

## Effect of Ballet Program on Rhythmic Recognition in Elderly

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**Abstract:** The degenerative changes in old people associated with physical activity and exercise decline lead to the reduction of working capabilities and levels of physical activities. The movements along with music have been promote to improve the ability of movements, reduce stress, promote physical fitness and improve social interaction in elderly. The aim of the research was to investigate the effects of ballet on rhythmic recognition in 8 weeks participation of elderly. Twenty healthy elderly participants were recruited in this research. The basic ballet program was modified and approved by expertise. The program was conducted one and a half hour/session, 3 sessions a week. Rhythmic recognition test were collected by researcher who were dance teachers. The checklist's evaluation was divided into 2 aspects, body movement skill and aesthetics with a 5-point Likert scale. The observation for rhythmic recognition had divided into 3 times during the 8 weeks of the participation. The first observation had obtained at the beginning of the training session. The second observation had obtained on the last day of the 4th week. Then, the last observation had done on the last day of the training session. The results revealed that the repeated measures ANOVA presented the statistically significant improvement of all rhythmic recognition's scores. The rhythmic recognition's score was significantly higher in both aspects when comparing between the 1st and 8th week and between the 4th and 8th week. The present finding suggested that ballet program could be suitable and help improving rhythmic recognition in elderly.

**Key words:** Elderly, ballet, rhythmic recognition, body movement skill, aesthetics, session

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### INTRODUCTION

Thailand is becoming the aging society in the next 7-8 years, since, the rate of birth gradually declines. The census which had been surveyed in 2013 by the Ministry of Social Development and Human Security, reported that the rate of old population had been continuously increasing and becoming the complete aging society in 2030 (Anonymous, 2009). Progressive physiological changes in the elderly associated with physical activity and exercise have been researched. The degenerative changes in old people lead to the reduction of working capabilities and levels of physical activities (Chodzko-Zajko *et al.*, 2009; Nigam *et al.*, 2012; Tudor-Locke *et al.*, 2013). The beneficial of physical activity has been found in several research. This plays a major role in decreasing the rate of the incidences of injuries in daily living and maintaining physical activity in old people (Lips *et al.*, 2001; Wong *et al.*, 2003; Tanaka *et al.*, 2004). Since, people grow older, degenerative changes occur in several aspects including

psychological aspect. Therefore, physical activity and exercise should be promoted. These would help increase in both physical and psychological performances. In addition, it would help improve confidence in old people and make them realize that they are not burden of the family.

There are a wide variety of exercise to strengthen the muscles, especially lower extremities' muscles which could improve the ability of movements in elderly. The suitable movement programs for elderly are based on the same paradigm; continuous, low impact exercise with duration at least 20 min, 3-5 times per week (American College of Sports Medicine, 2014). The movements along with music such as dance generally focus on balance control while moving in any directions. Dance is usually group practice that helps promote both physical and psychological health and wellness. Elderly could practice to correctly improve position, respond to sound and rhythms and apply to movements in activity of daily living. Dance is a form of aerobic exercise that require no special equipment and can perform anywhere. It is an ideal

exercise to reduce stress, promote physical fitness and improve social interaction. There are several benefits of dance such as neuromuscular coordination improvement, cholesterol, BMI and hypertension reduction, blood sugar control, circulation improvement, muscular strengthening, posture and balance control (Shigematsu *et al.*, 2002; Kreutz, 2008; Hui *et al.*, 2009; Murrock *et al.*, 2009; Murrock and Garry, 2010). There were solid evidences indicated the application of dance to promote health and wellness in elderly and patients for stimulating thinking process, visual and auditory sensation and music recognition (Kim *et al.*, 2003; Brown *et al.*, 2005; Hokkanen *et al.*, 2008; Kettenstroth *et al.*, 2010). The changes of whole body position make the center of gravity to move to any directions from one to another axis. Body has to move and create new base of support to prevent falling. This is the preventive mechanism from injuries. Developing these factors help improving the efficiency of balance. Dance is an activity that requires large joint movements in dynamic situation and muscle strength in both static and dynamic situations. Moreover, it is enjoyable and creates social reaction (Connor, 2000; Wikstrom, 2004; Lima and Vieira, 2007). The objective of the study was to investigate the effect of 8 weeks of ballet program training on rhythmic recognition in elderly.

