Journal of Physical Education and Sport ® (JPES), 18 Supplement issue 5, Art 314, pp. 2092 - 2096, 2018
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Paneurhythmy as a method of physical education in university sports classes

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Published online: November 30, 2018
(Accepted for publication November 20, 2018)
DOI:10.7752/jpes.2018.s5314

Abstract:
Paneurhythmy gymnastics is a method of physical education and a social physical activity for all. Our purpose is to prove that Paneurhythmy is applicable for the physical education classes of university students for the improvement of physical activity and physical fitness in the context of the EU competence approach for skills for life. Methods: literature research, observation, and psychological questionnaires and physical tests administered in the beginning and at the end of the experiment and processed statistically (Spss19). The experiment was carried out in February-June 2013 with 38 university students divided in an experimental and control groups during their physical education classes. Results: In the beginning of the experiment the two groups are homogeneous and there is no significant difference between them in any of the test items. At the end, the comparative analysis of the dependent samples gives significant changes for the items dynamic balance, shuttle running and tapping tests in both groups, as well as for sit ups and static balance in the experimental group only. The analysis of the independent samples proves that there is significant difference (α 0,001) between the experimental and control groups for balance, speed and agility (items Dynamic balance, Shuttle running and Tapping tests) in favor of the experimental group. We conclude that Paneurhythmy may be included in the physical education classes of students in view of offering greater diversity, competence-based learning approach and interesting forms of exercising.
Key words: Paneurhythmy, competence approach, physical education, university sport, functional movements.

Introduction

European policies for a competence based approach in education require that all disciplines at all levels provide skills and competences for the students' life after graduation. Physical education classes can contribute to the development of health-preserving, social, communicative and interdisciplinary skills. University sport classes need a wider variety of physical activities, applicable in life at all ages. *Paneurhythmy* is a health-enhancing physical activity created in Bulgaria in the 1930-ies by Beinsa Douno (PeterDeunov) (1844-1944) - philosopher, theologian, violin player, composer, healer, and founder of a Christian doctrine for a life in harmony with nature. It is performed in the open, in pairs, in group forming geometrical patters (mostly circle). Paneurhythmy contains three parts, 70 minutes, of which Part I may be practiced independently and contains 28 exercises with pauses between them, 50 minutes.

As a method of physical education Paneurhythmy is a structured rhythmic gymnastics in walking, combining physical with mental activity, simultaneously moving the whole body in the rhythm of music and concentrating on a concept. Paneurhythmy is a social, non-competitive, health-related and interdisciplinary physical activity and it is suitable for all ages. Recently some universities take interest in it as a Bulgarian heritage. Three conferences were co-organized by *Paneurhythmy Research and Application Institute* and *Vassil Levski* National Sports Academy in Sofia in 2001, 2003 and 2005 and three PhD thesis were defended (Daskalova-Yankova, 2011; Chervenkova, 2012; Pandulcheva, 2015).

Purpose

Our study aims to prove that Paneurhythmy is a method of physical education, applicable in the physical education classes of university students for the improvement of their physical activity and physical fitness. The experiment was carried out in February-June 2013 with 38 university students, 1st and 2nd grade, split in an experimental (E) and control (C) groups, practicing sports. The experimental group consisted of volunteers who choose to take Paneurhythmy exercises only. The control grup had their regular university classes of sport for non-specialists.

Methods

We have used literature research, observation, psychological questionnaires (GSE, SES, THS, SWLS, PANAS), BMI and physical tests. The physical tests applied to test dynamic balance (Walking in a figure of eight test by Johansson and Jarnlo, Frandin et al in Chervencova (2012, 2013)), static balance (Single leg stance test by Clark in Chervencova (2012, 2013)), speed of reaction (Tappins test), agility (Sit and reach test), power

