Chapter II

REVIEW OF THE RELATED LITERATURE

A careful study and exploration of the selected literature for present study is essential to have insight into work already done within the field. In our country, very little research work has been done as compared to other countries in relation to the field. The scholar has given a deep thinking to those studies and has gained valuable methodological hints from their procedure and findings which were of great importance in the formulation of adapted physical education programme. A brief review of related studies in the field of mentally retarded physical activities are presented in this chapter:

Sherri\(^1\) conducted an investigation to determine, if balance can be sustained or improved in clients with cerebral palsy and mental retardation through a non-invasive kinesthetic intervention program. The subject of the study (N=33 for static balance and N=31 for dynamic balance) resided at state of operated facility. Each subject was

randomly assigned a training protocol groups; group one used exercises prescribed by Armheim and Pestolesi, 1973; group two used the exercise protocol plus a balance beam routine; group three used the exercises and specially designed rolling walker protocol. The subjects were pre-tested, practiced for 21 sessions and post-testing using a form of the Bass Balance Test. An Analysis of Covariance (ANCOVA) was performed, results revealed that, each of the training groups yielded statistically significant changes in pre and post test analysis of static and dynamic balance, none of the changes were significant when the three groups was compared to one another, p<.412 for static balance and p<.221 for dynamic balance. The results also indicate that positive change had occurred in the static balance scores, (p<.001) and dynamic balance (p<.001) if pre and post test of each group compared.

Pitetti² sought to determine whether moderately mentally retarded adults could improve their Cardio Vascular Fitness (CVF) through a minimally supervised training programme.12 trainable mentally retarded adults consisting of 5 females and 7 males under between 22-28 years of age with IQ between 58 and 64 were undergone a 16 week training

programme 50 min/day, 5 day/wk. Each subject repeated exercise tests twice on two different modes of exercise, the treadmill (TM) and Schwinn Air-Dyne ergometer (SAE), before training to ensure validity and reliability of initial cardio-vascular fitness levels. Intensity and frequency of exercise were closely monitored. An observer was present during the training bouts, but, initial instructions only given, no additional encouragement or instructions were given. Although the training programme significantly increased peak VO2 (29.2 + or - 8 to 33.5+ or - 9ml. kg - 1 Min - 1) and peak ventilation (73 + or - 26 to 81+ or - 23, 1 Min - 1) when assessed in treadmill, significant changes in these same parameters were not seen when assessed on the Schwinn Air-Dyne ergometer.

Decker\(^3\) conducted a study of which was to evaluate the relative effectiveness and efficiency of forward chaining, reverse chaining and total task presentation in the acquisition of three targeted motor fitness skills with individuals diagnosed as severely mentally retarded. The modified squat thrust were task analyzed into seven sub

tasks each. After a screening procedure, six individuals from a midwestern school were selected and divided into 2 age groups. The subjects were then randomly selected to receive instruction in each of the motor fitness skills, each paired with one of the instructional strategies. Based on the data obtained, there was no significant difference between forward chaining, reverse chaining and total task presentation in the acceleration, number of trials, time and amount of prompting required to reach criterion on three targeted motor fitness skills. Further there was no significant difference between the three instructional techniques in the retention of three targeted motor fitness skills.

Dhari⁴ conducted the study to compare the effects of massed versus distributed practice on gross and fine motor proficiency of twenty-six female and 26 male adolescents, aged 180-204 months, used a pursuit rotor to practice fine motor skills and stabilometer for gross motor skills. Each subject, whether on a massed or distributed practice schedule, had 15 trails on the first day and 5 trails on the

following day. Subjects who followed a distributed practice schedule, had 30 sec trials with 30 sec rest between each; subjects who followed the massed practice schedule had 30 sec trials with 5 sec rest between each. Hypothesis are tested by ANOVA at .05 level of significance. the results showed that males using distributed practice on fine motor task performed better than females; and males using massed practice performed better on motor task than females.

Webber\textsuperscript{5} conducted a study to determine if trisomy 21 down's syndrome (DS) adolescents males and females could increase their muscular strength significantly more by utilizing a weight training programme than a similar group receiving a strength exercise programme. Fourteen trisomy 21 DS individuals consisting of 3 female and 11 males between 13 and 18 years of age with IQ between 32 and 52 on the Stanford Binnet Intelligence test were pretested for each 10 muscular strength tests. The subjects were then match paired and randomly assigned, based on weight training programme and a strength exercise programme. Subjects who met 3 days per week for 6 weeks. At conclusion of the 6 week treatment period, all of the subjects were post tested for the 10 muscular

strength tests. Results indicated that weight training programme had made significantly greater gains in muscular strength.

