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The Motor Performance of the Mentally Retarded

The Olympic Games being held in Montreal this summer will focus the attention of the world on the epitome of skilled movement; in contrast, this paper will examine the less than optimal gross motor performance of persons who are mentally retarded. Adequate motor performance is an important part of the day-to-day life of the mentally retarded; in fact, the long-term health outlook, the opportunities for social interaction, and the prospects for self-supporting vocational opportunities, may all depend on the motor proficiency of the mentally retarded person.

The first section of this paper summarizes some of the conclusions that can be made on the motor proficiency of moderately mentally retarded persons.^{9, 7} In the next section, selected factors that influence the motor development of these retarded persons are discussed, followed by an examination of recent program development trends designed to meet the unique motor learning needs of the retarded. Finally, the paper examines the need for some new research directions that might facilitate the development of more effective physical education programs for children who are mentally retarded.

retardate motor proficiency

The moderately mentally retarded are markedly inferior in physical fitness and gross-motor performance when compared to their non-retarded counterparts; in fact, some studies have indicated that they are two to four years behind in most motor tasks.^{20, 21} The fine-motor proficiency of the moderately retarded is also deficient when compared to non-retarded persons.^{7, 8, 17, 26} The lower the intelligence level or mental age, the greater are the motor proficiency deficits of the

retarded.^{1, 8} The cognitive demands of a motor task increase with task complexity and, as the complexity of a task increases, the motor performance of the moderately retarded decreases.^{11, 15} Greater intra-individual variability and wider individual differences are found in retardate motor performance scores than in the population at large,³⁰ and the mentally retarded are especially sensitive to motivational factors in their motor performance efforts.¹⁸

The above conclusions should be accepted with some caution in that many of the studies were completed on restricted sample sizes in which experiential factors, motivational variables, and psychometric problems, such as floor and ceiling effects were not adequately controlled. Furthermore, few studies of females and young mentally retarded children have been completed.⁷

practice and retardate motor performance

Many studies have emphasized the interaction of constitutional, maturational, environmental, and learning factors in the optimal development of motor performance. In order to understand why the mentally retarded are deficient in motor performance one would have to carefully consider these interacting factors. However, if one accepts as a given that the mentally retarded are deficient to some degree in the constitutional and maturational aspects of the developmental array and if one then concentrates on an examination of selected environmental and learning factors that are sensitive to teacher manipulation, then one may discover that the key question of why the mentally retarded are motorically deficient may not be satisfactorily answered but that new avenues for program development and research may be opened.

Information from a number of different sources indicates that mentally retarded children are less physically active and have fewer opportunities to practice motor skills than non-retarded children. Rarick's and Dobbins' recent study reported significantly higher body fat content and lower physical fitness scores for the wide age-range of mentally retarded children that they measured.²⁰ Widdop focused attention on the lack of physical education programs and the general lack of play opportunities for the mentally retarded.³⁰ The overprotectiveness of some parents and teachers of retarded children also contributes to the problem. An important time period in the development of motor skills is the pre-school years. A number of inherent factors limit the amount of motor practice opportunities available to the

preschool mentally retarded child. Some of these factors are discussed below.

An essential step in learning complex motor skills is the development of an understanding of what one is expected to do in a given perceptual-motor task. Gentile has labelled this early stage of motor-skill acquisition the "getting the idea of the movement" phase.¹² For example, when learning to catch a ball, the learner must correctly perceive the flight of the oncoming ball and then plan a sequence of movement responses that results in catching the ball. Mentally retarded children, by definition, are impaired in their cognitive-verbal abilities; furthermore, recent research has indicated that the mentally retarded have short-term memory deficits and have considerable difficulty in identifying and then attending to the salient features within a stimulus display.^{6, 10, 32} Due to the above limitations, mentally retarded children are handicapped in the important "getting the idea of the movement" phase of skill acquisition. For example, young preschool non-retarded children when learning to catch a ball can observe and use verbal cues from others in "getting the idea" of catching. However, mentally retarded preschool children have difficulty observing the salient features in a catching task and cannot rely to the same extent on verbal teaching cues to develop an understanding of what they are expected to do. Thus, because they cannot adequately model the motor performance of others, from a very young age retarded children are handicapped in the opportunities for practice naturally presented by the environment.

