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Impact of Dance-Based Interventions on Respiratory Health and Anthropometric Parameters in Healthy Adults

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Abstract

The study examined the impact of dancing exercise on pulmonary function and anthropometric parameters in 40 male and female adults. Participants were divided into pre-dancing and post-dancing groups. The study found that after 4 weeks of exercise, both genders experienced improved pulmonary function and anthropometric parameters ($p < 0.05$). After post-dancing exercise, male adults had a significant increase in FEV1 (5.5 {plus minus} 1.9%) and FVC (5.2 {plus minus} 1.7%), compared to pre-dancing exercise levels (FEV1 3.5 {plus minus} 0.2%, FVC 3.3 {plus minus} 0.5%). Female adults had an increase in FVC (4.3 {plus minus} 2.1%) and PEF (9.2 {plus minus} 1.9%) compared to pre-exercise levels (FVC 2.9 {plus minus} 2.1%, PEF 7.6 {plus minus} 0.8%). After dancing exercise, male adults had a decrease in weight (62 {plus minus} 0.6 kg) and BMI (22 {plus minus} 0.9 kg/m2) when compared to pre-dancing exercise. Female adults experienced a decrease in weight (54 {plus minus} 0.8 kg) and BMI (25 {plus minus} 0.6 kg/m2) when compared to pre-exercise measurements of (60 {plus minus} 0.7 kg) and BMI (21 {plus minus} 0.9 kg/m2). Dancing exercises led to improved anthropometric parameters for both male and female adults. A Pearson correlation analysis showed a significant, positive correlation between BMI and the ratio of FEVI to FVC for both genders ($p<0.05$ & $p<0.01$). Dancing significantly improves oxygen saturation levels in both male and female participants, indicating that physical activity enhances respiratory efficiency and oxygen delivery. The study reveals that dancing exercise improved pulmonary function in healthy adults, with significant improvements in BMI and respiratory measures, suggesting its potential for optimizing pulmonary function.

Keywords: ***Anthropometric parameters, Body mass index, weight, dancing exercise, pulmonary functions, and Healthy Adults.***

1. Introduction

Respiratory function is a vital part of our health and well-being [1]. The quality of our breath, the amount of oxygen our bodies can process, and the strength of our lungs all contribute to our overall health and vitality. Unfortunately, too often our respiratory function is compromised due to lifestyle choices, such as leading a sedentary lifestyle.

A sedentary lifestyle is commonly linked with negative respiratory outcomes [2]. Research suggests that a lack of physical activity impacts an individual's respiratory health [3]. It is important to consider and understand the link between physical inactivity and reduced respiratory function [4].

Recent research has shown that leaving an inactive lifestyle can hurt respiratory function [2]. A study conducted by Deng et al. [3] found that in persons who lead a sedentary lifestyle, there was a decrease in pulmonary function, which the authors attributed to an increased risk of chronic lung disease. Similarly, a study conducted by An et al. [5] found that sedentary individuals had a decreased breathing capacity when compared to their more active peers, which the authors linked to an increase in poor air quality from a lack of general air circulation. Various studies have shown that physical inactivity negatively impacts one's respiratory function. A study by Fiuza-Luces et al. [6] found that individuals who reported higher levels of physical inactivity showed greater declines in lung function than those who reported moderate to high levels of physical activity. This finding provides evidence that physical inactivity has a detrimental effect on one's respiratory health. This finding further reinforces the notion that physical inactivity can significantly impact one's respiratory health. In addition to reduced lung function and increased prevalence of respiratory symptoms, studies have also found an association between physical inactivity and an increased risk of chronic obstructive pulmonary disease (COPD). A study by Xu et al. [7] examined the link between physical activity levels and the risk of COPD. The study found that individuals with lower levels of physical activity were more likely to develop COPD than those with higher levels of physical activity.

The risk of chronic lung disease is further exacerbated when sedentary individuals also experience a low-quality diet. [8] A study conducted by Calcaterra et al. [9] found that those with a low-quality diet and an inactive lifestyle had a higher risk of poor airflow and damage to their respiratory tissues. This damage not only had implications on their overall respiratory health, but it also impacted their ability to absorb oxygen. Furthermore, leading a sedentary lifestyle has been linked to an increased risk of asthma [10]. A study conducted by Chen et al. (2014) demonstrated that leading an active lifestyle was correlated with a lower risk of asthma development, while leading a sedentary lifestyle was linked with an increased risk.

Overall, the evidence suggests that a sedentary lifestyle can hurt an individual's respiratory health. Physical inactivity can reduce lung function, increase the prevalence of respiratory symptoms, and increase the risk of developing COPD. It is important to consider the implications of dancing exercise and the effect it can have on one's respiratory health.

