

DOI: <https://doi.org/10.57125/FED.2024.06.25.15>

How to cite: Korobka, T. (2024). The Influence of Pilates Classes on the Development of Coordination and Flexibility in Future Professional Dancers. *Futurity Education*, 4(2). 279-289.
<https://doi.org/10.57125/FED.2024.06.25.15>

The Influence of Pilates Classes on the Development of Coordination and Flexibility in Future Professional Dancers

Tetiana Korobka

Studio owner, Modern dance studio "Star Dance", Ternopil, Ukraine; Pilates instructor, Club Pilates, Brooklyn, NY, United States, <https://orcid.org/0009-0004-9540-3271>

Corresponding author: trenertetyana90@gmail.com.

Received: January 23, 2024 | **Accepted:** May 26, 2024 | **Available online:** June 7, 2024

Abstract: Pilates classes emphasize core strength, stability, and alignment through controlled movements and breathing techniques, making them beneficial for dancers. This study aimed to examine the impact of Pilates training on the development of coordination and flexibility in future professional dancers. A quasi-experimental methodology was adopted, using a pre-test and post-test design with non-equivalent control and experimental groups. The findings indicate that Pilates training improved coordination and flexibility among the participants. Evidence suggests that regular Pilates practice enhances overall performance and movement control. These results contribute to our understanding of the value of Pilates in professional dance training. Further cross-national studies with larger samples are recommended to generalize the benefits of Pilates over conventional training. Additionally, the study emphasizes the psychological advantages of Pilates, including mood enhancement, stress reduction, and improved self-awareness, which are particularly relevant for dancers facing physical and emotional demands. By incorporating breathing techniques and body awareness, Pilates supports mental focus, posture correction, and muscle stabilization. The training was especially effective in enhancing spinal alignment, muscular endurance, and range of motion. Data also confirmed gender-related trends in Pilates participation, with female dancers more actively engaging in the program. Overall, Pilates represents a cost-effective, low-impact approach to developing key physical attributes in dancers, promoting both performance quality and injury prevention.

Keywords: coordination skills, experimental design, pilates classess, professional dancers, training.

Introduction

The physical fitness of students is well-defined by how they can perform movements with varying degrees of complexity. A significant element within the movement system is coordination skills. Enhancing these skills demands taking into account the general physical fitness level of the students. The purposes of developing coordination abilities may include improving or sustaining health at a fitting level or achieving proficiency in movements that meet future professional standards. The objective of enhancing coordination abilities can be to enhance health at an appropriate degree and elevate the skill level of movements to meet the requirements of future careers. It is the specialized standards that shape the methods for developing students' coordination abilities. Coordination skills become vital for optimizing training adaptations, augmenting injury, and overtraining. The method focuses on moderating direct balance, which will be related to recovery procedures such as stress management, which can contribute to the overall accomplishment and well-being of students' coordination skills. Boutios et al. (2022) examined the coordination skills of movements in children. The researchers discovered that as children grow older, their coordination indicators enhance and are positively influenced by engagement in sports. Further research has demonstrated that the development level of coordination indicators is strongly linked to the success of competitive activities. Coordination is the harmonious integration of movements and flexibility. According to Honório, Batista, Petrica, Santos, Serrano, & Martins, (2021). In the physical training programs for students, it is essential to take into account their initial level of coordination training. Jentzsch (2021) examined the changes in coordination skills among first and second-year students. It has been found that students can be characterized based on their age and their level of coordination preparedness. This insight is practically significant for designing effective physical education programs for students. Liu (2024) explored the impact of mistakes in the process of teaching motor skills to students. The authors suggest a framework for teaching motor skills that provides educators with a foundation for students to apply it. Pilates is a mindful movement practice developed by Joseph Pilates in the early 20th century. It emphasizes core strength, stability and alignment through controlled movements and breathing procedures. Pilates training is generally used in school. Therefore, professional dancers use the procedures to improve posture, alleviate and facilitate voluntary heart rate, body control, and core muscles during dynamic movements, and ensure that physical and mental vitality are promoted (Catai et al., 2020). However, despite the general acceptability of the method across diverse populations, including female subjects (Cavina et al., 2021), the methods remains indistinct among other methods of developing professional dancers. Pilates training is a major area of interest within the field of physical education. A key aspect of Pilates training is maintenance to ensure the improvement of the cardiovascular and lymphatic systems, which enhances the function of the musculoskeletal system. According to Cavina et al. (2020), pilates training is one of the exercises used to enhance the sense of balance and body in space, strength, and muscular endurance, as well as facilitate the stabilization of muscles that support the spine. Over the past century, there has been a dramatic increase in the development of pilates training as the method has been applied in dance for supplementary training and maintenance of body shape. Recent developments in the field of physical education have led to a renewed interest in integrating pilates training as a form of exercise that could integrate dancing in the form of exercise to help students develop muscle strength, body awareness, core strength, changing body shape and ensure the rich imagination are promoted . This has made the method very simple so that everyone can learn easily. Central to the entire application of pilates training in students' exercises is the concept of using deep intercostal breathing. The technique is effective in reducing emotions such as anger, depression, stress,

