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Recreational judo training, singing in the choir, or hip-hop dancing – the alternative opportunities to develop the human respiratory system. The pilot study

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Key words: choir, judo, hip-hop, lung capacity, fatty tissue

Abstract
Background. One of the most important elements of physical wellness is the comfort of breathing – unlimited use of the surrounding air by the human body, without breathlessness, day or night apnea, or the ability to use the voice at full range and intensity. Comfort of breathing can be obtained for example by participation in sport or physical recreation. A large number of studies have indicated low levels of physical activity in the contemporary young generation, which limits the development of the respiratory system as well as complicates proper general physical development.
Problem. Can singing in a choir, hip-hop dancing or recreational *judo* training improve functionality of the respiratory system in a similar way as does another form of physical activities?
Material and Methods. A spirometric study involved 24 female members of the Chamber Choir of Kazimierz Wielki University, 24 female students from physical recreation practicing judo, 24 female hip-hop dancers and 26 female students from other faculties – control group. All these people were from Kazimierz Wielki University.
Results. The results of the spirometric test suggest that singing in the choir, judo training and hip-hop dancing significantly improve human respiratory system.
Conclusion. The results showed that the physical activity by recreational judo training improves the human respiratory system to the highest degree and it does not require special natural abilities like "ear to sing" (required in choir) and "a sense of rhythm" (required in hip-hop dancing)

Introduction

Physical wellness of the younger generation, especially students, (i.e. also future teachers), should be a priority task for many institutions involved with broadly understood public health.

In the case of teachers, their ability to use their voice at full range has been studied by numerous researchers [McAleavy *et al.* 2008]. There are multiple components of physical wellness, not defined here as lack of disease, but rather as the human ability to function well in the environment. One of these components is breathing comfort, enabling free unlimited use of the surrounding air, both during activity and rest. There exist simple and objective indicators for determining comfort of the respiratory system. Forced and unforced spirometry are among basic indicators of the functionality of the respiratory system [Pujszo *et al* 2010].

Breathing comfort in everyday life is provided by respiratory system that is in a good condition. Disorders of the respiratory system are present in up to 30 percent of the female student population in Polish Colleges for Teachers [Sliwinska–Kowalska *et al.*, 2002]. These disorders may be combined with other factors affecting the general condition of the organism. In this research we use the BMI (Body Mass Index) as an indicator of obesity,

which in itself causes problems with breathing and contributes to overall state of muscular strength and endurance [Bajerska-Jarzębowska *et al.* 2004]. Combining spirometry tests with measurements of chest mobility and fat tissue content affords a broader assessment of the organism. Breathing (both exhalation and inhalation) is an activity that involves the cooperation of diaphragm and muscular system, and in intensive breathing also the main and auxiliary expiratory muscles [Raven 1997].

Poor physical activity adversely affects the overall fitness of the body, and thus also the efficiency of the muscles responsible for the respiratory system, as well as the inhalation and exhalation capacity [Przybylski *et al* 2010].

It is evident that a low level of physical activity and unhealthy habits impair the development of the entire organism, including the respiratory system. Research on the formation, prevalence, and opposition to unhealthy habits [Bailey, Davidson 2003], such as tobacco smoking, substance abuse (alcohol consumption) and lack of physical activity has been conducted for many years in countries diversified in terms of culture and wealth [Li *et al* 2012]. A great deal of the studies have focused on women [Thundal, Granbom, Allebeck 1999] as well as academic faculty [Kumar, Mohan, Jain 1996].

Significant positive dependencies were found in the now classic studies on the effect of music on such physiological responses as the pulse and blood pressure in relation to results of college examinations [Blanchard 1979]. Thus it may be assumed that also singing, which after all involves frequent regular use of the breathing apparatus, might improve its overall functioning.

The earlier studies of choir singers have shown their better health and longer life expectancy. The authors of these studies have argued that bonds of solidarity, friendship and a sense of community related to the cooperative singing might be the reason for this phenomenon [Mattsson B., Mattsson M. 1998].

Some studies indicate that well-structured singing programs can encourage cared-for participant with dementia to develop better communication [Davidson, Fedele 2011].

Also, new studies show the positive influence of singing lessons for improvement of quality of life in patients with Chronic Obstructing Pulmonary Disease (COPD). Singing lessons also have a greater impact on wellness than the activity in a film club [Lord *et al*. 2010; Lord *et al*. 2012].

Very similar studies on correlations between singing lessons and spirometric parameters were carried out on elderly patients with COPD. In these studies, the control group performed handcraft work. The result of the research showed that regular practice of singing may improve the life quality (wellness), and preserve the maximal expiratory pressure of these patients [Bonilha *et al*. 2009].