The second factor that limits the practicing of motor skills is an outgrowth of the first. Because preschool retarded children do not readily develop fundamental motor skills, they are limited in the amount of purposeful motoric behavior they exhibit in a play environment. A recent pilot project in the Preschool Play Program for preschool mentally retarded children at the University of Alberta measured the amount of purposeful play behavior exhibited by the children in a free-play environment designed to encourage their active participation.² The results indicated that the mentally retarded children performed much less purposeful motor behavior in comparison with the free play patterns of non-retarded preschool youngsters. Furthermore, a striking preliminary finding, that needs further replication, was the positive relationship between the fundamental motor skill level of the children and the amount of purposeful motor practice time they used a specific piece of equipment. Thus if the children could climb adequately they tended to use the climber; conversely, if they did not know how to slide, they did not practice sliding. Therefore, it was evident that in order to increase the key factor of motor practice time,

the children had to be taught the specific fundamental motor skills that they lacked.

Finally, as mentally retarded children grow older, any deficiency in fundamental motor skills that they may have further limits their motor practice opportunities by preventing them from participating in games and physical activities that are based on these motor skills.

program trends

The factors outlined above must be considered when developing effective physical education programs for moderately mentally retarded children. These factors center on the inability of young retarded children to copy adequately the motor performance of others. This difficulty leads to a lack of motor practice in the natural play environment which culminates in less than adequate motor proficiency in later years. A number of programs have been established to take these problems into account.

- The first trend is the use of task analysis methods to teach directly fundamental motor skills to mentally retarded children. The "I Can" program at the Michigan State University was one of the first to employ task analysis methods to meet the unique motor learning needs of children who are mentally retarded.²⁸ It is based on individualized task sequences of all the fundamental motor skills, e.g. walking, running, jumping, throwing, catching. Task analysis is a method in which any skill is systematically analyzed, and then, for learning purposes, is structured into progressively more difficult performance objectives. The performance objectives clearly describe under what conditions and with what quality the learner must perform a particular skill. A well-structured task analysis ensures that the teacher has developed a learning progression that systematically leads to a specific instructional goal. Criterion-referenced measurement is used throughout the teaching period and this provides a clear record of the passing or failing of each specific sub-skill objective in the progression. An analysis of the pass-fail record of a task sequence shows the teacher where refinements are needed in the progression.

The task analysis method lends itself to the motor learning needs of the mentally retarded in that the teacher can design a task sequence that emphasizes the key features in a sub-skill that the children must attend to in order to perform the selected motor skill adequately. Appropriate verbal or physical-prompting feedback can be given to the children and the teacher can note the exact problem area

in the sequence that requires further refinement. Thus the attentional and short-term memory deficits of the mentally retarded are directly helped by the construction of task sequences that make allowances for these limitations.

- The second trend is a recognition of the importance of starting instructional programs in motor skills for mentally retarded children at as young an age as possible. An example of this is the Preschool Play Program at the University of Alberta in which task analysis methods are used to teach fundamental motor skills to preschool trainable mentally retarded children.² This early intervention and use of a direct teaching method is an attempt to alleviate the motor practice problem that is central to the motor skill deficits of the retarded. The children are taught specific motor skills and are encouraged to use the newly acquired skills in a teacher-guided play environment that is designed to reinforce their practice of motor skills.

- The third major program that must be mentioned is the Special Olympics program for the mentally retarded. It began in 1968 under the auspices of the Kennedy Foundation and has had an extremely positive effect in encouraging mentally retarded children to practice motor skills. The program encourages teachers and volunteer leaders to prepare children for the Games well in advance of the date of competition. Furthermore, the instructional manuals related to the Games are a valuable source of methods and activities suitable for use in physical education programs for the mentally retarded.²⁵

A study by Rarick on selected aspects of the Special Olympics indicated that the use of the instructional manual by leaders was not widespread and the amount of skill practice time available to the children before the meets needed to be increased.¹⁹ The results of the study emphasized the need for improved physical education and recreation programs in order to encourage physical activity among mentally retarded persons of all ages.