frustration and the development of negative impressions about others. Zhang & Zhang (2016) opined that higher education students, particularly females, have more advantages over their male counterparts in benefiting from pilates training, as the exercise methods allow them to pursue new things, including building core strength. The technique is much more popular among female college students as it enables them to shape their body lines and achieve a slimmer body than their male counterparts. There is a consensus among physical educators that pilates training was developed to promote the healing of old injuries and injury prevention and improve body posture through exercise (Liu, 2024; Long et al., 2021; Isacowitz, 2022). Data from several sources have identified increased body exercise and dancing associated with achieving body balance and maintaining body posture (Liu, 2024; Cavina et al., 2021). Recent trends in pilates training have led to the classification of the method into two levels. The levels are classified according to the difficulty of the mat and apparatus. Mat training is the foundation and essence of exercise. The exercise is divided into three different layers of training: beginner exercise, intermediate exercise, and advanced level. Despite the growing interest in Pilates exercise, the method has received less recognition among male students in some higher education institutions. The method does not require much to implement, as a mat and ray of sunshine are enough to create an excellent space for a fitness environment. Because of the simplicity of pilates exercise, the methods have been used to integrate mind-body coordination, aiming to restore physical fitness uniformly, correct postures, enhance vitality, invigorate the mind, and uplift the spirit (Adliah et al., 2020; Jinglong, 2023). Despite being less intense than other dance and aerobic exercises, Pilates is profoundly effective for achieving a healthy body. Consequently, Li et al. (2024) suggest conducting a study to examine the impact of Pilates training as a form of exercise to counteract the risks posed by other dance methods. However, this alone may not resolve the issue; therefore, other mind-body exercises should also be investigated for their effectiveness in correcting musculoskeletal misalignments among dancers.

Research Problem

Teaching students to coordinate sports so they can move melodiously and stylishly is one of the key priorities of pilates training. One of the advantages of using the method during the exercise is that it improves body movement and stabilizes muscle. However, a major problem with modern dancing is the issue of physical and psychological problems; this includes anxiety, stress and injuries (Koutedakis et al., 2005; De la Corte-Rodriguez et al., 2024). There is increasing concern that the intense training that the method exposed students can lead to many problems, such as injury of the musculoskeletal system (Koutedakis et al., 2005). Moreover, research has consistently shown that students have overstretched themselves to maintain their body shape. This has made them receive so much pressure from their instructor and peers, and subsequently result in developing anxiety, stress and low self-esteem (De la Corte-Rodriguez et al., 2024). Research has not treated pilates training in much detail as a potential substitute for modern dancing methods. The method was very effective as it presented numerous physical and psychological benefits to students (Pereira et al., 2022). Promoting relaxation and improving mood can help students reduce stress and anxiety, which is the key priority of pilates training. The methods emphasize self-improvement, self-awareness, and self-acceptance. However, despite the method's importance, inadequate literature explores the benefits of Pilates training in improving coordination and flexibility among future professional dancers, limiting its use in sports. Therefore, this study has set the objective to deeply analyze and explore the effectiveness of Pilates training in improving coordination and flexibility among future professional dancers. The method is capable of providing students with the opportunity to improve both the physical and psychological benefits while engaging in dancing.