Dupper\(^6\) studied the effects of an aerobic exercise programme on the physiological, cognitive and behavioural functioning of ten institutionalized retarded children. The subjects, ages 12-21 years, were trainable mentally retarded students who were randomly divided into experimental group (Group I) and control (Group II) groups. Group I participated in a 30 minute aerobic exercise programme, three times per week. Group II spent the same amount of time participating in a physical education-motor skill class. All subjects were evaluated at the beginning and end of ten week period with Durmum and Rahaman skinfold estimate of body fat, the Skubic Hodgkins Step test, 600 yard run/walk, Goal attainment Scale, and Vineland Adaptive behaviour scales-socialization domain. A posttest revealed a significant improvement among the experimental treatment group within the areas of body fat composition and cardio-vascular efficiency. Cognitive and

behavioural functioning did not improve as a result of treatment.

Akers\textsuperscript{7} investigated the gross motor performance of learning disabled and normal children. The Bruininks-Oserseky Test of motor proficiency was administered to 40 learning disabled children and 40 normal children. Subjects were selected from a summer learning disabilities programme, 8 subjects matched 4 chronological age were selected from each group at each of the age levels from age 8 to 12. Results indicated that significant differences in overall gross motor performance for learning disabled and normal children with the learning disabled group exhibiting significant deficits in all four areas tested. Gross motor performance was superior for males both groups. When comparisons were made within sex, normal males were higher than learning disabled males and normal females were higher than learning disabled females.

Lewis\textsuperscript{8} studied the effects of participation for 12 weeks in an individualized data base instructional programme on the physical fitness of severely retarded female adolescents. Randomly assigned into experimental and control group. Four instructors used the least prompt instructional system to teach each subject in the experimental group, two flexibility and five muscle endurance exercises. A multiple baseline design was utilized to analyze the data and demonstrate the efficacy of the instructional intervention on the subjects ability to independently and correctly perform the exercises. All the subjects were able to learn at least three exercises, two subjects learned four exercises, one subject learned five exercises and three subjects learned all seven exercises. From results of the study, It was concluded that the severely retarded female adolescents who participated in the physical fitness programme could learn the exercises with an appropriate amount of time allotted, the data seemed to indicate that all subjects could have learned all the exercises.

\textsuperscript{8}Deanna Marie Lewis, "The Effects of Participation in an Individualized Instructional Program on the Physical Fitness of Severely Retarded Female Adolescents" \textit{Dissertation Abstract International} 43:7 (January 1983) : 2275-A.
Boswell\(^9\) studied efficacy of participation in an adapted dance program based on the model of Riordan(1980) in facilitating change in selected dynamic balance and rhythmic skills of mildly and moderately mentally retarded children. The subjects were 26 mentally retarded children, ages 8 to 13 years, who attended Mineralwells Public Schools during the spring of 1982. The subjects were assigned to either the 8 week adapted dance programme or a movement exploration programme of equal duration. Dynamic balance was measured by six balance beam tasks and stabilometer performance. Rhythmic skills were measured by an auditory rhythmic perception test. The findings indicate that although two distinct movement models were employed, the resultant patterns of change demonstrated great similarity. Significant difference which was found on the most difficult balance beam task included (a) sensitivity of this measure to initial change, and (b) opportunities for development of spatial orientation skills provided by the dance programme.

Powers\textsuperscript{10} examined the present status of physical education for mentally retarded\textsuperscript{(MR)}. The study analyzed source materials from the disciplines of special education and physical education to identify operational guidelines for the development and implementation of adapted physical education programme for the MR in public schools. The guidelines identified were also complaint with mandates of Public law 94-142 of U.S.A., information was obtained in regard to: programme foundation; programme design; physical education assessment for MR; least restrictive environment; programme organization and administration of services for the MR. A non categorical approach to MR was used. The result found that adapted physical education programme can be appropriately developed and implemented in a design concurrent with the goals and objectives of regular physical education, as well as be an effective and positive element in the delivery of special education services to the MR. Physical education also possesses the capability for MR students to participate in a variety of educational services individually designed for the least restrictive environment. It is

\textsuperscript{10}Pative James Powrs, "Operational Guidelines for the Development and Implementation of Adapted Physical Education programs for the Mentally Retarded in Public Schools", \textit{Dissertation Abstract International} 4:3 (September 1983) : 704-A.
concluded that no single theoretical programme model of operational design can be successful if implemented in an immediate approach.