The need to incorporate music, as well as cultural and physical activities in future individual and community-based health promotion programs have been confirmed in studies worldwide [Batt-Rawden, Tellnes 2011]. Taking into consideration the above aim of research, it seems justifiable and relevant to scientifically indicate relationships between choir singing and improvement in the capacity of the respiratory system which contributes to physical welfare of young women.

Similar studies on the human respiratory system were carried out among people practicing judo and dance. Both the pros and cons of participation in these activities were taken into account– health aspect, therapeutic ability, and possible threats to the respiratory tract [Berndt *et al.* 2012; Demczyszak *et al*. 2007; Golebiewski, Bryl, Hoffmann 2013; Plewa, Markiewicz 2006; Pujszo *et al*. 2013; Rong *et al.* 2008].

Additionally, it was noted that dance re-discovers the artistic component of martial arts, thus starting again the search for harmony, beauty and peace which are the basis of the philosophy of martial arts [Raimondo, Coccia, Ceccarelli 2013].

The literature review, as cited above, justifies the question: which of the researched activities improves the functionality of the respiratory system to the highest degree?

Methods

Twenty-four female students of the Chamber Choir of Kazimierz Wielki University, twenty -four female hip-hop dancers, and twenty-four female who practiced recreational judo and 26 female students from other faculties – control group, participated in the study, carried out in the academic year 2013/14.

The female singers declared vocal practice for 2 years in the amount of at least 1.5 hrs, 4 times a week and a lack of any other physical activities. During that time four (4) students withdrew from singing in the choir for economic reasons.

Females from recreational judo program declared training for 2 years in the amount of at least 1.5 hrs, 3 times a week and not practicing singing in the choir and/or hip-hop dancing.

The hip-hop dancers declared training for 2-3 years in the amount of at least 1 hrs, 2-3 times a week and not practicing singing in the choir and/or judo.

Their results have been compared with the results of spirometric tests carried out in a group of twenty-six female students from different faculties of Kazimierz Wielki University not involved in any of the three researched activities and declared participation only in obligatory university imposed physical education (PE) activity program (one lesson per week).

Students of the faculty of Physical Education and professional athletes were excluded from the study.

The study was conducted in the afternoon, in a spacious, ventilated room, in the ambient temperature of 20 degrees Celsius. The women declared a good overall physical, condition and lack of previous respiratory diseases.

The necessary measurements included the subjects: weight, height, and level of fatty tissue. The analysis of fatty tissue was carried out using the Omron BF-300 device.

The subjects' relaxed expiratory lungs capacity was measured using a Microlab ML 3500 spirometer, along with Vital Capacity (VC), intense expiratory lungs capacity (Forced vital capacity – FVC), 1st-second expiratory lungs capacity (Forced expiratory volume in 1 second – FEV1) and max. breathing flow (Peak expiratory flow – PEF).

Chest mobility ratio (R) and the ratio of body mass index (BMI) were calculated. In order to compare the values obtained in all groups the parametric f-test (for variances) and parametric t- test (for differences) were used.

Statistical processing of the results was completed using Statistica (version 5.0). The significance of the differences was determined at the level of $p<0.05$.

The results are presented in tables (Tables 1–3) and diagrams (Fig. 1–3).

Chest mobility ratio (R) expressed as percentage:

$$R = \left(\frac{O_1 - O_0}{O_1}\right) * 100 \qquad \text{Eqn.1.}$$

R – chest mobility (%)
O_1 – max. chest size in inhalation
O_0 – min. chest size in exhalation

Results

The percentage of body fatty tissue is at the statistically same level in the group of the choir and the control group.

In the hip–hop group and judo group the percentage of body fat tissue is lower at a statistically significant

Table 1. Anthropometric data: a group of members of Kazimierz Wielki University Choir (choir) group of female students from other faculties of the same university(control), female students from judo recreation group of the same university (judo), female hip-hop dancers (hip-hop)

Number	Weight (kg)	Range (kg)	Height (m)	Range (m)	BMI (kg/m^2)	Range (kg/m^2)	Age (years)	Range (years)
n=24(choir)	58,20±6,34[a]	45,0–68,0	1,66±0,05	1,58–1,78	20,97±1,68	17,58–24,24	21,35±0,94[a]	20,25–23,0
n=26(control)	57,93±8,09[b]	40,5–74,1	1,66±0,06	1,58–1,81	20,87±2,38	16,02–25,03	21,13±1,77[b]	19,25–26,5
n=24(judo)	58,30±6,13[c]	46,5 – 68,3	1,67±0,06	1,59 -1,78	21,00±1,60	18,40-24,25	21,31±0,93[c]	20,0-24,0
n=24 (hip-hop)	53,56±4,50[a,b,c]	44,3 – 62,5	1,67±0,04	1,58–1,76	19,22±1,48	17,00-23,5	19,31±3,00[a,b,c]	16,2-25,0

