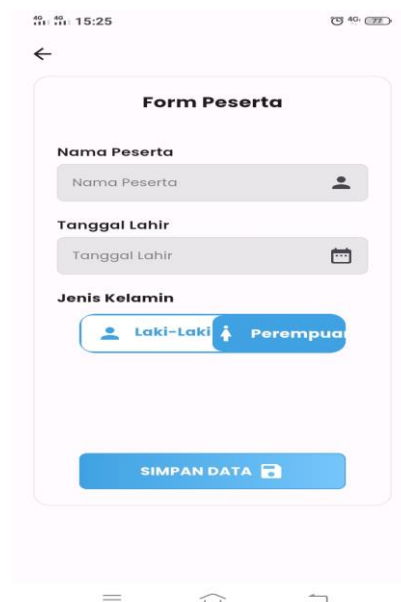


**Figure 5: Add Participant Form Page**

On the next page, users can input data on the test participant's height and weight. The test taker's weight is entered in kilograms (kg) and height in centimetres (cm). After that, to find out the results, the user can click "see results" Then the results of the test participant's BMI will appear consisting of the Body Mass Index Value, Z-Score of the

participant's BMI, and the category and score of the participant's BMI. The application display can be seen in the image below.
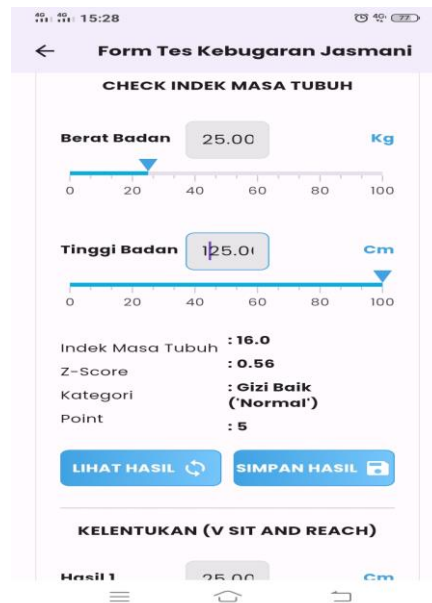


**Figure 6: BMI Data Input Page**

After completing the BMI data, you can then input the flexibility data. This flexibility data is the participant's test result data after carrying out the V sit and reach test 3 times. Users can input test results as in the image below. Test results are input in centimetres (cm). After that, the user can click "see results" and then the highest score from the flexibility test, category, and also the score from the participant's flexibility test will appear. The page display can be seen in the following image.
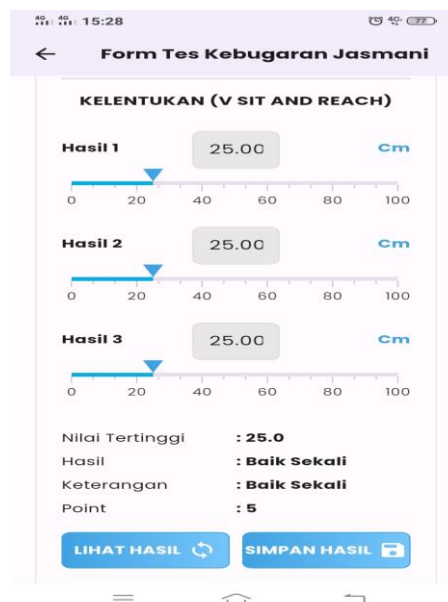


**Figure 7: Flexibility Data Input Page**

After completing the input of flexibility data, the next step is to input the muscle strength data. This muscle strength data is the participant's test result data after carrying out the grip strength test with the handgrip dynamometer test 3 times. The test results are input in kilograms (kg). After that, the user can click "see results" and then the highest

score from the muscle strength test, category, and also the score from the participant's muscle strength test will appear. The page display can be seen in the following image.
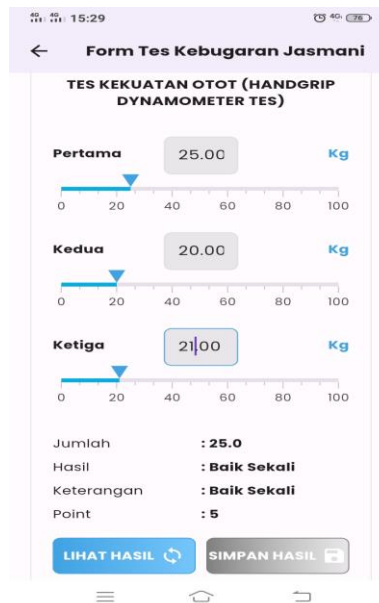