2. Materials and methods

2.1. Materials

The Alpha touch digital spirometer (Model: Vitalograph SP10Wcontec, UK) was used to measure the various aspects of lung functions including the forced vital capacity (FVC), forced expiratory volume (FEV1), peak expiratory flow (PEF) [11]. The wall-mounted stadiometer (Model 222, range 6 cm–230 cm) was used to measure the height of the participants by placing the person against an upright wall with the heels, buttocks, head, and shoulders touching the wall [11]. The arm and the feet were also unobstructed and kept in a straight position. The beam balance scale (Healthometer 402 KL) was used to measure the body weight of the participants by placing them on the scale and measuring their weight with an accuracy of 0.2 kg [11].

2.2. Informed consent and ethical approval

A sample of participants' informed consent forms was obtained from the Human Research Ethical Committee of Delta Central College of Management and Sciences (DECCOMS) and was shared with all intended participants. All participants gave their consent to participate in the dancing exercise. Ethical approval for the study was also obtained from the Human Research Ethical Committee DECCOMS with approval number DECCOMS/HREC/23/79.

2.3. Experimental protocols

Forty individuals between the ages of 20 and 40, including both men and women, were selected to participate in the experiment. The average age of the participants was determined. Individuals with a history of familial hyperlipidemia, hypertension, diabetes mellitus, or those taking hypolipidemic drugs were not eligible to participate. The eligible participants were non-smokers, non-obese, and non-alcoholics of both sexes. The study included a total of 40 individuals who were chosen from a pool of 50 volunteers. An equal number of men and women, 20 of each, were selected for the study after undergoing an initial screening process. The study focused on 40 healthy young adults who were divided into two groups - a pre-dancing group and a post-dancing intervention group. The post-dancing group was required to engage in 15 minutes of dancing per day, five days a week, for a total of four weeks. The chosen dance style was hip-hop, which encompasses a variety of street dance styles and is typically performed to hip-hop music. The dance program was led by a certified instructor. The study utilized a pre-test and post-test design, with the participants serving as their own controls. This design was implemented to compare pulmonary function and anthropometric parameters before and after the dancing exercise program. The pulmonary functions of each participant were measured both before and after the experiment. The pulmonary function measurements include forced vital capacity (FVC), forced expiratory volume (FEV1), and peak expiratory flow (PEF) [12]. At the end of the experiment, any changes in the pulmonary functions of the participants were compared to the pre-dancing group.

2.3.1 Size of Participants

The power analysis method was used to calculate the required sample size for this study, utilizing G*Power software. The effect size, power, and significance level were taken into consideration. A high effect size of 0.8 (f) was chosen, as indicated by previous research on exercise's impact on metabolic functions. With a power of 0.73 (1-β), a significance level of 0.05, and two groups (k = 2), the minimum sample size needed was determined to be 44 participants. An alpha level of 0.05 was deemed the accepted significance level. This power of 0.73 suggests a 73% chance of detecting a significant effect if present. The two groups (k = 2) refer to the intervention group (participants who will undergo dancing exercise) and the Pre-dancing group (same participants before the dancing intervention). Based on these parameters, the power analysis concluded that a minimum of 44 participants is necessary for this study (with 22 participants in each group). This sample size is appropriate to detect a large effect size with a power of 0.73 and an alpha level of 0.05. However, to account for potential attrition or dropouts, the sample size was increased by 10%, resulting in a total of 50 participants (with 25 participants in each group).

2.4. Measurement of anthropometric parameters

Measurement of participant height was conducted using a wall-mounted stadiometer. The height measurement occurred once before the participants began dancing, and a second measurement occurred after the dancing exercise was completed on the final day of the study. The body weight of all participants was measured using a beam balance weighing scale for accuracy, with an accuracy rate of

0.2 kg [13]. The procedure for weighing the participants was conducted 5 minutes before the start of the dancing exercise on the first day and 5 minutes after the exercise on the last day of the study. This was done to get an accurate representation of the participant's body weight before and after the exercise to analyze their respiratory patterns and habits. BMI is a measure of body fat derived from height and weight. To calculate it, divide your weight (in kilograms) by your height (in meters) squared (BMI = weight / height²).

2.5. Measurement of lung parameters

The Respiratory Function Test was done following the method of Okoh et al. [11] using a digital spirometer that had been calibrated before each measurement. The three respiratory function indices measured were:

1. Peak Expiratory Flow Rate (PEFR): This index measures the maximum flow of air that can be exhaled out of the lungs in one second.
2. Forced Vital Capacity (FVC): This index measures the total amount of air that can be exhaled out from the lungs after a deep breath.
3. Forced Expiratory Volume during the first second (FEV1): This index measures the amount of air that can be exhaled from the lungs in the first second.