[a] – Values statistically different in the same columns at the level p<0,05
[b] – Values statistically different in the same columns at the level p<0,05
[c] – Values statistically different in the same columns at the level p<0,05

Table 2. Values: body fat, vital capacity (VC), and mobility of the chest (R) in the study of female all groups

Number	% fatty tissue	Range	Chest mobility (R) (%)	Range	VC (dm^3)	Range (dm^3)
n=24(choir)	17,48±4,45[c]	7,8–24,4	6,94±1,07[c]	5,26–8,69	3,98–0,43[a,d]	3,5–5,44
n=26(control)	17,35±4,73[b]	9,5–23,8	6,34±1,6[a,b,c]	2,2–8,9	3,74±0,39[a,b]	3,0–4,64
n=24(judo)	16,77±2,91[a,b,c]	11,2-22,2	7,02±1,15[b]	5,3-8,8	4,04±0,42[b,c]	3,52 -5,52
n=24(hip-hop)	14,43±2,87[a,b,c]	9,6-22,8	7,37±0,93[a,]	5,6-8,9	3,80±0.30[c,d]	3,22-4,33

[a] – Values statistically different in the same columns at the level p<0,05
[b] – Values statistically different in the same columns at the level p<0,05
[c] – Values statistically different in the same columns at the level p<0,05

Table 3. Values: forced lungs capacity (FVC), 1st-second lungs capacity (FEV1) and max. breath flow (PEF) in the study of female students' groups.

Number	FVC (dm^3)	Range (dm^3)	FEV1 (dm^3)	Range (dm^3)	PEF (dm^3/min)	Range (dm^3/min)
n=24(choir)	3,79±0,42[a]	3,15–5,12	3,52±0,41[a]	3,00–4,65	446,9±50,5[a]	369–540
n=26(control)	3,54±0,44[a]	2,36–4,29	3,24±0,34[a,c]	2,32–3,79	370,9±75,6[a,b,c]	244–502
n=24(judo)	4,00±0,36[a,b]	3,40-5,31	3,76±0,38[a,b]	3,01-4,84	448,1±52,2[b]	369-555
n=24(hip-hop)	3,69±0,31[b]	3,20-4,11	3,43±0,25[b,c]	2,98-3,92	431,1±37,1[c]	375-534

[a] – Values statistically different in the same columns at the level p<0,05
[b] – Values statistically different in the same columns at the level p<0,05
[c] – Values statistically different in the same columns at the level p<0,05

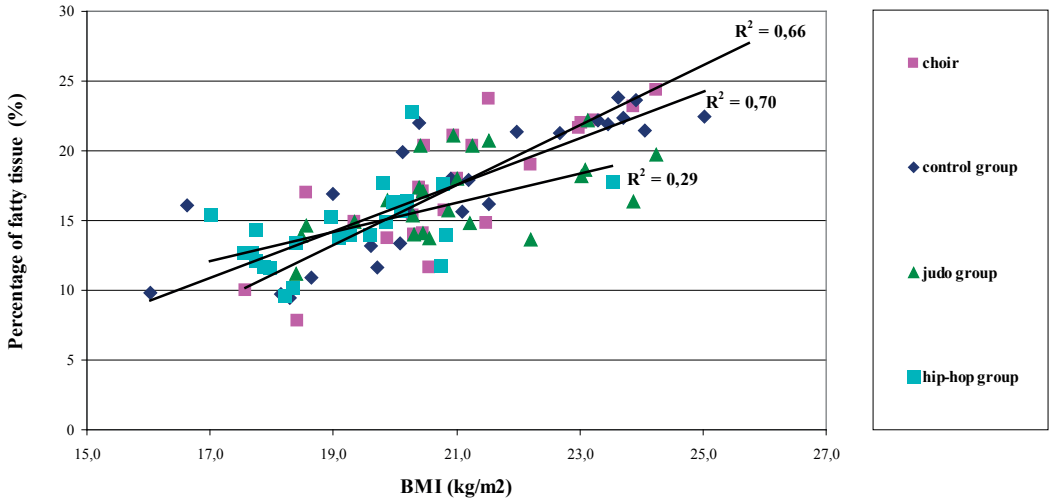

Fig. 1. The relation between BMI and percentage of fatty tissue in all the groups.

