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Dancing the Pilates Way: The Possible Effects of Pilates on the Alignment of a Dancers' Body

Darla Jentzsch
University of Northern Colorado

UNIVERSITY OF NORTHERN COLORADO
Greeley, Colorado
The Graduate School

DANCING THE PILATES WAY: THE POSSIBLE EFFECTS OF PILATES ON THE ALIGNMENT OF A DANCERS' BODY

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Darla Ann Jentzsch

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Accepted by the Thesis Committee:

_____
Sandra L. Minton, Ph.D., Chair, Advisor

_____
Christy O'Connell-Black, M.A., Committee Member

Accepted by the Graduate School:

_____
Jeri-Anne Lyons, Ph.D.
Dean of the Graduate School
Associate Vice President for Research

ABSTRACT

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The purpose of this research was to investigate any mental and physical benefits that Pilates Exercises might have on dancers' alignment. The researcher collected quantitative and qualitative data to answer these four research questions:

Q1 How can a dancer's alignment be measured to see change after ten Pilates Classes?

Q2 Can Pilates bring a dancers' body closer to ideal alignment in ten Pilates classes?

Q3 What do dancers notice differently in their dancing after having been taught Pilates?

Q4 What are the benefits of having proper alignment as a dancer?

The researcher examined the effects of the Pilates exercises on ten advanced dancers in terms of their responses to determine if the four research questions were answered. The dancers were taught the Basic Ten Pilates Method exercises for ten weeks and given the opportunity to answer pre and post questionnaires along with participating in anatomical alignment measurements. The information gathered was analyzed with the aim of understanding the dancers' experiences and any anatomical changes. The findings suggested that adding Pilates to a dance teaching curriculum or personal dance training can only be beneficial. The findings also suggested a dancer's physical alignment and mental awareness is positively affected through the

Pilates training. The information gathered can serve as a resource for teachers and dancers in creating a safer and healthier career for oneself or their students.

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CHAPTER I

INTRODUCTION

Goal of Thesis

The goal of this thesis is to teach dancers how to find ideal alignment through the performance of Pilates exercises and the benefits this technique has to offer. Joseph Pilates stated the following in his book *Return to Life Through Contrology*, "Good posture can be successfully acquired only when the entire mechanism of the body is under perfect control" (32). In the book *The Pilates Method,* written by Phillip Friedman and Gail Eisen, he also commented "It is the mind itself which builds the body" and "… Change happens through movement and movement heals" (7). Joseph Pilates believed the content of these statements whole heartedly. He also noted that "… in ten sessions of Pilates work you will feel the difference, in twenty you will see the difference and in thirty you will have a whole new body" (Siler back cover). The system supporting his beliefs and its benefits to the body is named after him and was originally called Contrology.

Dancers rely on having healthy bodies so they can perform effectively and without pain. In 1926, the Pilates Method or Contrology was invented as a dancer's cross training dream. Dancers discovered the Pilates Method which was developed in Monchengladbach, Germany by Pilates to heal, train, and help individuals combat poor movement habits and improve their relationship between body and mind. This system of exercises was designed to focus on six major principles. These principles include concentration, control, centering, flow of movement, precision, and breath. All these principles come together for the dancer's benefit as Pilates

designed his method of exercises to enhance the quality of movement and to improve simple actions performed in everyday life.

The six principles are integrated into the Pilates exercise method and could help support the dancer in multiple ways. Concentration can be described as the place where someone directs their attention. Concentration is developed through Pilates exercises by having the dancer focus on performing the exercises with intention. This means going through the mental checklist and making sure one is performing the exercises correctly and one's body is in the correct position to receive the pure benefits Pilates has to offer.

Control can be described as the regulation of any given action. When performing Pilates exercises with slow and controlled movements, Rael Isacowitz and Karen Clippinger stated in their book, *Pilates Anatomy,* "… often a higher level of control is associated with fewer and smaller errors, exact alignment, better coordination and balance" (3). Suzanne Farrell, a retired principal dancer for the New York City Ballet and world-renowned guest soloist explained in the book *The Pilates Method of Physical and Mental Conditioning* "… the Pilates Method teaches you to be in control of your body and not at its mercy" (qtd. in Friedman and Eisen 15).

In the Pilates system, centering means finding focal points in the body. A focal point can be described as balancing your spine or core which is a technique needed in every aspect of dance. Pilates aligns and balances one's center through strengthening the pelvic and shoulder girdle muscles and supporting muscles of the spine. Amy Taylor Alpers and Racheal Taylor Segal, co-owners of the Pilates Center in Boulder Colorado and authors of *The Everything Pilates Book,* pointed out that Pilates can correct muscular imbalances like tight hamstrings, overloaded quads, low back pain in addition to improving coordination, control, balance, precision, endurance, breathing capacity, and efficient movement patterns (8). "Pilates emphasis

on restoring the body to true balance, on ease and economy of movement, and a channeled flow of energy was central to the appeal his method had for the greatest figures in dance" (Friedman and Eisen 3). Jerome Robbins, Martha Graham, Hanya Holm, and Ted Shawn were some of the well-known dancers who used the Pilates Method to find proper alignment, strengthen and balance their core, and recover from or prevent injuries. Ruth St. Denis, who was known as "the First Lady of American Dance", stated "… not only is the body rejuvenated when using the Pilates exercises, but the mental and spiritual refreshment is beyond calculation" (Friedman and Eisen 3).

Movement flow involves focusing on all the movements and actions coming from the center or core of the body flowing outward to the extremities. This means the exercises are performed slowly, precisely, and with uninterrupted movements initiated from one's center which is also the ideal in dance. In her 2016 article in the *Seattle Times*, titled "How Trisha Brown Changed the Way We Think About Dance*"* Melody Datz-Hansen shared that "… even though she was already a dancer deeply immersed in ballet that it is the flow of movement and energy that keeps movement from becoming stagnant" (2). When comparing a river's flow of movement to that of dancers, a river flowing smoothly is ideal for a dancer's movement. Flowing without any barriers or blockages in alignment is ideal to help movement flow through the body freely while dancing.

Precision can be described as the manner in an action or movement is executed. Datz-Hansen shared a memory of watching a male dancer midjump. In the same article as the one noted above, Datz-Hansen pointed out that when observing a dancer's explosion and precision of movement during the take-off and landing that "… it marked a major turning point in my understanding of dance as an artform" (2). She shared that even though she was already a dancer

deeply immersed in finding different ways to stay safe while performing amazing jumps with precision and flow these techniques became her lifelong study (2).

Flow is defined in the *Journal of Music Research in Africa* by Clorinda Panebianco-Warrens in her research article "Exploring the Dimensions of Flow and the Role of Music in Professional Ballet Dancers" as "being "in the zone" and a positive, enjoyable, psychological state linked to optimal performance" (2). Kate Hefferon and Stewart Ollis wrote in their article "Just Clicks: An Interpretive Phenomenological Analysis of Professional Dancers' Experience of Flow" that "… flow is a psychological state in which the mind and the body 'just click', creating optimal performance" (2). In agreement with the prior definitions of flow is Elsa Urmston's description of Mihalyi Cskizsentmihalyi's flow theory in her article, "Keeping the Enjoyment Alive: Positive Psychology for Dance" as "… a subjective mental state contributing to optimal experience, which is characterized by complete absorption in an activity, at given moment in time" (3). In the same article, Urmston invited the readers to think back to why they started dancing. She noted "… no doubt it was because of the sheer enjoyment and exhilaration of feeling your body move" (2). Klara Lucznik et al. concluded in their article flow is associated with a personal feeling "… cognitively efficient, motivated and happy" (2). The researcher also believed a reason why individuals are drawn to dance and continue is for the enjoyment and feeling of the body moving in a flowing and authentic way creating a personal happiness.

Trisha Brown is known for her style of flowing and precise movements. She provided her dancers with choreography that was challenging knowing that with the proper control, alignment, precision and flow her choreography would be safe, expressive, and authentic for her dancers. Klara Lucznik et al. found and reported in their article, "A Qualitative Investigation of Flow Experience in Group Creativity," that "… dancers commonly associated flow with a highly

creative state where they tended to find surprisingly, very organic and natural movements" (2). Alpers and Segal agreed that dancers' movements should be connected, precise, and natural to produce flow of energy through the body (35). A dancer from Street Dance Studio experiencing flow in dance stated "I could not adequately describe the way dance makes me feel. It is though I somehow found a way to sever the cords holding me to this earth and for a moment if only a fraction of a second, I can fly" (2). Irene Dowd, who has worked with neuromuscular re-education, teaches when the above elements are connected, the dancer's body can "take root to fly" (Dowd 60) and "go with the flow" (2) safely.

The last Pilates principle is breath. Breath is key to living and the Pilates technique teaches correct breathing while in proper alignment. Each Pilates exercise is accompanied by a set of breathing exercises. Romana Kryzanowska a student of Pilates, was quoted in the book *The Pilates Method,* when she described how to breathe as "… breathe in at the point of effort and out on the return or relaxation" (qtd. in Friedman and Eisen 16). "Pilates saw the key of forced exhalation as the key to full inhalation" and if you "squeeze out the lungs as you would a wet towel dry, than the entire body is charged with fresh oxygen from toes to fingertips" (Friedman and Eisen 16). He whole heartedly taught and preached in his life and book *Return to Life through Contrology* that "… breathing is the first act of life and the last. Our very life depends on it" (23). Pilates believed that focusing on breathing was vital to the quality of life. When a dancer can master the art of Pilates breathing, the body, mind and spirit will benefit by being connected and work together.

When the Pilates exercises are performed correctly all six principles are emphasized and the dancer benefits from having a safe, efficient, and healthy physical alignment. Pilates was quoted in his book *Return to Life Through Contrology* when he explained that "… a few well

designed movements, performed properly in a balanced sequence, with focus are worth hours of doing sloppy calisthenics or forced contortions" (5). These exercises performed while focusing on the six principles can allow dancers to benefit both physically and mentally. When concentration, control, centering, precision, flow of movement, and breath are integrated into dance, a perfect cross training match can result. This is true because both Pilates and dance technique emphasize a strong center, focus and concentration, control for executing movements in correct alignment, precise lines, fluid and flowing movements and proper breathing.