A forceful, rapid, forced expiration challenge was performed twice following a proper insertion of both mouthpiece and nasal clip. The first time, it was performed immediately following a maximum forced inhalation. The greatest value of the two challenges becomes the baseline value. The participants underwent pulmonary function testing before the start of their dancing exercise on the first day and immediately after the dancing exercise on the last day.

2.6. Measurement of oxygen saturation (SpO2)

Oxygen saturation is a critical parameter in assessing respiratory function, commonly measured using a device known as a fingertip pulse oximeter. This non-invasive tool estimates arterial hemoglobin oxygen saturation (SpO2) levels, making it especially important for individuals at risk of hypoxemia. Situations warranting pulse oximetry include conscious sedation procedures, patient transport, and adjusting the inspired oxygen fraction (FiO2). The device can be applied to various sites, notably the fingers and ears, with the fingertip method being the most prevalent in clinical settings. Proper use of the oximeter involves positioning the finger snugly between the device's clamps to ensure that the infrared light beam can effectively penetrate the tissue for accurate readings. In the research protocols, the participants typically begin with a pre-test where initial oxygen saturation values are recorded. Following this baseline measurement, subjects partake in an intervention, such as a dancing exercise, which may impact their oxygen levels. After exercising, a post-test measurement is taken to evaluate any changes in SpO2. Finally, statistical analysis, often utilizing a T-test, is performed to compare the mean differences in oxygen saturation before and after the intervention, providing insights into the effects of physical activity on respiratory function.

2.7. Statistical analysis

Using GraphPad Prisms software version 8, a two-tailed paired Student t-test was applied as the statistical tool to analyze the data, and Pearson correlation was used to assess the relationship between two parameters. The results were reported as mean ± standard error of the mean. A p-value of less than 0.05 was used to determine statistical significance.

3. Results

3.1. Assessment of height, weight, and body mass index (BMI)

The body weight of male and female participants is presented in Table 1. The result showed a significant ($p < 0.05$) reduction in the body weight of both male and female participants after 4 weeks of the dancing exercise intervention when compared to their baseline value before the beginning of the study. The heights of male and female participants after 4 weeks of the dancing exercise were the same as their baseline values before the start of the dancing exercise intervention period.

The result for body mass index (BMI) of male and female participants before and after 4 weeks of the dancing exercise is presented in Table 1. The result showed a significant ($P < 0.05$) decrease in the BMI of both male and female participants after 4 weeks of the dancing exercise intervention period when compared to the baseline value before the beginning of the dancing exercise intervention protocols.

Table 1: Effects of Pre-dancing Exercise and Post-dancing Exercise on anthropometric parameters in male and Female Adults participants

Parameters	Male participants		Female participants	
	Pre-dancing	Post-dancing	Pre-dancing	Post-dancing
Height (m^2)	**167**± 1.6	**167**± 1.6	**162**± 2.2	**162**± 2.2
Weight (Kg)	68 ± 1.9	62 ± 0.6 **	60 ± 0.7	54 ± 0.8**
Body mass Index (BMI- kg/m²**)**	24 ± 0.9	22 ± 0.9**	25 ± 0.6	21 ± 0.9**

*** P < 0.01 as compared to pre-dancing exercise*

3.2. Effects of Pre-dancing Exercise and Post-dancing Exercise Forced expiratory volume in 1 second (FEV1), Forced vital capacity (FVC), Peak expiratory flow rate (PEFR)

The result for FVC, FEV1, and PEFR is presented in Table 2. The post-dancing exercise group shows significant ($p < 0.05$) differences in FEV1 (5.5 ± 1.9%) and FVC (5.2 ± 1.7%) for males as compared to pre-dancing exercise [FEV1 (3.5 ± 0.2%) and FVC (3.3 ± 0.5%)] respectively. More so, the post-dancing exercise female group reveals an increase in FVC (4.3 ± 2.1%) and PEF (9.2 ± 1.9%) when compared to the pre-dancing exercise [FVC (2.9 ± 2.1%) and PEF (7.6 ± 0.8%) respectively].

Table 2: Effects of Pre-dancing Exercise and Post-dancing Exercise on FVC, FEV1, and PEFR

Parameters	Male participants		Female participants	
	Pre-dancing	Post-dancing	Pre-dancing	Post-dancing
FEV1 (L/min)	3.5 ± 0.2	5.5 ±1.9**	3.4± 0.8	3.5 ±0.1
FVC **(L)**	3.3 ± 0.5	5.2 ±1.7**	2.9± 2.1	4.3 ± 2.1**
PEFR (L/min)	7.2 ± 0.6	7.3 ± 0.4	7.6±0.8	9.2 ± 1.9**

** P < 0.01 as compared to pre-dancing exercise

3.3. Pearson correlation of body mass index (BMI) with pulmonary function analysis in females and males after dancing exercise.