Research Focus

As this study aims to investigate the effectiveness of Pilates training in enhancing coordination and flexibility among future professional dancers, the following research objectives have been established.

Research Aim and Research Questions

1. How does regular Pilates training influence the coordination skills of future professional dancers?
2. What is the impact of Pilates training on dancers' flexibility over a defined period of time?

Literature Review

A German physical trainer Joseph Pilates is the founder of the Pilates methods. The scientist was born on December 1883, in Monchengladbach, Germany. The German physical trainer was suffered from several disease such as asthma, rickets, and rheumatic fever. Despite the physical challenges faced by Pilates, he was able to overcome all these ailments through determination and dedication to physical fitness. Pilate went ahead to developed his unique approach to exercise which is called Pilates. The methods was referred to as "Contrology" which emphasized on the importance of core strengths, flexibility and body control. The method involves a range of exercises that focus on engaging the mind and body, improving posture, balance, and overall physical fitness. In 1925, Pilates and his wife Clara migrated to United State, where they established a studio in New York City. The studio quickly gained popularity, attracting dancers, actors, and other performers who were drawn to Pilates unique approach to physical fitness. The Pilates system has a significant impact on the development of physical abilities such as strength, flexibility, and coordination. The autonomy of movement gained through regular practice supports the efficient functioning of the musculoskeletal, cardiovascular, and lymphatic systems, and also contributes positively to mental well-being (Wang & Hao, 2024; Frantsi, 2023). Modern dance training emphasizes balance and coordination, which considerably improves overall posture. Recent studies suggest that dance training enhances flexibility and agility, allowing movements to appear more natural and fluid. However, despite its benefits for balance and coordination, modern dance training has several notable drawbacks. Pilates emphasizes the Control of body movement, resounding with its original alias, Control. These exercises can be done based on (mat Pilates) or equipment-assisted with regulating spring resistance (lab Pilates). The core principles of Pilates incorporate centering, concentration, precision, flow, and breathing (Adliah et al., 2020). The Pilates method integrates body coordination to reestablish physical fitness uniformly, correct postures, enhance strength, invigorate the mind, and elevate the spirit (Suna & Isildak, 2020). Despite being less concentrated than other dance and aerobic exercises, Pilates is incredibly effective for achieving a healthy body (Rayes et al., 2019). Primarily considered for rehabilitation and later adopted for training dancers, Pilates offers a comprehensive "essential" workout that benefits muscular strength, endurance, flexibility, balance, and cardiorespiratory endurance (Tozim & Navega, 2018). It incorporates a mind-body component, potentially offering a range of health benefits across different populations (Alvarenga et al., 2018). While Pilates is not a conservative exercise like resistance training, it is a structured physical activity that has been shown to enhance muscle strength, flexibility, and dynamic balance, particularly in young and middle-aged individuals (Mannan et al., 2024).

However, recent study found that men prefer to do strength training that visually emphasizes muscle growth (Mannan et al., 2024). However, if we look at male choreographers, Pilates affects not only muscle growth but also muscle strength. Such advanced exercises as Boomerang, Control Balance, Jack Knife, Rocking, Roll over, Side Bande and Swan Dive not only visually change the body, but also

develop strength, mobility, flexibility, balance and control. These are essential companions when performing highly complex choreographic moves, both for women and men. Table 1. presents some of the renowned choreographers and their contribution to the world of dance.