Christine Bergeron, who is an active Pilates and dance instructor with eighteen years teaching experience wrote an article titled "How Effective is Pilates as an Additional Training Program for Dancers." In this article, Bergeron witnessed positive changes in her students from using the Pilates exercises. Bergeron wrote, "I can see the connections and similarities between dance technique and Pilates. Some of the similarities include the focus of attention, corrected body alignment, core engagement, concentration and precision" (1).

Dancers are prone to injury with the demands put on their bodies and at times this creates bad postural habits. Some of the common habits which have been observed in dancers are misalignment in the shoulders, pelvis, knees, ankles, and spine, including rounded shoulders, forward jutting chin. tucked pelvis, over arched back, splayed ribs, hiked working hip, knees which are not aligned over the toes, ankles which roll in, beveling and sickling feet, tension throughout the body, holding the breath, and individual postural deviation patterns. Focusing on one's anatomy through the Pilates Method and its exercises is a way to combat and prevent poor postural habits. Other mind-body exercise methods which also focus on working with dancers to correct alignment and other issues are the Feldenkrais Method, Alexander Technique, Bartenieff Fundamentals, and Iyengar Yoga.

Purpose of Study

Good alignment consists of a long-decompressed spine and neutral pelvis and shoulder girdle. The spine benefits from good alignment because there is freedom of movement. Freedom of movement allows dancers to transition through movements with ease and safety. Dancer and choreographer Alvarado Restrepo, director of El Colegio del Cuerpo, a school in Cartagena, Columbia, firmly believed there is a connection between dance and personal freedom. He wrote in his 2008 article for the *Guardian* that "… freedom opens the door to expression" (1). Dance is a form of expression and when the body is aligned it allows dancers to be open to movement and experience its flow.

Flow has also been described in dance as elegance, grace, freedom, or fluidity. As mentioned previously, in proper alignment, the pelvis rests in a neutral position with no tucking under or arching of the back, while the shoulder girdle supports the head which is balanced evenly on the spine. Good alignment can be identified during a plié when the pelvis falls and rises effortlessly in relation to the earth. Treva Bedinghaus wrote "… balance is achieved through proper alignment and dancing is not a matter of staying rigid but moving gracefully" (2). When the muscles are balanced properly, it positions the spine in ideal alignment, and this is the pure magic of the Pilates Method.

There are many benefits for a dancer who is in proper alignment. Alpers and Segal indicated "… flowing, natural movements are safe movements, and any athlete will tell you that controlled, graceful, connected movements are less apt to strain and allow for free-flowing movements" (35). As a dancer, the researcher is familiar with the benefits of the Pilates method since dancing while not being properly aligned caused an injury. Since Pilates helped her, she is hopeful it will help other dancers who are out of alignment or dancing in pain.

When dancers' bodies are in alignment, they will benefit by having fewer injuries and a longer dance career. Benefits also include increased stamina, strength, flexibility, balance, less tension in muscles, physical awareness, freedom of movement, improved posture, less stress on joints, and gravity falling through the center of the body. Rebecca Martin interviewed professional dancers on the significance of Pilates and dance regarding alignment and their benefits. She quoted Marc Cassidey, a former professional ballet dancer in *Dance Informa Magazine*. In this interview he stated,

> When I was dancing my best, Pilates was for the most part a daily routine, I started Pilates in my first year of the Australian Ballet School, which is around 23 years ago, and I discovered Pilates at a really good time in my career. I was at a point where I was frustrated and wanting more out of dancing. I have always loved performing but what I didn't realize at the time was how much more I could do for myself to enhance my technique and experience performing. (qtd. in Martin 2)

In the same article, Lana Jones shared that "Pilates for me is the perfect marriage with ballet. The core strength with focus on alignment and length help to aid and enhance my dancing. I have more awareness and understanding of what I'm asking my body to do and it's an all-together feeling that I crave" (qtd. in Martin 4). Pilates exercises were developed to create alignment of the spine through core strength and awareness. Alpers and Segal preached the Pilates message and noted, "Pilates teaches your muscles to respond precisely to your mind, so that each movement provides the maximum benefit for each muscle group" as well as "Pilates helps discipline your body to the Pilates postures, movements and breathing techniques, giving your body a deeper, more effective way to move" (Alpers and Segal 34).

Pilates postures and exercises are unique because they involve every muscle and cell of your body, giving dancers and others complete control and the ability to change. In her book, *The Pilates Body,* Brooke Siler confirmed that "… for this reason Pilates is designed with the intent of making you the master of your own fitness destiny" (13). To quote Pilates, "… one of the major results from Pilates exercises is gaining the mastery of your mind over the complete control of your body" (Pilates 19). As a dancer the researcher believed the benefits of Pilates are numerous and can keep dancers safe and in the present moment. When the dancer is in ideal alignment, exercises such as pliés, relevés and balancing in various positions put less stress on the joints and the dancer can enjoy dancing without pain. Considering these statements, the goal of this research was to answer the following four research questions:

Q1 How can a dancer's alignment be measured to see change after ten Pilates Classes?

Q2 Can Pilates bring a dancers' body closer to ideal alignment in ten Pilates classes?

Q3 What do dancers notice differently in their dancing after having been taught Pilates?

Q4 What are the benefits of having proper alignment as a dancer?

Elisa Withers is a dance teacher and physiologist at the Australian Physiology and Pilates Training Institute part of the United Health Melbourne Medical Center. In her article, "Pilates for Dancers", she wrote that Pilates provides advantages to dancers who practice its techniques because it develops body awareness and control of their alignment. Withers noted, "...in a recent systematic review that the injury rate in dancers is high and accounts for seventy-five percent of all reported athletic dance injuries" (1). In their 2017 article in *NeoroSports*, editors Deu, et al. posted that "… the seven most common dance injuries which could be minimized by strength training and proper alignment are ankle sprains, Achilles Tendonitis, Flexor Hallucis Longus

Tenosynovitis also known as “trigger toe,” ankle impingement, snapping hip, hip impingement, and Patellofemoral Pain Syndrome” (2). They also emphasized in this article that having the body in proper alignment allowed for gravity and repetitive forces to fall correctly and evenly preventing injuries.

Jeffery Russell and Ruth Solomon Professors at the University of Rochester’s Medicine Orthopedics and Physical Performance Center and proud sponsors of Sports Trauma and Overuse Protection Program (STOP) found and documented in their article, “Dance Injuries” that “… across the spectrum of dance the vast majority of injuries are from the result of overuse rather than trauma” (1). STOP focuses on and targets sports that have the highest rates of overuse and trauma injuries, specifying dance as one of them.

Withers reported when looking at the range of causes for dance injuries “… professional dancers often face grueling rehearsal and performing schedules as well as constant, vigorous and stressful scrutiny from within and those surrounding them” (1). Withers also shared, “… good alignment is vital to dancers whose movements demand control yet fluidity, ease and grace” (2). She also indicated that “The highly repetitive and complex movements and demands place undue stress on a dancer’s body. When these movements are performed on a misaligned body or with poor control injuries occur” (2). “When performed in an aligned body, dancers are able to combine graceful, seemingly, effortless movement with strength, flexibility, endurance, and exceptional control” (3).

Withers, who is a respected and well-known dance physiotherapist and Pilates instructor also reported that she,

> … sees the rewards that Pilates pays to the dancers who practice. Pilates marvelously connects the mind and body and in doing so builds greater awareness of control and

> alignment to allow fluid, yet accurate movements to prevail. Pilates approach towards control, precision and fluid movement and its philosophies, which mirror those of dance, is a natural choice for many dancers. (6)

Significance of Study

Dancers and athletes, as mentioned earlier, are hard on their bodies physically and prone to injury. Having a well-balanced body will help prevent unnecessary injuries. In the book, *Return to Life Through Contrology*, Pilates wrote, "Because of poor posture, practically 95 percent of our population suffers from various degrees of spinal curvatures" (27). When poor posture and repetitive unhealthy movements are present, pain and gravity are continuous over time and the body responds by creating unhealthy habits affecting the alignment of the body. When continued over time, unhealthy postures, and poor movement habits, cause the body to shift and reduce movement efficiency. These poor habits disturb the distribution of weight through the joints of the body resulting in misalignments. When in proper alignment a dancer's joints are placed correctly, and the body's weight is distributed evenly. Dancers are continuously trying to improve their strength and flexibility. Engaging in Pilates exercises teaches the dancer that quality over quantity in movement is safer and when the body is in proper alignment, the correct muscles work and allow the body to fall into a more balanced state. "One of the major results of Contrology is gaining the mastery of your mind over the complete control of your body" (Pilates 19). Pilates as well as others agree when unity is created with the mind, body, and spirit balance is achieved creating an aligned body.

Irene Dowd wrote in her book *Taking Root to Fly*, "Human beings are designed to move" (56). When speaking of the body being in balance physically, mentally, and spiritually she indicated, "… it is as if the person creates a more spacious and ecologically rich inner land to

move through. This happens by the very process of traveling through the superhighways of one's own inner realm of physical being" (Dowd 86). Pilates agreed with this statement because each of his exercises in his method teaches that, "Everyone is the architect of their own happiness" (Pilates 20). This is also a mantra used by the researcher as a reminder to stay present, safe and move in proper alignment. This quote is seen universally in Pilates' studios including the one owned by the researcher in Colorado, and many others similar facilities. The owner of Absolute Pilates Studio in Pennsylvania Allison Zang stated in *Lifestyle Magazine*, "In this journey we all call life, there are moments when we all stop and assess our future, how we can be better individuals to our community and to ourselves" (2).

