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# THE EFFECTS OF SQUARE – STEPPING EXERCISES ON COGNITIVE SKILLSFOR KINDERGARTEN AGE CHILDREN

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**Abstract**

*Purpose.* Physical activity in kindergarten is a fundamental part of the child's educational process. Body experience and physical activity contribute to encouraging the acquisition of physically active lifestyles. Recent scientific evidence has confirmed the role of physical activity in disease prevention and quality of life improvement. A key priority of scientific research is to identify the opportunities and methods of motor learning and to increase the daily physical activity levels of children by reducing sedentary time and promoting active play. The aim of this study was to explore the effects of square – stepping exercises on cognitive skills in kindergarten age children.

*Methods.* The sample was comprised of 28 kindergarten age children [age, 5.76 ± 0.23 years; height, 122.88 ± 6.08 cm; weight, 28.12 ± 7.19 kg; (mean ± SD)] .Who all members in kindergarten class in Mansoura state (2012). The subjects divided into two groups. The experimental group (n= 18) participated in square – stepping exercises. Three-times weekly. To eight weeks. The control group (n= 10) participated in the traditional program only. All of the participants completed the cognitive skills tests..

*Results.* The data revealed that significant differences between two groups in the cognitive skills of the experimental group.

*Conclusions.* Finally, the findings indicated that the implication of this research for teachers working with square – stepping exercises are that to match the child's preferences.These results have to be taken into account by teachers in order to better understand and implicated of these concepts in movement education lessons.

*Keywords:* square – stepping, cognitive skills, kindergarten.

## Introduction

Kindergarten has changed radically in the last two decades. Children now spend far more time being taught and tested on literacy and math skills than they do learning through play and exploration, exercising their bodies, and using their imaginations. Many kindergartens use highly prescriptive curricula geared to new state standards and linked to standardized tests. In an increasing number of kindergartens, teachers must follow scripts from which they may not deviate. These practices, which are not well grounded in research, violate long-established principles of child development and good teaching. It is increasingly clear that they are compromising both children's health and their long-term prospects for success in school.(Edwards, Raikes, 2002)

Play is essential for all children's healthy development and learning across all ages, domains, and cultures. The play does the following:

- Enables children to make sense of their world
- Develops social and cultural understandings
- Allows children to express their thoughts and feelings
- Fosters flexible and divergent thinking
- Provides opportunities to meet and solve real problems
- Develops language and literacy skills and concepts (Bredekamp, Copple, 1997; Gronlund, 2001)

Kindergarten represent the initial stage of education is characterized by gentle treatment of childhood and directed, as they create, through good early upbringing, the child to receive the following roles to life on a sound basis. The goal of maintaining kindergartens encroachment care and development of the child moral and mental and physical in normal conditions along the family atmosphere and in accordance with the requirements of the Islamic religion. The goal of kindergarten to train the child on motor skills, and practice the correct habits, breeding senses and training to use it, and encourage innovative child activity, and pledged his aesthetic taste, and provide an opportunity for vitality and realize .(Derryberry, Rothbart, 1997)

The kindergarten targeted educational stage no less important than other educational stages as they stage a distinct educational and stand-alone educational philosophy and behavioral objectives and educational psychological and instruction of their own.

It is based targets kindergarten to respect the self-children and their individuality and stimulate their thinking creative independent and encourage them to change, without fear, and care of children physically and familiarize good health habits and help them to live, work and play with others and savor the music, art and the beauty of nature and get them used to sacrifice some of their desires in order to benefit the community.

Kinetic and education as an educational concept in achieving its objectives based on the

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principle of drafting procedural behavioral soft way in the management of the educational process, where you will be able to identify the parameter various renderings of her children through pre-defined criteria.