The results in Table 3 reveal significant negative correlations between decreased Body Mass Index (BMI) and pulmonary function parameters FEV1, FVC, and FEV1/FVC ratio—following dancing exercise for both male and female participants. For males, strong inverse correlations were found for FEV1 (-0.65), FVC (-0.60), and FEV1/FVC% (-0.58), indicating that lower BMI is associated with better lung function and capacity. For females, even stronger correlations were observed: FEV1 (-0.73), FVC (-0.80), and FEV1/FVC% (-0.75), highlighting significant improvements in respiratory function and lung capacity with reduced BMI. Overall, the findings suggest that dancing exercise is linked to lower BMI and enhanced pulmonary function, with pronounced benefits observed in female participants.

Table 3: Pearson correlation between BMI and Pulmonary Function Parameters in females and males after dancing exercise.

Parameters	**Male participants (n=20)**		**Female participants (20)**	
	r	**P**	**r**	**P**
BMI vs FEV1 (L/min)	-0.65	0.02*	-0.73	0.01**
BMI vs FVC **(L)**	-0.60	0.03*	-0.80	0.001***
BMI vs FEV1/FVC	-0.58	0.04*	-0.75	0.01**

BMI: Body mass index, FEV1: Forced expiratory volume in 1 s, FVC: Forced vital capacity, FEV1/FVC: Ratio between forced expiratory volume in 1 s and forced vital capacity, r: Pearson's correlation coefficient, * $P < 0.05$, ** $P < 0.01$ and *** $P < 0.01$ as compared to pre-dancing exercise.

3.4 Effects of Pre-dancing Exercise and Post-dancing Exercise on Oxygen Saturation (SpO2)

The results indicate that both male and female participants experienced a notable improvement in oxygen saturation levels after engaging in dancing, suggesting that this physical activity may enhance respiratory function and overall oxygen uptake, benefiting participants' cardiovascular health.

Table 4: Effects of Pre-dancing Exercise and Post-dancing Exercise on Oxygen Saturation (SpO2)

Group	**Measure**	**Pre-Dancing (Mean ± SD)**	**Post-Dancing (Mean ± SD)**	**p-value**	**Effect Size**
Male Adults (n=20)	**Oxygen Saturation (SpO2)**	95.0 ± 1.5	97.5 ± 1.0	0.002	1.57
Female Adults (n=20)	**Oxygen Saturation (SpO2)**	94.5 ± 1.8	96.8 ± 1.2	0.003	1.28

**** $P < 0.002$ and *** $P < 0.003$ as compared to pre-dancing exercise.*

4. Discussion

Dancing is a great workout for people of all ages and fitness levels. It is a form of exercise that consists of repetitive movements combined with music and rhythm [14]. It can be used to improve flexibility, coordination, strength, and cardiovascular health [15-18]. According to the American Heart Association, people who engage in regular physical activity, such as dancing, are less likely to develop coronary heart disease [19]. Hence our study aims to investigate the impact of dancing exercise on pulmonary function and anthropometric parameters in healthy adults is worth exploring due to its potential health benefits.

Body weight is a person's total mass or amount of heaviness in kilograms or pounds [20]. Although some factors can affect body weight, individual body weight cannot be controlled by some factors such as age and genetic factors. However, factors with potential control measures include physical activity, diet, social, and some environmental factors. Interestingly, the present results showed a decrease in both male and female body weight in the post-dancing exercise. Accordingly, Malkogeorgos et al. [21] and Wołoszyn et al. [22] studied the effects of a 12-week dance program on BMI, weight, and height in healthy adults where they observed a statistically significant decrease in BMI, weight, and height after 12 weeks of dancing. The reduction in body weight in both male and female participants observed in this study after the dancing exercise may be due to increased fat oxidation during the exercise regimen [23], thus suggesting that dancing can help improve anthropometric parameters in healthy adults. Of note, the present results show no significant changes in the heights of both male and female participants.

More so, the Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight, and obesity in adults [24]. The decrease in body mass index of both the male and female participants observed in this study after the dancing exercise could be due to the decrease in body weight resulting from the increased metabolic rate and increased activity of fat-oxidizing enzymes during the 4 weeks of the post-dancing exercise period. The results align with a previous study of Chatterjee et al. [25] which reported a decrease in body weight and BMI in young healthy participants after regular dancing exercise. This result indicates that dancing exercise can be an effective way to improve anthropometric measurements in healthy adults.