Table 1

Prominent choreographers and their contributions to the development of contemporary dance

S/N	Choreographers	Contribution
1	Martha Graham	Is known as the “Mother of the Modern Dance”. Graham developed the Graham technique, which emphasizes emotional expression and breathe control.
2	Isadora Duncan	Duncan rejected traditional ballet techniques and instead emphasized natural movement and expression. Her style influenced many future choreographers
3	Lester Horton	Developed modern dance techniques inspired by native American dances and was a pioneer of racial integration in dance performance
4	Merce Cunningham	Developed Cunningham’s avant-garde approach to dance which emphasized chance and randomness. He developed the “Choreography by chance” technique, which involved assigning movement randomly
5	Twyla Tharp	Tharp’s innovative fusion of ballet and modern dance has earned her numerous awards. She has choreographed over 125 dances and five Hollywood movies.
6	Alvin Ailey	Ailey’s Choreography often explored themes of African American culture and spirituality. He founded the Alvin Ailey American Dance Theater, which remains a prominent dance company today

Source: Authors’ own development.

Moreover, to distinguish between choreographers who used Pilates methods and their contributions to the development of contemporary dance, Table 2 presents the information.

Table 2

Some Prominent Choreographers who used Plates Methods and their Contribution

S/N	Choreographer	Contribution to Contemporary Dance	Use of Pilates Method
1	Martha Graham	Developed the Graham technique, emphasizing emotional expression and breath control Incorporated Pilates exercises into her warm-up routines	Incorporated Pilates exercises into her warm-up routines
2	Doris Humphrey	Focused on abstract, expressive movement, and collaborated with Pilates on exercises	Used Pilates exercises to improve dancers' strength, flexibility, and control
3	Charles Weidman	Developed the Weidman technique, emphasizing expressive movement and collaboration with musician	Incorporated Pilates exercises into his teaching and choreography
4	Alvin Ailey	Founded the Alvin Ailey American Dance Theater, promoting African American cultural heritage and modern dance	Used Pilates exercises to improve dancers' strength, flexibility, and control

5	Trisha Brown	Developed the Trisha Brown Dance Company, known for experimental and collaborative choreography	Incorporated Pilates exercises into her choreographic process and dancer training
6	Merce Cunningham	Developed the Cunningham technique, emphasizing chance and randomness in choreography	Used Pilates exercises to improve dancers' strength, flexibility, and control

Source: Authors' own development.

Therefore, this study is determined to investigate the impact of Pilates training in improving coordination and flexibility among future professional dancers.

Materials and Methods

A method used in this study was a quasi-experimental design, as it enables researchers to examine the impact of the independent variable on the dependent variable. The methods involved assigning the sample into two groups: experimental and control groups. The method has been identified as very effective in a situation where the aim is to assign samples to two different groups without disrupting the process of teaching. The method involved assigning randomly intact classes into experimental and control groups (Suna & İşildak, 2020). Therefore, this study has considered a quasi-experimental design as suitable for the study. The study used intact classes or pre-existing, nonequivalent groups in the control and experimental groups. The sample size was determined using an online sample size calculator, which consisted of 28 subjects. The subjects were divided into two groups of 14 and assigned to a control group and an experimental group using the random number table method. The additional criteria for the study required participants to be between 15 and 25 years old and of any gender. Participants were selected using a non-probability convenience sampling technique. Upon satisfying the additional criteria, 28 potential participants were selected to participate through a written form. Randomization was achieved by having each participant draw either an experimental or control group from a box, allocating them to either Group A or Group B. At the first visit, researchers collected demographic data, medical history, and baseline fitness assessments.

Data Analysis

The study applied descriptive statistics and t-test to compare the mean difference between experimental and control group when they are subjected to Pilates classess and normal dancing classess.

Results

The study assessed the effectiveness of Pilates training in improving coordination and flexibility among future professional dancers. The sample had 28 participants, with 14 allocated to experimental and control groups. Demographic information of the participants is presented below in Table 3-5.