**Figure 8: Muscle Strength Data Input Page**

Next, after you have finished inputting the strength test data, you can input the muscle endurance data. This muscle endurance data was obtained from the results of a 30-second sit-up test. This can be seen in the following image.
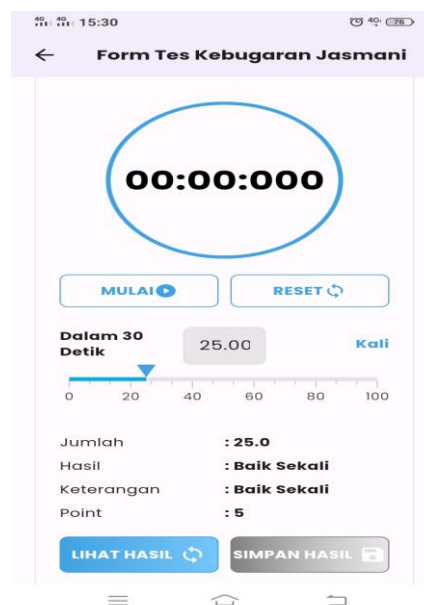


**Figure 9: Muscle Endurance Input Page**

This muscle endurance data is the participant's test result data after doing the sit-up test for 30 seconds. After the test results are entered, the user can click "see results" and then the number of sit-up test results performed by the participant, the category, and the score of the test will appear.

Once you have finished inputting muscle endurance data, you can then input cardiovascular endurance data. This cardiovascular endurance data is data from

participants' test results after carrying out the bleep test at a distance of 15 meters. The data entered is the level and return that can be obtained from the bleep test carried out by the participant. After that, the user can click "see results" and then the highest score from the cardiovascular endurance test, category, and also the score from the participant's cardiovascular endurance test will appear. The page display can be seen in the image below.
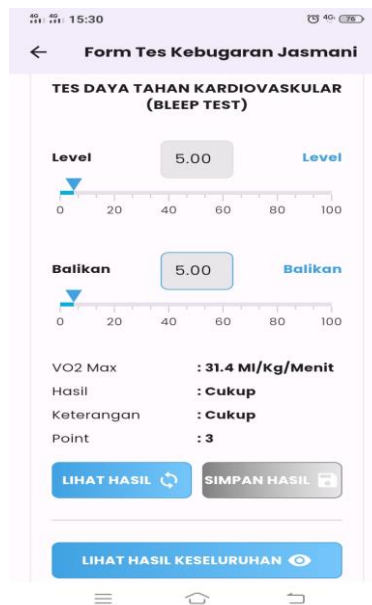


**Figure 10: Cardiovascular Endurance Input Page**

After completing all the results of each test item, we can find out the physical fitness level of the test taker. This can be done if all test items have been completely entered, then by clicking "See Overall Results" at the bottom as in Figure 18, we can find out the physical fitness test results of the test participants and their categories. Apart from that, you can also see a description or explanation of each test item carried out by participants as in the picture below.
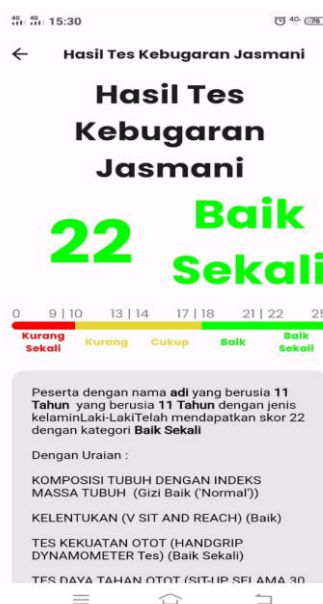


**Figure 11: Physical Fitness Test Results Page**

After the Android application for an Android-based physical fitness test instrument for children aged 10-12 years has been developed, expert validation is carried out by Informatics Engineering experts to assess whether this application is suitable and valid for use. Validation was carried out by 2 validation experts who are also lecturers at the Faculty of Engineering, Universitas Negeri Padang. Expert validation testing was carried out by directly demonstrating the Android-based physical fitness test instrument application for children aged 10-12 years. Apart from that, the researcher also explained how to use this application before validation. After that, the researcher gave a validation sheet to the expert to fill in. The following are the results of expert validation of the physical fitness test Android application for children aged 10-12 years.

**Table 1: Validity Analysis of Physical Fitness Instrument Android Applications for Children Aged 10-12 years**

| Component | Percentage | Explanation |
|---|---|---|
| Android App | 90 | Valid |

From the table above it can be seen that the application developed is feasible and valid to be continued and used as a medium for measuring physical fitness, especially for children aged 10-12 years. This Android application can be used as a medium to assist in the evaluation process or determining category results from respondents so that with this application it will make it easier to determine the final results.

## CONCLUSION

Fitness is a condition where a person does not feel tired when doing physical work. The Android-based physical fitness instrument for children aged 10-12 years that was developed is a valid instrument for measuring the physical fitness of children aged 10-12 years, especially physical fitness related to health. By developing an Android-based physical fitness test instrument for children aged 10-12 years, it is hoped that it can help educational staff, researchers, and the public to be able to measure the level of physical fitness specifically for health.

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