The researcher feels taking control of one's mind, body and spirit and shaping it for success can benefit the dancer. Incorporating Pilates into a dancer's regimen can support a strong healthy career and one in which dancers can shape to their advantage. Injury is a common problem among dancers and one the researcher would like to help prevent by incorporating the Pilates exercises into her students' dance training. The researcher believes there is no other issue more critical to a dancer's career and the field of dance today than having a healthy aligned body and mind. This investigation into the Pilates Method could help dancers combat injury, correct postural misalignments, and teach them a way to be in control of their own health. Through the Pilates Method's six fundamentals, the researcher desired to teach the importance of balanced body alignment for all dancers, allowing for a long and heathy career.

CHAPTER II

LITERATURE REVIEW

Introduction

Dancers are highly susceptible to injuries and frequently require interaction with medical professionals. When the mind or body is out of alignment the body is prone to injury. Prevention of injury is of importance to a dancers' career as well as individual expression. The purpose of this research was to investigate any mental and physical benefits that Pilates Exercises might have on dancers' alignment supporting an injury free career.

A Discussion of Dance Injuries

Many types of injuries can be attributed to dancing. The following section of this chapter includes information about attempts that have been made to prevent common dance injuries and the entities that have promoted those changes.

Short History of Injury Prevention in Dance

In this section, the researcher discussed steps that have been used to educate dancers on preventing injury. Dancers have the support from the International Association of Dance Medicine and Science (IADMS) to create a long, safe, and successful career. IADMS described the following information on their website by explaining they are a "… global network of medical professionals, educators, dancers, and researchers committed to dancers' health and improving health through dance" (iadms.org). This organization has been focused on and is a forerunner in the process of educating dancers and helping them to shape their own future with

respect to preventing dance injuries. IADMS' annual conferences advance and present information about changes in injury prevention. Clare Guss-West and Emily Jenkins, who attended an IADMS conference wrote, "IADMS enhances health, well-being, training, and performance in dance by cultivating medical, scientific, and educational excellence" (1). Injury prevention and advancements in medical sciences are crucial in educating and supporting dancers.

Dana Kotler and her collages expressed the following in the abstract of their article "Dancer's Perceived and Actual Knowledge of Anatomy." They wrote, "… while dancers typically have a finely tuned body awareness, including sensations of fatigue, imbalance, and impending injury. It is not a given that they know the fundamentals of human anatomy" (1). These authors also noted that "… prevention of injury is an important topic in dance medicine research as injuries sustained through dancing may have a weighty impact on a dancer's future health" (1).

Urmston stated in her blog for IADMS "… it is the moment that all dancers and their teachers dread. Sustaining an injury in dance. Injury can be a momentary interruption to dance training and performance, at worst a career ending catastrophe" (1).

Roger Dobson established in his survey on dancers who experienced an injury that "Eight in ten dancers a year in the United Kingdom have at least one injury that affects their ability to perform" (1). He surveyed 1,056 dancers and concluded that eighty percent of professional dancers experienced at least one injury, which caused them to have an average of 11.5 days off from classes, 7.9 days off in which they missed a rehearsal, and 6.6 days when they could not perform (1). Thus, injury prevention is important to the future of dancers and their safety. Luke Hopper and Peta Blevins made the following comment in the June IADMS journal,

"Maybe You Should Stop Dancing… a Little" (1). In line with this recommendation, Kotler and her colleagues indicated, "A dancer who has not experienced some sort of injury that has forced them to stop or modify their training is a rarity" (1). These authors also explained in their article that, "We all know how super hard dancers work. Dance is a passion, a lifestyle, and an identity" (1).

Some Common Dance Injuries and Their Prevention

In this section, the researcher discussed and described the most common dance injuries. John Hopkins experts Raj Deu, a sports medicine specialist, and performing arts physical therapists Amanda Greene and Andrea Lasner wrote an article titled "Common Dance Injuries and Prevention Tips. In this article they indicated that "… dance may look effortless, but it requires a lot of strength, flexibility, and stamina. It also comes with a high risk of injury" (2). These researchers discussed the seven most common dance injuries as ankle sprains, Achilles Tendonitis, Flexor Hallucis Longus Tenosynovitis (trigger toe), ankle impingement, snapping hip, hip impingement, and Patellofemoral Pain Syndrome (2).

Ankle sprains have been documented by John Hopkins Medicine Professionals "… as the most acute injury in dancers" and stated "… most dancers will experience their first ankle sprain by the age of thirteen" (Deu et al. 3). This injury is caused by any movement that forces the ankle outside of normal range of motion, resulting in over stretching. Ankle sprains often happen due to improper landing from a jump and misaligned ankles and skeletal system. Deu et al. wrote that "… torn ligaments never heal to the preinjury condition. Once you have sprained your ankle, you are at risk for doing it again" (4). Building muscle strength and proper alignment will help to prevent, if not avoid this and further injuries. A few studies have concluded, the majority of dance injuries from over-use of joints and muscles when out of alignment could be prevented.

Studies also found that injuries involving an ankle, leg, foot, hip, or lower back are the main reason, as noted earlier, for the majority of dance injuries.

Achilles' Tendonitis is another injury which can be avoided by having proper skeletal alignment. Achilles' Tendonitis is the inflammation of the tendon in the back of the ankle that connects the prime mover to point the foot. The Achilles' tendon activates during relevé and while pointing the foot, which is why injury is common when utilizing improper technique (Deu et al. 4). Stretching the Achilles' tendon with the foot in parallel will improve alignment and avoid unnecessary injuries. Proper alignment can reduce the likely occurrence of this injury because the use of stretching your Achilles tendon in parallel, decreases force absorbed by the ankle. It is important to avoid this injury because it could worsen and lead to tendon rupture which is more difficult to heal than regaining proper use through preventive training.

Trigger toe is another overuse injury that causes inflammation to muscles that are active during pointing the big toe. Proper alignment and stretching will assist in avoiding this injury as well as others such as ankle and hip impingements, two of which are of the seven of the most common dance injuries. Proper alignment will reduce the chance of sustaining this injury by correcting any tight muscles or ligaments, help avoid crunching the toes to force a pointe, and ultimately improve the mechanics and technique of the dancer.

Patellofemoral Pain Syndrome, also known as "jumpers-knee" results from the kneecap "tracking" incorrectly due to muscle imbalances like tight hamstrings and calves coupled with weak quads. Deu, et al. concluded "… the placement of repetitive forces on the patella, through performing jumps or pliés without proper form puts a dancer at increased risk" (9). And last, Deu and his colleagues also fascinatingly noted that "… dancers have a much lower rate of anterior cruciate ligament (ACL) injuries than any other athletes quite possibly related to intense jumping

from an earlier age than any other sports" (3). In conclusion, alignment is important in every stage of a dancers training. Dancers use their body as an instrument and the more aligned the body, the better the dancer is tuned to perform safely.

What Is Good Skeletal Alignment?

In this section, the researcher discussed skeletal alignment in general and more specifically, in terms of how it pertains to dance and to preventing injuries. Elisa Withers found and reported that "… repetitive and complex movements place undue stress on dancers' bodies. When these movements are performed on a misaligned body or with poor control, injuries occur" (Withers 1). Many dance movements are, of course, performed in a repetitive manner and body alignment plays a very important role in ease and ability of movement, injury prevention, and coordination. Greg Holdaway, Assistant Director of the Alexander Technique in Sydney, Australia, wrote, "Good dancers don't make it look easy -- they make it easy; ease in movement and postural alignment is an underlying factor in the development of good dance practice and a long-lived practical enjoyment of dancing" (1). He concluded, "Movement looks better and feels better, when a dancer or student has a well-balanced alignment" (5).

Descriptions of Good Alignment

Ideal skeletal alignment is essential to professional dancers to avoid and prevent injuries. Alignment is defined in the *Oxford Dictionary of English* as "… an arrangement in a straight line or placement in correct or appropriate relative positions" (40). *The Merriam -Webster Dictionary* defined alignment "… as to be in or to come into precise adjustment or correct relative position" (42), and the *Cambridge International Dictionary of English* described alignment as "… an arrangement in which two or more things are positioned in a straight line or parallel to each other" (39).

Ideal skeletal alignment allows for dancers to accomplish extraordinary movement without injury. To understand alignment the arrangement of the skeletal bones is discussed in detail throughout this chapter. Alignment of the structural building blocks, known as our skeletal bones, create desired ideal alignment in a properly trained individual. A properly aligned skeletal structure supports the body relative to gravity while creating a safer foundation with less pull on the bones supporting the body.

Ideal Alignment in Dance

Proper alignment of a dancer is described as a posture which is essential to dancers, because it makes them appear more elegant and confident. It also improves overall balance and body control. Dancing with correct alignment makes dancing comfortable and safe. *Kentucky Educational Television's (KET) Dance Glossary* defined a dancers' ideal alignment "… as the body placement or posture based on the relationship of the skeleton to the line of gravity and the base of support" (2). Proper alignment lessens strain on muscles and joints and promotes a healthy dancer. Irene Dowd emphasized that when an individual has all the bones of the body stacked evenly in a vertical line that this arrangement or alignment allows gravity to flow through the body naturally (60). Judith Aston, developer of Aston Postural Assessment, a new paradigm for evaluating body postures, depicted good alignment "… as the placement of the body segments in space, as a three-dimensional relationship to one another as well as the whole body" (Aston 17).

Dancers perform extraordinary skills, and the aligned body allows for moving with grace and safety. Having a well-aligned body can be compared to the structure of a house which is how Joseph Pilates has described his exercise method. Like building a house, when the foundation is

solid and the support is aligned, everything above is balanced and falls evenly in relation to the pull of gravity.

Ruth Solomon and Jeffery Russell shared in their 2019 article, “Preventing Dance Injuries,” that,

> … most professional dancers began dancing at the age of five or six with the repetitive practice of movements that require extreme flexibility, strength, and endurance making them prime candidates for overuse injuries. These injuries show up with greater frequency in dancers as they age. Emphasizing the importance of ideal alignment is extremely important to dancers as they can help themselves prevent future injuries. (1-2)

When a dancer is in ideal profile alignment it can be seen in photographs by drawing a straight vertical line that passes just behind the ear, through the center of the shoulder and hip joints, and just in front of the ankle. From the front of the body, ideal alignment can be noted in photographs when a line of gravity can be drawn through the crown of the head, center of sternum, and the center of the pelvis to the earth. In Posture Solutions, a highly credited system focusing on postural alignment, Owner and Director Jeff Hornacek stated, “Getting closer to your plumb line, or ideal skeletal alignment will reduce wear on joints, help use postural muscles more efficiently, align internal organs, and most likely reduce pain creating a healthy body” (2-3).