Reid et al\textsuperscript{11} conducted a study to more clearly describe motor performance and anthropometric and fitness status of autistic children. Twelve subjects were chosen from a school for multiply handicapped and from hospital setting. The subjects were divided into two groups, a young group, mean age 10.2 years, range 8.3-12, and older group, mean age 16.6 years, range 14.8-19.4. Tests are sit-and-reach flexibility test using a modified Wells and Dillon flexometer, caching and balance from Bruininks - Oseretsky test of motor Proficiency. The remaining items were taken from a study conducted by Rarick, Dobbins and Broadhead\textsuperscript{(1976)} and included: anthropometric and fitness measures of height, weight, left and right grip strength (hand dynamometer) abdominal strength (sit-ups); and estimated body fat as well as following performance measures - vertical and horizontal target throw, standing long jump, mat crawl and scramble. The items believed to provide a broad assessment of

the motor domain. Results are compared with various groups. The young autistic group demonstrated less grip strength than the young mentally retarded children and non retarded group, both groups of autistic subjects demonstrated a large deficit in trunk flexion. The autistic individuals performance was below than comparison group on the balance and target throwing tasks. The present data support previous research and clinical reports which argued that autistic persons do not perform motor skills at a rate consisted with their chronological age. It recommends individualized instruction using contemporary educational technology probably is necessary for these youngsters to develop motor skills.

Joey\textsuperscript{12} conducted a study to determine the effects and intermodality association of two different sensory motor proficiencies that comprise the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP). Two curricula were designed that incorporated sequential developmental skills within the two basic target areas of the psychomotor domain: vestibular/proprioceptive and visual motor. The 18 children

\textsuperscript{12}Joey Cowden, Robert Eason and Jennifer Wright, "A Comparison of Two Sensory Motor Intervention Programs for Elementary Children Diagnosed as Specific Learning-Disabled" Cited in: Eason, \textit{Adapted Physical Activity: From Theory to Application}, 236-243.
selected were paired by age, sex and screening motor proficiency scores and them assigned randomly to two experimental sensory intervention groups. The subjects ranged in age from 6 to 11 years with mean age of 8.2 years for vestibular/proprioceptive group and a mean age of 8.6 years for visual group. A sensory motor screening battery that contained similar items as in the BOTMP was administered to each subject prior to beginning the intervention. Following 12 week experimental period, the BOTMP was administered. The vestibular/proprioceptive (VP) group received seagential activities designed to stimulate VP modality. The second group received specific visual/fine motor (visual) exercises. Based on the result of the study, the investigators conclude that sensory motor intervention programs that emphasize the visual modality result in greater gains on tests of motor proficiency than the programme that emphasize the VP modality. Result also support the use of various VP activities for motor proficiencies that require visual motor control with rhythmical sequence of movement.

Charles\textsuperscript{13} investigated the use of Health Related Physical Fitness Test and the Modified Pull Up with

mainstreamed EMR/TMR children. Comparison of health related fitness levels and modified pull up scores of mainstreamed EMR/TMR children to normal children was a secondary aspect of study. Subjects for the study were 126 twelve to fifteen year old TMR children from mainstreamed settings. The subjects were administered the following items. (a) modified sit-ups, (b) sit and reach (c) 880 yard run (d) skin fold fat measured (triceps only), and (e) modified pull ups. Significant differences between normal and mentally retarded children were noted for the modified pull-ups, modified sit-ups, sit and reach and 880 yard run. Non significant differences between normal and EMR/TMR adolescents were found in the assessment of body fat. Comparison between sex’s indicated that fitness trends in retarded populations are similar to normal populations. Males demonstrated significantly more strength and endurance, and better cardiorespiratory endurance than females. Females were significantly more flexible than males and tended to have greater amounts of body fat.