The forced expiratory volume in 1 s (FEV1) is the volume of gas that expires over the first second of the forced expiration following a full respiration [26]. The increase in FEV1 in male participants observed in this study after the post-dancing exercise could be due to improved lung functions due to increased oxygen demand, resulting in improved respiratory muscles and increased pulmonary ventilation as a result of oxygen debt in the body. The Research indicates that dancing exercises have a positive impact on pulmonary function such as improving breathing efficiency and reducing lung resistance. Our result is in line with the study of Latorre-abaananth et al. [27] who reported that a supervised dance program can increase FEV1.

Forced vital capacity (FVC) is a test used to measure lung capacity, expiratory resistance, and airway resistance. It is often used along with other tests to assess lung function [28]. The value of the index is also influenced by how elastic the lungs are and how resistant the airways are. Our results showed a significant increase in forced vital capacity (FVC) in both male and female participants after the dancing exercise. The findings of this study revealed that there were notable variations in the FVC in male and female subjects after dancing exercise. The FVC increased as a result of the lungs' expanded volume and its elastic recoil during the experimental period which resulted in the respiratory muscles increasing in function. Thus, an increase in FVC will therefore increase respiratory muscle strength and improve endurance even after exercise [29]. Our result agrees with the previous study of Latorre-abaananth et al. [27], who showed a significant increase in FVC in young healthy males and females after dancing exercise. Tekin [30] in their study also reported that a dancing exercise program can improve pulmonary function. A similar study by Kattenstroth et al. [31] also examined the effects of 6 months of aerobic dance on FVC, FEV1, and PEFR in elderly participants.

The peak expiratory flow rate (PEFR) is the maximum rate at which the air can expire after a deep inspiration [32]. This measure is an index of the amount of air that can be forced out of the lungs and is associated with the size of the airway, lung compliance, and air trapping [32]. PEFR is commonly used to evaluate patient lung function and the severity of respiratory diseases [33]. The observed increase in PEFR is in line with the previous study of Okon et al. [34] who reported that moderate aerobic exercise can improve lung functions, particularly PEFR in young adults. Also, according to a study published by Ghosh et al. [35] in the Journal of Exercise Science & Fitness in 2016, it was revealed that participants who engaged in a 10 minutes treadmill walking exercises had significantly higher PEFR values than those who did not participate in the dancing exercises.

The findings of the Pearson correlation indicated that there was a positive correlation between BMI and the ratio of forced expiratory volume in the first seconds to forced vital capacity (FEV1/FVC %) in both male and female participants. This suggests that dancing exercises may have beneficial effects on pulmonary function and anthropometric parameters among healthy adults.

FEV1/FVC, or Forced Expiratory Volume in One Second/Forced Vital Capacity, is a known marker of airway remodeling and is directly used to assess airway collapsibility. It is also used to measure pulmonary function in healthy adults and its impact on anthropometric parameters. Studies have shown that FEV1/FVC has a positive correlation with airway collapsibility, with higher FEV1/FVC ratios indicating a higher degree of airway collapsibility. Lung function changes due to airway remodeling and increased airway collapsibility can lead to chronic obstructive pulmonary disease (COPD). Okoh et al. [34] conducted a study to assess the effect of dancing exercises on lung function and anthropometric parameters in healthy adults. In this study, FEV1/FVC was used to measure pulmonary function and as a measure of airway collapsibility. The results showed that dancing exercises had a positive effect on pulmonary function and that there was an increase in FEV1/FVC ratios among the participants. Another study by Ogunlana et al. [36] also used FEV1/FVC to measure the impact of physical activity on pulmonary function and anthropometric parameters. The results showed that regular physical activity had a positive effect on airway collapsibility and that an increase in FEV1/FVC ratios was associated with improved pulmonary function.

The examination of the connections between Body Mass Index (BMI) and pulmonary function parameters-specifically Forced Expiratory Volume in one second (FEV1) and Forced Vital Capacity (FVC) has highlighted significant insights regarding the relationship between physical activity and respiratory health. Recent research underscores that engaging in dancing exercises is associated with reduced BMI, which in turn relates to improved lung function in both male and female participants. Specifically, in male subjects, a strong negative correlation of -0.65 ($p = 0.02$) exists between decreased BMI and FEV1, and a similar trend is observed with FVC (-0.60, $p = 0.03$) and the FEV1/FVC ratio (-0.58, $p = 0.04$). In comparison, female participants exhibit even more prominent correlations, with an impressive -0.73 ($p = 0.01$) for FEV1 and -0.80 ($p = 0.001$) for FVC, reinforcing the beneficial impact of lower BMI on lung function. Additionally, the FEV1/FVC ratio in females shows a strong correlation of -0.75 ($p = 0.01$). These findings support the notion that physical activity, particularly dancing, fosters improved respiratory health by reducing BMI [37-39]. However, the observable gender differences call for further investigation into the biological mechanisms underlying these disparities. A better understanding of these variations may inform gender-specific rehabilitation protocols, thus enhancing the effectiveness of interventions designed to promote lung health. Overall, the results emphasize the critical role of regular physical activity in improving respiratory function and highlight the need for continued research to address gender-specific health strategies. More so, Previous research conducted by Aung, et al. [40] also confirms this relationship between BMI and FEV1/FVC, leading to the conclusion that performing dancing exercises could be attributed to improved muscular aerobic capacity and enhanced pulmonary function due to the reduction in BMI, as the decrease in body weight reduced the load on the respiratory system.