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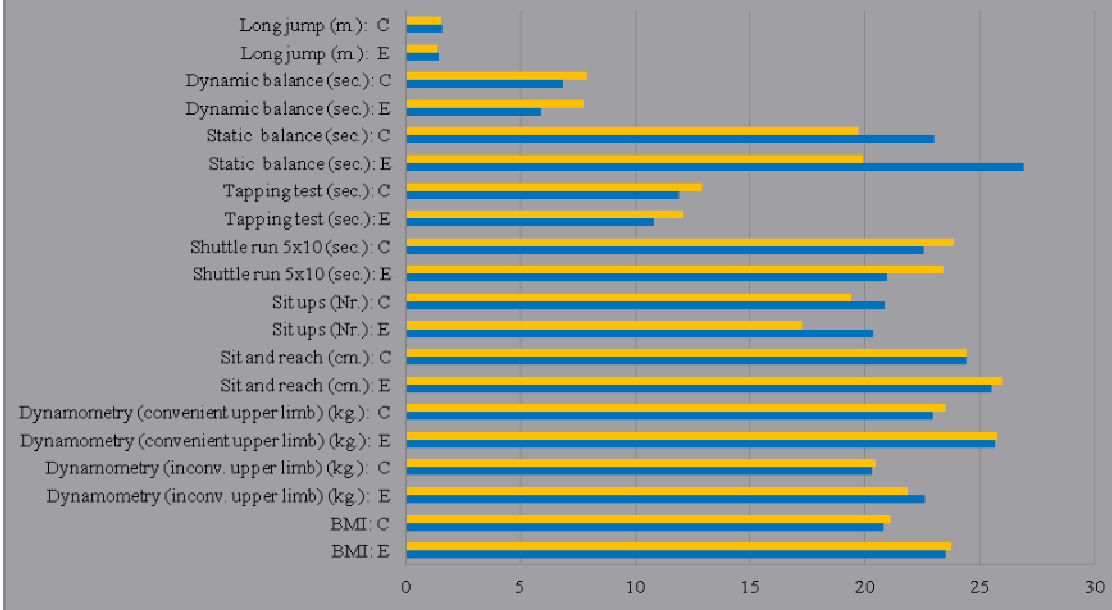
of lower limbs (Long jump test), strength of upper limbs (hand grip Dynamometry), strength and endurance of the trunk muscles (Sit-ups test), speed and agility (Shuttle running 10x5 test) for which we have used the Eurofit battery. All the tests were applied before and after the experiment and the results were processed for validity with SPSS19.

Results

Before the experiment the comparative analysis of the independent samples using Mann–Whitney U test for non-parametric data and Student's t test for parametric data proves that there is no significant difference between the experimental and control in any of the psychological and physical test items (P(t)□ 95%).

The initial comparison of the average values of the first and second testing of the experimental and control groups shows higher average values in both groups for the items where the higher value is better (Static Balance, Sit-ups, Long jump) and lower average values for the items, where the lower value is better (Dynamic balance, Shuttle run, Tapping test). The average values of the second test are better for Dynamometry of inconvenient upper limb of the experimental group and Dynamometry of convenient upper limp for the control group. At the same time, the average values of the second test are worse for Dynamometry of convenient hand for the experimental group and Dynamometry for inconvenient hand of the control group, although that is insignificant within the statistical error. The same is valid for the average values of the Sit and reach test of the experimental group. The average values for Sit and reach of the control group are identical in both tests. The graphic representation of the average values of the items is displayed in Fig.1

Fig.1 Average values of the physical tests results before and after the experiment for the Experimental (E) and Control (C) groups



	BMI: E	BMI: C	Dynamometry (inconv. upper limb) (kg.): E	Dynamometry (inconv. upper limb) (kg.): C	Dynamometry (convenient upper limb) (kg.): E	Dynamometry (convenient upper limb) (kg.): C	Sit and reach (cm.): E	Sit and reach (cm.): C	Sit ups (Nr.): E	Sit ups (Nr.): C	Shuttle run 5x10 (sec.): E	Shuttle run 5x10 (sec.): C	Tapping test (sec.): E	Tapping test (sec.): C	Static balance (sec.): E	Static balance (sec.): C	Dynamic balance (sec.): E	Dynamic balance (sec.): C	Long jump (m.): E	Long jump (m.): C
Before	23.75	21.1	21.89	20.47	25.79	23.53	26	24.42	17.26	19.42	23.42	23.85	12.08	12.92	19.93	19.73	7.72	7.89	1.39	1.52
After	23.52	20.8	22.63	20.32	25.68	22.95	25.53	24.42	20.37	20.89	20.97	22.57	10.78	11.91	26.92	23.03	5.9	6.83	1.45	1.57

