3.1 CRITERION MEASURES
3.2 SELECTION OF SUBJECTS
3.3 SELECTION OF REGIONAL LOCALES
3.4 THE DESIGN OF THE STUDY
3.5 ADMINISTRATION OF MOTOR FITNESS TEST
3.6 ADMINISTRATION OF SELF-CONCEPT QUESTIONNAIRE
3.7 RELIABILITY AND VALIDITY OF DATA
3.8 STATISTICAL PROCEDURE
CHAPTER-III

PROCEDURE

In this chapter criterion measure, Selection of Subjects, Reliability, Methodology and Statistical techniques have been described. The investigating materials for this study were (i) Scholastic Achievement (ii) Motor Fitness and (iii) Self-concept conducted on adolescent subjects of both sexes belonging to rural and urban localities in the four culturally regions of the State of West Bengal.

3.1 CRITERION MEASURES

To conduct the study the investigator tested each subject on one practical test and one written test on the same day. The criterion measures chosen for this study were North Carolina Motor Fitness Battery and Self-concept Questionnaire as standardized by Raj Kumar Saraswat, in addition to Scholastic Achievement scores obtained from school records of Madhyamik results.

3.1.1 North Carolina Motor Fitness Battery\(^1\) consisted of 5 test items. The items were sit-ups, side-stepping, Standing Broad Jump, Modified Pulls-ups and squat Thrust. Items were selected for boys and girls of 9 years through 18 years.

3.1.1.1 Justification of Selecting North Carolina Motor Fitness Battery:

It was chosen for the present study as it was considered easy to conduct and involving less number of equipment. This test was applicable for both boys and girls, age ranging from 9 years to 18 years. In the present study both boys and girls in the age group 15 years to 18 years were chosen randomly as subjects. Moreover the test battery comprised of only 5 test items. So the North Carolina Motor Fitness Test Battery was considered ideal for the purpose.

3.1.2 Self-concept Questionnaire\(^2\) consisted of six dimensions. Each dimension having eight questions, in total 48 questions. All the questions were placed haphazardly in the questionnaire. Scoring was done according to the guideline of the test manual.

3.1.2.1 Justification of Selecting this particular self-concept questionnaire:

The questionnaire was prepared considering the Indian Condition and it consisted of only 48 questions and was the only one available in this country. Thus it was considerate to be worth-using for this purpose.

3.1.3 Scolastic achievement of the subjects were obtained from their respective school records. The marks obtained by the subjects in the Madhyamik Examination conducted by West Bengal Board of Secondary Education (W.B.B.S.E.) in the Year 1993 were considered for this purpose.

3.1.3.1. Justification of considering Madhyamik results as Scholastic Achievement:

For measuring Scholastic Achievement, results of Madhyamik Examination was considered to be most suitable determinant as the students of this standard were tested through out West Bengal on the same days with uniform questions on the same syllabus followed by all the subjects and evaluated as per an uniform pattern (under the direction of the W.B.B.S.E.). The subjects were divided into groups on the performance in Madhyamik Examination.

3.2 SELECTION OF SUBJECTS:

Four hundred eighty students were selected following stratified Random Sampling method, from sixteen Rural Schools and fourteen Urban Schools situated at four typically distinct geographical regions in West Bengal, namely Central Gangetic Valley, Western Table Land, Southern Sea-Coast, and Northern Hill Area.

The population in this study was stratified in the sense that because of diversity of regional environment the total population did not truly constitute a homogeneous group. The regions were considered homogeneous strata (Sub-population) wherefrom the representative samples were selected by simple random sampling method.

Even after selection of samples from the four distinct regions, the samples were further classified into rural and urban localities under which the subjects were categorized into boys and girls gender groups.

The number of boys and girls selected from each region were proportionately distributed i.e., each region consisted of 60 boys and 60 girls. Out of these, 30 boys and 30 girls were from urban schools, and 30 boys and 30 girls belonged to rural schools. Schools affiliated under the West Bengal Council of Higher Secondary Education and situated within the jurisdiction of the four stated regions, were selected for the purpose of the study. The data have been collected during the year 1993-94, when the subjects were admitted in grade XI.

The subjects considered for the study were in the age group of 16 years to 18 years. Justification for selection of this age group was that in this late adolescence period mental turbulence gradually settled down and the subject developed better self-concept.
3.3 SELECTION OF REGIONAL LOCALES:

The selection of the four regions involved the following districts according to their respective geographic similarity and proximity:

(i) Central Gangetic Valley included the districts of Hooghly, Nadia and North 24 Parganas.
(ii) Western Table Land included the districts of Birbhum, Bankura and Purulia.
(iii) The Southern region of Sea-Coast included the districts of Midnapore and South 24 Parganas; and
(iv) The Northern region of Hill Area included the district of Darjeeling only.