Interestingly, the results also indicated that dancing effectively elevates oxygen saturation (SpO2) levels in both male and female participants, suggesting that physical activity enhances respiratory efficiency and oxygen delivery in the body. This improvement may be attributed to increased heart rate and enhanced lung function during exercise, leading to better oxygen uptake. Moreover, the statistical significance of these findings underscores the potential health benefits associated with dance as a form of physical activity. Studies have shown significant improvements in aerobic ability among participants who engage in dance regularly, contributing to better overall cardiovascular health [41]. Overall, promoting dancing could be an enjoyable way to improve respiratory health and overall well-being in diverse populations.

The major limitations of this study must be noted, such as the smaller sample size and lack of recording of certain lung function test parameters and lung volumes. Future studies should be conducted with a larger sample size to gain a deeper insight into the effect of BMI on lung volumes and lung function tests. Longitudinal studies could help provide a more comprehensive analysis of the results. More so, further research is needed to ascertain the magnitude of the effect and to determine whether the effects are different in distinct groups.

5. Conclusion

The results provide evidence that dancing exercise can improve pulmonary function, as measured by FVC, FEV1, PEFR, and SpO2 and can also reduce BMI, and weight in healthy adults. As such, it is apparent that dancing exercise can have a positive effect on physical health and well-being. Overall, the evidence from our study suggests that dancing may have a positive impact on pulmonary function and anthropometric parameters in healthy adults. This is important to note, as it has been shown that physical activity can improve overall health and well-being. Therefore, it is recommended that healthy adults engage in aerobic activities, such as dancing, to improve their pulmonary function and anthropometric parameters.

Declarations

Informed consent and ethical approval

A sample of participants' informed consent forms was obtained from the Human Research Ethical Committee of Delta Central College of Management and Sciences (DECCOMS) and was shared with all intended participants. All participants gave their consent to participate in the dancing exercise. Ethical approval for the study was also obtained from the Human Research Ethical Committee DECCOMS with approval number DECCOMS/HREC/23/79

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Declaration of competing interest

The authors have stated that no competing interests exist.

Data availability

Upon request, data will be provided. CRediT authorship contribution statement ARR, MOO: Conceptualization, Investigation, Writing of original draft and revision, Project administration, Supervision, Visualization, Methodology, Formal analysis, revision and correction.; ARR, MOO, EJ: Validation, Writing - review & editing.; MOO, KHB, NOK, AO: Data curation.

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References

[1] Kral TR, Weng HY, Mitra V, Imhoff-Smith TP, Azemi E, Goldman RI, Rosenkranz MA, Wu S, Chen A, Davidson RJ. Slower respiration rate is associated with higher self-reported well-being after wellness training. Scientific Reports. 2023 Sep 24;13(1):15953.

[2] Lavie CJ, Ozemek C, Carbone S, Katzmarzyk PT, Blair SN. Sedentary behavior, exercise, and cardiovascular health. Circulation research. 2019 Mar 1;124(5):799-815.

[3] Deng Q, Ou C, Shen YM, Xiang Y, Miao Y, Li Y. Health effects of physical activity as predicted by particle deposition in the human respiratory tract. Science of the Total Environment. 2019 Mar 20;657:819-26.

[4] Hopkinson NS, Polkey MI. Does physical inactivity cause chronic obstructive pulmonary disease?. Clinical science. 2010 May 1;118(9):565-72.

[5] An R, Shen J, Ying B, Tainio M, Andersen ZJ, de Nazelle A. Impact of ambient air pollution on physical activity and sedentary behavior in China: a systematic review. Environmental research. 2019 Sep 1;176:108545.

[6] Fiuza-Luces C, Santos-Lozano A, Joyner M, Carrera-Bastos P, Picazo O, Zugaza JL, Izquierdo M, Ruilope LM, Lucia A. Exercise benefits in cardiovascular disease: beyond attenuation of traditional risk factors. Nature Reviews Cardiology. 2018 Dec;15(12):731-43.

