The Possible Effects of Motor Activities on Improving Perceptual Motor Capabilities of Trainable Mentally Retarded Children

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Abstract: Recent literature confirms the effects of motor activities on the formation and reinforcement of movements in the first years of life among mentally retarded children. It is proposed that there is a relationship between formation of movements and improvements in motor-perceptual capabilities and academic achievement. These lead us to the idea that the phenomenon of perception, the role played by motor activities in relation to perception, cognition and organizing adaptive and normal behavior can be recognized as new domains of interest in physical education studies. This investigation was an attempt to explore the effects of motor activities on developing perceptual-motor skills. It used the highly reliable and valid Scale of Motor Capability developed by Lincoln-Oseretsky on a sample of 75 mentally retarded children (aged 9±0.5) from special education schools in West Azerbaijan. Analysis of the data obtained through a quasi-experimental design indicated a significant difference between pretest and posttest mean scores of all mentally retarded children including both males and females in terms of perceptual motor capabilities. In addition, results showed a significant difference in posttest mean scores of mentally retarded (males vs. females) children in terms of perceptual motor capabilities using Sloan Standard Scale. Further analysis of data indicated a significant relationship between academic achievement (male and female) and their perceptual-motor capabilities. Therefore, it was proposed that motor activities may provide suitable situations for mentally retarded children to benefit from their capabilities and develop their perceptual capabilities.

Key words: Mentally retarded %Motor activities %Perceptual-motor capabilities

INTRODUCTION

The vital role played by physical power in learning and its effects on mental power are issues taken into consideration in modern training and education. Modern psychology has shown that physical maturity should not be ignored due to its effects on mentality and personality [1, 2]. Several studies, a good report of which is presented below, have reported significant relationships between motor activities and perceptual motor capabilities. These studies provide considerable evidence that consistent instruction of motor activities and exercises improve mental efficiency which in turn improves academic achievement. This may apply to the mentally retarded individuals whose total harmony of body movement is weak manifested by unbalanced and unstable physical status [3].

The general definition for mentally beardedness refers to a status where the function of one’s mind is under the average level, which, in turn, leads to disorders manifested in terms of adaptive behaviors during growth [3]. The weak physical status of this special cohort calls for considerate attention of trainers as well as physical educators as far as improving mentality as an outcome of physical education is concerned. As far as the physical power of mentally retarded children is concerned, they need to be helped improve their physical fitness, acquired motor capabilities and body mechanics.

As for the positive outcomes of instructing motor activities, Gallahaue and Ozman (2002) [4] found out that acquiring the basic motor abilities is not accidental. They proposed that consistent, continual and high quality instructions as well as purposive exercises must be taken into account. These, in turn, help school children to reach...
appropriate physical and motor fitness. In a similar vein, Barton, Ford and Kirby (2004) [5] reported that growth in terms of cognitive and emotional abilities as well as motor skills enables children to participate in all activities that relate to physical growth and learning basic skills.

Investigating the physical performance of preschoolers and school children, Krombolz (2006) [6] reported that high physical performance depended on several factors such as physical growth, cognitive performance and economic status. In the meantime, environmental factors played a significant role in this regard. Similarly, Young, McDowell and Scarlett (2006) [7] suggested that physical exercises and sport movements had significant effects on motor abilities of children. This is confirmed by Zivcic, Trajkovaski and Stenderdi (2009) [8] who maintained that special physical activities had a remarkable influence on improving physical movements.

Scholars like Sachelhasus and Straub (2008) [9] and Ahnert and Schneider (2005) [10] indicated a significant relationship between acquiring motor skills and academic achievement. They reported that children who improved their basic motor abilities were more successful in terms of learning cognitive concepts.

Delacato (as cited in Attarzade Hosseiny, 1991 [11]) advocating the idea of reinforcing movements introduced motor therapy. He proposed that in order to make students develop a good level of reading, writing and mathematics, one should eliminate the problems of harmony in movement (e.g. directionality) by means of various exercises in neuromuscular movements.

As far as mentally retarded learners are concerned, Kreshner and Marzolf (as cited in Dean, 1976 [12]) found out that a four-month physical activities program had a vital role in improving motor development of trainable mentally retarded students.

Researchers like Ismail, Kephart and Gowell have carried out some studies in this regard. Their reports showed a significant relationship between the academic achievement of students and the test of coordination [13,12]. Singer and Brank (1367) [14] scrutinized the correlation between the perceptual motor and mental capabilities of the sample population (students in grade 3 and 4). The results of this research manifested a significant correlation between two factors mentioned above. Husk and Mac gill (as cited in Edward, 1975 [15]) tested the correlation between perceptual-mental motor abilities and developing reading skill in primary school grade 1 to 3. Among 105 male and 106 female students, they found that the correlation between the balance and reading development of subjects in grade 1 to grade 3 was very low. Similarly, in an attempt to assess, among others, the correlation of some fitness variables with 64 mentally retarded participants’ intellectual disability (ID) levels, body composition, flexibility, balance ability (FT) and motor coordination (TUGT), Guidetti et al. (2010) [16] showed that physical activity improved fitness in adult athletes with ID decreasing health risks. Athletes with lower ID obtained higher performance scores in motor coordination test.