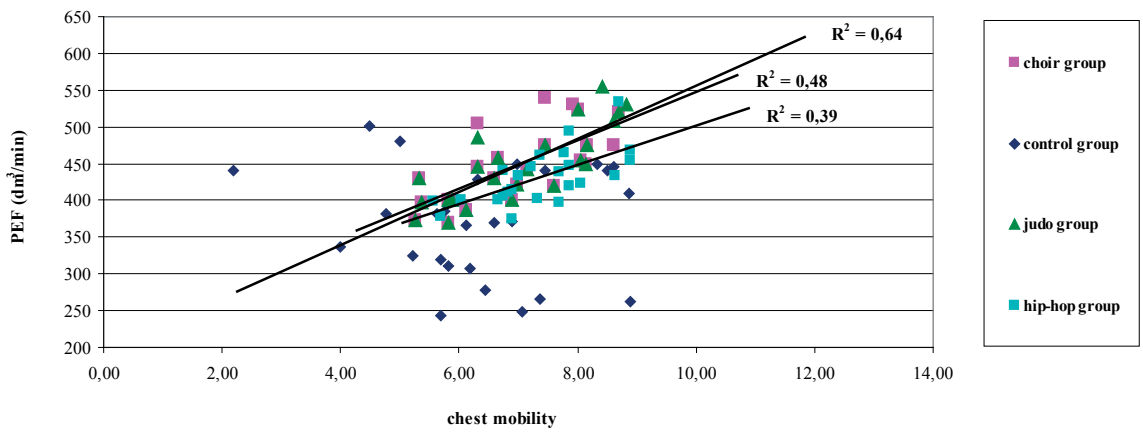

Fig. 2. The relation between the chest mobility and PEF in all the groups.

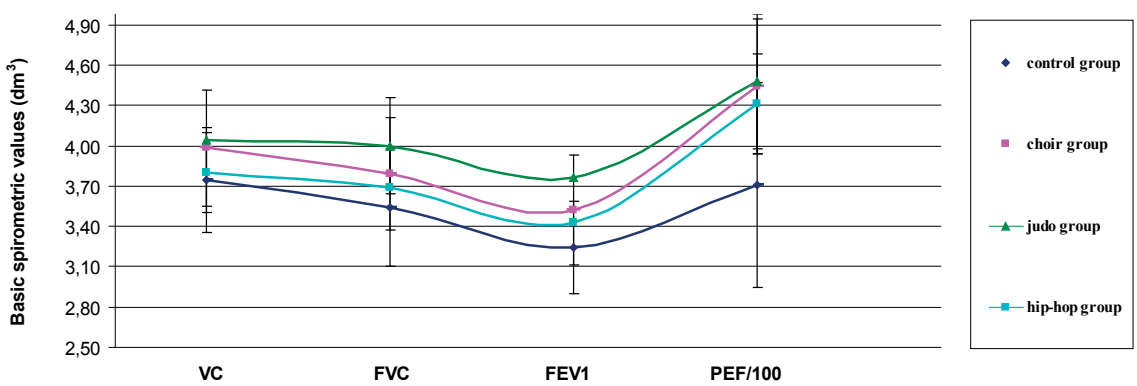

Fig. 3. Basic spirometric values (VC, FVC, FEV1 PEF/100) in all the groups.

level from the choir and the control groups. The lowest level of body fat tissue was observed in the group of hip-hop dancers.

The mobility of the chest has the same value in the choir, hip-hop and judo groups and is statistically significantly higher than in the control group.

The vital capacity (VC) has the same value in the choir and judo groups and they are statistically significantly higher than in the control group. The hip-hop group has the vital capacity (VC) at the same value like in control group and lower than in choir group and judo group at a statistically significant level.

The relation between BMI and the percentage of fat in the study of female students' groups has been presented in Figure 1.

The relation between the chest mobility and PEF in the study of female students' groups has been presented of in Figure 2.

The basic spirometric values (VC, FVC, FEV1 PEF) in the study of female students' groups have been presented in Figure 3.

The graph indicates the relation between the variables in all the groups. The strength of relation $R^2 = 0.66$ and $R^2 = 0.70$ in the choir group and the control group are statistically significant to a high degree. In hip-hop group relation R^2=0,29 is low. In the judo group the relation between the variables is not observed.

The relation between the variables is visible in the choir group at a statistically significant level (R^2=0.48) hip-hop group (R^2=0,39) and in the judo group at a statically significant level (R^2=0,64). The relation between the variables in the control group is not observed.

In order to represent all measurements – the PEF value was divided by 100. All spirometric values obtained in the group of the choir, hip-hop and judo are higher than in the control group. The largest difference is for PEF value. As compared with the values obtained in the judo group, two values (VC and PEF) are at the same level in the judo group and the choir group.

Discussion

In the discussion, reference is made only to the results obtained by the students singing in the choir, hip-hop dancers and the group of recreational judo, compared with the results of the control group.

The anthropometric data presented in the Table 1 (age, weight, height) and percentage of fatty tissue (Table 2), show that the groups of judo, choir and control have similar somatic parameters (differences statistically insignificant) and are at similar age.

The group of hip-hop dancers have a low level of weight, height and are younger than other groups. Female students from the recreational judo group and hip-hop dancers have a visible (statistically significant) lower level of body fat tissue.