Relationship between Misalignments and Dance Injuries

Good body alignment in dance is significant because it is critical to prevention of injuries and having a lifelong career. To have proper alignment and the knowledge to support oneself is a gift and opportunity to avoid common dance injuries. Over the last decade it has been discovered that more and more acrobatic movements are becoming part of the dance repertoire demanding

dancers to train and perform extraordinary skills. In addition, dancers are often expected to train and perform in shoes such as pointe shoes. These and other requirements mean dancers need to be aligned to avoid any injury.

Rebecca Martin of *Dance Informa Magazine* interviewed Marc Cassidy, a former Senior Artist with The Australian Ballet, who also owns and operates True Form Pilates in Melbourne on Pilates and alignment. He commented,

> Dancers spend most of their time in the studio, dedicating themselves to their art. Ballet/dance is their real job and like any it is a daily struggle and takes a toll on the body. Pilates helps dancers to rectify the imbalances they tend to create in the studio and allows them the space they need outside of the studio and outside of class to re-balance, release and re-connect. (2)

Juliet Burnett, Senior Artist for the Australian Ballet and Master Pilates Instructor at True Form Pilates enjoys the benefits of Pilates. She explained in her interview with *Dance Informa Magazine*,

> Pilates is the perfect complement to my dancing. It strengthens and lengthens the muscles, improves coordination of breath and movement and a good teacher will encourage a holistic approach which engages the mind's awareness of your body and its responses. With such a varied repertoire and a busy schedule of rehearsals and performances, for me daily Pilates is an integral part of maintaining my body's equilibrium. (6)

Lana Jones, Australian Ballet's principal artist has been doing Pilates for over 18 years and noticed the benefits of Pilates while dancing. She was quoted saying, "Pilates for me is the perfect marriage with ballet. The core strength with focus on alignment and length help to aid

and enhance my dancing. I have more awareness and understanding of what I'm asking my body to do and it's an altogether feeling that I crave" (6).

The last dancer interviewed, Jessica Fyfe, loves Pilates and indicated,

> Pilates has helped get me to where I am today in my career and is helping to further it. It gives me a feeling of security and freedom in my dancing through strengthening my core stabilizers. Pilates helps my body to achieve length while being connected and having the strength to work super-fast and sustain super-slow movements, which is extremely important for me as a dancer. (8)

In addition, dancers have found ways to cross train to support alignment through multiple somatic methods which are discussed in the following sections.

The Relationship Between Somatics and a Dancer's Training

Somatics is a field of bodywork and movement studies focusing on internal physical perception and experiences. The term has been identified in movement therapy to categorize approaches based on the soma, or as defined in Wikipedia "… the body as perceived from within" ("Somatics"). In dance the term refers to the dancers' internal sensations. Wikipedia identified the fact "… all forms of dance demand the dancer's close attention to proprioceptive information and somatic movement refers to the dancers experience rather than the dancers personal, physical appearance" ("Somatics"). Margort McKinnon and Hannah Etlin-Stein who wrote for IADMS *Health for Dancers, Dancers for Health* noted "… it is now widely acknowledged by dance researchers, clinicians, and educators that supplemental training is an essential ingredient to a dancer's success and dance longevity. Dance class alone will not provide the necessary physical adaptions to ensure optimal performance and reduced chances of injury" (1).

Somatic methods can, of course, become a supplemental form of training. Somatic methods have been used to help support a dancers' skeletal alignment because it is an ideal way for them to cross-train and prevent injuries. Thomas Hanna wrote in Glenna Batson's article, "Somatic education differs first from traditional dance pedagogy in its philosophical basis that of dismembering mind-body dualism in pursuit of personal autonomy. Self-awareness, self-control, and the active application of the will to the processes of growth and development are the major themes of somatic education" (1). Batson also noted that,

> … all somatic methods share common goals in their approaches to re-education: (1) Process over goal-oriented product, that is, enhancing kinesthetic awareness in a nonjudgmental and non-competitive, non-doing environment (2) Using sensory awareness to modulate (i.e., constrain) movement range and effort to uncover the potential for new mobility, and (3) Rest--resting phases in which the dancer is given time to listen to the body, to clarify what sensations have arrived and differentiate wanted from unwanted stimuli, and to consolidate motor learning. (6)

In the above section, the researcher discussed somatics in the dance field and techniques used to support ideal skeletal alignment, believing educating the dancer is key to injury prevention. The researcher has included information about four different Somatic techniques in this section which all integrate somatic practices designed to teach physical movement while engaging and connecting the body and mind.

Somatic Methods Used by Dancers to Support Ideal Alignment

In this section, the researcher described somatic practices and their philosophies and how they can be used to create ideal skeletal alignment. Dancers are drawn to using somatic methods designed to support alignment because both dance and somatics are similar since they can

engage an individual both mentally and physically. The Pilates Method, the Alexander Technique, the Feldenkrais Method, and Iyvander Yoga are discussed in terms of their unique approach. Each somatic practice listed above includes exercises designed to create ideal alignment by engaging mental, physical, and spiritual awareness and enhancing the quality of not only dance, but life**.** Julie Brodie and Erin Lobel documented the use of somatics for dancers when they wrote, "training in somatic techniques is an effective means of improving dance students' efficiency and ease of movement by bringing awareness to the bodily processes of breathing, sensing, connecting, and initiating. It can help students reconnect or connect the mind and the body through technique" (80). Studies have found dancers shifting the focus of movement from product to process can promote optimal functioning and help prevent injuries.

Each of the four somatic movement systems mentioned earlier; the Pilates Method, Alexander Technique, Feldenkrais Method, and Iyvander Yoga were developed as a series of very specific exercises and philosophies with focus on shifting the emphasis of movement from product to process as noted in Brodie and Lobel's quote above in an effort to improve the mind–body connection. They share basic concepts and principals on the way the body performs with greatest efficiency and put awareness on improved physical alignment and mental connections. All their methods support kinesthetic awareness and a constant state of growth. The methods also support dancers both mentally and physically while developing ideal alignment.

Joseph Pilates is the creator of a somatic exercise system called the Pilates Method. This method is a physical fitness system defined as a somatic technique emphasizing ideal physical fitness. Pilates defined ideal physical fitness as the "… attainment and maintenance of a uniformly developed body with a sound mind fully capable of naturally, easily and satisfactorily performing our many varied daily tasks with spontaneous zest and pleasure" (Pilates 7). The

Pilates Method works your body in a systematic and organized progression. First, the core muscles of the body are developed to support the muscles of the trunk, and to support alignment and posture. Next, focus is on balancing the strength and flexibility in the surrounding muscles and joints. And finally, the body has a higher level of strength, flexibility, and balance that is ideal for the body of a dancer while providing a sound mind-body connection.

Frederick Matthias Alexander is the developer of his technique, the Alexander Technique. He created his somatic technique as an educational process to return to more effective patterns of movement and posture. Alexander's philosophy of his somatic process is noted in Wikipedia as an "… educational process to correct poor habits in posture and movement." He believed poor habits in posture damaged spatial self-awareness as well as health. It is also noted the "… process emphasizes awareness strategies applied to conducting oneself while in action, which now is called "mindfulness" or "mindful action" ("Alexander Technique"). The Alexander Technique is a way of learning to move mindfully and deliberately. Judith C. Stern, Senior Alexander Technique Practitioner shared in her article "Introduction to the Alexander Technique, the Complete Guide to the Alexander Technique" that "Alexander work is nonjudgmental" and "… everyone's energy is different. The Alexander Technique is about exploring your body, making space in your body, and moving efficiently" (3).

The Feldenkrais Method devised by Moshe Feldenkrais is defined as a "… type of exercise therapy claimed to reorganize connections between the brain and body and so to improve body movement and psychological state" ("Feldenkrais Method"). This somatic program of alternative exercise directs attention to habitual movement patterns that are thought to be inefficient or strained and teaches new efficient patterns by helping dancers to connect to their bodies and minds. The movements are slow and gentle and repair impaired connections

between the motor cortex and the body, so much that the quality of movement allows for changes in functioning and improving wellbeing which in turn allows for not only skeletal alignment to support the dancer, but also improves the mind-body connection.

The last somatic practice mentioned supporting ideal alignment and the mind-body connection is Iyengar Yoga. Iyengar Yoga is named after and developed by B.K.S. Iyengar. Iyengar Yoga is a form of yoga as exercise that focuses on ideal structural alignment of the physical body paying close attention to anatomical details. This form of movement places an emphasis on detail, breath, precision, and alignment while performing yoga postures also known as asanas. Each asana has its own specific movement sequence or style which are important in having full body results. The order in which the asanas are practiced is equally important in achieving ideal alignment and crucial in allowing energy to flow freely throughout the body. There are over two hundred asanas and, according to yogis and when in proper alignment, the energy, also known as prana, moves throughout the body and flows freely. John Schumacher, an advanced certified Iyengar Yoga teacher and one of thirteen instructors in the United States who studied with B.K.S. Iyengar, wrote for *Yoga Vastu's* newsletter, a studio in Sydney Australia, "… by aligning the body to create physical balance and internal space, one can deepen the breath and increase energy." Schumacher also shared "… when we practice somatic exercises, we become more aware of the subtle flow of energy we can control within us" (5).

Somatic methods are a benefit to every dancer's lifestyle in supporting structural alignment as well as the mind-body connection. In the following section the Pilates Method is discussed in detail.

A Discussion on the Pilates Method

The Pilates Method of Physical and Mental Conditioning is a somatic exercise system designed by Joseph Hubertus Pilates. His exercise method was originally called Contrology and focuses on ideal skeletal alignment which supports dancers. In this chapter the researcher described how Pilates is unique in the approach to creating ideal alignment in the body along with the unique qualities Pilates has to offer dancers.