Table 3

Students' Background Information

Group	N0	Age	Height (m)	Weight (kg)
Experimental	14	15 to 25	1.6 to 1.7	41.59 to 60.21
Control	14	11 to 25	1.6 to 1.7	41.59 to 60.21

Source: Authors' own development.

Table 4*Gender Distribution of the Participants*

Group	Gender	N	Total	Percentage
Experimental control	Male	9	14	64%
	Female	5		36%
	Male	8	14	57%
	Female	6		43%

Source: Authors' own development.**Table 5***Students' Performance on the Impact of Pilates Training on the Coordination Skills of Future Professional Dancers*

Parameter		Pretest		Posttest		
	Group	$\bar{x}$	SD	$\bar{x}$	SD	p-value
Pilates and	Experimental	4.19	1.82	19.14	4.25	0.000
Coordination Skills	Control	3.22	1.75	5.49	2.61	0.000

Source: Authors' own development.

Table 5 presents results obtained from the test administered to the control and experimental group on the impact of pilates training. The information gathered revealed that there was an average mean of 4.19 and a standard deviation of 1.82 in the pretest. The analysis further revealed an average mean of 19.14 with a standard deviation of 4.25 in the post test of experimental group. Equally, the analysis of the control group revealed an average mean of 3.22 and a standard deviation of 1.75 in the pretest, while the posttest showed an average mean of 5.49 with a standard deviation of 2.61. This indicated that the mean gain in the post was greater than the mean value of the pretest. This implies that Pilates training improved the coordination skills of future professional dancers.

Table 6*Analysis of the Impact of Pilates Training on Dancers' Flexibility*

Pilates training	Pre-test				Post-test		
	N	$\bar{x}$	SD		$\bar{x}$	SD	p-value
Pilates	14	8.11	1.83		19.83	3.70	0.000
Flexibility	14	7.27	1.90		9.75	2.11	0.000

Source: Authors' own development.

The result presented in Table 6 revealed an average mean of 8.11 and a standard deviation of 1.83 in the pre-test, while the information on the analysis of the post-test shows that the test had an average mean of 19.83 with a standard deviation of 3.70 in the post-test of the experimental group. The analysis of the performance of the control group in the test shows that the test had an average mean of 7.27 with a standard deviation of 1.90 in the pre-test, while the post-test analysis indicated that the test had an

average of 9.75 with a standard deviation of 2.11. This indicated that the mean gain in performance between the control and experimental group was significant, which implies that the posttest means were greater than the pretest mean in the experimental group, which had a higher mean gain score than the control group. This indicates that Pilates training has an impact on dancers' flexibility over time.

Table 7

Analysis of Experimental and Control Group Perceptions of the Benefits of Pilates for Performance and Movement Control

Group Gender	Pre-test			Post-test		Mean gain
	N	$\bar{X}$	SD	$\bar{X}$	SD	
Experimental	14	4.18	1.80	19.00	4.30	14.82
control	14	4.22	2.05	20.11	4.01	15.89

Source: Authors' own development.

Table 7 shows experimental data on the benefit of pilates in performance and movement control. The finding revealed an average mean of 4.18 with a standard deviation of 1.80 in a pre-test of the experimental group. Equally, the findings further revealed that the test had an average of 19.00 with a standard deviation 4.30 in the past quarter. This indicated a significant difference in mean performance between the pretest and posttest in the experimental group, which is 14.82 (i.e., the mean gain). The analysis of the result further revealed that the test had an average mean of 4.22 with a standard deviation of 2.05 in the pre-test, while the test had an average mean of 20.11 with a standard deviation of 4.01 in the post-test. This indicated a significant difference in the mean gain between the pretest and posttest in the control group, which was 15.89. Thus, Pilates has benefits in terms of overall performance and movement control.