Tucker\textsuperscript{14} conducted a investigation to evaluate the individualized motor activity programme on the level motor

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development, perceptual motor development, physical fitness, self concept and academic achievement of 37 learning disabled ELE children of CAs 7 to 12 yrs. and M IQ of 98. The Ss were pre and post tested using and 18 wk individualized instructional period with experimental group, and control group experienced a traditional PE programme. Results of the study indicated that the level of physical fitness, motor ability, and perceptual-motor development can be enhanced through participation in an individualized motor activity programme.

Futten\textsuperscript{15} conducted a study to assess the effects of a supplementary perceptual-motor training program (PMP) on the level of perceptual-motor development, movement, self-concept, social emotional growth, and academic achievement of trainable mentally retarded (TMR) children. 46 students were randomly assigned into an experimental group (N=23) and control group (N=23). Both groups received same physical education and special education programs. The experimental group was exposed to a supplementary PMP 30min/day, 5 days/wk. for 20 weeks. All subjects were pre and posttested on 7 dependent variables (dynamic balance, eye-hand

\textsuperscript{15}Donald Lee Futten, "Effects of a Supplementary Perceptual-Motor Program on Trainable Mentally Retarded Children", \textit{Dissertation Abstract International} 41:9 (March 1981): 3942-A
coordination, social-emotional growth and academic achievement). MANOVA with repeated measures on the second factor was used to analyze the data, when all 7 dependent variable were analyzed simultaneously, the MANOVA showed a significant test effect and significant test X group interactions. Result indicated that the PMP had a significant effect on the experimental groups dynamic balance, eye-hand coordination shape and figure - ground discrimination, body image and social-emotional growth of experimental group. It was concluded that: (1) the level of PM development can be enhanced in TMR children as a result of PM training, (2) TMR children became more socially and emotionally adjusted as a result of PM training and (3) the movement self-concept, and academic achievement of TMR children does not appear to be affected by participation in a supplementary PM training programme.

Hussein\textsuperscript{16} undertook a study to determine effects of a structured physical activity programme on the physical fitness and self-esteem of trainable mentally retarded individuals, as measured by the AAHPER-Kennedy Foundation Special Fitness Test and Coopersmith's Self-Esteem.

Inventory (SEI). These two measures were previously found to be significantly related to standard achievement scores of the TMR individuals. Forty-five TMR persons, twenty five male and twenty females, ranging in age from six to twenty years were randomly selected for this study. The IQ of all the subjects ranged between 30 and 50 as measured by standford-Binnet or Weschler Intelligient Scale for Children (WISC). 35 subjects were randomly selected as experimental group and remaining 10 subjects served as a control group. The subjects in each group were randomly subdivided into three activity units. Experimental group (1 and 2) participated in a structured physical activity programme for 9 weeks, each day, 5 days a week for 45 minuets. All 45 students were completed the programme, improvement in physical fitness and self-esteem was determined by pre and posttest scores on the AAHPER special fitness test and self-esteem by self esteem inventory. This study revealed significant improvement in both experimental groups. This emphasize the value of structured physical activity programme on development of physical fitness an self-esteem of the TMR children.

Poehlman¹⁷ studied the effects of a three part

experimental physical education programme on fitness levels of mentally retarded children. The purpose of the study was to determine the effect of an experimental physical education programme which combined a jog/walk activity, calisthenics and individual exercise on physical fitness of mentally retarded children. The selected subjects were 15 male and 5 female from the special education classes of the Bellefonte Elementary School, PA and Community School, Tehran, Iran. Each subject participated in an 8 week experimental physical education programme. Each subject was pre and post tested, using a modified version of AAHPER Special Fitness test for the Mentally Retarded. Dependent t tests for within group comparisons on sub-test scores and on the fitness independent t test for comparisons between the two schools were used in the data analysis. Result showed a significant in the physical fitness indicated by the sub test scores from the modified AAHPER special fitness test for the mentally retarded. It was concluded that participation in a planned and systematic programme of physical activities improves the physical fitness of educable mentally retarded children.

