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Establishment of norms for sit ups test of higher secondary students of Maharashtra state

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Abstract
To measure the physical fitness component that is stability and establishing norms of same test for students, age 16 and 17 years, studying in the Higher Secondary Schools of Maharashtra was represent the population. Random sampling, maximum 12,800 students (i.e., 6,400 boys and 6,400 girls) from all Education Divisions of Maharashtra state was attended for data collection. The research design followed, here, a survey-cum-normative research. To measure and Establishing norms for abdominal strength and endurance of age ranging from 16-17 years, belonging to the state of Maharashtra, Sit ups test used as a tool. The results of the percentile norms presented the grade of raw scores in Sit ups test item can be identified on the basis of Likert's Five Point scale.

Result reveals that the values of Sk (Skewness) and Ku (Kurtosis) of the distribution of subject's (16 Years) Sit ups were Sk .159 (Boys), Ku .016^{lk} (Boys), Sk .541 (Girls), Ku .657^{lk} (Girls) and subject's (17 Years) Sk -.053 (Boys), Ku -.205^{lk} (Boys), Sk .394 (Girls), Ku .020^{lk} (Girls) respectively. It can, therefore, be said that the distribution of subject's scores in Sit ups test is positively skewed. It seems the distribution of Sit ups scores is nearly normal.

Keywords: Sit ups test, higher secondary students, stability and establishing, Maharashtra

Introduction

The twenty first century is witnessing a shocking upsurge in the prevalence of diabetes, obesity, metabolic syndromes and other lifestyle related diseases. Our day-to-day life, people have become very conscious about their fitness. The aspiration to look good is also encouraging people to use various forms of fitness techniques. Exercise is not just for Olympic hopefuls of supermodels. In fact, you're never too unfit, too young of too old to get started. Many investigators (Kuntzleman & Reiff, 1992; Sallis & McKenzie, 1991) [1, 2] have reported that unfit or Low-fit, Under-grown and over-weight children exhibit early signs to coronary-artery disease including high Blood pressure and adverse Blood Lipid profiles. This has, in fact, compelled us to re-think about the real status of *Physical fitness* of going Higher secondary students.

Keeping in view improving declined status of public health, the world's leading institutions (American Academy of Physical Education, 1987, the American Academy of Pediatrics committee on sports Medicine and School Health, 1987) suggested that-

- Proper programme in physical education and its policy and cover 97% of the population for better public health.
- Appropriate physical activity in physical education can significantly reduce risk factors of stress related diseases.

In existed syllabus of higher secondary school students Health and fitness are the major objectives of physical Education, but there is no proper procedure for assessing Health related physical fitness and physical fitness aspects for higher secondary school students in Maharashtra State. It is revealed from the existing syllabus of that Physical fitness and motor fitness teaching, training and evaluation has been incorporated and treated as an integral part of the present syllabus of Physical Education subject for secondary classes. However, there are no standard norms available for the assessment and Physical fitness till the date. Therefore the researcher has concern professionals as well as authorities for its application and inclusion immediately.

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Materials and methods
Research Design
The research design followed a Survey Study considering the norms of Physical fitness and Motor fitness test.

Population and Sampling
All the Students, age 16 and 17 years, studying in the Higher Secondary Schools of Maharashtra was represent the population. Considering the stratified random sampling, maximum 12,800 students (i.e., 6,400 boys and 6,400 girls) from all Education Divisions of Maharashtra state were attended for data collection. To obtain a representative sample from all over Maharashtra state and to make the study more authentic and reliable the present investigator chalked out a list of higher secondary schools to locate the educational zone-wised.

Instrumentation
On the basis of AAHPERD's recommendation (AAHPERD, 1980) and results of earlier report (Pargonkar, 2002) following test-item of Physical Fitness test has been identified and variable-wise test items pertaining to the selected component of physical fitness were the instruments for data collection [3, 4].