The relation (Fig. 1) between BMI and the percentage of body fatty tissue – (highly statistically significant in the choir group and the control group) indicates a similar tendency in an individual development – increase of the BMI indicator as a result of fatty tissue growth. In the judo group this trend has not been observed. In hip-hop dancers group this trend is visible at the low level R^2=0,29

Similar phenomena have been reported several times in connection with the consumption of saturated fats e.g. in Brazilian studies regarding obesity in connection with the BMI indicator and distribution of fatty tissue in men and women [Ramos de Marins *et al.* 2001].

Similar research regarding BMI in correlation with fatty tissue and active mass tissue has been presented in the studies on Polish judo players in comparison to non-practicing individuals [Pujszo *et al.* 2011].

The BMI indicator is often juxtaposed with other biochemical and physiological indicators (blood pressure, cholesterol, skin thickness) to evaluate the effectiveness of programs aiming at increasing physical activity and health benefits [Grant *et al*. 2004]. These examples demonstrate a wide variety of research issues involving BMI and demonstrate that BMI can be a highly discriminatory indicator which supports the reasoning process.

Women in the choir group and the control group declared no additional physical activity, attending only obligatory PE lessons, which might signify a low level of physical activity. The existence of groups with a low level of physical activity and possible consequences of such a lifestyle has been signaled several times in population studies carried out by US, British and Swedish researchers [Harrison, McElduff, Edwards 2006; Lee *et al* 2001; Lindstrom 2011] in different social groups [Stasiolek, Jegier 2003].

On this basis, one should expect similar results of spirometric measurements (forced and unforced spirometry) and assign any potential differences to practice connected with choir singing. In addition, it can be expected higher spirometric results in groups of physically active (judo and hip-Hop)

In the light of the presented (statistically significant) information also the chest mobility of the female choir members may be explained by the influence of chest exercises related to singing. Measurements of chest mobility of students of the Academy of Physical Education in Cracow carried out between 1979 and 2008 showed a decrease in chest mobility at a statistically significant level. It was the only somatic feature of the inter-generation regression [Mleczko, Mirek, Komorowski 2009]. The connection between chest mobility and spirometric measurements has already been signaled in studies of people training judo as a form of recreation [Przybylski *et al.* 2010] and were determining factors improving the physical welfare of female students [Pujszo *et al.* 2010].

In each case, higher chest mobility correlated with higher spirometric results. The connection of chest mobility and max. breath flow PEF (Fig. 2), were visible in the choir group, hip-hop group and in judo group on a statistically significant level indicates a growth of PEF together with an increase of chest mobility. It suggests positive influence of regular choral singing, regular hip -hop dancing and regular judo training on the respiratory system.

Free lungs vital capacity (VC) is one of the most frequent indicators of respiratory ability. Despite being an individual feature, it undergoes great improvement in professional athletes involved in disciplines combining endurance with strength. The results have been confirmed in these studies worldwide [Cheng *et al*. 2003; Stuart, Collings 1959; Rong 2008; Walla *et al.* 2000] and in numerous others. Other factors under investigation include the influence of relaxing activities, even static

ones, which increase the level of VC. However, no conclusive results have been reported, both in relation to ailments [Alexander, Cropp, Chai 1979] and rehabilitative activities [Birkel, Edgren 2000].

The value of VC is higher in the judo group and the difference is statistically significant. It should be noted that the VC is an individual feature and the differences between all the groups are small and have a high variability. This suggests that the free lungs vital capacity (VC) has a little effect of discrimination in this case.

The data presented in the Tab. 3. and Fig. 3 show that all of the results of tense spirometry are higher in the choir group, hip-hop dancers group and judo group, (FVC, FEV1 and PEF) than in control group on a statistically significant level.

The data indicate that the biggest difference in the spirometric results between groups of choir, hip-hop, judo versus control group is evident in PEF and it was statistically significant. It should be noted that the values of PEF are at the same level in the choir group and the judo group. A higher level of PEF obtained in a choir group than in the hip-hop dancers is rather unexpected. This can be explained by the lower age of dancers group but it requires further research.

The maximal breath flow (PEF) is a spirometric value most closely associated either with disabilities [Peters *et al.* 1997] of the respiratory system or with training of it, as shown in a Finnish study of people suffering from asthma [Malkia, Impivaara 1998] and an Israeli study investigating the relationship between dust around a nuclear power plant and incidence of asthma in children [Peled *et al.* 2005]; and in a study of professional athletes [Pujszo *et al.* 2011; Raven 1997].

The above results show three groups: the choir group the hip-hop dancers group, and the judo group versus the control group as a subject of study of respiratory system. The subjects are at similar levels of their individual development and they present different ways of life activity.