The child learns in kindergarten through his mental basic principles that will help him to build character and adapt to society, such as the acquisition of good habits, and decision-making, choosing friends, and acquire good values, skills and expertise, and broadening understanding and so on of the things that will help him to refine his character and readiness to enter primary school, kindergarten programs are offered usually thoughtfully under the framework of a specific educational attractions, this course helps build a person's character and can of social harmony, and prepared to become a good citizen. (Afaf, 2010)

In addition to the kindergarten create the appropriate environment for the child to explore his environment and the environment in which live the middle by providing tools and hardware, toys appropriate discovers from behind, his environment and the environment in which they live, and through the use of these devices and tools will undoubtedly has the skills many through experimentation and try, Of course, this will increase the confidence and ability to innovation and experimentation, and provide a kindergarten field of coexistence with others by playing teamwork, and put inside him the spirit of cooperation and solidarity and respect for the property of others, and respect for others, and use of time, in addition to other skills acquired from kindergarten such as nutrition good and hygiene and commitment to the system, and the ability to self-reliance, self-control, and the possibility of express what he feels the child from the pain and hopes and feelings and the ability to speak boldly and freedom and without restrictions.

All of these things combined should be instrumental in building an individual's personality and ability to estimate itself through social adjustment, defying modern developments and the complexity of relationships and the multiplicity of activities in time become the dominant technology is dominant.

In sum, the kindergarten in the Arab world in general, Egypt, especially those still in the role of evolution: It is therefore necessary to intensify efforts and re-examine this main pillar of the pillars of Education, which is a cornerstone in the preparation of a good citizen, and refine aspects of his personality and qualifying for the completion of phases The study that follows the kindergarten stage, the first core and the task that deserves continued support, and follow-up of permanent, you need to careful management, and a high degree of expertise and training, in addition to general culture, and great care to prepare the child prepared to ensure it is to be a good citizen

It is noticeable in the curriculum of kindergartens lack of curriculum and national fixed and definite Educational kinetic or physical despite the presence of 3 servings or weekly intervals dedicated to this aspect motor, but there are local programs based on a range of activities each kindergarten preparing them as it deems appropriate and in accordance to the ability which may lead to uneven capacity of children and do not achieve the requirements of growth and development. There is also a discrepancy between the lists of parameters on these programs from kindergarten to another one in kindergarten, in terms of rehabilitation and training, and appropriate academic preparation for the implementation of such programs . (Stuss, Alexander, 2005).

As studies have shown again the importance of the development aspects of the motor for the child and returns on other aspects of the development of his personality and the launch of its potential and contribute to strengthening the areas of his life cognitive It is noticeable in the curriculum of kindergartens lack of curriculum Educational kinetic or physical despite the existence of quotas or weekly intervals dedicated to the development of this aspect locomotors , but there are local programs based on a range of activities based kinetic all kindergarten preparations have as it deems appropriate and in accordance with its potential, which may lead to uneven capacity of children and do not achieve the requirements of growth and development. There is also a discrepancy between the lists of parameters on these programs from kindergarten to another one in kindergarten, in terms of rehabilitation and training, and appropriate academic preparation for the implementation of such programs.

Social play and peer interaction provide a framework for children to explore their physical and social environments. Conversely, lack of social interaction during childhood has been associated with a variety of social and emotional difficulties including behavior problems, peer rejection, depression, and low self-esteem. (Isenberg, Quisenberry, 2002)

The Square Stepping Exercise or SSE is a low-cost indoor program to improve fitness of the lower extremities developed through the collaborative efforts of researchers in sports medicine, physiology and gerontology from several national universities. It is an exercise method based on solid scientific evidence and its applications include the improvement of mobility in the elderly, enhancement of physical fitness in children, conditioning for athletes and the prevention of lifestyle-related diseases.

Square-stepping Exercise (SSE) is a novel form of exercise and comprises various stepping actions. SSE requires participants to remember step patterns demonstrated by an instructor. Further, the SSE program has 200 stepping patterns, which are organized by the complexity involved in stepping actions. After participants master a pattern, the instructor presents more complex patterns. (Rubinstein, 2006)

Featuring simple square stepping exercises where she is a vertical bar width 1 m numbered from one to four, and there are three levels of it (mild, moderate Advanced

Although, the Square-stepping Exercise (SSE) is very simple exercise and the kindergarten children can practice it , no articles investigated it in the kindergarten , and all articles focused on older persons

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only, Hence, the purpose of this study was to explore the effects of square – stepping exercises on Cognitive skills For kindergarten age children.

**Material and Methods**

**Experimental Approach to the Problem**

Two groups (experimental and control), performed a pre and post training designed intervention in which Primary Test of Cognitive Skills (PTCS). The experimental group practiced 30 minutes per day 5 times a week on the Square-stepping Exercise for eight weeks. The control group continued their normal daily live in kindergarten, while the experimental group completed a Square-stepping Exercise program to see whether this type of exercise modality would have a positive or negative or no effect on Primary Test of Cognitive Skills (PTCS).