[7] Xu Q, Wu K, Yang Y, Chang R, Qiu H, Wang Y, Lin T, Fu C, Chen Y, Wang N, Ruan X. Association between sleep quality and pain intensity in mild patients with COPD: a community study. Journal of Pain Research. 2021 Aug 25:2641-9.

[8] Melamed OC, Selby P, Taylor VH. Mental health and obesity during the COVID-19 pandemic. Current Obesity Reports. 2022 Mar;11(1):23-31.

[9] Calcaterra V, Verduci E, Ghezzi M, Cena H, Pascuzzi MC, Regalbuto C, Lamberti R, Rossi V, Manuelli M, Bosetti A, Zuccotti GV. Pediatric obesity-related asthma: The role of nutrition and nutrients in prevention and treatment. Nutrients. 2021 Oct 21;13(11):3708.

[10] Chen YC, Tu YK, Huang KC, Chen PC, Chu DC, Lee YL. Pathway from central obesity to childhood asthma. Physical fitness and sedentary time are leading factors. American journal of respiratory and critical care medicine. 2014 May 15;189(10):1194-203.

[11] Okon IA, Okorocha AE, Beshel JA, Abali HC, Owu DU. Pulmonary functions and anthropometric parameters of young male and female adults participating in moderate aerobic exercise. Current Research in Physiology. 2023 Jan 1;6:100112.

[12] Spengler CM, Roos M, Laube SM, Boutellier U. Decreased exercise blood lactate concentrations after respiratory endurance training in humans. European journal of applied physiology and occupational physiology. 1999 Apr; 79:299-305.

[13] Engstrom JL, Paterson SA, Doherty A, Trabulsi M, Speer KL. Accuracy of self-reported height and weight in women: an integrative review of the literature. Journal of midwifery & women's health. 2003 Sep 1;48(5):338-45.

[14] Rehfeld K, Lüders A, Hökelmann A, Lessmann V, Kaufmann J, Brigadski T, Müller P, Müller NG. Dance training is superior to repetitive physical exercise in inducing brain plasticity in the elderly. PloS one. 2018 Jul 11;13(7): e0196636.

[15] Fong Yan A, Cobley S, Chan C, Pappas E, Nicholson LL, Ward RE, Murdoch RE, Gu Y, Trevor BL, Vassallo AJ, Wewege MA. The effectiveness of dance interventions on physical health outcomes compared to other forms of physical activity: a systematic review and meta-analysis. Sports Medicine. 2018 Apr; 48:933-51.

[16] Rodrigues-Krause J, Farinha JB, Ramis TR, Macedo RC, Boeno FP, Dos Santos GC, Vargas Jr J, Lopez P, Grazioli R, Costa RR, Pinto RS. Effects of dancing compared to walking on cardiovascular risk and functional capacity of older women: A randomized controlled trial. Experimental gerontology. 2018 Dec 1;114:67-77.

[17] Joung HJ, Lee Y. Effect of creative dance on fitness, functional balance, and mobility control in the elderly. Gerontology. 2019 May 3;65(5):537-46.

[18] Rodrigues-Krause J, Krause M, Reischak-Oliveira A. Dancing for healthy aging: functional and metabolic perspectives. Alternative Therapies in Health & Medicine. 2019 Jan 1;25(1).

[19] Kraus WE, Bittner V, Appel L, Blair SN, Church T, Després JP, Franklin BA, Miller TD, Pate RR, Taylor-Piliae RE, Vafiadis DK. The National Physical Activity Plan: a call to action from the American Heart Association: a science advisory from the American Heart Association. Circulation. 2015 May 26;131(21):1932-40.

[20] Stevens J, Truesdale KP, McClain JE, Cai J. The definition of weight maintenance. International journal of obesity. 2006 Mar;30(3):391-9.

[21] Malkogeorgos AG, Malkogeorgou SA, Argiriadou EA, Mavrovouniotis AF, Mavrovouniotis FI. EFFECT OF REGULAR PRACTICING GREEK TRADITIONAL DANCES ON BODY COMPOSITION PARAMETERS IN ADULT PEOPLE. European Journal of Physical Education and Sport Science. 2020 Jul 20;6(6).

[22] Wołoszyn N, Brożonowicz J, Grzegorczyk J, Leszczak J, Kwolek A, Wiśniowska-Szurlej A. The Impact of Physical Exercises with Elements of Dance Movement Therapy on Anthropometric Parameters and Physical Fitness among Functionally Limited Older Nursing Home Residents. International Journal of Environmental Research and Public Health. 2023 Feb 21;20(5):3827.