The findings reported so far seem to propose that learning is a kind of developmental and acquired activity. In other words, performing physical activities especially those related to the perceptual-motor abilities in the first years of a child’s life is vital. These activities have significant roles in forming and reinforcing the movements related to the level of perceptual motor abilities in the process of evolution. However, there is a paucity of research as highlighted by Bruce et al. (2012) [17] examining the role played by motor activities among mentally retarded learners. Bruce, Farrow, Raynor, Mann (2012) [17] maintained that the influence of motor skill on perceptual-cognitive and perceptual-motor decision-making has been theorized but not verified empirically. This study is, thus, motivated to determine the possible outcomes of such treatments in an Iranian context, especially the mentally retarded students in the untouched areas like West-Azerbaijan.

**MATERIALS AND METHODS**

**Participants:** 75 (male and female) children were randomly selected from a pool of the mentally retarded students within the age of 9±0.5 who were registered in institutes for special education in West-Azerbaijan. They were selected from Urmia, Khoy, Salmas, Mian-do-ab and Mahabad. Participants’ profile is summarized in Table 1.

**Design:** This study was designed to explore the probable changes in dependent variable (developing the perceptual-motor capabilities) through the independent variable (presenting the motor activities). In other words, this investigation aimed to find out whether taking part in physical activities and sports under the supervision of professional coaches could improve mentally retarded children’s perceptual motor capabilities. Therefore, the most appropriate design seemed to be a quasi-experimental one conducted through some pretest, treatment and posttest procedures.
Table 1: Description of the participants

<table>
<thead>
<tr>
<th>Index Cities</th>
<th>Urmia</th>
<th>Khoy</th>
<th>Salmas</th>
<th>Mian-do-ab</th>
<th>Mahabad</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Frequency</td>
<td>13</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>Percent</td>
<td>28.88</td>
<td>8.88</td>
<td>13.33</td>
<td>22.22</td>
<td>26.66</td>
<td>100</td>
</tr>
<tr>
<td>Female Frequency</td>
<td>11</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Percent</td>
<td>36.66</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>13.34</td>
<td>100</td>
</tr>
<tr>
<td>Total Frequency</td>
<td>24</td>
<td>10</td>
<td>12</td>
<td>13</td>
<td>16</td>
<td>75</td>
</tr>
<tr>
<td>Percent</td>
<td>32</td>
<td>13.33</td>
<td>16</td>
<td>17.33</td>
<td>21.33</td>
<td>100</td>
</tr>
</tbody>
</table>

**Instruments:** The instrument planned to provide data on the possible effects of physical activities on perceptual motor activities was Lincoln-Oseretsky’s scale by Sloan adapted from Naderi and Seif Naraghi (1992) [18]. It is a highly reliable and valid test measuring perceptual-motor capabilities. It consists of 36 items; every level includes 6 sub-tests carried out from simple to the most difficult ones through which every participant is separately tested by the examiner. The reliability scores of the above mentioned test is 0.96 using the split half method based on the Spearman Brown correlation. The test, according to Naderi and Seif Naraghi (1992), had high construct validity and content validity [18].

**Procedure:** The children registered in institutes for special education who scored 50-70 in terms of IQ based on Leiter Scale were selected for this study.

The first step encompassed a pretest of each participant’s perceptual-motor capabilities. Then, the participants were exposed to special motor activities during sports sessions by professional coaches who were provided with the required guidelines by the researcher. The whole training process was about four and a half months. Posttest, as the final stage, was implemented when the treatment was over. Evaluation procedures in both the pretest and posttests were conducted by specialized testers who were well familiar with the procedures. As for the academic achievement, the participants’ Grade Point Average (GPA) was obtained through their records both before and after the treatment.

**RESULTS**

Figures 1 and 2 represent the summary of descriptive data obtained as far as participants’ academic achievement and chronological and intellectual age are concerned.

As Table 2 shows, t test results indicated a significant difference in the mean scores of the perceptual motor capabilities of all participants between the pretest and posttest. In other words, the results showed that presenting motor activities significantly improves perceptual motor capabilities.