3.3.1 Central Gangetic Valley:

This is a deltaic plain in the southern part of West Bengal. Its Western limit is marked by the Rarh plain and the eastern limit is our political boundary with Bangladesh.

Physical Feature: The perfectly flat and plain formed of deposits of river silt or alluvium. At no place does the plain rise above 25 mt. from the sea level. It is covered by numerous streams which take winding courses. The land is so flat that when water collects on it, it does not move quickly. The deltaic plain can be divided broadly into two groups - the upper delta and the lower delta.

Climate: The climate is hot and humid because of its location near the Tropic of Cancer and its closeness to sea. The temperature is high throughout the year except during the dry winter months. Rainfall is reasonably heavy - occurs during mid-June to mid-September. The winter months are pleasant and not very cold.
3.3.2 Western Table Land:

The region of West Bengal is located in the Western part of the State and continuous into the Chotonagpur plateau of Bihar and Orissa. This is triangular in shape and covers 15 percent of the total area of West Bengal. The major portion of the region is in Purulia and Bankura districts and extends southward into Midnapore and Northward into Bardhaman and Birbhum districts.

**Physical Feature:** This is an undulating rolling upland where the general height is above 75 mt. A long chain of hills (Ayodhya) is situated between Subarnarekha and Kasai rivers in Purulia district. The Soil is not very fertile.

**Climate:** This region is not very far from the sea. There is a great difference between summer and winter temperature. The flat rocky surface gets intensely heated during summer, when the average temperature is as high as 40 °C and results in oppressive hot summer. Winter is fairly cool with an average temperature of 10 °C. The rainfall is less than other areas.

3.3.3 Southern Sea-Coast:

A 25 Km. wide coastal strip of 24 parganas (south) and Midnapore district extends from the mouth of Ichhamati and Hooghly rivers in the east to the mouth of Subarnarekha river in the West.

**Physical feature:** The sandy beach has been built by the deposition of sand from the Bay of Bengal by strong south-westernly winds. The coastal region shows three characteristics: (i) All along the coast there is a wide firm sandy sea beach, (ii) Low sand dunes are found parallel to the sea beach, the height of the sand dunes rises at further inland, (iii)
Fertile low lands and scattered marshes are found between the sand dunes of the interior and the sandy beach of the coastal area. Rasulpur is the chief river of the area, and the river water is also salty, because tidal water from the sea comes up stream frequently and makes the water salty.

**Climate:**

The climate is hot and humid but summer is not too hot as sea breeze brings a cooling effect over the land. Rainfall occurs from June to September caused by monsoon winds. The annual average rainfall is 1500 mm. Cyclonic storms and tidal waves do great damage to the coastal areas. Winter is rather warm and dry.

**3.3.4 Northern Hill Area:**

The hill region of West Bengal is bounded by Nepal in the west, the State of Sikkim in the north and Bhutan in the east.

**Physical feature:**

This is the only mountainous region of West Bengal. The mighty Singalila Range enters Darjeeling district from the north. It has three mighty peaks in West Bengal that is Phalut, Sandakphu and Tanglu. The north to south flowing rivers of this region cut steeply through the ranges and have formed deep gorges and canyons. The mountainous area of Darjeeling district descends abruptly southwards to a height of 150 mt at Siliguri.

**Climate:**

During the summer months the valleys and foothills of the mountains are a little hot but higher up the mountain the weather is cool. Rainfall is heavy throughout the region. The south-west monsoon wind causes heavy rainfall from May to September. The cool
season starts from November and lasts till February. Frosts are common and there are occasional snowfall.

3.4 The Design of the Study:

The data were collected with the help of a practical test battery (North Carolina Motor Fitness Battery), a written test through questionnaire (Self-concept questionnaire), and examination records (Madhyamik examination scores conducted by the West Bengal Board of Secondary Education). After the collection of data, all the raw scores were converted into standard scores with the help of the formula \[ \frac{(X-M)}{\sigma} \]

All the scores of 5-test items motor fitness battery converted into standard scores and were summed-up for a composite score of motor fitness. By applying the same formula the scores of all dimensions of self-concept were converted into a single score of self-concept. Scholastic achievement scores of the subjects were determined by considering the marks obtained out of a total marks of 900 in the Madhyamik Examination of the West Bengal Board of Secondary Education (W.B.B.S.E).

