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CONSTRUCTION & STANDARDISATION OF A KNOWLEDGE TEST ON HEALTH RELATED PHYSICAL FITNESS FOR SCHOOL CHILDREN OF KERALA

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ABSTRACT

The present study was to construct a knowledge test on Health Related Physical Fitness for School Children of Kerala for which six dimensions were identified namely Concepts of Fitness, Scientific Principles of Exercise, Components of Physical Fitness, Effect of Exercise on Chronic Disease Risk Factors, Exercise Prescription and Others Factors. Since multiple choices questionnaire method was found to be the best, all possible and suitable items pertaining to the different aspects of the six dimensions were written and thus a total of 55 items were identified.

The preliminary version of the test blueprint were analyzed and evaluated by three well know experts in the field of Physical Fitness. Based on their feedback, the final blueprint was prepared and the trial run was done on 370 school boys and girls studying from 8^{th} to 12^{th} grade. Thereafter, item analysis, item difficulty and Item discrimination have been applied on the student's responses to the questionnaire and further effecting necessary modifications, the final version of the test was prepared which consisted of fifty items.

The Reliability of the test was ascertained using the Internal Consistency Reliability Co-efficient and the Cronbacha's Co-efficient thus obtained was 0.742(Cronbacha's Alpha). The validity of the test was the Content Validity and was ascertained by comparison with ratings done by a panel of experts in Physical Fitness.

KEYWORDS

Health Related Physical Fitness, Knowledge Test

INTRODUCTION

"Quality of life" has become one of the major aims of contemporary societies. In this context, the emphasis is seen as a shift from enhanced life expectancy to the ability to lead a healthy, active and independent life. Many chronic and degenerative diseases that are overly

manifested during adulthood have their roots in childhood. This phenomenon is strongly correlated to exercise and natural habits developed during the early stages of growth and development. A positive exercise habit formed during childhood will be carried over to adulthood and ultimately helps to reduce illness and occurrence of death due to chronic diseases. Thus, it is apparent that primary prevention of such diseases must begin with proper health habits developed during childhood, rather in other words a healthy activity pattern initiated at a young age will persist through adulthood.

World Health Organization gives a lot of emphasis to increase physical fitness knowledge, so as to promote health consciousness. It is still unclear whether these efforts have had any beneficial impact especially in the light of non-availability of a well-developed standardised test of physical fitness knowledge. Furthermore, no existing syllabus or fitness programmes includes cognitive assessment of physical fitness knowledge. Although many studies have reported that a subject's adoption and maintenance of physical activity is directly related to his / her health and knowledge of exercise. The children do not know why and how to exercise properly, and hence can they maintain good exercise habits in their adulthood? Besides, it is seen and found that students who understand the concept of physical fitness are likely to do exercise regularly. The present remarks of Kerala state school curriculum does not contain any component emphasizing knowledge of the importance of physical fitness and exercise skills.

In this context, the investigators have felt a need to develop a standardised physical fitness knowledge test which is appropriate enough to be used for high school and higher secondary school students.

Many health related fitness programs have knowledge objectives and the extent to which these objectives are met can best and sometimes exclusively be determined only with a knowledge test.

The measurement of knowledge is an indirect process and as such Knowledge is not tangible and cannot be weighed or assessed through the use of some mechanical instrument. The use of written test to measure knowledge is based on the assumption that responses made to a written item reflect to some degree the amount of knowledge achieved. Thus, it is important to understand the relationship between the tasks presented on a test and the mental process that the test is intended to measure. The indirect nature of this measurement process also has implications on the methods of assessing its efficiency.

REVIEWS OF RELATED LITERATURE

Lee et. Al (2004) constructed a geriatrics knowledge test designed for medical students. An 18-item geriatrics knowledge test was developed from a pool of 23 items. The instrument demonstrated good reliability (Cronbach [alpha] = 0.80) and concurrent validity.

Wei et. al. (2001) discussed relevant problems in knowledge tests in order to improve the scientific quality of the tests in PE departments and institutes and to enrich the teaching and research contents in "Sports Measurement and Evaluation".

Wilson-Rolayne (1984) conducted a study to construct a pictorial paper-and-pencil physical fitness knowledge test for first graders based on the content contained in the AAHPERD (1981). Statistical validity was established using Flanagan's Item Analysis. Functioning of the test item choices, difficulty rating and discrimination were determined. Twenty-one items met the

statistical criteria in all three areas. The Kuder-Richardson Formula 20 yielded a reliability coefficient of 0.41.