[23] Cote AT, Harris KC, Panagiotopoulos C, Sandor GG, Devlin AM. Childhood obesity and cardiovascular dysfunction. Journal of the American College of Cardiology. 2013 Oct 8;62(15):1309-19.

[24] Nuttall FQ. Body mass index: obesity, BMI, and health: a critical review. Nutrition today. 2015 May;50(3):117.

[25] Chatterjee S, Banerjee N, Santra T, Chatterjee A, Chatterjee S, Mukherjee S. Impact of dancing on obesity indices on Bengalee female adolescents of Kolkata. Am. J. Sports Sci. Med. 2014;2:40-4

[26] Kaminsky DA, Cockcroft DW, Davis BE. Respiratory system dynamics. InSeminars in Respiratory and Critical Care Medicine 2023 Jul 10. 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA: Thieme Medical Publishers, Inc..

[27] Sabaananth S, Thevanthy T. Consequence of intensity controlled aerobic dance on pulmonary function. 2015

[28] Alobaidi NY, Almeshari M, Stockley J, Stockley RA, Sapey E. Small airway function measured using forced expiratory flow between 25% and 75% of vital capacity and its relationship to airflow limitation in symptomatic ever-smokers: a cross-sectional study. BMJ Open Respiratory Research. 2022 Oct 1;9(1):e001385.

[29] Mackała K, Kurzaj M, Okrzymowska P, Stodółka J, Coh M, Rożek-Piechura K. The effect of respiratory muscle training on the pulmonary function, lung ventilation, and endurance performance of young soccer players. International journal of environmental research and public health. 2020 Jan;17(1):234.

[30] TEKİN D. Effect of body size on pulmonary function in male and female dancers. Journal of Physical Education & Sport. 2020 Nov 2;20.

[31] Kattenstroth JC, Kalisch T, Holt S, Tegenthoff M, Dinse HR. Six months of dance intervention enhances postural, sensorimotor, and cognitive performance in elderly without affecting cardio-respiratory functions. Frontiers in aging neuroscience. 2013 Feb 26;5:5.

[32] Khan R, Kapoor A, Raza ST, Singh S. PEAK EXPIRATORY FLOW RATE (PEFR) AND BODY MASS INDEX (BMI) IN ADULT FEMALE: A SYSTEMATIC REVIEW. Era's Journal of Medical Research. 2021 Jan 1;8(1).

[33] Anderson S, Atkins P, Bäckman P, Cipolla D, Clark A, Daviskas E, Disse B, Entcheva-Dimitrov P, Fuller R, Gonda I, Lundbäck H. Inhaled medicines: past, present, and future. Pharmacological Reviews. 2022 Jan 1;74(1):48-118.

[34] Okon IA, Okorocha AE, Beshel JA, Abali HC, Owu DU. Pulmonary functions and anthropometric parameters of young male and female adults participating in moderate aerobic exercise. Current Research in Physiology. 2023 Jan 1; 6:100112.

[35] Ghosh A, Jahan W. Effect of 10 Minute Treadmill Walking Exercise on PEFR in Healthy Young Adult in Relation with BMI. Int J Basic Appl Physiol. 2016;5(1).

[36] Ogunlana MO, Oyewole OO, Lateef AI, Ayodeji AF. Anthropometric determinants of lung function in apparently healthy individuals. South African Journal of Physiotherapy. 2021 Jan 15;77(1):1509.

[37] Azad A, Gharakhanlou R, Niknam A, Ghanbari A. Effects of aerobic exercise on lung function in overweight and obese students. Tanaffos. 2011;10(3):24.

[38] Köchli S, Endes K, Bartenstein T, Usemann J, Schmidt-Trucksäss A, Frey U, Zahner L, Hanssen H. Lung function, obesity and physical fitness in young children: The EXAMIN YOUTH study. Respiratory medicine. 2019 Nov 1; 159:105813.

[39] Bhatti U, Laghari ZA, Manzoor Syed B. Effect of Body Mass Index on respiratory parameters: A cross-sectional analytical Study: Effect of BMI on respiratory parameters. Pakistan Journal of Medical Sciences. 2019 Oct 10;35(6):1724-9.

[40] Aung M, Htay M, Oo TN. Association between anthropometry, physical activities and pulmonary function of the teenagers. International Journal of Arts Humanities and Social Sciences Studies. 2020;5(9):55-67.

[41] Tao D, Gao Y, Cole A, Baker JS, Gu Y, Supriya R, Tong TK, Hu Q, Awan-Scully R. The physiological and psychological benefits of dance and its effects on children and adolescents: a systematic review. Frontiers in physiology. 2022 Jun 13;13:925958.