Thus collected, the data were put to statistical treatment for analysis leading logically to conclusions and suitable recommendations.

3.5 Administration of Motor Fitness Test:

The test was administered to the subjects at the respective school grounds. The investigator himself, with the help of physical education teacher of the school conducted the tests. The schedule of testing and details of the test items were put on the notice board of the school well in advance. The cooperation of physical education teacher was sought in orienting their students to the test procedures and to give adequate training to elicit performance to their highest levels of capacity eliminating the learning effects on the test performances.
The purpose of testing was explained to them. Their cooperation was solicited in the interest of finding out the fact scientifically.

The subjects were allowed to warm-up at their own for 10 minutes before the actual tests were administered. In order to motivate the subjects to put in their best performance an element of competition was introduced. The names of the best three performers in each test items were announced. The tests were administered as described below:

3.5.1 Sit-up:

**Purpose:** To measure abdominal strength, endurance and speed.

**Facilities and Equipment:** Since mats were not available, the floor was used, and also a stopwatch.

**Procedure:** The subject was asked to lie on the back with fingers clasped behind the neck and elbows touching the floor, knees bent, and feet flat on the floor pulled in close to the body, the feet held securely by a partner. On the signal to start, the subject sat-up, turning the trunk to the left, touched the right elbow to the left knee and returned to the starting position. Again sat-up and touched the left elbow to the right knee. The exercise was repeated as the subject alternated sides.

**Instructions:** The fingers remained in contact behind the neck throughout the exercise. when returning to the starting position, elbows were flat on the mat before sitting up again.

**Scoring:** The score was the number of correct sit-ups performed in 30 seconds.
3.5.2 Side-Stepping:

**Purpose:** To measure agility, endurance and speed.

**Facilities and Equipment:** Two lines on the floor 12 feet apart and a stop watch.

**Procedure:** The subject assumed a starting position with one foot touching a sideline. On the signal to start he/she moved sideward with a side-step leading with the foot nearest the line that was being approached. This step was repeated until the foot touched or went beyond the line. The subject then moved to the other sideline in the same manner.

**Instructions:** Subject faced the same direction throughout the exercise. Subject while reaching the line never crossed the feet at any time.

**Scoring:** One point was scored each time the subject touched a sideline. The final score was the number of one-way trips completed in 30 seconds.

3.5.3 Standing Broad Jump

**Purpose:** To measure explosive power of the leg.

**Facilities and Equipment:** Outdoor jumping pit, a take-off mark and a measuring tape.

**Procedure:** The subject stood with feet several inches apart, with the toes just back of the take-off mark. Subject swung the arms and bent the knees in marking the jump forward. Both feet left the floor as well as landed together.

**Instructions:** Subject was cautioned not to fall backward on landing.

**Scoring:** The measurement was taken from the nearest border of the take-off line to the spot where the heel or other body part touched the pit nearest to the
take-off line. Three trials were permitted and the best one was recorded up to the nearest inch.

3.5.4 Modified Pull-ups

Purpose: To measure arm and shoulder girdle strength, endurance and speed.

Facilities and Equipment: Two chains of equal height 30 inches high supported a bar 1 inch in diameter and 4 feet long. Two students sat on the two chairs and held the bar on the chair to prevent it from sliding or rotating, and a stopwatch.

Procedure: The subject grasped the bar with palms away from the face and positioned the body under the bar with the feet flat on the floor directly under the knees so that the area between the knees and the head comprises a straight line. The arms were extended to form a 90 degree angle with the chest. From this position the subject pulled up with the arms until they were completely bent, and then lowered with the extension of the arms.

Instructions: The subject was not permitted to rest between pull-ups. Feet were kept under the knees at all the times and the body kept straight between the knees and the head. The arms were flexed until the chest or the chin touched the bar. And the arms were fully extended between pull-ups.

Scoring: The score was the number of correct pull-ups performed in 30 seconds.

3.5.5 Squat Thrust

Purpose: To measure agility, endurance and speed.

Facilities and Equipment: A stop watch.
Procedure: From the standing position

1. The subject went to a full squat position placing both hands on the floor about shoulder width apart in front of his feet.

2. The subject then thrust both legs backward to a front learning rest position with the body resting on both hands and toes and approximately straight from the shoulders to the feet.