Simultaneously, the results of the chest mobility measurements and all spirometric measurements (VC, FVC, FEV1 and PEF) are significantly higher in the choir group, hip-hop dancers group and in the judo group than in the control group.

Also, female students singing in the choir have two spirometric values (VC and PEF) at the same high level as the women in the recreational judo training group. The other two spirometric values: FVC and FEV1 were in the choir group at a lower level than in the judo group.

In addition, female students who sing in the choir have significantly higher levels of body fat than female students from the judo group. The level of fatty tissue was the lowest in hip-hop dancers group which is consistent with other studies on the prevention of youth obesity [Fitzgibbon *et al.* 2002].

Rejecting the theoretical cases the only explanation for the results is the positive effect of singing in the choir, or hip-hop dancing or judo training on the respiratory system.

Comparing the spirometric values of all three groups it should be noted that singing in a choir cannot replicate the benefits of physical activity completely.

Conclusions

1. All of the three researched kinds of human physical activities, offer the potential to develop the human respiratory system, reducing the body fat tissue and develop the chest mobility.
2. The recreational judo training improves the efficiency of the human respiratory system to the most significant level.
3. Singing in a choir and hip-hop dancing give similar results as they improve the human respiratory system. It must be noted that they have the natural limitations (required – "ear for music", or "a sense of the rhythm").

References

1. Alexander A.B., Cropp G.J., Chai H. (1979), *Effects of relaxation training on pulmonary mechanics in children with asthma*, "Journal of Applied Behavior Annalisis", no. 12(1), pp. 27–35.
2. Bailey B.A., Davidson J.W. (2003), *Amateur Group Singing as a Therapeutic Instrument,* "Nordic Journal of Music Therapy", no. 12(1), pp. 18–32.
3. Bajerska-Jarzębowska J., Jeszka J., Czlapka-Matysik M., Zielke M. (2004), *Sposób żywienia, parametry antropometryczne, stan odżywienia i wydolnosć fizyczna wybranej grupy studentów,* "Żywność Nauka. Technologia Jakosć", no. 3(l), pp. 9–17.
4. Batt-Rawden K., Tellnes G. (2011), *How music may promote healthy behaviour,* "Scandinavian Journal of Public Health", no. 39(2), pp. 113-120.
5. Berndt C., Strahler J., Kirschbaum C., Rohleder N. (2012), *Lower stress system activity and higher peripheral inflammation in competitive ballroom dancers.* "Biological psychology", no. 91(3), pp. 357-364.
6. Birkel D.A., Edgren L. (2000), *Hatha yoga: Improved vital capacity of college students.* "Alternative Therapies on Health and Medicine", no. 6(6), pp. 55–63.
7. Blanchard BE. (1979), *The Effect of Music on Pulse Rate, Blood Pressure and Final Exam Scores of University Students*, "Journal of School Health", no. 49(8), pp. 470–471.
8. Bonilha A.G., Onofre F., Vieira L.M., Prado M.Y.A., Martinez J.A.B. (2009), *Effects of singing classes on pulmonary function and quality of life of COPD patients*, "International Journal of COPD", no. 4(1), pp. 1-8.
9. Cheng Y.J., Macera C.A., Addy C.L., Sy F., Wieland D., Blair S.N. (2003), *Effects of physical activity on exercises tests and*