**Literature review:** Dance is one of the systematic, natural and beautiful body expression. It is widely called body language to express human sensation and emotion. Dance usually performs along with rhythmic instrument to determine body movements. Ballet is a unique art form which lets the dancers tell a story, express the feelings and communicate emotions through dancing without dialouge. The history of ballet had taken place in the courts of the monarchy and popularly performed until present. It requires musculoskeletal coordination with efficient balance, strength and flexibility from head, shoulders, trunk and extremities (Anonymous, 2001; Thiesen and Sumiya, 2011). Maintaining the center of gravity over the small base of support is required for accelerating the body in any given direction such as support body weight on tiptoe (the en pointe) or spinning on one foot while the raised foot touching the knee of the supporting leg (the pirouette) (Lin *et al.* 2011; Cicchella and Caminiti, 2015). There are several beneficial of ballet dance, for example, strengthening muscles from repetitive movements, increasing balance, enhancing good body alignment. Moreover, it can help improve psychosocial factors such as enhancing intercommunication and good emotion. It has been modified to be physical activities or dance therapy for a while (Anonymous, 2001).

Body movement skill and rhythm refer to the process and ability in controlling the body and mind by using the body as a media to express the creativity, emotion and interpretation. The repetitive movements, combined with rhythm, generate the capability to control muscles to move the body segment. In addition, the combination between body movement skill and rhythm is regularly used as physical activities which the body and mind have response by physical and emotional expression to relieve stress, improve common skill for activities in daily living (Dolman, 1992).

## MATERIALS AND METHODS

**Participants:** Twenty healthy elderly with age of  $64.7 \pm 3.39$  years, weight of  $58.58 \pm 13.01$  kg and height of  $156.15 \pm 6.27$  cm who were between 60-69 years old had no balance deficiency, peripheral neuropathy, pain, arthritis or injuries of lower extremities or unilateral lower extremity pain  $>3$  on the 11 point visual analog scale prior and during participating in the program were volunteered into the study. Estimated sample size was calculated by using G\*power 3.0.10 with medium effect size ( $d = 0.5$ ),  $\alpha = 0.05$  and power analysis = 0.80. This study received ethics clearance from the Burapha University Ethical Committee prior to participant recruitment. All participants were informed about the purposes, procedures and advantages of the study including inclusion and exclusion criteria, then, the consent forms were signed prior to starting the experimental procedures.

**Measurement:** A rhythmic recognition's evaluation was divided into 2 aspects, body movement skill aspect and aesthetic aspect for the researcher's observation. Each aspect consisted of 4 checklists with a 5-point Likert scale. The Likert scale of body movement skill aspect was: the participant can perform correctly throughout the session, the participant can perform correctly 70% of the session, the participant can perform correctly 50% of the session, the participant can perform correctly  $>50\%$  and the participant cannot control movement or balance. For aesthetic aspect, the Likert scale was the participant can continuously and correctly perform with enjoyable, the participant can perform continuously with a little error and enjoyable, the participant can perform continuously with 50% error and enjoyable, the participant can perform continuously with  $<50\%$  error and a little lack of confident and the participant cannot perform continuously with lack of confident.

The basic ballet program in this research had been developed by ballet teachers based on the modified course for elderly including arm movements (En avant, En

haut), squat in “v” position, leg movements (marching, heel raise, one leg standing). The program was verified by expertise, ballet dancer, medical professional and sport scientist. The program divided into 3 parts, warm-up, dance and cool down. The program was conducted one and a half hour/session, 3 sessions a week for 8 weeks to find out the change in rhythmic recognition’s aspects of the participants. The observation for rhythmic recognition had divided into 3 times during the 8 weeks of the participation. The first observation had obtained at the beginning of the training session. The second observation had obtained on the last day of the 4th week. Then, the last observation had done on the last day of the training session.

**Statistical analysis:** The descriptive mean and standard deviation of general characteristics such as age, body weight and body height and Body Mass Index (BMI) were calculated. The repeated measures ANOVA was used to determine if there was significantly different ( $p < 0.05$ ) between the 1st, 4th and 8th week of participating in the basic ballet training program. A Bonferroni post hoc test was conducted between periods. All statistical analyses were conducted using statistical software analysis.

**RESULTS AND DISCUSSION**

This research’s objective of the study was to investigate the effect of 8 weeks of ballet program training on rhythmic recognition in elderly. Three males and eighteen females who got along with the inclusion criteria, had participated in the research. A participant was excluded from the study, since, he showed the sign of neurological impairment due to chronic alcoholism. Table 1 summarizes the characteristics of the participants. The mean and standard deviation of the general characteristics of the participants were presented.

In rhythmic recognition’s evaluation was divided into 2 aspects, body movement skill aspect and aesthetic aspect. The mean and standard deviation of the changes in recognition was collected before (the 1st week) during (the 4th week) and after (the 8th week) participating in the basic ballet program. The repeated measures ANOVA revealed significant difference of the body movement skill aspect ( $p < 0.01$ ,  $ES = 0.614$ ) and significant differences of the aesthetic aspects ( $p < 0.01$ ,  $ES = 0.892$ ) between the 1st

and 8th week and 4th week and 8th week. No significant difference had been found between the 1st and 4th week (Table 2 and Fig. 1).