3. The subject returned to the full squat position.

4. Then the subject stood erect.

Instructions: The subject reached the full squat position before legs were thrust backward. Back was kept straight in this front learning rest position. Subject came to an upright position with the body in a straight line at the hips; and no rest between any of these movements.

Scoring: The score was the number of complete repetitions correctly executed in 30 seconds.

The tests were administered on a combination of the station to station and squad method of administration. The subjects were divided into 5 squads that rotated from one station to another until all squads visited all 5 stations.

At the beginning of the test all subjects were supplied with an individual score card. All 5 test items were explained and demonstrated station-wise. The squads then went to the stations assigned, score cards were collected at the last station where the subjects were tested by the researcher.

The total score of motor fitness was calculated by summing up all the scores in respect of these five components.
3.6 **ADMINISTRATION OF SELF-CONCEPT QUESTIONNAIRE**

The subjects were assembled and seated in a class room. A model answer sheet with examples of answers was shown to them, so that everyone could clearly see the entries in it. Then the research scholar marked his answer for sample items on the model questionnaire-cum-answer-sheet and explained the procedure of recording answers to the subjects. The purpose of the test was explained to the subjects. Then the research scholar assured them that the scores obtained in the test would be kept confidential. The doubts or questions arising about the purpose and use of this test were answered frankly and honestly.

Self-concept questionnaire of Raj kumar Saraswat were then distributed to them. They were asked to fill in all the entries on the answer sheet. After making sure that identifying entries were made by everyone, the research scholar read out the instructions clearly from the test booklet. It was ensured that the instructions had been understood by all correctly. Queries on procedure were invited and doubts removed before the subjects started to respond to the items of the test. The subjects were then asked to proceed with recording the answers. The investigator and his assistants went around and checked that all of them completed all the 48 items. However, they were not hurried through completing the test within any stipulated time.

The answer sheets were scrutinized before scoring to check that no item was answered with more than one response. The scoring was done as prescribed in the manual. The raw scores for all the six dimensions were counted and entered in the space provided for it in the answer sheet itself. The total raw score was obtained by adding all these dimensional scores and entered in the space provided for it in the scoresheet. The summated scores of all the forty-eight items provided the total self-concept of a subject. A high score on this inventory indicated a high self-concept, while a low score indicated a low self-concept.
3.7 RELIABILITY AND VALIDITY OF DATA

Reliability and validity of the data depended on several factors such as reliability of instrument, competency of the tester and reliability and validity of the tests.

3.7.1 Reliability of Instruments:

In the present study the instruments used were stop watches, manufactured by Racer Company of India to see to it that every subject was allowed exactly the allotted time. Before the commencement of the test the watches were synchronized and found true to its purpose. Thus the time recorded on those watches were regarded as reliable.

Measuring Tape manufactured by free man's company which had been found to be used widely were deemed to be reliable for the study.

3.7.2 Competency of Testers:

Testers engaged in the present study for the purpose of collecting data were having more than 10 years working experience in the field of physical education and having professional qualification of Master of Physical Education degree from Lakshmibai College of Physical Education, Gwalior, India and other reputed colleges. They were also given a sort of orientation well before the data was collected. Thus it could be assumed that the testers were competent enough and reliable for the purpose.

3.7.3. Reliability and Validity of the tests:

Reliability of the questionnaire was found by test-retest method and it was found to be .91 for the total self-concept measure. Reliability coefficients of its various dimension varied from .67 to .88, and separately for code A physical as .77, for
code B social as .83, for code C Temperamental as .79, for code D Educational as .88, for code E moral as .67 and for code F Intellectual as .79.

Reliability of the Motor Fitness test was found by test-retest method. Reliability coefficients of its various items varied from 0.82 to 0.92 and separately for item I Sit-Up as 0.88 for item II Side Stepping as 0.86, for item III Standing Broad Jump as 0.89, for item IV Modified Pull-Up as 0.82 and for item V Squat Thrust as 0.92.

This was a standard test, and used widely for the purpose of determining motor fitness. Thus it could be regarded as a valid test.

3.8 STATISTICAL PROCEDURE

After collecting data, these were converted into standard scores. The result of the study was obtained by following statistical procedures as mentioned hereunder:

(i) At first the Mean, and Standard Deviation of all the scores were calculated.

(ii) To assess the Regional influence on scholastic achievement, motor fitness and self-concept Three-Way Analysis of variance (F-Test)\(^3\) was done. It was followed by a post-hoc ‘t’ test in case of indication of significant difference.

(iii) To observe the correlation among the parameters the coefficients of correlations were found out.