Further analysis was carried out in relation to males’ performance in terms of perceptual motor capabilities in the posttest compared to those in the pretest. Table 2 summarizes the outcomes of this comparison where males performed significantly better in the posttest as compared to pretest. This indicates that male participants improved well in terms of perceptual motor capabilities when trained through some physical activities. The same pattern was observed when female participants’ performance was analyzed in the pretest and posttest (Table 2).
Table 2: Independent sample t test: perceptual motor capabilities of all participants (males and females) in the pretest and posttest

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>df</th>
<th>tobs</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants</td>
<td>75</td>
<td>16.38</td>
<td>1.32</td>
<td>74</td>
<td>12.41</td>
<td>0.001</td>
</tr>
<tr>
<td>Males</td>
<td>45</td>
<td>16.86</td>
<td>1.89</td>
<td>44</td>
<td>8.02</td>
<td>0.001</td>
</tr>
<tr>
<td>Females</td>
<td>30</td>
<td>15.66</td>
<td>1.68</td>
<td>29</td>
<td>9.32</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 3: Posttest results: both males and females compared to Sloan’s Standard Scale

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>df</th>
<th>tobs</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>45</td>
<td>51.77</td>
<td>22.98</td>
<td>87</td>
<td>7.55</td>
<td>0.01</td>
</tr>
<tr>
<td>Sloan’s scale*</td>
<td>44</td>
<td>81.39</td>
<td>15.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>30</td>
<td>52.03</td>
<td>20.16</td>
<td>67</td>
<td>3.82</td>
<td>0.01</td>
</tr>
<tr>
<td>Sloan’s scale*</td>
<td>39</td>
<td>67.74</td>
<td>16.91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data are obtained by Sloan (1948) from Lincoln-Oseretsky Test.

Table 4: Dependent sample t test: academic achievement (pretest vs. posttest)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>df</th>
<th>tobs</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants</td>
<td>75</td>
<td>1.29</td>
<td>0.19</td>
<td>74</td>
<td>6.78</td>
<td>0.001</td>
</tr>
</tbody>
</table>

As far as the mean scores of the perceptual-motor capabilities between male and female mentally retarded students as compared to that of Sloan’s Standard Scale is concerned, significant differences were observed between the mean scores of the mentally retarded students and the criterion mean score defined by the Sloan’s test. However, as the mean scores indicated presenting motor activities could make a difference in terms of approaching the criterion level. This trend was observed more among females compared to males (Table 3).

Further analysis of data showed a significant improvement (Table 4) in academic achievement in the posttest as compared to that in the pretest. As shown in Table 4, there was a significant difference in the participants’ academic achievement scores prior to and after treatment. In addition, a significant correlation was observed between the academic achievement and all participants’ perceptual motor capabilities (r=0.21, p<0.05).

DISCUSSION AND CONCLUSION

Taking all the outcomes of the present study into account, the researcher determined a significant difference in the mean scores of the perceptual-motor capabilities of the mentally retarded students (male/female) in pretest and posttest. In other words, all the students having undergone appropriate motor activities improved their perceptual-motor capabilities recognizably. Furthermore, based on the other findings of the research, a significant difference was observed between the mean scores of the students in their academic achievement in the pretest and posttest. In addition, there was a significant correlation between the perceptual-motor capabilities of the subjects and their academic achievement. Therefore, one can conclude that the results of this research and its findings are in accordance with the results of such studies as Delacato (as cited in Attarzade Hosseiny, 1991 [11]), Gallahue and Ozman (2002) [4], Barton et al. (2004) [5], Ahnert and Schneider (2005) [10], Young et al. (2006) [7], Sachelhasus and Straub (2008) [9], Zivcic et al. (2009) [8], Getman (1970) [19], and VanBeurden, Zask, Barnett and Dietrich (2004) [20] who confirmed the positive relationship between physical and mental power. The findings confirm that in order to eradicate all the problems related to harmony in movement utilizing different exercises seem to be of paramount influence. To use Kellman and Garrigan’s (2009) [21] terms, perceptual learning is a fundamental contributor to human expertise and is crucial in domains where humans show remarkable levels of attainment in many fields. This is especially important in the first stages of an individuals’ development. That is to say, the childhood stage is the most important and critical stage when one can develop his motor potentials and mental abilities. This, in turn, leads to stronger talents later in life. Otherwise stated, basically all the perceptual-motor activities are affected by environment. Therefore, if such abilities are not reinforced positively from the environment from the very beginning stages of life, a person will certainly face a lot of problems in his future life.
A probable conclusion may be that planning well established programs in general and presenting appropriate motor activities, more specifically in educational settings [21] related to mentally retarded learners by the professional teachers, can flourish motor perceptual abilities. For example, preschool education can be influential in improving motor capabilities of these children. To sum up, focus on lifetime promotion of physical activity in this specific but rapidly growing population is recommended [22].

REFERENCES