Short History of the Pilates Method

Siler quoted Pilates in her book *Pilates Bodies*, believing that "… physical fitness is the first requisite to happiness" (Siler 7). Pilates developed his somatic form of physical fitness conditioning in the 1920's during an influenza outbreak. The influenza outbreak occurred in Germany along with many other countries and the Pilates Method with its focus on correct physical alignment, a strong and flexible system and correct breathing drew attention from many. Following the outbreak, Pilates moved to New York City and rented space with his wife Clara. This space was in the same building as George Balanchine and the New York City Ballet. The relationship between dance and Pilates was first established when George Balanchine sent his dancers to Pilates to rehabilitate their injuries and gain strength and ideal alignment.

Pilates and Ideal Alignment

Ideal alignment of the mind, and spirit are also important in aligning the body through the Pilates Method. Elizabeth Lowe Ahearn and colleagues Amanda Greene and Andrea Lasner reiterated in the conclusions of their study "Some Effects of Supplemental Training on the Posture, Strength, and Flexibility of Dancers 17 to 22 Years of Age that "… dance is an art form that requires the ability to perform complex movements and patterns utilizing the mind, body and spirit" (1). They also concluded that "… solid technique is a requisite for not only aesthetic

pleasing performances, but most importantly for injury prevention" (1). Julie Brodie and Erin Lobel documented in their article, "Integrating Fundamental Principles Underlying Somatic Practices into the Dance Technique Class" that "… shifting the focus from product (skill acquisition) to process (what is actually happening in the body) can promote optimal functioning and prevent injuries" (80).

The Magic of the Pilates Method

Brooke Siler documented that, "Pilates is unique because its use can create attention and awareness while also establishing safe efficient movements patterns which support ideal alignment. Pilates was designed to work directly with the deepest muscles in the body, creating a strong core to support ideal skeletal alignment and efficient movements" (10).

Dancers around the world have benefited from the Pilates Method and have been able to continue with careers by using the Pilates Exercise principals and concepts. Raj Deu and colleges agreed and promote whether a dancer, dance teacher, or parent that "… education and awareness of one's proper alignment is part of the discipline of being a well aligned dancer thus offering a long and healthy career in dance" (5).

Dance may sometimes look effortless and easy, but it requires strength, endurance, flexibility, and stamina coming with a high risk of injuries. As Joseph Pilates stated, "… with body, mind, and spirit functioning perfectly and as a coordinated whole, what else could reasonably be expected other than an active, alert, and disciplined person" (13). The dancer experiences the magic of the Pilates Method with the personal reward of a healthy and connected mind and body thus allowing the body the freedom to dance with more grace and ease.

CHAPTER III

METHODOLOGY

Preliminary Processes and Procedures

The purpose of this study was to investigate the possible physical benefits of Pilates training for dancers. The study was also conducted to distinguish if there were any positive skeletal alignment changes in terms of the location of the ear, shoulder, hip, and knees of the subjects. The methodology chapter outlines how the data were collected with the goal of answering the following research questions:

Q1 How can a dancer's alignment be measured to see change after ten Pilates Classes?

Q2 Can Pilates bring a dancers' body closer to ideal alignment in ten Pilates classes?

Q3 What do dancers notice differently in their dancing after having been taught Pilates?

Q4 What are the benefits of having proper alignment as a dancer?

Subjects' Demographics

Prior to conducting the study, the researcher requested approval from the Institutional Review Board (IRB). IRB approved the researchers' description of her project along with approving the consent forms and research instruments required to conduct both the quantitative and qualitative research. The researcher next received written consent from a Pilates Studio in Lafayette that allowed the researcher to instruct classes in their facility. The Pilates Studio also allowed the researcher to post a flyer at their location, seeking ten volunteer dancers for the thesis project who were advanced dancers eighteen years or older. Once the ten interested

subjects responded, they were contacted individually, and consent forms were signed and returned. These procedures were done on-line. Each subject was given a personal identification code (ID) to maintain confidentiality so the researcher could collect and organize data and remain unbiased. The researcher used letters of the alphabet to identify each subject. A copy of the consent forms and flyer can be found in Appendix A.

Seven of the subjects were 18 years of age, two were 20 and one was 22. Please see Figure 1 for a depiction of the subjects' ages in percentages.

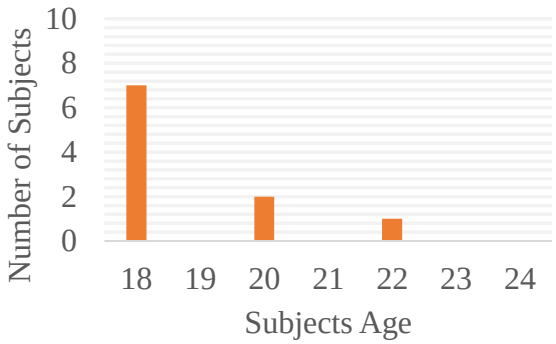

Figure 1: Ages of subjects.

The subjects' varied in ethnicity. Figure 2 shows that forty percent, or four out of the ten subjects were Caucasian, three of the ten or thirty percent were Hispanic, two or twenty percent were Asian and one or ten percent were African American.

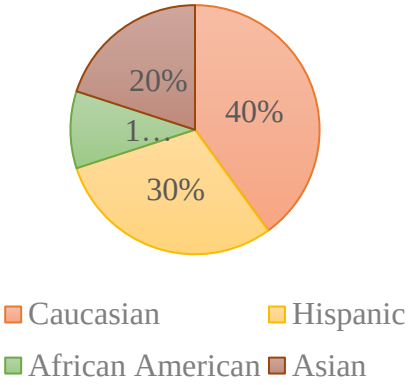

Figure 2: Ethnicity of subjects.

The subjects in this study had prior dance knowledge with a minimum of five years studio experience. The subjects were of different skill levels and at various stages in their dance career. Figure 3 shows the number of subjects including two professionals, four college dance majors, and four studio dance students that participated in the study.

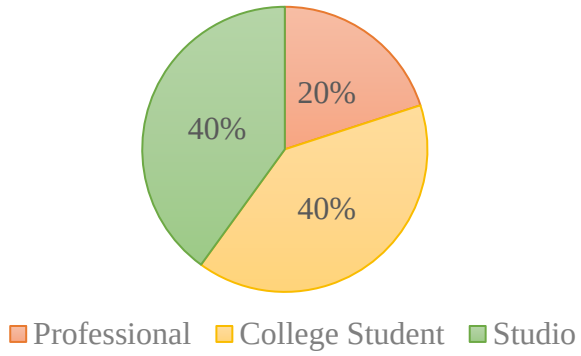

Figure 3: Subjects' level of dance.

Although the subjects had prior dance experience some were new to Pilates. In Figure 4 it is shown that sixty percent of the class had taken a Pilates class prior to beginning the study and that forty percent had not.

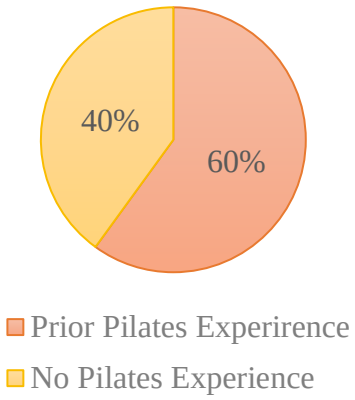

Figure 4: Subjects' Pilates experience prior to start of class.

The subjects were consistent in their ten-week attendance and the researcher was able to complete the study within the deadlines allotted.

Research Instruments

In the introductory questionnaire, the researcher asked the subjects to offer their personal definitions of correct alignment. In the questionnaire, the subjects were also asked to describe their prior knowledge of the Pilates Method, and their understanding of how breathing, strength, flexibility, and imagery related to the Method. In a third part of the questionnaire, the subjects described prior injuries, the type of injuries, if they were experiencing tightness or pain in their body and activities which caused soreness. A summary of the answers to these questions is located in the discussion chapter. In the post questionnaire, the subjects' described personal knowledge they gained based on their experiences throughout the classes. The questionnaires can be found in Appendix B.

The research instruments used in this study also included two anatomical measuring instruments. The first measuring instrument was an anatomical chart, a Postural Analysis Grid Chart made by the researcher. The chart measured 33 inches wide by 84 inches long or 85 centimeters wide by 213 centimeters long. The chart was hung on the wall positioned behind the dancer subjects. A bold straight line was positioned vertically in the middle of the chart with multiple bold straight vertical lines positioned every inch horizontally outward from the center line.

The objective in terms of alignment measurements was for subjects to stand in front of the chart with their side next to the chart to measure their profile alignment. A plumbline was hanging from the ceiling in front of their body to help with the profile alignment measurements. A photo of this chart and the position of the plumbline can be found in Appendix C as Figure 11 along with a photograph of proper positioning for measurement of the subjects in Figure 12.

The tools used to measure the subjects' alignment included a level and a ruler. The point was to measure how much the subjects' ear, shoulder, hip, and knee deviated from the plumb line in terms of their profile alignment. The researcher also used a camera to photograph each subject when they were standing in front of the chart, and behind the plumb line. The photographs were taken with the subjects standing with their feet in the same position each time they were photographed. This meant the front of the ankle of each subject was in line with the center line on the chart for the front-to-back or profile analysis. The photographs were used as a profile alignment measurement after comparing them to the in-person measurements.

The Pilates Classes

Once the Pilates class began, the researcher took time to get to know the subjects, which enabled her to create a class structured around the Pilates Method and the Basic Ten Pilates

Method Exercises. Next, the researcher conducted a 45-minute Pilates class once a week for a total of ten weeks. Each of the ten classes focused on a specific Pilates Method concept or theme, which can be found below in Table 1.

Table 1

Pilates Cass Concepts or Themes

Wee*k*	Theme of Lesson
1	What is Pilates?
2	How to breathe
3	Neutral pelvis
4	Use of abdominal muscles
5	Pelvis stabilization
6	Shoulder stabilization
7	Uniform development
8	Oxygenation and circulation
9	Ideal alignment and balance
10	Dancing the Pilates Way

In each class the subjects focused on the same concept or theme using imagery while performing the Basic Ten Pilates exercises for the purpose of enhancing concentration and alignment. The themes and images are notated in Table 2.