Williams\textsuperscript{18} investigated the effects of a prescribed

physical activity programme on the arm strength, leg strength, abdominal strength, speed, flexibility, power and coordination, and cardiorespiratory endurance of 60 moderately mentally retarded (MMR), (chronological ages 8-19) with IQs 30-50, subjects were randomly assigned into three groups, designated: experimental, social activity and control. A 7 item motor fitness test was administered as a pre test and post test following a 7 week treatment period. The experimental group engaged in prescribed physical exercises 30 minutes/day: 3 times weekly. The social activity group engaged in prescribed social activity 30 minutes per day, three times weekly and the control group engaged in their normal activity. Multivariate ANOVA, Univariate ANOVA and fishers LSD, were used determine between which groups statically significant differences (P < .05) existed. The experimental group significant differences, greater gains than both the social activity group and control group on arm strength abdominal strength and cardiorespiratory endurance and the experimental and social activity group made greater gains than the control group on speed. It was concluded that the fitness of MMR can be improved through development activities but that the prescription of the specific activities is most critical in the success of such a programme.
Jenkins's\textsuperscript{19} study states that certain factors in mentally retarded individuals can improve. Two groups (N=10) were equated with respect to IQ and chronological age. The experimental group received approximately 1 hour of individual and/or group instruction in selected physical education activities daily for a period of 7 weeks, whereas the control group followed the usual regime of the Denton State School. The basic movements emphasised during the instructional programme of physical education were walking, running, jumping and hopping. Proficiency in the basic movements were measured by means of the following tests: the Health Rail - walking test, the 30 yard dash and the standing broad jump test. The investigator devised an original test to measure proficiency in hopping. The experimental group showed significant improvement in rail walking, broad jumping and hopping, whereas no significant changes occurred in running speed. The motor proficiency of the control group did not change.

McMakin\textsuperscript{20} conducted a study to evaluate the effects of programs of physical activity on mentally retarded children. Three classes selected as random from the primary EMR classes and put one as control, experimental I and experimental II groups was provided a training programme with lesson plans developed by the investigator that consisted activities with cues for left and right. For experimental group II, did the programme which did not stress left and right. All three groups participated in the daily activities. The training programme gave the result that it produced significantly greater improvement in directional skills than did the non-laterality training programme.

Green\textsuperscript{21} conducted a study to investigate the effects of a programme of total body movement upon educable mentally retarded child's ability to understand selected geometric forms. Twenty subjects whose ages ranged from eight to thirteen years and whose IQ ranged from 50 to 75. Programme

\textsuperscript{20}Tansel Bobo McMakin, "Differential Effect of Two Training Programmes on Directional Orientation and Social Development of Educable Mentally Retarded Children" \textit{Dissertation Abstract International} 34:10 (April 1974) : 6431-A.

\textsuperscript{21}Rachel Dean Green, "The Effects of a Program of Total Body Movement Upon the Educable Mentally Retarded Child’s Ability to Understand Selected Geometric Forms, \textit{Dissertation Abstract International} 33:2 (August 1972) : 605-A.
involving total body movement activities which incorporated movements of total body through space, contact skills, bilateral movements, unilateral movements and cross lateral movements and selected geometric form were included in the programme. The result of the study indicated that the total body movement programme did not have a significant effect on the educable mentally retarded child's ability to understand selected geometric forms.

Elord\textsuperscript{22} studied the effects of a sequential and structured perceptual motor training programme on the development of perceptual motor skills as measured by Purdue Perceptual Motor Survey and general behaviour is observed in classroom activities. Subjects selected and divided into groups. The method of research were case study method. The result shows that combined perceptual motor and music programs will improve perceptual motor skills of educable mentally retarded children.

Kuklentz\textsuperscript{23} investigated the effectiveness of a special programme of physical education for educable mentally retarded children in developing selected basic motor skills. This special programme did not require any additional specialized personnel, special equipment, or increased time for physical education. Data were sought on the following question: Are there differences in balance, power, strength, agility and speed between educable mentally retarded students who have a specially designed programme of physical education and those students who do not experience the special programme. The 67 subjects were divided into two groups; the experimental group used a special programme of physical education prepared by the investigator; the control group used the programme designed for pupils of normal intelligence of the same age group. The result of the study revealed that there were significant differences in favor of the experimental group in three of the four tests of balance. The difference in the fourth test was not significant, but was in the same direction as the other three tests of balance. There were significant differences in favor of the experimental

\textsuperscript{23}Paul Edward Kuklentz, "A Study of the Effectiveness of a Specially Designed Programme of Physical Education for Elementary Age Educable Mentally Retarded Pupils", \textit{Dissertation Abstract International} 32:2 (March 1972): 5021A
group on both measures of power. There were no significant difference found on the measure of strength. There were significant differences in favor of the experimental group in both tests of agility. There was a significant difference in favor of the experimental group on the test of speed.