In the late 1960's, several physical fitness knowledge tests (Kahnert, 1969; Mowen, 1968; Wade, 1968) were developed: Kahnert test was intended for college males of age between seventeen and twenty-seven; Mowen's test was developed for high school boys of nine to twelve grades. and Wade's tests were developed for college age students. Neither the tests by Mowen (1968) nor Wade (1968) included reliability information. Further, no validity information was reported for any of these three tests.

METHODOLOGY

Selection of Subjects

The sample was selected from high school and higher secondary students of age between 13 and 19 years. The Trial run of the Health Related Physical Fitness Knowledge Test (HRPFKT) were administered on a total of 370 students of rural and urban area schools in the state of Kerala, which do follows different syllabus namely State board, C.B.S.E. and I.C.S.E.

Development of Questionnaire

The multiple-choice questionnaire method made up of a number of items, each of which carries two or more responses out of which only one is correct or definitely better (Bhatia, 1990) is the best means for testing judgement that is available and contains different types of questions which are related to definition, purpose, association, similarity, identification etc. The multiple choice test is definitely and the most appropriate one for measuring knowledge the multiple choice items form was selected.

An extensive review of literature and opinion of the experts in the field of physical fitness was done in order to obtain a correct conceptualization of the questionnaire, so as to decide the areas to be included in the questionnaire. Before the questions were finally formulated, the operational form of the Health Related Physical Fitness Knowledge Test (HRPFKT) was reviewed extensively for appropriateness of content, potential bias against specific subgroups of examinees, difficulty and match to the specifications for the test. Later, an item was reviewed a number of times before confirming in a pilot or tryout form of the HRPFKT. Subsequently, item performance was reviewed again at least two times before making it operational. In addition, performances of all operational items were reviewed to make certain that item performance has not been altered.

Since, the development of content specifications necessarily precedes any development of items or any assembly of forms of the test and these specifications provide the blueprint for the test construction. The development of the specifications for the HRPFKT began with a review of literature on physical fitness knowledge by the investigators. The investigators considered what, why and how was it in the reviews. Firstly, the investigators examined the students' knowledge of what physical fitness is. For this, the investigator included two content categories, Concepts of Fitness and Components of Physical Fitness, as it was important to be ascertained that, the students understand the multi-faceted nature of fitness as well as the need to improve fitness through a multi-faceted approach.

Secondly, the students' understanding of why they need to develop and maintain physical fitness was examined. Two content categories were included in this regard, they were the Effects of Exercise on Chronic Disease Risk Factors and Scientific Principles of Exercise.

Thirdly, the student's knowledge of how physical fitness needs to be was examined. This was done with two content categories: Exercise Prescription and Other factors. The first category

covered a broad range of content sampling from detailed exercise prescriptions such as, appropriate frequency, intensity and duration needed to develop and maintain physical fitness and to evaluate the progress of one's own physical fitness. Thus, Six dimensions have been identified into which the various items were classified and they were namely Concept of Fitness, Scientific principles of exercise, Components of physical fitness, Effect of exercise on chronic disease risk factors, Exercise prescription and Other factors. Thereafter, as the next step all possible and suitable items, which pertain to the different aspects of the six divided dimensions were written. The details of the questions selected from the core and related areas of the Health Related Physical Fitness Knowledge is presented in Table 1

TABLE : 1

Dimensions, Content Specifications and Weightage of Questions

I.	**Concept of Fitness**	
A.	Definition	**18%**
B.	Relationship with physical activity	
C.	Relationship with health	
II.	**Scientific Principles of Exercise**	
A.	Physiological (acute)	**6%**
B.	Physiological (chronic)	
C.	Physiological (other)	
D.	Psychological	
III.	**Components of Physical Fitness**	
A	Cardio-respiratory Function	**18%**
B.	Muscular strength & endurance	
C.	Flexibility	
D.	Body fatness & leanness	
IV.	**Effects of Exercise on Chronic Disease Risk Factors**	**12%**
V.	**Exercise prescription**	
A.	Frequency	**12%**
B.	Intensity	
C.	Duration	
D.	Mode	

E.	Self Evaluation	
F	Adherence to Exercise	
VI.	**Other Factors**	
A	Exercise and Nutrition	**34%**
B	Warm-up/cool down	
C	Injury/Illness	
D	Consumer Issues	
E	Equipment	

The preliminary version of the test blueprint and the test items were sent to three well-known experts and were asked to rate both the blueprint and the items. On the basis of their feedback, the final blueprint was constructed.