Table 2

Basic Ten Pilates Exercises with Accompanying Image

Week	Exercise	Imagery
1	Hundreds	pump
2	Roll up	curl
3	Single leg circles	trace
4	Side kicks	sweep
5	Rolling like a ball	round
6	Spine stretch	lengthen
7	Saw	slice
8	Stomach series	zip
9	Teaser	gather
10	Seal	clap

The imagery was supplied to help the subjects connect mind and body. The researcher observed the subjects' responses to these images and recorded these responses for a later discussion.

Measurement Procedures

The measurements were taken at the beginning, middle, and end of the study to distinguish if there were measurable skeletal profile alignment changes. Each subject's alignment was measured based on the photos described above. For the profile measurements, the grid on the chart was used to measure each subject's alignment or changes in alignment in the photographs based on the distance of their ear, shoulder, hip, and knee from the plumb line. This measurement was used to scale to true size. For example, the grid has 50mm spacing, and it was

measured in the photograph as .5mm, so the scale factor is 100. The formula used to calculate was the measurement in photograph multiplied by 100. Each subjects measurements were calculated and recorded on a chart to summarize the collected data for analysis later.

Analysis Procedures

After instructing and witnessing the subject's bodily responses to the ten classes the researcher analyzed the collected data. The research instruments used in this study supplied data which could be analyzed both quantitatively and qualitatively. The measurements, which were taken to distinguish any changes in the subjects' profile alignment compared to that of ideal alignment were analyzed quantitatively.

The researcher also documented the subjects' personal reflections and changes they noticed and after practicing exercises from the Pilates Method. The information from the questionnaires was analyzed both quantitatively and qualitatively. Information about the subjects' previous injuries or pain and soreness they were experiencing was analyzed quantitatively, while their responses to the Pilates classes was analyzed qualitatively.

Summary

The researcher analyzed both the qualitative and qualitative data in this study. The researcher was able to distinguish the deviations from ideal alignment if any and discussed the experience of the research participants. The following chapter will explain how the information collected helped to design the concept or theme and focus of subsequent Pilates classes as well as supporting the subjects for the study.

CHAPTER IV

DISCUSSION

As indicated in the Introduction, the goal of this thesis was to investigate the physical benefits of a Pilates training program, particularly on the subjects' alignment, and the possible benefits and outcomes of such a training program for dancers.

This chapter will address the process and outcomes of both the qualitative and quantitative data collected throughout the course of the study. The curriculum concepts and themes that emerged during the analysis of the data will be discussed along with the outcomes of the analysis. This chapter is organized based on the process described by the researcher. The researcher will also compare the thematic responses between the beginning and end of the study along with subjects' personal experiences discovered and noted in the post questionnaire.

An Introduction to Pilates Concepts in Movement

The researchers' goal included creating ten Pilates classes with a focus to investigate the physical benefits of Pilates. The classes were designed in a way that the Pilates concepts and Basic Ten exercises were taught using imagery which allowed the subjects to feel supported in a growing, learning, and protective environment. Through exploration of imagery while allowing authentic movement to arise, the subjects shared changes they noticed in their bodies during the study of Pilates. The researcher's goal in this chapter is to describe the themes of the classes, how she instructed the exercises through use of imagery, the subjects' experiences she observed and documented, and the outcome of the data analysis.

Preparation for the Study

The study began by getting to know the students' prior injury experiences, where they experienced tightness and pain in their bodies, and physical activities causing them pain. All three of these outcomes are shown below in Figures 5,6, and 7.

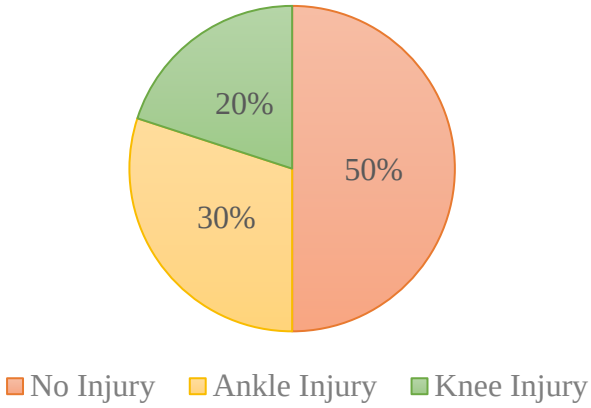

Figure 5: Subjects' prior injuries and type.

Figure 5 illustrates that fifty percent of the subjects had not experienced any type of injury, while the other fifty percent of the subjects had. Of the subjects who had experienced injuries, thirty percent of these injuries were ankle injuries consisting of three ankle sprains. This meant that three of the ten subjects in the class previously had an ankle sprain. Figure 5 also shows that twenty percent of the subjects had prior knee injuries. Both these knee injuries were a "dislocated knee" also known as overstretched ligaments. Of then ten subjects, twenty percent had a past knee injury which was two subjects or twenty percent of the class.

Figure 6 also summarizes the outcomes from the introductory questionnaire, helping to further describe the subjects, their physical safety concerns, and individual needs. Figure 6 below, documents the prior tightness and pains in subjects' bodies.

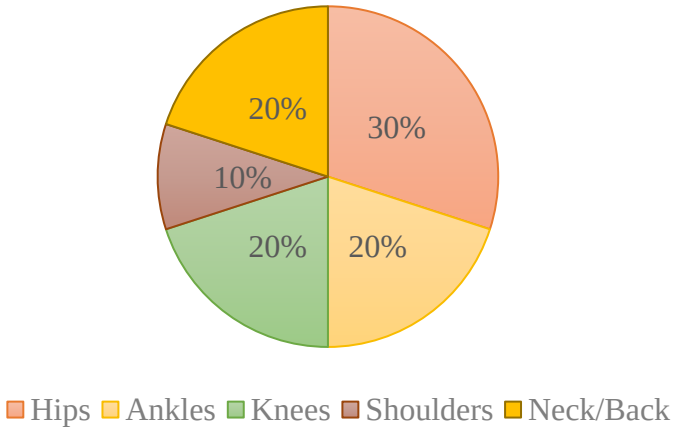

Figure 6: Subjects' prior tightness and pain with locations.

As seen in Figure 6, the subjects had prior tightness and pain in multiple locations of their bodies. Thirty percent of the subjects had prior tightness and pain in their hips, twenty percent in the ankles, knees, and neck/back, and ten percent in shoulders. This figure shows that many of the subjects experienced different forms of tightness and pain along with injuries prior to beginning of class. This knowledge helped the researcher create a lesson structure and plan to follow in the classes. Below in Figure 7, the researcher identified the subjects' physical soreness along with the activities causing the pain, including dancing to again help with creating successful lesson plans.

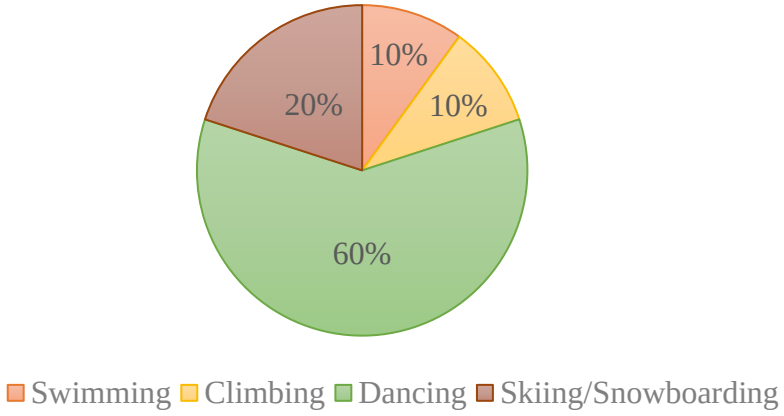

Figure 7: Physical activities causing soreness.

The subjects indicated they were active in cross training and other sports besides dance. The other sports are swimming, climbing, and skiing/snowboarding. Sixty percent of the subjects are sore after dancing, ten percent after swimming, ten percent after climbing, and twenty percent after skiing/snowboarding. Identifying which muscles are used in these activities again helped create the lesson plans.

The subjects' responses to questions 3,4,5, and 9 from the introductory questionnaire can be found in Table 3. In question 3, the researcher asked the subjects if they noticed whether they hold their breath while dancing. In question 4, she asked if the subjects felt flexible and in question 5 if they felt they were strong? The last question documented in the table below are the answers to question 9, in which the researcher asked if the subjects have ever worked with imagery.

Table 3

Subjects' Responses to Introductory Questionnaire

Week	Response	Yes	No
3	Holding breath while dancing	8	2
4	Flexibility	7	3
5	Strength	10	0
9	Previous use of imagery	7	3

The researcher also attempted to understand the subjects' concept of proper body alignment by asking them to provide their personal definition of alignment. These responses are documented in Table 4. The actual question was: What do you consider proper alignment? This information also helped the researcher develop the class themes and structures and share Pilates concepts in a way the subjects would understand. Thus, creating a universal definition of alignment was crucial to the outcome of the subjects' learning.

Table 4

Subjects' Definition of Proper Alignment

Response	Number of Subjects
Body balanced in the center	4
Even weight on both feet	2
Ability to perform pirouettes	1
Straight spine	1
Ability to hold dance pose	1
Body in a line up and down	1

After reviewing the subjects' responses to the questions, the researcher began the classes with a focus on safety and education, paying attention to the outcomes on breath, strength, flexibility, imagery, and proper alignment.

Presentation of Data Analysis

The following content describes both the qualitative and quantitative outcome of the study. The qualitative analysis is presented first based on the subjects' answers to questions on the post-questionnaire.

Outcome of Qualitative Analysis

Question 2 in the post-questionnaire addressed changes subjects noticed in their bodies while dancing after participating in the Pilates classes. These outcomes are shared in Table 5.