respiratory function, "British Journal of Sports Medicine", no. *37*, pp. 521–528.
10. Davidson J.W., Fedele J. (2011), *Investigating group singing activity with people with dementia and their caregivers: Problems and positive prospects*, "Musicae Scientiae", no. 15(3), pp. 402-422.
11. Demczyszak I., Wrzosek Z., Ziólkowska M. (2007), *Choreoterapia jako element wspomagający rehabilitację pacjentów w podeszłym wieku,* Physiotherapy/Fizjoterapia", no. 15(2), pp. 35-41 [in Polish].
12. Fitzgibbon M.L., Stolley M.R., Dyer A.R., Van Horn L., Kaufer Christoffel K. (2002), *A community-based obesity prevention program for minority children: rationale and study design for Hip-Hop to Health Jr*, "Preventive Medicine", no. 34(2), pp. 289-297.
13. Grant S., Todd K., Aitchison T.C., Kelly P., Stoddart D. (2004), *The effects of a 12-week group exercise programme on physiological and psychological variables and function in overweight women*, "Public Health", no. 118(1), pp. 31–42.
14. Gołębiewski P., Bryl W., Hoffmann K. (2013), *Wpływ wybranych technik fizjoterapeutycznych na redukcję masy ciała u osób otyłych*, "Forum Zaburzeń Metabolicznych", Via Medica Medical Publishers, no. 4(1), pp. 37-42 [in Polish].
15. Harrison R.A., McElduff P., Edwards R. (2006), *Planning to win: Health and lifestyles associated with physical activity amongst 15,423 adults*, "Public Health", no. 120(3), pp. 206–212.
16. Kumar A., Mohan U., Jain V.C. (1996), *Academicians' attitudes and beliefs towards anti-smoking measures*, "Public Health", no.110(4), pp. 241–246.
17. Li R., Wang D., Chen J., Chai J., Tang M. (2012), *Regional Differences in smoking, drinking, and physical activities of Chinese Residents*, "Asia Pacyfic Journal of Public Health", 1010539512437604. [Epub ahead of print]
18. Lee I.M., Rexrode K.M., Cook N.R., Manson J.E., Buring J.E. (2001), *Physical activity and coronary heart disease in women: Is "no pain, no gain" passé?*, "JAMA" no. 285(11), pp. 1447–1454.
19. Lindstrom M. (2011), *Social capital, desire to increase physical activity and leisure-time physical activity: A population-based study*, "Public Health", no. 125(7), pp. 442–447.
20. Lord VM., Cave P., HumeVJ., Flude EJ., Evans A, Kelly JL., Polkey MI., Hopkinson NS. (2010) *Singing teaching as a therapy for chronic respiratory disease – randomised controlled trial and qualitative evaluation*, "BMC Pulmonary Medicine", no.10(41). Available at: http://www.biomedcentral.com/1471-2466/10/41.
21. Lord V.M., Hume V.J., Kelly J.L., Cave P., Silver J., Waldman M., White C., Smith C., Tanner R., Sanchez M., Man W.D-C., Polkey M.I., Hopkinson N.S. (2012), *Singing classes for chronic obstructive pulmonary disease: a randomized controlled trial*, "*BMC Pulmonary Medicine*", no. 12/69.
22. Available it: http://www.biomedcentral.com/1471-2466/12/69
23. Mattsson B., Mattsson M. (1998), *To sing in a choir and be healthy — which are the mediating mechanisms?* [abstract], "Scandinavian Journal of Public Health", vol. 26, no. 3, p. 3.
24. Malkia E., Impivaara O. (1998), *Intensity of physical activity and respiratory function in subjects with and without bronchial asthma*, "Scandinavian Journal of Medicine and Science Sports", no. 8(1), pp. 27–32.
25. McAleavy G.J., Adamson G., Hazlett D.E., Donegan H.A., Livesey G.E. (2008), *Modelling determinants of the vocal health of teachers in Northern Ireland: Implications for educational policy and practice*, "Public Health", no. 122(7), pp. 691–699.
26. Mleczko E., Mirek W., Komorowski L. (2009), *Długookresowe tendencje przemian w budowie somatycznej studentów AWF w Krakowie* [in:] *Akademicka Kultura Fizyczna Studentów*, Rzeszów University Press, Rzeszow, no. 3, pp. 9–23 [in Polish].
27. Peled R., Friger M., Bolotin A., Bibi H., Epstein L., Pilpel D., Scharf S. (2005), *Fine particles and meteorological conditions are associated with lung function in children with asthma living near two power plants*, "Public Health", no. 119(5), pp. 418–425.
28. Peters A., Wichmann H.E., Tuch T., Heinrich J., Heyder, J. (1997). *Respiratory effects are associated with the number of ultrafine particles*, "America Journal of Respiratory and Critical Care Medicine" no.155, pp. 376–383.
29. Plewa M., Markiewicz A. (2006) *Aktywnosc fizyczna w profilaktyce i leczeniu otylosci*, "Endokrynologia, Otylość i Zaburzenia Przemiany Materii" vol. 2, no. 1, pp. 30-33 [in Polish].
30. Przybylski G., Pujszo R., Pyskir M., Pyskir J., Bannach M. (2010), *Male recreational judo training as a factor improving physical wellness based an particular indicators* [in:] B. Bergier [ed.], *Physical activity in disease prevention and health promotion*, Państwowa Szkoła Wyższa im. Papieża Jana Pawła II, Biała Podlaska, pp. 61–70.
31. Pujszo R., Kuzminska A., Przybylski G., Pyskir M., Pyskir J., Bannach M., Adam M. (2013), *The differences in chosen spirometric values of young judo competitors against of the control group as one of the patterns to the improvement the health of the young generation*, "Ido Movement for Culture. Journal of Martial Arts Anthropology", no. vol. 13, no. 4, pp. 16–24.
32. Pujszo R., Przybylski G., Pyskir M., Pyskir J., Bannach, M. (2010). *Spirometry as one of wellness indicators female students of Kazimierz Wielki University in Bydgoszcz [*in:] W. Tuszyńska-Bogucka [ed.], *Environment and wellness in different phases of life, Lublin NeuroCentrum, pp. 211–*237.
33. Pujszo R., Przybylski G., Pyskir M., Bannach M. (2011), *Spirometric parameters of judo training and inactive young men - measured compared to predicted values as one of wellness indicators* [in:] *Wellness in different phases of life*, Lublin Medical University, Lublin, pp. 145–155.
34. Raimondo S., Coccia G., Ceccarelli G. (2013), *Martial Arts and Contemporary Dance: rhythmic Convergences*