Item Analysis

After the items have been written, reviewed and carefully edited, the data obtained from the trial run were subjected to a procedure called item analysis, through which those items, which were valid and suited to the purpose were selected and the rest were either eliminated or modified to suit the purpose. Since, item difficulty and item discrimination have been found to provide excellent indicators of item quality over the past many years, they were used for the analysis of the data.

Item Difficulty.

The index of difficulty of a test item is the ratio of the number of examinees who answer the item correctly to the total number of examinees who took the test rather in other words the index of difficulty is actually the percentage of examinees who answer the item correctly. The higher the percentage, the easier will be the item and more difficult the item, the lower will be the percentage responding correctly.

The HRPFKT forms have been constructed in such a manner, that the first few items in each section are relatively easier. As educational researches have shown that scores for some students may be higher if easier items are placed in the beginning of the test and harder items towards the end.

Item Discrimination.

The discrimination of a test item refers to the extent to which a test question can discriminate between examinees who have high level of physical fitness knowledge compared to those who have low level of knowledge. The statistic used to describe item discrimination is the point-biserial correlation (rpbi). This correlation coefficient describes the relationship between the examinee's score on the test and whether or not the examinee answered the item correctly.

The empirical method also known as the statistical method is the basic and scientific method of determining the index of difficulty of an item. Out of the two common statistical methods through which the index of difficulty can be ascertained, the multiple point items were used.

The index of difficulty were determined from a certain portion of the group of examinees and the formula for determining the index by using of the extreme portion of the group was:-

$$P = \frac{Ru + RL}{Nu + NL}$$

Where p is the index of difficulty; Ru is the number of examinees answering correctly in the upper group; RL is the number of examinees answering correctly in lower group; Nu is the number of examinees in upper group; and NL the number of examinees in the lower group.

The final form of the questionnaire was finalised and constructed by discriminating the values of items, which fall above 0.8 (inclusive of 0.8) and below 0.2 (inclusive of 0.2).

Reliability of Health Related Physical Fitness Knowledge Test

Test reliability is an important characteristic of a test and it reflects the consistency with which the test measures. Reliability is also transitory, i.e.,each time a test is administered, the reliability may change. Consequently, test reliability needs to be estimated for each test administration. In general, if a test of the same ability and preparation is given to students it can be expected that the reliability of the test to remain reasonably close to values obtained previously.

Since, the test was administered for a single time, The type of reliability thus ascertained was called as "internal consistency," and is a measure of the extent to which the items on the test measure the same general ability. The more homogeneous are the items on the test, the higher the reliability and will usually be. Since, the commonly reported internal consistency reliability coefficient being Cronbach's Coefficienta. The Cronbach's Alpha reliability thus obtained for the Health Related Physical Fitness Knowledge Test (HRPFKT) was 0.742.

Validity of Health Related Physical Fitness Knowledge Test

The validity of a test being the most crucial aspect in the development of a test and do indicates whether or not the test can be depended upon to provide useful information for making judgements about an individual’s knowledge or achievement. If the validity of a test is strong enough, then one should be reasonably confident that the information is sufficiently accurate for the intended use. On the other hand, if the validity is too low, then one should not assume that the test provides adequate information.

Validity is unitary but it has multiple facets. Consequently, it is useful to distinguish different aspects of validity which need to be explored. The Standards for Educational and Psychological Testing (AERA, 1985) list three types of validity: content, criterion-related, and construct. For this study the content validity was ascertained.

Content Validity

Content-related validity refers to the extent to which the content of the test reflects standards theory and practice. As such, the test blueprint was specifically designed to maximize content validity and since, the content of the test was intended to reflect important aspects of physical fitness as defined in the literature. The match between the test items and the final form of the test blueprint was obtained through a consensus among experts in the field. For which, copies of all the items which had been written for the Health Related Physical Fitness Knowledge Test had been send to a panel of three nationally known experts in Youth Fitness. Accordingly, content validity was ascertained by comparing the ratings done of the panel of experts on Physical Fitness.