The above three program trends are designed to encourage mentally retarded children to learn and practice motor skills. If there is widespread acceptance of the principles underlying these programs, then they should make significant contributions to the improvement of the motor proficiency of moderately mentally retarded children.

research in retardate motor performance

If, as has been suggested earlier in this paper, the mentally retarded require carefully-planned instruction in fundamental motor skills at

a young age, then one of the priority research objectives must be the development, refinement, and evaluation of specific task analysis sequences and their use within planned physical education programs. In order to structure motor task sequences effectively, more information is required on the underlying task factors that must be manipulated to ensure sound motor learning progressions.^{16, 23} Furthermore, new advances in criterion-referenced measurement techniques and their use in program evaluation studies are needed.

Recent motor performance research studies indicate that attentional, short term and long term memory, and feedback mechanisms are important component processes that underlie the acquisition and performance of skilled movement.^{16, 27} Information on the differences in these processes between groups of mentally retarded and non-retarded persons would be valuable in order to develop task analysis sequences and guide the modification of teaching-learning methods that should be employed with the mentally retarded. Therefore, a long-term retardate motor performance research program should be started within a coherent theoretical framework based on human motor performance research studies. Major findings from cognitive-verbal studies with mentally retarded persons should be used to guide this new research effort. Some suggested areas for future retardate motor performance research are presented below.

A short-term memory rehearsal deficit is one of the most clearly established characteristics of retardate cognitive performance.^{6, 10} A number of techniques that permit the isolation of visual, proprioceptive, and verbal inputs, and rehearsal mechanisms within motor short-term memory have been developed by human performance researchers.³¹ Comparable studies on the differences between retarded and non-retarded persons could provide valuable information on the specific motor memory deficiencies of the mentally retarded as well as on the nature of the motor short-term memory process itself.

An important component of skilled motor performance is the ability to perceive an object quickly in a stimulus display so that an adequate motor response can be made within the time constraints of a given task.¹⁶ The mentally retarded have greater difficulty in selecting relevant aspects of a visual stimulus display than their CA-matched counterparts. A similar finding has been found in tactile discrimination tasks.^{5, 32} These findings suggest that it might be worthwhile to investigate variations in the intensity and saliency of different cues within motor performance tasks with the mentally retarded.

The ability to recognize redundancy and efficiently code information from an open environment is an especially important one if the

motor performer is not to be in a continual state of information overload. A number of recent studies have indicated that retardates are less efficient at spontaneously recognizing and using information – reducing aspects of a stimulus presentation to organize their input and thereby aid recall.²⁴ Spitz has cautioned that this deficit was found within a digit recall task and needs further research to be accepted as a general coding deficit. Perhaps those interested in retardate motor performance research could use the paradigm Whiting has employed in his studies of the acquisition of ball skills in order to investigate this retardate cognitive deficit within a motor performance context.²⁹

Berkson, using a choice reaction time paradigm coupled with variations in response complexity, proposed that the complex reaction time deficits of retardates in comparison to normal CA-matched controls might be due to a response initiation deficit which was sensitive to variations in response complexity.⁴ A number of other retardate reaction time studies have implicated response set rigidity as a possible deficit area.^{3, 14} Glencross has presented evidence indicating that reaction time lengthens with increases in response complexity. He has developed a number of experimental techniques that vary the response complexity of motor tasks.¹³ The application of these techniques to the study of retardate performance in motor tasks varying in response complexity should prove to be profitable.

The above suggestions on the future direction of retardate motor performance research have centered on the investigation of differences between retardates and normals in rehearsal functions, attention to the relevant features of a stimulus display, perceptual coding of information, and in motor performance decrements with increases in response complexity. If differences in the functioning of retardates in the above areas are found, then further research into means by which these deficits can be circumvented would be needed.

summary

In summary, mentally retarded persons are deficient in their motor performance. Many interacting factors contribute to this deficiency, but one key area open to teacher intervention is the amount of directed motor practice that is available to the mentally retarded child. Mentally retarded children can learn motor skills when they are taught in a sequential progression that permits them to practice in controlled motor learning situations. New program developments have been established that stimulate mentally retarded children to learn and use fundamental motor skills. These types of programs need to be widely implemented so that many children can benefit from them.

Finally, new research efforts that are based on a sound theoretical framework are needed to develop more effective motor learning methods that will help persons who are mentally retarded to develop their motor skill potential so that they can experience fully the joys of movement.

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