**Participants.** The sample was comprised of 28 kindergarten age children [age, 5.76 ± 0.23 years; height, 122.88 ± 6.08 cm; weight, 28.12 ± 7.19 kg; (mean ± SD)] .Who all members in kindergarten class in Mansoura state (2012). The subjects divided into two groups. The experimental group (n= 18) participated in square – stepping exercises. Three - times weekly. To eight weeks. The control group (n= 10) participated in the traditional program only. All of the participants completed the cognitive skills tests.

**Instrumentation**

**Primary Test of Cognitive Skills (PTCS)**

The PTCS measures memory, verbal, spatial, and conceptual abilities. According to Public Law 94-142 (PL 94-142), a discrepancy between ability and achievement can be used as evidence of a learning disability. PTCS can be used with the California Achievement Tests®, Form E (CAT E) or with the Comprehensive Tests of Basic Skills, Fourth Edition (CTBS®/4; 1996) to obtain anticipated achievement information in order to screen for learning disabilities. In addition, as an ability measure, it is useful in screening for giftedness, for evidence of developmental delay, or for planning for the instructional needs of young children (Huttenlocher, Levine, 1990).

The PTCS has four scales.

**Spatial.** Abilities assessed include sequencing and spatial integration. Spatial relationships are tested in the form of sequences or patterns of shapes, and shape transformations.

**Memory.** Abilities assessed include recall of information presented in both spatial and associative formats.

**Concepts.** Spatial and category concepts are tested in the form of categorical and geometric relationships.

**Verbal.** Skills assessed include object naming and syntax comprehension.

**Square – stepping exercises Protocol**

The 8-week in-season training program consisted of three axes.

1. Simple
2. Mild
3. Advanced

**Statistical Analysis**

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference ± 95% confidence intervals (mean difference ± 95% CI). Student's t-test for independent samples was used to determine the differences in parameters between the two groups. The $p<0.05$ was considered as statistically significant.

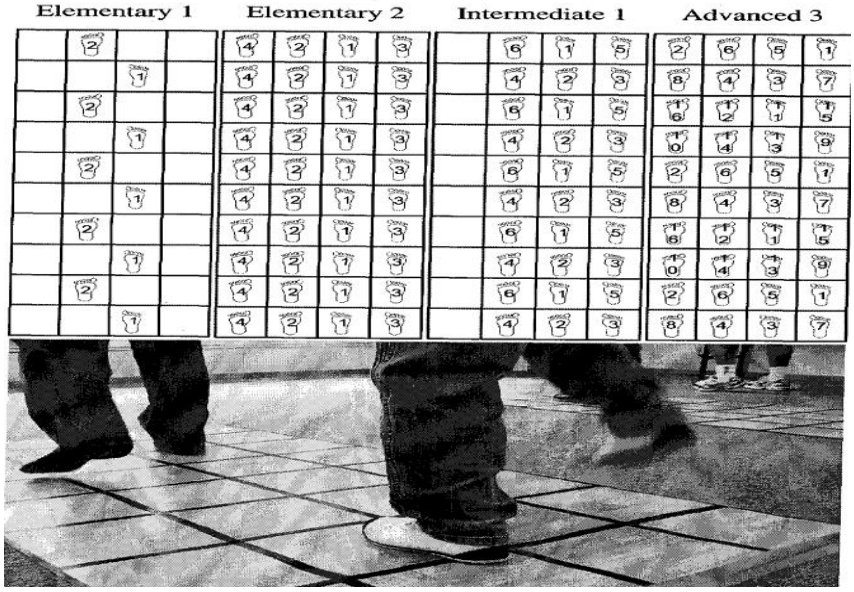


**Fig 1 explain the square – stepping exercises (S. Ryosuke, et al. 2008)**

**Results**

Table 1. Age and anthropometric characteristics of the group (mean ± SD).

| Variables | N | Age [years] | Weight [kg] | Height [cm] |
|---|---|---|---|---|

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| | | | | |
|---|---|---|---|---|
| | **17** | **5.76 ± 0.23** | **28.12 ± 7.19** | **122.88 ± 6.08** |

Table 1 shows the age and anthropometric characteristics of the subjects. No significant differences were observed for the subjects.