The aim of this research was to investigate the effect of 8 weeks of ballet program training on rhythmic recognition in elderly. The results revealed that the participant’s recognitions, both body movement skill and aesthetics had been improved throughout the 8 weeks of basic ballet program, especially, between the 4th and 8th week. Dance movement, a complex sensorimotor rhythmic activities integrating physical, cognitive and social components have recently used as a therapeutic intervention for physical and psychosocial benefits. The recall of sequences of dance movement is enhanced for structured compared to unstructured sequences and appeared to have enhanced encoding of movement items in general. When performing dance, the combination between positions and stepping which correspond with beats of music to organize the movement along with the rhythm to repeat the pattern of movement in space. Rhythm is a pace that influences on the brain which control all systems of the human body. It usually uses for stimulating brain functions and applies in wide variety of lifespan. There several beneficial of the rhythm are easy to access, stimulating brain, improving both physical and psychological health, promoting social interaction. The cognitive tasks are always easier when the melody is playing and when to move. Perception, memory and motor skills could be improved by the integration between visual system with spatial memory and rhythm while dancing (Brown *et al.*, 2005). Rhythm can adding enjoyable to almost any kind of physical activity assists sequential coordination. More specifically, music helps an individual

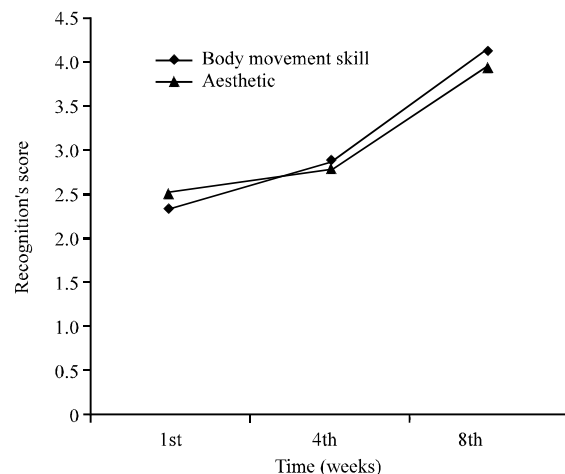


Fig. 1: The rhythmic recognition’s scores in the 1st, 4th and 8th week of basic ballet program’s participation

Table 1: General characteristics of the participants

Variables	$\bar{x}$	SD
Age (years)	064.7	03.39
Body weight (kg)	058.58	13.01
Body height (cm)	156.15	06.27
BMI (kg/m <sup>2</sup> )	023.89	04.40

Table 2: The comparison of the rhythmic recognition between the 1st, 4th and 8th week of basic ballet program's participation

Rhythmic recognition	1st week	4th week	8th week	F-values
Total body movement skills	2.50+0.45	2.79+0.85	3.94+0.42	30.278*
Balance	2.55+0.60	2.85+0.99	3.70+0.47	12.424*
Weight transfer	2.35+0.59	2.75+1.07	3.70+0.57	17.597*
Body control	2.25+0.64	2.75+0.72	4.20+0.62	44.214*
Body coordination	2.85+0.37	2.80+1.06	4.15+0.67	19.164*
Total aesthetic skills	2.36+0.42	2.86+0.93	4.13+0.70	34.206*
Dancing posture	2.40+0.68	2.95+0.94	4.05+0.83	20.819*
Rhythm and posture	2.15+0.67	2.80+1.11	3.90+0.85	24.745*
Enjoyment	2.85+0.37	3.15+1.04	4.30+0.57	21.648*
Space utilization	2.05+0.39	2.55+0.99	4.25+0.85	44.333

\*\*p<0.01 level

anticipate, select, initiate, coordinate and maintain movement (Scott, 2008). It reduces perceived rate of exertion and effort and increases psychological arousal all while making the time fly (Sacks, 2007; Harmon and Kravitz, 2007). Several studies established that musical exercise led to improved cognitive function both in residents of long-term care facilities and in patient with or without dementia (Hagen *et al.*, 2003; Cevasco and Grant, 2003; Van de Winckel *et al.*, 2004). In addition, dance with musical rhythm is fundamentally a social activity that promote social engagement in older people (Fratiglioni *et al.*, 2004; Keyani *et al.*, 2005). The social benefits of basic ballet class participation for a period of time enhance physical sharing space, accepting individual differences, increase in communication skills and development creativity. The sedentary elderly who usually spend more time alone in their space, step outside to the community for participating in the activities which could help them promoting better quality of life, both physical and mental aspects.

### CONCLUSION

In summary, the basic ballet program, modified from the complex classical movement pattern to be suitable for the elderly, could improve the rhythmic recognitions. On the basis of the results of this research, the significant differences were found after participating in the program. Although, the body movement aspect might take longer time to find the change than the aesthetics. The present finding suggested that ballet program could help improving the rhythmic recognitions.

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