Components
Test Items
Abdominal strength and endurance
Sit ups

Test description
Sit ups test
Purpose
To Measure Abdominal strength and endurance.

Facilities and equipment
Mats be used if they are available, otherwise the floor is satisfactory, stop watch.

Procedure
The student lies flat on the back with knees bent and feet on the floor with the feet not more than 1 foot from the buttocks. The knee angle should be no less than 90 degrees. The fingers are placed behind the neck or shoulder. The feet are held securely by a partner the subject then curls up to a sitting position and touch the elbows to knees. This exercise is repeated as many times as possible in the time requirement.

Instruction
You may not push off the floor with an elbow. Your finger must placed behind the neck or shoulder.

Scoring
One point is scored for each correct sit up. The score is maximum number of sit ups completed in 60 seconds [5].

Methods of Establishing Norms
The procedure of standardization and development of norms of 'Physical Fitness Test' and 'Motor Fitness Test' was followed by three stages (Bhattacharyya, 1977, Furst, 1970 and Bera, 1993) [6, 7, 8].
1. **Preparatory Stage** involves formation of test-items, determination of content validity, first try-out to get a 'preliminary form' of developing Norms.
2. **Middle Stage** considers the evaluation of 'Item-difficulty' and 'Item-discrimination'.
3. **Final Stage** includes establishment of final norms, test's reliability and validity.

Statistical Techniques Used
The data were analyzed using the following statistical technique:
- The reliability of the Preliminary form of the test was determined by spilt-half method of correlation.
- Content validity was determined by analyzing the opinions of the various experts in the area of education and physical education.
- Item-Analysis and Factor Analysis of the test were done on the basis of the principles as stated by Bhattachryya *et al*., (1977).
- Before establishing the norms, the distribution of performance scores of each item of Health Related physical fitness and Motor Fitness test were assessed with respect to a normal probability curve. Here, normality of the scores was evaluated on the basis of the values of Skewness (SK), Kurtosis (Ku) and their standard errors along with the percentage of distribution within the range of three standard deviations.
- After testing the normality of the item-wise performance scores of the subjects, the data were processed for calculation of percentile norms.
- The item-wise normative data were graded on the basis of the principles of Likert's Five point scale.
- In general, descriptive statistics was applied wherever deemed necessary (Bhattacharyya *et al*., 1977) [9].

Results
A) Results of Selection of test-items
Following test-item constituted the preliminary form of the test on Motor Fitness
- Sit ups Test

B) Results on Establishing Norms
It is a common procedure that establishing the norms of a test is possible only if the related data are representing a mostly normal probability curve. Therefore, the normality of distribution of scores as obtained from test item was statistically tested separately. Skewness (Sk) and Kurtosis (Ku) of distributed scores of the large sample were calculated. After finding out the nature of distribution and on the basis of the characteristics of probability curve, the percentile norms of test item were determined.

Table 1: Characteristics of Distribution of Scores Obtained by the Subjects in Sit ups test (Boys)

Statistical Measures	Distribution Characteristics of Test Sit ups	
	16 Yrs.	**17 Yrs.**
Mean	27.30	26.13
Std. Error of Mean	.134	.137
Median	27.00	26.00
Mode	25	25
Std. Deviation	7.259	7.470
Skewness (Sk)	.159	-.053

Std. Error of Skewness ($_{sk}$)	.045	.045
Kurtosis (Ku)	.016[lk]	-.205[lk]
Std. Error of Kurtosis ($_{ku}$)	.090	.090

Table 2: Characteristics of Distribution of Scores Obtained by the Subjects in Sit ups test (Girls)

Statistical Measures	Distribution Characteristics of Test Sit ups	
	16 Yrs.	17 Yrs.
Mean	19.23	17.42
Std. Error of Mean	.120	.118
Median	19.00	17.00
Mode	20	20
Std. Deviation	6.524	6.408
Skewness (Sk)	.541	.394
Std. Error of Skewness ($_{sk}$)	.045	.045
Kurtosis (Ku)	.657	.020
Std. Error of Kurtosis ($_{ku}$)	.090	.090