Table 5

Changes Subjects Noted When Dancing After Involvement in the Pilates Classes

Changes	Increased Ability	Awareness	Efficiency
Flexibility	6	2	2
Strength	6	2	2
Breathing	4	3	3
Balance	6	3	1
Alignment	3	4	3

From Table 5, it is evident that the subjects' responded to changes in the flexibility, strength, breath, balance, and alignment in their bodies after participating in the Pilates classes. Increased ability meant the subjects felt their ability in that area had improved. Awareness

indicated the subjects had become more aware of the component, and efficiency meant using less physical effort to find desired outcome.

Subjects' responses to their increased changes in abilities, awareness, and efficiency of movement following the Pilates classes were positive, but not to the same degree for all the components. Both flexibility and strength show that sixty percent of the subjects had increased ability, twenty percent increased awareness and twenty percent noted more efficiency for flexibility and strength when dancing. In terms of the other components, forty percent of the subjects' noticed increased ability in breathing, and of the remaining subjects, thirty percent experienced an increased awareness in breathing and thirty percent an increased efficiency in their breathing. Table 5 shows that balance was noticed with an increase of sixty percent amongst the subjects, thirty percent noted increased body awareness for balance and ten percent increased their efficiency in balancing. In the last component in Table 5, alignment, thirty percent of the subjects noticed an improvement in their alignment, forty percent became more aware of their alignment, and thirty percent thought their alignment was more efficient.

Along with the changes the dancers noticed in their increased ability, awareness, and efficiency, they also responded to the success of the images used by the researcher. As shown in table 2 in the previous chapter, imagery was also a focus of the Pilates classes. This means every direction given to the subjects to initiate movement was precise, intentional and with a descriptive cue to create specific responses in their bodies.

Below in Table 6, the three most successful images used for each of the Basic Ten Pilates exercises are presented based on the subjects' answers to question 3 of the post-questionnaire. For example, for the Hundreds exercise, the most successful images were the laser hands, zipper and pumping water.

Table 6

Successful Imagery Exercises

Exercise	Imagery
Hundreds	laser hands, zipper, pumping water
Roll up	cat stretching, curl over ball, piece of taffy
Single leg circles	draw circle, scooping inside bowl, glued spine
Side kicks	floating, feather on toes, scooping sand
Rolling like a ball	look at belly button, fall backwards punch, curl over an egg
Spine stretch	curl over ball, slide plate across table, ruler along shoulders
Saw	zip belly to move, stretch fingertips apart, shoulders glued
Stomach series	zipper, back against wall, parallel feet with knees
Teaser	curl, scoop, zip
Seal	curl to clap, create a c with spine, bark

The subjects were also asked to share if they noticed any positive changes when dancing after completing the Pilates classes. The subjects' responses to positive changes they noticed in their jumping, turning, leaping, ability to perform pliés, flow, precision, and stability can be found in Figure 8 below.

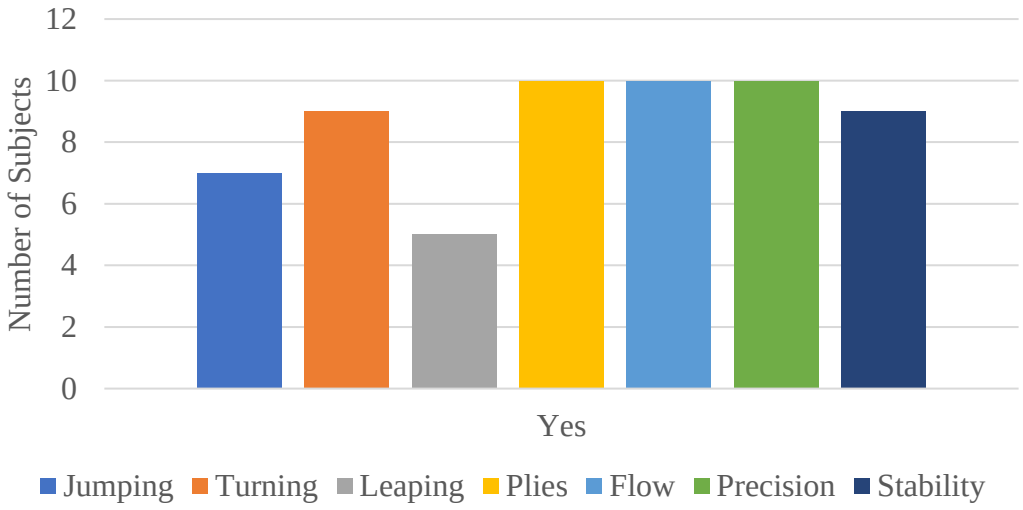

Figure 8: Changes subjects noticed in their dancing after ten Pilates classes.

From the above figure it is seen that 70% of the subjects had increased ability, awareness, and efficiency of movement in their jumping, 90% noticed the positive changes in their turning ability and stability, 50% noted changes in their leaping ability, and 100% of the subjects noticed an increase in their ability, awareness, and efficiency in their pliés, flow of movement, and precision when dancing and initiating movement.

All subjects responded with an overwhelming amount of gratitude and respect for the Pilates Method. They all stated they gained a new appreciation for their body and anatomical awareness. The final question asked on the post-questionnaire was if the subjects were planning to continue studying Pilates. All subjects involved in the research project plan to continue studying the Pilates Method and add it into their dance regimen. Three of the ten subjects plan to continue with an in-depth study of Pilates and possibly become certified instructors of the Method so they can teach it specifically to young dancers.

Quantitative Data Outcomes on Profile Alignment

In Figure 9 below the front-back or profile view of the subjects are noted as having alignment changes that were measured in millimeters and in the percent of alignment change in the body reference points of ear, shoulder, hip, and knee. The measurements in millimeters for all subjects were averaged for weeks one, five and ten. The measurements were calculated from the photographs between the anatomical points for ideal alignment and calculated with the measurements in millimeters of change between the first and fifth week of the study and between the fifth and tenth week. The averages were calculated by adding all ten subjects' measurements together for the first, fifth, and tenth weeks and dividing each week's total by ten.

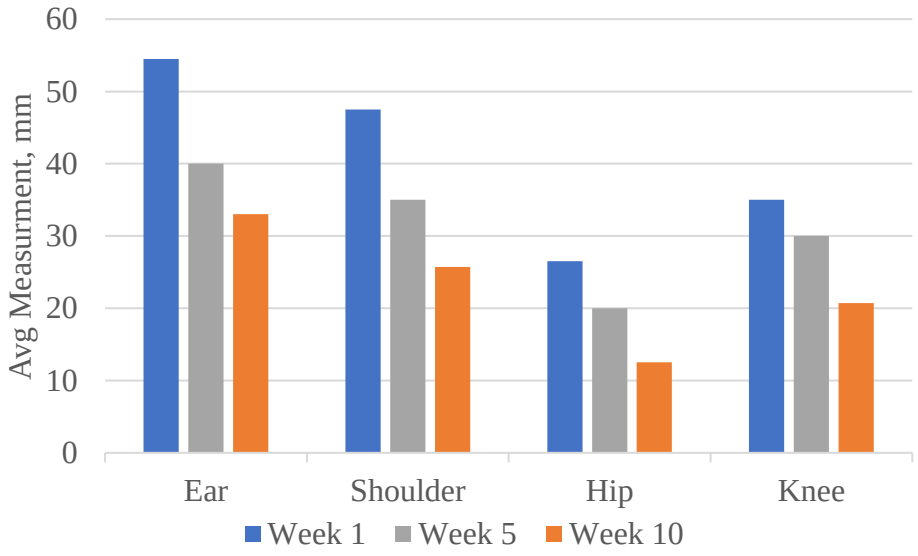

Figure 9: Averaged profile alignment measurements of body reference points weeks one, five, and ten.

Outcomes for the subjects in weeks five and ten show subjects' average alignment moving closer to plumb line from the original measurement in week one. Between both weeks

one and five and five and ten there was significant change in average class alignment. Between weeks one and five there was a fifteen percent improvement in alignment for the ear, a thirteen percent for the shoulder, seven percent for the hip, and a five percent for the knee. Between weeks five and ten the improvement in alignment for the ear was seven percent, nine percent for the shoulder, seven percent for the hip, and nine percent for the knee. The average percentage change in alignment between weeks one and ten can be seen in Figure 10 below.

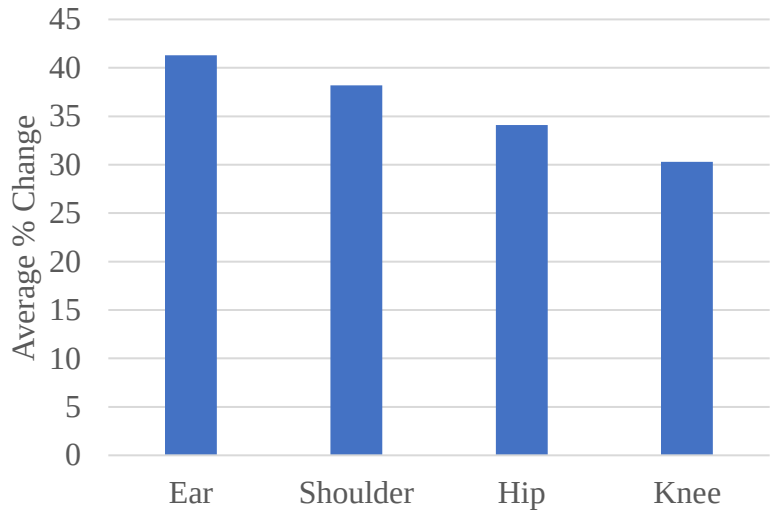

Figure 10: Final average profile alignment percentage change in body reference points in ten weeks.

Summary

The purpose of the study was to educate dancers on how to find ideal alignment through the performance of Pilates concepts and the Basic Ten exercises. The class curriculum focused on developing the following proficiencies: flexibility, strength, breath, balance, and alignment. The class was structured to focus on ability, awareness, and efficiency of all movements by incorporating imagery.