Chavez24 conducted a study to determine if students classified as educable mentally retarded would show significant improvement in agility, power, speed, and strength after participating in one of the three specialized physical education programme. The tests of agility, balance, power, speed and strength were given at the beginning and at the conclusion of a six weeks programme. The t-test for correlated groups was used to determine the significance of mean gains made by each group on tests of agility, balance, power, speed, and strength. An F-ratio was used for comparison of the differences between the posttest means on the composite scores of these groups. The result of the study was: An organized six week physical education programme meeting 30 minutes per day, 5 days a week, that used activities related to agility, balance, power, speed and

24Ricardo Chavez, "Effects of Three physical Education Programme on Selected Physical Fitness Components of Educable Mentally Retardates", Dissertation Abstract International 31:8 (February 1971) : 3929-A.
strength failed to produce significant gains in all these tested components except power. Programme using related activities plus game type activities, for the same length and frequency as in the above conclusion, did not produce significant gains in power. Subjects who participated in the physical education programme which used game type activities showed as much improvement in tested physical fitness components as did the group participating in related activities. There was no significant difference in the relationship of the type of physical education programme participated in with the improvement of grip strength, speed, balance, and agility and power scores combined.

Ebel\textsuperscript{25} was conducted a study to determine what effects a trampoline training programme would have on static and dynamic balance of selected educable mentally retarded children aged fourteen to sixteen years. The population of this study totaled forty two with an experimental group of twenty three and control group of nineteen. IQ of the subjects from 46 to 86, as determined by Stanford Binnet and Wechsler Scales, enrolled in the special education programme

of school district. Three established tests of static balance were used which consisted of: (1) Standing on one foot with eyes open, (2) Standing on one foot with eyes closed, and (3) Standing heel to toe for a specialized time with eyes closed. Two tests were used to discriminate dynamic balance abilities which consisted of: (1) Rail walking on a four inch wide beam, and (2) Rail Walking on a two inch wide beam, both eight feet in length. Pre test and post test were administered to the two groups. The experimental group was given trampoline training in a sequential task routine for approximately thirty minutes a day, five days a week, for a period of six weeks. The programme activities consisted of volleyball, bowling, softball, basketball, social dance and physical activities. The data were analyzed through a t-test and results of the study indicated that both the trampoline training programme and regular training programme were effected in improving the static balance of educable mentally retarded children. Regarding the dynamic balance, results indicated that both trampoline training programme were not effectual in the development of dynamic balance of educable mentally retarded children within the limited duration of this study.
Goodwin 26 conduct a study to determine the effects of a traditional physical education programme and a movement exploration programme on the physical fitness, IQ and Social Maturity of trainable mentally retarded children. Subjects from the opportunity training center for trainable mentally retarded children of public schools were pre and posttested with the Hayden Physical Fitness Test for the mentally retarded, the Peabody Picture Vocabulary Test, and informants (teachers) provided information for the Vineland Social Maturity Scale on each of the thirty three subjects. The subjects were equated in to three groups of eleven each on the basis of chronological age, sex, and result of the pretests. The study was conducted for ten weeks with the two experimental groups meeting thirty minutes a day, five days a week. The experimental groups were exposed to a traditional physical education programme (Group I) which was group oriented, and a movement exploration programme (Group II) where creativity was emphasized, the third group served as control factor, which included the recreational programme. Major findings of the study that significant difference in physical fitness of subjects in favor of the traditional

26 Lane Alden Goodwin, "The Effects of Two Selected Physical Education Programs on Trainable Mentally Retarded Children", *Dissertation Abstract International* 31:8 (February 1971): 3933-A.
physical education programme. There was significant improvement between the pre and posttest mean scores of both experimental groups exposed to the physical education programme in all three variables tested, physical fitness, IQ, and social maturity.

Chasey and Waneen\textsuperscript{27} conducted a study to find out the effects of a physical developmental programme on psychomotor ability of retarded children. The Oseretsky Test of Motor Proficiency were administered to 27 educable mentally handicapped (EMH) children before and after participating in a 15 week physical development programme, and to 20 EMH children not enrolled in the developmental programme. A comparison of pre and post programme performances on the Oseretsky Test, and these improvements resulted in the experimental educable mentally retarded group surpassing the control group on the majority of items of the posttest.