Discussion

The study aimed to explore the effectiveness of Pilates training in improving coordination and flexibility among future professional dancers. The findings indicated significant improvements in all three variables for both groups, with the Pilates training influencing the coordination skills of future professional dancers, while Pilates excelled in enhancing dancers' flexibility, and Pilates has benefits in the dancer's overall performance and movement control. Pilates training improved the Coordination skills of future professional dancers, which was statistically significant (Roh, 2018). This outcome is consistent with other research indicating that Pilate training enhanced coordination skills (Honório et al., 2021; Petruk, et al., 2021; Bergeron et al., 2017). In terms of dancers' coordination skills, Pilates training also demonstrated significant improvements, corroborating findings from previous studies that emphasize the role of Pilates training in enhancing dancers' coordination skills (Liu, 2024). The result also shows that Pilates training has an impact on dancers' flexibility over time. It is also statistically significant. The superior performance of Pilates in improving flexibility aligns with existing literature, which highlights the comprehensive benefits of Pilates in increasing range of motion and muscular flexibility (Zhang & Zhang, 2016; Tozim et al., 2021). This can be attributed to the emphasis on controlled, precise movements and stretching integral to Pilates (Cavina et al., 2020; Preeti et al., 2019). The result further shows that Pilates has benefits in the overall dancer's performance and movement control. This collaborates with the studies conducted by (Wang & Hao, 2024) and contradicts the finding this no significant difference between the mean of the two groups. The study's strong suit included a precise sample size and randomization, ensuring the reliability of the findings. However, there were

limitations that needed to be addressed. The study duration was short; perhaps this will have a longer-term effect on the exercises that are not assessed. The results suggest that both Pilate's training and Coordination skills are effective in improving flexibility and movement control (Li, 2024; Łuczniak et al., 2021). Pilates, on the other hand, excelled in flexibility enhancement, possibly due to its emphasis on controlled stretching and muscle elongation.

Conclusions and Implications

This study is determined to explore the impact of Pilate's classes on the development of coordination and flexibility in future professional dancers. The study concluded that Pilates training significantly improves coordination skills, flexibility, and overall performance and movement control; these findings suggest that incorporating both into fitness programs can provide broad benefits, promoting overall health and well-being. In human healthcare, it can increase multiple aspects of physical fitness, eventually contributing to better weight management and increased muscular endurance.

Suggestions for future research

Under this study, many questions have been thrown up that need further investigation. What is now needed is a cross-national study involving large numbers of students to explore the impact of pilates classes on the development of coordination and flexibility in future professional dancers. It would be interesting to assess the effects of gender and socio-economic status of pilates classes on the development of coordination and flexibility in future professional dancers.

Acknowledgements

None.

Conflict of Interest

None.

Funding

The Author received no funding for this research.

References

- Adliah, F., Puspita, A., & Sutono, E. (2020). Comparison between core exercise program with pilates exercise program in weight changes in overweight students. *Enfermería Clínica*, 30, 300–303. <https://doi.org/10.1016/j.enfcli.2020.06.067>
- Alvarenga, G., Charkovski, S., Santos, L., Silva, M., Tomaz, G., & Gamba, H. (2018). The influence of inspiratory muscle training combined with the Pilates method on lung function in elderly women: A randomized controlled trial. *Clinics*, 73. <https://doi.org/10.6061/clinics/2018/e356>
- Bergeron, C. S., Greenwood, M., Smith, T., & Wyon, M. (2017). Pilates Training for Dancers: A Systematic Review. *National Dance Society Journal*, 2. <https://iadms.org/education-resources/blog/2018/august/how-effective-is-pilates-as-an-additional-training-program-for-dancers/>
- Boutios, S., Fiorilli, G., Buonsenso, A., Daniilidis, P., Centorbi, M., Intrieri, M., & di Cagno, A. (2021). The Impact of Age, Gender and Technical Experience on Three Motor Coordination Skills in Children