At the end of the experiment the results from the analysis of the dependent samples of the psychological questionnaires show significant improvement for the items THS (hope) and PANS (positive emotions) in the experimental group. However the analysis of the independent samples in the psychological tests do not show significant difference between the groups.

At the end of the experiment the comparative analysis of the dependent samples using Wilcoxon signed-rank test for non-parametric data and Student's t test for parametric data gives significant changes in both experimental and control groups for dynamic balance, shuttle running and tapping tests; as well as for sit ups and static balance in the experimental group. We also find a tendency for significant change in the Long jump test item (P(t) 94.50).

The analysis of the independent samples using Student's t test for parametric data and Mann–Whitney U test for nonparametric data proves that there is significant difference (α 0,001) between the experimental and control groups for balance, speed and agility (items Dynamic balance, Shuttle running and Tapping tests) in favor of the experimental group (Table 1 and 2).

Table 1. Dynamic balance and Tapping tests
Significance of the difference between the E and C groups (independent samples) Mann–Whitney U test

Items	Test	Experimental group			Control group			Mann–Whitney U	Wilcoxon W	Z	α	P(t) %
		n	Average rank	Sum of ranks	n	Average rank	Sum of ranks					
Dynamic balance (seconds)	1st	19	17,55	333,50	17	19,56	332,50	143,50	333,50	-0,57	0,568	43,20
	2nd	19	13,13	249,50	17	24,50	416,50	59,50	249,50	-3,23	**0,001**	**99,90**
Tapping test (seconds)	1st	16	15,88	254	19	19,79	376	118,00	254	-1,126	0,260	74,00
	2nd	16	12,38	198	19	22,74	432	62,00	198	-2,981	**0,003**	**99,70**

Table 2. Shuttle running test
Significance of the difference between the E and C groups (independent samples) Student's t test

Item	Test	Experimental			Control			Difference	t	α	P(t)
		n	$\bar{X}$	S	n	$\bar{X}$	S				
Shuttle running (50 m) (seconds)	1st	19	23,42	1,53	19	23,85	2,02	-0,43	-0,74	0,463	53,70
	2nd	19	20,97	0,92	19	22,57	1,73	-1,60	-3,56	**0,001**	**99,90**

Discussion.

The significant improvement in several physical test items in the dependent samples of both groups is related to the increased physical activity of students in the second semester of the academic year as we move from winter to summer. The study process in the physical education classes does not allow for the achievement of cumulative training effect since the period between the training sessions is big and to improve functional skills we need to add extracurricular activities (Bachvarov, 2000; Kostov, Nemigenchev & Zlatev, 2007). Nevertheless our study shows positive changes and significant difference between experimental and control groups in favour of the experimental group for the three of the physical test items. The change is due to the method of physical education applied, Paneurhythmy. To this success has contributed the corrected methods of teaching by intensifying the physical activity workload, in comparison to a preliminary experiment with lower intensity and greater focus on the interdisciplinary aspects of Paneurhythmy when there was no significant difference (Pandulchev, 2012). The preliminary experiment used only 13 exercises, while here we used almost all of the first 28 exercises to intensify the physical activity workload. We also paid special attention to the motivation for additional extracurricular training of the students by providing hand-outs with the warming up exercises, the first 10 Paneurhythmy exercises and also asked the students to practice the Paneurhythmy stepping pattern.