Funk\textsuperscript{28} studied the effects of a physical education programme on the physical fitness and motor development of

\textsuperscript{27}William Chasey and Waneen Wyrick, "Effects of a Physical Developmental Program on Psychomotor Ability of Retarded Children", \textit{American Journal of Mental Deficiency} 75:5 (March 1971) : 576-570.

\textsuperscript{28}Dean C Funk, "Effects of Physical Education on Fitness and Motor Development of Trainable Mentally Retarded Children", \textit{Research Quarterly} 42:1 (March 1971) : 30-34.
trainable mentally retarded (TMR) children, an experimental group of 18 TMR students, ages 8-18 years, were given 30 minutes of planned physical education daily for 58 consecutive school days. The 18 trainable mentally retarded children who served as control had free play or teacher directed recreational activity during this time. On two fitness test items, the shuttle run and sit-ups, the experimental group showed significant improvement. On other fitness items the experimental group did not improve significantly.

Davis\textsuperscript{29} conducted a study to explore the relations between body image boundary and physical fitness in mentally retarded subjects. Subjects had an IQ range of 30 to 78 and age range of 12 to 20 years. The Holtzman Inkblot Test and AAHPER-Kennady Special Fitness Test was used to evaluate the body image boundary and physical fitness status. The result of the study were: In terms of relations between the body image boundary aspects and fitness status, significant relationships between the barrier score and fitness measures were found with both male and female groups for which shuttle

\textsuperscript{29}Ruth Meredith Davis," The Relation between Body Image Boundary and Physical Fitness in Children from a Trainable Program for Mentally Retardates", \textit{Dissertation Abstract International} 31:7 (Jan 1971) : 3316-A.
run and sit-ups were the significantly related tests. The number and extent of relations were not to be conclusive, but study did not support the supposition that a higher level of physical fitness necessarily contribute to the social adjustment of retardates.

Cavanaugh's study on mentally retarded had ten subjects, classified as educable mentally retarded and eight minimally brain damaged children engaged in a 22 week physical education programme consisting of 30 minutes of exercises and 60 minute of vigorous recreational games each day. Both groups showed significant improvement in measures of strength, power, balance, agility, cardiovascular efficiency, coordination and speed of response. Although significant gains were found is all but one measure - a flexibility test - it was noted that least amount of improvement was found in the more complex tasks requiring several different responses.

Owens\textsuperscript{31} studied the effects of a 20 day programme of physical education (1 hour daily) on the intellectual development and social status of eight educable mentally retarded boys. The subjects were compared with the officials group of eight groups (who kept records and rated the training group in an attempt to study the Hawthorn effect) and the control group of eight subjects (who remained in their usual classroom programme). The subjects were attending special day classes, were aged between 16-17 years, and had IQs between 50 and 80 on the Wechsler Intelligence Scale for Children (WISC), the Youth Fitness Test and Cowell Personal Distance Scale were administered before and after the programme. The WISC full scale, verbal scale, and Performance Scale IQ's were analyzed by analysis of variance, and the test of differences between two groups was applied. The training group made significant full scale IQ and verbal scale IQ gain scores over the control group. On Youth Fitness Test every boy in the training group showed improvement on every subtest, and group as a whole made significant gain scores over the officials and the control group.

Summary of Reviewed Literature

The results of review of literature presented support the effectiveness of adapted physical education programmes to develop motor performance and fitness status of mentally retarded children.

The review of literature emphasize the development of physical fitness components as a result of participation in planned and systematic programme of physical education. Studies have indicated positive changes in static and dynamic balance through a non invasive kinesthetic intervention. Specialized physical education programme have brought improvement in various physical fitness components such as strength, speed, agility, balance etc.

The educable mentally retarded subjects have shown to develop physical fitness as well as intellectual development and social status as a result of regular and systematic physical education programmes.

The review of literature supports the proposition that participation in physical development programme will help to improve the psychomotor ability of retarded children.

There seems to be an agreement on the findings of the studies pertaining to effect of adapted physical education programme on fitness variables of mentally retarded children.
The results of a comparison of source materials from the disciplines of special education and physical education to identify operational guidelines for development and implementation of adapted physical education programme for mentally retarded clearly shows that no single theoretical programme model of operation design can be successful if implemented in immediate approach.

There seems to be more of a conflict than agreement among the findings of studies done on the effect of adapted physical programme for mentally retarded. A repetitions of similar studies would be needed to make general conclusions.