1. Result on the norms of Sit ups test

- Result reveals that the values of Sk (Skewness) and Ku (Kurtosis) of the distribution of subject's (16 Years) Sit ups were .159 (Boys), .016[lk] (Boys), .541 (Girls), .657 (Girls) and subject's (17 Years) -.053 (Boys), -.205[lk] (Boys), .394 (Girls), .020 (Girls) respectively. It can, therefore, be said that the distribution of subject's scores in Sit ups is positively skewed. It seems the distribution of Sit ups scores is nearly normal.
- The result of percentile norms indicates that the P99 and P1 values of the Sit ups were "46.00 & above" and "15.75 & below" for 16 years boys and for 17 years boys "43.00 & above" and "14.00 & below" and for 16 years girls "46.00 & above" and "18.00 & Below" and "53.00 & above" and "21.00 & Below" respectively for 17 years girls.

2. Results on Reliability & Validity of Test

The item-wise Split-half reliability coefficients of items viz. 0.87 respectively.

The 'item-sum' correlation showed that the 'Test' retained its internal criterion validity; however, the researcher could not examine the external criterion validity because no parallel standardized test is available. However, the coefficients of internal validity of test-items were 0.74. It is important to note here that the Test ensured *face validity* as the items were endorsed the experts after a thorough review.

Table 3: Grading Scale of Performance in the Sit ups Test based on the Percentile Norms for 16 and 17 Years High School Boys and Girls of Maharashtra State

Age & Gender	Grades				
	Excellent (A)	Good (B)	Average (C)	Fair (D)	Poor (E)
16 (Boys)	33 & Above	28 to 32	23 to 27	11 to 22	10 & Below
17 (Boys)	35 & Above	27 to 34	22 to 26	15 to 21	14 & Below
16 (Girls)	25 & Above	19 to 24	15 to 18	9 to 14	8 & Below
17 (Girls)	22 & Above	18 to 21	14 to 17	9 to 13	8 & Below

Table 4: Split-Half reliability and validity of Sit ups Test

Name of Items	Items Measuring	Reliability Coefficient	Validity Coefficient
Sit up	Abdominal Muscles Strength	0.87	0.74

*All the values are significant at the 0.01 level

Discussion of Results

Many state governments have prepared syllabus of physical education for improvement of Health Related Physical fitness and Motor fitness among the higher secondary school students, however, standard procedure for evaluation of fitness is beyond the reach of physical education teachers. It was, therefore, thought desirable to develop and standardize a test battery and establish norms to assess the physical fitness status of the high school student especially for the state of Maharashtra.

The present investigator has taken severe pain locate the sample throughout the state of Maharashtra and to get permission from the school to collect data. He accepted it as a challenge. He painstakingly made few groups of experts for data collection throughout the state. Finally, he was successful in collection the data required for this study.

The result revealed that the preliminary from of the test consisted of many test-items and all these items were found reliable[k] and the reliability coefficients were accepted at the 0.01 level of confidence. Moreover, the preliminary form of the test was also found valid.

Merely, establishing the norms does not have value until the

norms are graded. In this study, the researcher has formulated the grades on the basis of Likert's five point scale. Now the new test battery as developed and standardized in this study got a fully form to be administered to assess Health Related Physical fitness and Motor fitness of any Children in the age group 16 to 17 years belonging to the state of Maharashtra.

Conclusion
With limitations, the results of the present study helped to warrant the following conclusions:
1. The 'Motor Fitness' component as developed and standardized in this investigation finally contains this test-item. It can objectively assess the Motor Fitness level of school boys (standard XI & XII) studying in secondary schools in Maharashtra with acceptable reliability and validity.
2. The norms developed in this study have adequate objectivity with statistical acceptability. The norms of the test are gradable and can useful to discriminate the High School Student having an Excellent/ good/ average/ Fair/poor level of physical fitness.

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