Table 2. Primary Test of Cognitive Skills (PTCS) Scores for two groups

| **Variables** | **Control** | | | **Experimental** | | | **T sign between groups** |
|---|---|---|---|---|---|---|---|
| | **Pre** | **Post** | **T sign** | **Pre** | **Post** | **T sign** | |
| **Spatial** | 5.15 ± 0.19 | 5.19± 0.22 | Not sign | 5.19 ± 0.16 | 6.71 ± 0.32 | Sign | Sign |
| **Memory** | 5.39 ± 0.12 | 6.42 ± 0.14 | Not sign | 5.33 ± 0.17 | 6.63 ± 0.44 | Sign | Sign |
| **Concepts** | 6.01 ± 0.22 | 6.07 ± 0.26 | Not sign | 5.08 ± 0.11 | 6.68± 0.51 | Sign | Sign |
| **Verbal** | 6.66 ± 0.55 | 7.23 ± 0.76 | Not sign | 6.59 ± 0.59 | 7.23 ± 0.27 | Sign | Sign |

Data in Table 2 shows that there is a significant difference in overall Primary Test of Cognitive Skills between the pre- and post-training.

**Discussion**

The results of this study showed that the experimental group higher scores than the control group in Cognitive Skills. These results were revealed that Square Stepping Exercise effectively.

Play is how children begin to understand their world. Children develop socialization skills by playing with other children. Play helps children learn to solve problems and to develop the critical thinking skills necessary to ask questions and figure out how things work. Through these activities children continue to strengthen their language development.

The many studies showed a range of educational facts or opinions that emphasizes the importance of childhood in human life, and its impact on the rest of the stages of life, and therefore important to take care of it and which is available from educational activities and experiences in various aspects. The stages of growth experienced by the child is an extension of each other, as demonstrated by these studies link the behavior of adults and their actions childhood experiences and returns many of the personality traits for pre-school.

A child is considered in the modern curriculum is central to all the activities they call him always to activities of self, and develop the element of experimentation and trial-and-discovery, and encourages him to play free, and rejects the principle of compulsion and coercion but rather focuses on the principle of flexibility, creativity and innovation, inclusiveness, and all this requires the existence of educational system is based on The latest What prompted by the results of educational research in the areas of education, sports, psychology, and other fields; where kinetic Education depends on the kinetic potential of natural fungal available through the child's body and called the basic movement.

Developmental research suggests that working memory and attention control undergo rapid development during the preschool years, and have a substantial impact on children's developing "approaches to learning" and corresponding academic achievement (Blair, 2006; Diamond, et al. 2007).). Much of this research has focused on the role that cognitive control capacities, often referred to as executive functions, play in fostering the child's capacity for self-regulated and goal-oriented learning. As a group, executive function skills, including working memory, attention set-shifting and inhibitory control all show substantial development during the preschool years (ages 3-5). Conceptually, these skills enable children to organize their thinking and behavior with increasing flexibility, decrease their reactive responding to contextual cues and contingencies, and engage in self-regulated and rule-governed behavior (Barkley, 2001; Blair, 2006; Blair, Diamond, 2008; Gathercole et al., 2008; Stuss, Alexander, 2005). By promoting children's capacity to inhibit prepotent or impulsive responses and choose alternative responses, these cognitive control capacities enable children to regulate the emotions that motivate and inform their exploration of their physical and social worlds (Derryberry, Rothbart, 1997; Kochanska, et al. 2000). Developmental researchers have postulated that executive function skills, particularly working memory and attention control, thus facilitate school readiness and early learning by supporting behavioral self-regulatory capacities and social competence (Blair, 2002; Hughes, Ensor, 2007), and by fostering children's capacities to engage more effectively with teachers and peers in classroom learning activities (Hamre, Pianta, 2005; Ladd, et al.1999; Gathercole et al., 2008).

The SSE program has multi stepping patterns, which are organized by the complexity involved in stepping actions. Therefore, children need to remember patterns and to execute the steps quickly and correctly on the basis of their recall. This implies that SSE can improve functional fitness of the lower extremities. (Silsupadol, et al. 2009)

Square Stepping Exercise can be useful to a wide range of people from children to the elderly. Here are just some of the feedback we've received from both beginners who have experienced SSE for the first time and experienced practitioners who have continued the exercise for many years.