of the Human Body, "Ido Movement for Culture. Journal of Martial Arts Anthropology", vol. 13, no. 2, pp. 20-26.
35. Ramos de Marins V.M., Varnier-Almeida R.M.R., Pereira R.A., Barros M.B.A. (2001), *Factors associated with overweight and central body fat in the city of Rio de Janeiro: results of a two-stage random sampling survey*, "Public Health", vol. 115, no. 3, pp. 236–242.
36. Raven D.B. (1997). *Pulmonary function of elite distance runners*, "Annals of the New York Academy of Science", vol. 301, no. 4, pp. 371–381.
37. Rong C., Bei H., Yun M., Yuzhu W., Mingwu Z. (2008), *Lung function and cytokine levels in professional athletes*, "Journal of Asthma", vol. 45, no. 4, pp. 343–348.
38. Stasiolek D., Jegier A. (2003), *Physical activity in medical students*, "Nowiny Lekarskie", vol. 72, no. 2, pp. 140–142.
39. Stuart D.G., Collings W.D. (1959), *Comparison of vital capacity and maximum breathing capacity of athletes and non-athletes*, "Journal of Apply Physiology", no. 14, pp. 507–509.
40. Sliwinska–Kowalska M., Fiszer M., Kotylo P., Siatkowska E., Stepkowska M., Niebudek-Bogusz E. (2002), *Effects of voice emission training on the improvement in voice organ function among students attending the College for Teachers*, "Medycyna Pracy", no. 3, pp. 229–232.
41. Thundal K.L., Granbom S., Allebeck P. (1999), *Women's alcohol dependence and abuse: the relation to social network and leisure time*, "Scandinavian Journal of Public Health", vol. 27, no. 1, pp. 30–37.
42. Walla G., Chorazy M., Saulicz E., Żmudzka-Wilczek E., Musialik E. (2000), *Wpływ wyczynowego uprawiania sportu na zachowanie się niektórych parametrów spirometrycznych.* "Annals Academiae Medicae Silesiansis", no. 44/45, pp. 83–90.

Rekreacyjny trening *judo*, śpiew w chórze, czy taniec *hip-hop* - alternatywne możliwości rozwoju ludzkiego układu oddechowego. Badanie pilotażowe

Słowa kluczowe: chór, judo, taniec hip-hop, pojemność płuc, tkanka tłuszczowa.

Abstrakt

Tło. Jednym z najważniejszych elementów fizycznego dobrostanu człowieka jest komfort oddychania czyli nieograniczone korzystanie przez człowieka z otaczającego go powietrza, bez duszności, bezdechu w dzień lub w nocy, możliwość korzystania z głosu w pełnym zakresie i pełną siłą.

Problem. Komfort oddychania można uzyskiwać w różny sposób, na przykład poprzez sport, rekreację fizyczną lub też śpiewanie. Wiele badań wskazuje niski poziom aktywności fizycznej młodego pokolenia, która to sama komplikuje prawidłowy rozwój fizyczny i ogranicza rozwój układ oddechowego. Czy śpiewanie w chórze, taniec hip-hop lub rekreacyjny trening judo poprawia funkcjonalności systemu oddechowego w podobny sposób, jak robi inną formy aktywności fizycznej?

Materiał i metody. W badaniach spirometrycznych wzięły udział 24 studentki z Chóru Kameralnego, 26 studentek z różnych wydziałów - grupa kontrolna, 24 studentki trenujące rekreacyjnie judo i 24 studentki trenujące taniec hip-hop.

Wyniki. Wszystkie te osoby były z Uniwersytetu Kazimierza Wielkiego w Bydgoszczy.

Wyniki: Wyniki badania spirometrycznego sugerują, że śpiewanie w chórze, rekreacyjny trening judo i taniec hip-hop istotnie poprawiają sprawność ludzkiego układu oddechowego.

Wnioski. Uzyskane wyniki wykazały, że aktywność fizyczna realizowana przez rekreacyjny trening judo poprawia w większym stopniu sprawność ludzkiego układu oddechowego niż badane tu, inne rodzaje ludzkiej aktywności.

Dodatkowo należy zauważyć że rekreacyjny trening judo nie wymaga od ćwiczących specjalnych zdolności jak „słuch muzyczny" (wymagany w chórze) lub „poczucie rytmu" (wymagane w tańcu hip-hop).