FINAL VERSION OF THE HRPFKT QUESTIONNAIRE

1. **Basic cause of obesity is**

   (a) Age **(b) Heredity**
   © Over Nutrition **(d) Stress**

2. **Which of the following is the ideal method for loosing body fat.**

   (a) Vibrating Machine **(b) Massaging**
   © Jogging **(d) None of the above**

3. **Wellness is achieved through.**

   (a) Proper Nutrition **(b) Regular Exercise**
   © Freedom from destructive habits **(d) All of these**

4. Vitamins are mostly found in.

(a) Leaf vegetables **(b) Meat**
© Egg **(d) Pulses**

5. The commonest form of exercise which helps to maintain body fitness is.

(a) Pull ups **(b) Weight Training**
© Push ups **(d) Walking**

6. Balance diet contains.

(a) Vitamins **(b) Minerals**
© Carbohydrate **(d) All of the above**

7. How much duration of daily physical activity do you need to gain health benefits?

(a) 10-20 min. **(b) 80-90 min.**
© 30-60 min. **(d) 2 hrs and above**

8. The modern concept of Physical Fitness is.

(a) Fitness & Health **(b) Fitness and Sports**
© Health and Sports **(d) Lack of illness**

9. The best method of loosing body weight is.

(a) Low calorie diet **(b) Well balanced diet and exercise**
(c) Heavy exercise **(d) Avoid fat food**

10. Excessive contraction of heart muscles leads to.

(a) High blood pressure **(b) Moderate blood pressure**
© Fatigue **(d) Muscle pain**

11. The best time for checking your resting heart rate is.

(a) Morning before getting up from bed **(b) After breakfast**
© Night after dinner **(d) Before Lunch**

12. World Health organization defines health as.

(a) Total well being of an individual **(b) Social well being**
© Mental well being **(d) Economic well being**

13. Bending and Stretching exercise helps to improve.

(a) Strength
(b) Agility
© Flexibility
(d) Speed

14. Which disease is caused by the deficiency of iron in the diet?

(a) Anemia
(b) Cancer
© Hypoglycemia
(d) None of the above

15. One is physically fit, when?

(a) One always feels tiredness
(b) One feels tiredness quickly
© One feels short of breath or fatigued when walking even a short distance (d) None of the above

16. Normal blood pressure of an individual is

(a) 120/80
(b) 240/120
© 80/40
(d) 120/40

17. Best exercise to reduce low back pain is

(a) Pull ups
(b) Leg lift from prone lying position
(c) Jumping Jacks
(d) Bent knee sit-ups

18. To shape the body, you ought to.

(a) Train for marathon
(b) work out in a gym
© Make Physical activity part of your daily routine
(d) Taking Rest

19. Disease characterized by reduction of bone strength ?

(a) Diabetics
(b) Osteoporosis
© Blood pressure
(d) None of the above

20. The product of strength and speed is known as

(a) Agility
(b) Explosive Strength
© Flexibility
(d) Strength

21. What is the normal body temperature of an individual?

(a) 98% Fahren Heit
(b) 80% Fahren Heit
© 100% Fahren Heit
(d) 78% Fahren Heit

22. Functional capacity of joints to move through a full range of motion.

(a) Co-ordinative ability
(b) Balance

© Flexibility (d) Strength

23. Which exercise is most likely to increase muscle size?

(a) Weight Training (b) Walking
© Running (d) Jumping

24. Physical Activity will reduce the risk of

(a) Dying prematurely (b) Dying prematurely from heart disease
(c) Reducing the risk of developing diabetics (d) All of the above

25. The important substance supplied to working muscle during heavy activities.

(a) Carbohydrates (b) Oxygen
© Water (d) Protein

26. Regular physical activity may help to prevent.

(a) Coronary heart disease (b) High Blood Pressure
© Depression (d) All of the above

27. Why balanced diet is necessary for an individual?

(a) Growth and development (b) Prevention from disease
© To maintain positive health (d) All of the above

28. High blood pressure occur due to excessive contraction of

(a) Heart Muscle (b) Tendon
© Skeletal muscle (d) Arteries

29. The quantity of blood in a normal human body.

(a) 2 litres (b) 3 litres
© 5 litres (d) None of the above

30. High percentage of body fat(obesity) leads to

(a) Diabetics (b) Hypertension
© Low exercise tolerance (d) All of the above

31. Water loss of ……. Percentage of persons total body weight can lead to death.

(a) 9-12 % (b) 1-3 %
© 4-6 % (d) 1-2 %

32. Which of the following form a part of the definition of term" fitness".

(a) Muscular co-ordination and flexibility (b) Freedom from disease
© Proper circulation of oxygen in the body (d) Better and richer life style