Shigematsu et al., 2008 indicated that square stepping exercise is a more useful exercise program

than regular walking for older adults; thus, it may serve as a new form of exercise to prevent falls.

**Conclusion**

The findings of this study indicated that Square Stepping Exercise are related to cognitive skills. Kindergarten teachers working with children need to take these factors into account when preparing for physical education class.

**References**

Afaf, O.. 2010, Glossary of educational knowledge in curriculum and teaching methods, the world of books, Cairo.

Barkley, R.A., 2001, The EF and self-regulation: An evolutionary neuropsychological perspective. Neuro-psychology Review. 11:1–29.

Blair, C., Diamond, A., 2008, Biological processes in prevention and intervention: Promotion of self-regulation and the prevention of early school failure. Development and Psychopathology.20:899–911.

Blair, C., 2002, School readiness.American Psychologist. 57:111–127.

Blair, C., 2006, How similar are fluid cognition and general intelligence? A developmental Neuroscience perspective on fluid cognition as an aspect of human cognitive ability.Behavioral and Brain Sciences. 29:109–125.

Bredekamp, S., Copple, C., 1997, Developmentally appropriate practice in early childhood programs. Washington, DC: NAEYC.

Derryberry, D., Rothbart, M.K., 1997, Reactive and effortful processes in the organization of temperament. Development and Psychopathology. 9:633–652.

Diamond, A., Barnett, S., Thomas, J. Et al., 2007, Executive function can be improved in preschoolers by regular classroom teachers. Science. 318:1387–1388.

Edwards, C., Raikes, H., 2002, Extending the dance: Relationship-based approaches to infant/toddler care and education. Young Children, 57 (4), 10-17.

Gathercole, S.E., Alloway, T.P., Kirkwood, H.J. et al., 2008, Attentional and executive function behaviours in children with poor working memory. Learning and individual differences. 18:214–223.

Gronlund, G., 2001, Rigorous academics in preschool and kindergarten? Yes! Let me tell you how. Young Children (NAEYC) 56, no. 2: 42-45.

Hamre, B., Pianta, R., 2005, Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? Child Development. 76:949–967.

Hughes, C., Ensor, R., 2007, Executive function and theory of mind: Predictive relations from ages 2 to 4. Developmental Psychology. 43:1447–1459.

Huttenlocher, J., Levine, S.C., 1990, Primary Test of Cognitive Skills: Norms book. Monterey, CA: CTB/McGraw Hill

Isenberg, J.P., Quisenberry, N., 2002, Play: Essential for all children. Childhood Education, 79 (1), 33-39.

Johnson, C., Ironsmith, M., Snow, C. Et al., 2000, Peer acceptance and social adjustment in preschool and kindergarten. Early Childhood Education Journal, 27 (4), 207-212.

Kochanska, G., Murray, K.T., Harlan, E.T., 2000, Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. Developmental Psychology. 36:220–232.

Ladd, G., Birch, S., Buhs, E., 1999, Children's social and scholastic lives in kindergarten: Related spheres of influence? Child Development. 70:1373–1400.

Ryosuke, S., Tomohiro, O., Masaki, N. Et al., 2008, Square – stepping exercises and fall risk factors in older adults: a single blind , randomized controlled trial, journal of gerontology, vol.63, no.1, 76-82

Rubinstein, L.Z., 2006, Fall in older people: epidemiology, risk factors and strategies for prevention. Age and Ageing 2006; 35-S2: ii37–ii41.

Shigematsu, R., Okura, T., Nakagaichi, M. et al., 2008,
Square-Stepping Exercise and Fall Risk Factors in Older Adults: A Single-Blind, Randomized Controlled Trial, Journal of Gerontology, 63A:1, 76-82.

Silsupadol, P. et al., 2009, Effects of single-task versus dual-task training on balance performance in older adults: A double-blind, randomized controlled trial. Archives of Physical Medicine & Rehabilitation, 90, 3, 381–387.

Stuss, D.T., Alexander, M.P., 2005, Does damage to the frontal lobes produce impairment in memory? Current Directions in Psychological Science. 14:84–88