- Practicing Taekwondo. *International Journal of Environmental Research and Public Health*, 18(11), 5998. <https://doi.org/10.3390/ijerph18115998>
- Catai, A. M., Pastre, C. M., Godoy, M. F. d., Silva, E. d., Takahashi, A. C. d. M., & Vanderlei, L. C. M. (2020). Heart rate variability: are you using it properly? Standardisation checklist of procedures. *Brazilian Journal of Physical Therapy*, 24(2), 91–102. <https://doi.org/10.1016/j.bjpt.2019.02.006>
- Cavina, A. P. de S., Pizzo Junior, E., Machado, A. F., Biral, T. M., Lemos, L. K., Rodrigues, C. R. D., Pastre, C. M., & Vanderlei, F. M. (2020). Effects of the mat Pilates method on body composition: Systematic review with meta-analysis. *Journal of Physical Activity & Health*, 17(6), 673–681. <https://doi.org/10.1123/jpah.2019-0171>
- Cavina, A. P., Silva, N. M., Biral, T. M., Lemos, L. K., Junior, E. P., Pastre, C. M., Vanderlei, L. C., & Vanderlei, F. M. (2021). Effects of 12-week Pilates training program on cardiac autonomic modulation: a randomized controlled clinical trial. *Journal of Comparative Effectiveness Research*, 10(18), 1363–1372. <https://doi.org/10.2217/cer-2021-0195>
- De la Corte-Rodriguez, H., Roman-Belmonte, J. M., Resino-Luis, C., Madrid-Gonzalez, J., & Rodriguez-Merchan, E. C. (2024). The role of physical exercise in chronic musculoskeletal pain: Best medicine-A narrative review. *Healthcare (Basel, Switzerland)*, 12(2). <https://doi.org/10.3390/healthcare12020242>
- Frantsi, J. (2023). Focus on mindful movement: Problematizing contemporary dancers' training practices through Pilates. *Movement Matters*, 2. <https://doi.org/10.29173/mm16>
- Honório, S., Batista, M., Petrica, J., Santos, J., Serrano, J., & Martins, J. (2021). Pilates and satisfaction with life in elderly. *Journal of Physical Education and Sport*, 21(1), 152-158. <https://efsupit.ro/images/stories/ianuarie2021/Art%2021.pdf>
- Isacowitz, R. (2022). *Pilates*. Human Kinetics.
- Jentzsch, D. (2021). *Dancing the Pilates way: The possible effects of Pilates on the alignment of a dancer's body* (Master's thesis, University of Northern Colorado). University of Northern Colorado Scholarship & Creative Works. <https://digscholarship.unco.edu/theses/228>
- Jinglong, D. (2023). Influence of Pilates training on physical coordination and stability of volleyball players. *Revista Brasileira de Medicina Do Esporte*, 29. https://doi.org/10.1590/1517-8692202329012023_0024
- Koutedakis, Y., Stavropoulos-Kalinoglou, A., & Metsios, G. (2005). The significance of muscular strength in dance. *Journal of Dance Medicine & Science: Official Publication of the International Association for Dance Medicine & Science*, 9(1), 29–34. <https://doi.org/10.1177/1089313x0500900106>
- Li, F., Omar Dev, R. D., Soh, K. G., Wang, C., & Yuan, Y. (2024). Effects of Pilates exercises on spine deformities and posture: a systematic review. *BMC Sports Science, Medicine and Rehabilitation*, 16(1), 55. <https://doi.org/10.1186/s13102-024-00843-3>
- Li, Z. (2024). Image analysis and teaching strategy optimization of folk dance training based on the deep neural network. *Scientific Reports*, 14(1), 10909. <https://doi.org/10.1038/s41598-024-61134-y>
- Liu, X. (2024). Feasibility study on the introduction of Pilates exercise in physical education teaching in art colleges and universities. *Region - Educational Research and Reviews*, 5(6), 96. <https://doi.org/10.32629/rerr.v5i6.1533>