33. Which type of food must be avoided before a workout as it may cause dehydration?

(a) Salty food (b) Sugary food
© Oily food (d) None of the above

34. Ability to perform occupational recreational and daily activities without fatigue is called

(a) Physical fitness (b) Well being
© Lack of fitness (d) None of the above

35. Bandaging of injured joint will help to

(a) Reduce clotting (b) Reduce pain
© Reduce the movement of joint (d) Re absorb edema

36. Which is the best exercise for improving cardio-vascular fitness?

(a) Weight Training (b) Running & Swimming
© Walking (d) All of the above

37. What all are the benefit of Physical Activity?

(a) Controlling Body weight (b) Maintaince of muscles
© Decreasing Stress (d) All of the above

38. Which of the following is the characteristics of the blood of highly fit individual?

(a) More number of Red Blood cells (b) Less number of Red Blood cells © Less number of White Blood cells (d) None of the above

39. To avoid heart disease what is the highly recommended cholesterol level for young adults in India?

(a) 240mg/dl (b) 220mg/dl
© 200mg/dl (d) 180mg/dl

40. Protein contributes relatively little to energy production generally less than?

(a) 5% (b) 10%
© 15% (d) 20%

41. At what age can you stop exercising

(a) 55 **(b) 75**
© 95 **(d) None of the above**

42. which among the following is not a component of health related physical Fitness?

(a) Cardio vascular fitness **(b) Body composition**
© Strength **(d) Flexibility**

43. The most commonly adopted criteria for assessing obesity

(a) Body mass index (BMI) **(b) Weight**
© Waist and hip ratio **(d) None of the above**

44. Each 100 ml of blood contains an average …… of hemoglobin in men?

(a) 14-18 gms **(b) 5-10 gms**
© 20-24 gms **(d) None of the above**

45. Which one of the following type of activity burns the maximum calories?

(a) Resistance Exercise **(b) Stretching exercise**
© Free hand exercise **(d) Aerobic exercise**

46. Which type of cholesterol is the most harmful to your heart and blood vessels?

(a) High density lipoprotein (HDL) Cholesterol (b) Low density lipoprotein (LDL) Cholesterol © Both type – they are equally harmful (d) None of the above

47. By walking of more than half an hour daily, one can maintain.

(a) Minimum Fitness **(b) Maintain performance**
© Strength **(d) Flexibility**

48. Which of the two substances supply most of the energy during vigorous physical activity?

(a) Vitamins and Proteins **(b) Proteins and fats**
© Carbohydrates and fats **(d) Fats and Vitamins**

49. The maximal force that a muscle or muscle group is termed as

(a) Power **(b) Endurance**

© Flexibility (d) Strength

50. Do you think muscle stretching should be needed before and exercise?

(a) Needed **(b) Not needed**
© Only before exercise **(d) Only after exercise**

SCORING THE HEALTH RELATED PHYSICAL FITNESS KNOWLEDGE TEST

The Health Related Physical Fitness Knowledge Test (HRPFKT) was scored manually. For the correct answer 1 mark and for incorrect answer 0 mark were given.

ANSWER KEY OF THE FINAL VERSION OF THE HRPFKT QUESTIONNAIRE

1.	**a**	**2.**	**c**	**3.**	**d**	**4.**	**a**
5.	**d**	**6.**	**d**	**7.**	**c**	**8.**	**a**
9.	**b**	**10.**	**a**	**11.**	**a**	**12.**	**a**
13.	**c**	**14.**	**a**	**15.**	**d**	**16.**	**a**
17.	**b**	**18.**	**c**	**19.**	**b**	**20.**	**b**
21.	**a**	**22.**	**c**	**23.**	**a**	**24.**	**d**
25.	**b**	**26.**	**d**	**27.**	**d**	**28.**	**a**
29.	**c**	**30.**	**d**	**31.**	**a**	**32.**	**b**
33.	**c**	**34.**	**a**	**35.**	**c**	**36.**	**d**
37.	**d**	**38.**	**a**	**39.**	**d**	**40.**	**c**
41.	**d**	**42.**	**c**	**43.**	**a**	**44.**	**a**
45.	**d**	**46.**	**b**	**47.**	**a**	**48.**	**c**

49. d **50. a**

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