The findings in our experiment are confirmed by two extensive studies over longer periods and for different populations. Chervenkova (2012, 2013) finds significant positive changes in adults training Paneurhythmy 1-2 times a week for 5-6 months for static balance, dynamic functional balance and general mobility and strength endurance of some muscle groups. Yankova-Dimitrova (2011, 2018) finds significant positive changes in the movement-coordination and general physical fitness and endurance of primary education pupils engaged in "Healthy by exercising in nature" programme with the practice of Paneurhythmy for a period of several years. Both studies prove a complex correlation between the physical fitness and various psychological and social test items. In our study the psychological questionnaires administered were kindly provided in Bulgarian by Chervencova (GSE, SES, THS, SWLS, PANAS). However the short duration of the training, the age of our subjects (1st and 2nd grade students) as well as the time frame context – a positive change from the cold and darker winter months to spring and summer, did not contribute to significant changes in the independent samples of our test items, although we find significant improvement for the items THS (hope) and PANS (positive emotions) in the dependent samples of the experimental group.

Health-enhancing physical activity is defined as such an activity which added to baseline activity (light-intensity activities of daily life) produces health benefits and brisk walking, dancing and doing yoga are some examples (PAGA, 2008, p. 2; WHO, 2010, p. 52). According to Neiman (1998) the main goal of physical activity is to achieve good health which implies a condition of physical fitness with "sufficient energy and vitality to accomplish daily tasks and active recreational pursuits without undue fatigue" (Neiman, 1998, p. 4).

Physical fitness has two main components. Health-related fitness includes cardiorespiratory fitness, musculoskeletal fitness (flexibility, muscular strength and endurance) and body composition (body fat) (Jackson, Morrow, Hill & Dishman, 1999; Neiman, 1998). Skill-related fitness includes agility, balance, coordination, speed, power, and reaction time, which some authors consider as sport skills with little relationship to health (Neiman, 1998). While some of the skill-related fitness components are important mostly for sports, others like balance and coordination promote health and fitness for all and improve overall functionality of movements. Functionality of movement is the "ability to produce and maintain a balance between mobility and stability along the kinetic chain while performing fundamental patterns with accuracy and efficiency" (Okada, Huxel & Nesser, 2011, p. 252). The interactive components of mobility and stability (static and dynamic) are muscle flexibility, joint range of motion and multisegmental joints interaction, postural control, balance, coordination, local muscular strength and endurance. These components have to be developed optimally in order to achieve functional quality of the basic movement patterns (squatting, stepping, lunging, reaching, kicking, pushing and rotational trunk segmental stabilization) and in this way to increase quality, accuracy and efficiency of all body movements (Cook, 2001).

Paneurhythmy is as a health enhancing physical activity with intensity "low to moderate for athletic individuals and people in good health, and from moderate to high for elderly people, sedentary individuals or individuals with health problems leading to some limitations in their physical activity" (Chervenkova, 2015, p.174). Paneurhythmy as a form of functional physical activity since its movements show the same characteristics as the functional movements: purposeful and meaningful, diverse, correct performance is primary concern, multiplanar and multisegmenal joints interaction, develop functional strength, performed from upright position requiring balance and coordination, movements performed symmetrically left-right, exercising of basic movement patters (Pandulchev, 2017). The functional movement approach trains movement patterns rather than isolated muscles (Boyle, Verstegen & Cosgrove, 2010; Cook, Burton, Kiesel, Rose & Bryant, 2010; Gambetta, 2007), being the more efficient approach since the movements are multisegmental and multiplanar which improves neuro-muscular coordination (Beckham & Harper, 2010; Peterson, 2013). When analyzed from the view point of the functional movement approach Paneurhythmy trains predominantly the stepping and reaching movement patterns with some similarities to the pushing and trunk rotary stability movement patterns (Pandulchev, 2017).

Conclusions

In university sports it is important to train physical activities that exercise functional movements and improve the basic movement patterns thus enhancing health-related physical fitness, movement efficiency, prevent injuries and create skills for life. Paneurhythmy is an example of such activity and it may be included in the physical activities of students in view of offering greater diversity and competence-based learning approach interesting forms of exercising.

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