- Long, K. L., Milidonis, M. K., Wildermuth, V. L., Kruse, A. N., & Parham, U. T. (2021). The impact of dance-specific neuromuscular conditioning and injury prevention training on motor control, stability, balance, function and injury in professional ballet dancers: A mixed-methods quasi-experimental study. *International Journal of Sports Physical Therapy*, 16(2), 404–417. <https://doi.org/10.26603/001c.21150>
- Łuczniak, K., May, J., & Redding, E. (2021). A qualitative investigation of flow experience in group creativity. *Research in Dance Education*, 22(2), 190–209. <https://doi.org/10.1080/14647893.2020.1746259>
- Mannan, R., Riaz, S., Kousar, A., Mannan, H., Rahim, R., Guftar, F., & Sadiq, S. (2024). Comparison of Pilates and core exercises for flexibility, endurance and weight reduction in adults. *Journal of Health and Rehabilitation Research*, 4(2), 1411–1416. <https://doi.org/10.61919/jhrr.v4i2.1001>
- Pereira, M. J., Dias, G., Mendes, R., Mendes, R. S., Martins, F., Gomes, R., Gama, J., Castro, M. A., & Vaz, V. (2022). Efficacy of Pilates in functional body composition: A systematic review. *Applied Sciences (Basel, Switzerland)*, 12(15), 7523. <https://doi.org/10.3390/app12157523>
- Petruk, L., Grygus, I., Biruk, I., Kosobutskyy, Y., Hryhorovych, O., Pinchuk, V., & Zarichanska, L. (2021). Influence of Pilates classes on the physical fitness of female students. *Journal of Physical Education and Sport*, 21, 2975–2980.
- Preeti, K. S., Yadav, J., & Pawaria, S. (2019). Effect of pilates on lower limb strength, dynamic balance, agility and coordination skills in aspiring state level badminton players. *J Clin Diagnostic Res*, 13(7), 1–6. <https://doi.org/10.7860/jcdr/2019/41713.12978>
- Rayes, A. B. R., de Lira, C. A. B., Viana, R. B., Benedito-Silva, A. A., Vancini, R. L., Mascarini, N., & Andrade, M. S. (2019). The effects of Pilates vs. aerobic training on cardiorespiratory fitness, isokinetic muscular strength, body composition, and functional tasks outcomes for individuals who are overweight/obese: a clinical trial. *PeerJ*, 7(e6022), e6022. <https://doi.org/10.7717/peerj.6022>
- Roh, S. Y. (2018). The influence of physical self-perception of female college students participating in Pilates classes on perceived health state and psychological wellbeing. *Journal of Exercise Rehabilitation*, 14(2), 192–198. <https://doi.org/10.12965/jer.1836088.044>
- Suna, G., & İşildak, K. (2020). Investigation of the effect of 8-week reformer Pilates exercise on flexibility, heart rate and glucose levels in sedentary women. *Asian Journal of Education and Training*, 6(2), 226–230. <https://doi.org/10.20448/journal.522.2020.62.226.230>
- Tozim, B. M., & Navega, M. T. (2018). Efeito do método pilates na força dos músculos inspiratórios e expiratórios em idosos. *Brazilian Journal of Kinanthropometry and Human Performance*, 20(1), 1–9. <https://doi.org/10.5007/1980-0037.2018v20n1p1>
- Tozim, B. M., De Aquino Nava, G. T., Marques, A. E. Z. S., & Navega, M. T. (2021). Efficacy of the Pilates versus general exercises versus educational workshops on neuromuscular parameters: A randomized controlled trial. *Journal of Bodywork and Movement Therapies*, 26, 420–427.
- Wang, J., & Hao, J. (2024). Analysis of mechanical damage in dance training under artificial intelligence behavior constraints. *International Journal of High Speed Electronics and Systems*. <https://doi.org/10.1142/s012915642440086x>
- Zhang, Y., & Zhang, L. G. (2016). Exploring the significance of offering Pilates elective course in colleges and universities. *Martial Arts Research*, 1(10), 125–127.