Based on the data, the subjects indicated that they noticed growth in all areas listed above. They indicated throughout their introductory and post-questionnaire responses that the curriculum had a positive impact. The measurements done by the researcher on alignment at the ear, shoulder, hip, and knee also endorsed the positive impact of the Pilates classes on the subjects' alignment. The subjects concluded with their post-questionnaire answers to questions 1, 4, and 6 that they also noticed positive changes in their dancing, found Pilates useful in locating and strengthening their ideal alignment, enjoyed the imagery, found a new freedom of movement and that they wish to explore more through the continuation of studying the Pilates Method.

All information collected in the study appeared to support the conclusion that Pilates is beneficial to the subjects. The researcher felt positive about the growth described by the subjects and demonstrated in changes in their alignment. Final thoughts and discoveries will be summarized in the next chapter.

CHAPTER V

CONCLUSION

The purpose of this study was to investigate the physical benefits of a Pilates training program, and the possible benefits and outcomes of such a training program for dancers. The study included both qualitative and quantitative research. As previously mentioned, the goal of this research was to answer the following four research questions:

Q1 How can a dancer's alignment be measured to see change after ten Pilates Classes?

Q2 Can Pilates bring a dancers' body closer to ideal alignment in ten Pilates classes?

Q3 What do dancers notice differently in their dancing after having been taught Pilates?

Q4 What are the benefits of having proper alignment as a dancer?

This final chapter of the thesis revisits the research questions, reviews the methodology used, summarizes the findings, describes the limitations to the study, and provides recommendations for further research.

Research Questions and Methodology

As explained in chapter three, the instruments used in the study included questionnaires and profile measurements. These instruments allowed for instruction, review, summary, and analysis of the data completed to support the outcome of the thesis and answered the essential questions. Both qualitative and quantitative methods were used to review and analyze data in the study with positive outcomes reported throughout. The qualitative data were analyzed using the subjects' personal responses to the post questionnaire. More detailed descriptions of their

responses can be found in Appendix C. A more detailed description of the quantitative data, including the exact anatomical measurements can also be found in Appendix D. Overall, the data suggested that all dancers had a successful experience by participating in the study and have decided to continue with Pilates.

Interpretations of Findings

The qualitative and quantitative findings of the study indicated that while each participant experience is unique and different, there were many shared experiences and common goals among the subjects. The quantitative measurements in millimeters were of the positive profile alignment changes experienced by each subject based on the location of the landmarks of the ear, shoulder, hip, and knee in relation to the plumb line as an indication of good profile alignment. The actual measurements for weeks one, five, and ten of the subjects' alignment in profile view can be found in Appendix D as well as Individual anatomical responses to final profile percent change.

The qualitative responses shared by the subjects were positive. These responses were generated by asking the participants if their dancing was enhanced when incorporating the Pilates Method into their training. The subjects were also asked to describe or note how the exercises were useful to help them achieve a more ideal alignment. A summary of the subjects' responses is shown in Tables 8 and 9 and the more detailed data is in Appendix C. In question 5 in the post questionnaire, the researcher asked the subjects to share any concerns, comments, or discoveries. A summary of these responses is displayed as Table 10 and the more detailed responses are in Appendix C.

Along with the responses to the above questions, the researcher asked subjects to share any appreciation or new anatomical awareness which they will take with them from the study to

add to their dance training. The subjects' responses to this question were also positive and created an overall successful feeling about the classes. A summary of these responses are in Table 7 along with the detailed comments that the class subjects made in response to this question in Appendix C.

Description of Possible Bias

The researcher was previously a professional dancer and personal beneficiary of the Pilates Method and found it could be educational and life changing in terms of a dancer's career. Through Pilates, the researcher healed a career threatening pelvis injury and stabilized her skeletal structure all while learning about the body and the control one has over it. She has also witnessed Pilates heal athletes, cancer patients, and chosen a career as a Pilates practitioner and teacher, all of which may have biased the design of this research project.

Limitations of the Study

It is important to note there are a few limitations to the study, including the number of the participating subjects and COVID restrictions which were enacted at the time.

The first limitation was the sample size of the subjects. Only ten subjects were used in the study which would have had more depth with a larger sample size. All subjects were from the same town in Colorado and affiliated with the same dance studio. All subjects were advanced female dancers with a minimum of five years dance experience, over the age of eighteen, and currently professional, college, or studio dance students.

The second limitation were restrictions due to the COVID pandemic. The pandemic restrictions meant the researcher could do no hands-on adjustments on the subjects or share any props with them. The subjects did lie on a yoga mat which they brought to the classes, although during customary circumstances the researcher would have supplied the yoga mat along with

props. Props such as stretch-bands, dowel rods, balls, and towels could not be used in the study due to the pandemic restrictions.

Recommendations for Future Research

Evidence from this study suggests that the Pilates Method supports dancers' health both physically and mentally. Further research could be conducted to determine the amount of change, if any, if the study was lengthened to a twenty-to-thirty-week study. All the concepts and themes identified in the research could be expanded into longer lessons and the imagery could be explored more thoroughly. The researcher believes there is still much to learn about the connections between the mind and body and Pilates is an asset to such an exploration. The researcher's advice to fellow colleagues and dance educators is to incorporate The Pilates Method into their dance lesson plans and to teach anatomy along with safe practices while discovering connections along the way.

Conclusion

In conclusion, the researcher believes adding Pilates exercises to a dancer's program is beneficial. The study concluded with a constructive takeaway by the participating subjects and showed that all four research questions were answered in a positive way. After participating in the ten-week study investigating the possible benefits of Pilates, the ten subjects felt more confidence in their bodies and had an increased knowledge of anatomy. Evidence from this study suggested that adding Pilates to a dancer's training has physical benefits of supporting proper alignment along with improving safety, health, and providing a longer career in dance. Ultimately, Pilates can bring dancers' bodies closer to ideal alignment within ten classes and the subjects noticed there were positive changes in their dancing.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD FORMS

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

Date:	12/23/2020
Principal Investigator:	Darla Jentzsch
Committee Action:	**IRB EXEMPT DETERMINATION – New Protocol**
Action Date:	12/23/2020
Protocol Number:	2010013014
Protocol Title:	Dancing the Pilates Way: The Possible effects of Pilates on the Alignment of a Dancers' Body.
Expiration Date:	

The University of Northern Colorado Institutional Review Board has reviewed your protocol and determined your project to be exempt under 45 CFR 46.104(d)(702) (703) for research involving

Category 2 (2018): EDUCATIONAL TESTS, SURVEYS, INTERVIEWS, OR OBSERVATIONS OF PUBLIC BEHAVIOR. Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

Category 3 (2018): BENIGN BEHAVIORAL INTERVENTIONS IN CONJUNCTION WITH THE COLLECTION OF INFORMATION FROM ADULT SUBJECTS through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met: (A) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement,

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

or reputation; or (C) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7). For the purpose of this provision, benign behavioral interventions are brief in duration, harmless, painless, not physically invasive, not likely to have a significant adverse lasting impact on the subjects, and the investigator has no reason to think the subjects will find the interventions offensive or embarrassing. Provided all such criteria are met, examples of such benign behavioral interventions would include having the subjects play an online game, having them solve puzzles under various noise conditions, or having them decide how to allocate a nominal amount of received cash between themselves and someone else. If the research involves deceiving the subjects regarding the nature or purposes of the research, this exemption is not applicable unless the subject authorizes the deception through a prospective agreement to participate in such research.

You may begin conducting your research as outlined in your protocol. Your study does not require further review from the IRB, unless changes need to be made to your approved protocol.

As the Principal Investigator (PI), you are still responsible for contacting the UNC IRB office if and when:

- You wish to deviate from the described protocol and would like to formally submit a modification request. Prior IRB approval must be obtained before any changes can be implemented (except to eliminate an immediate hazard to research participants).
- You make changes to the research personnel working on this study (add or drop research staff on this protocol).
- At the end of the study or before you leave The University of Northern Colorado and are no longer a student or employee, to request your protocol be closed. *You cannot continue to reference UNC on any documents (including the informed consent form) or conduct the study under the auspices of UNC if you are no longer a student/employee of this university.
- You have received or have been made aware of any complaints, problems, or adverse events that are related or possibly related to participation in the research.

If you have any questions, please contact the Research Compliance Manager, Nicole Morse, at 970-351-1910 or via e-mail at nicole.morse@unco.edu. Additional information concerning the requirements for the protection of human subjects may be found at the Office of Human Research Protection website - http://hhs.gov/ohrp/ and https://www.unco.edu/research/research-integrity-and-compliance/institutional-review-board/.

Sincerely,

Carter Hall 3002 | Campus Box 143 | Greeley, CO 80639 | Office 970-351-1910 | Fax 970-351-1934

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

Nicole Morse
Research Compliance Manager

University of Northern Colorado: FWA00000784

Carter Hall 3002 | Campus Box 143 | Greeley, CO 80639 | Office 970-351-1910 | Fax 970-351-1934

Darla's Pilates Studio, Ltd.

*Rehabilitation * Injury Prevention * Dance Education*

303-665-0639

To Whom It May Concern:

I give my permission to use Darla's Pilates Studio, Ltd. for the graduate research project Dancing the Pilates Way: The Possible Effects of Pilates on the Alignment of a Dancers Body. This project is approved to take place one time a week for ten weeks in the studio space between January and April 2021. All surveys, studies and projects are authorized to be completed in this space. Every student is required to have a signed permission form on file with the researcher. Please contact me with any questions.

Darla Jentzsch
Owner, Darla's Pilates Studio, Ltd.
(303) 665-0639
Climber732@aol.com

Pilates for Dancers

DANCERS NEEDED

Dancers 18 or older interested in participating in a study on the effects Pilates has on their alignment.

Please Contact Darla @ Climber732@aol.com

UNIVERSITY OF NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESERACH

UNIVERSITY OF NORTHERN COLORADO

Thesis Title: Dancing the Pilates Way: The Possible Effects of Pilates on the Alignment of a Dancers' Body.

Researcher: Darla Jentzsch, Graduate Student at the University of Northern Colorado

Contact Information: xxx-xxx-xxxx
Jent7817@bears.unco.edu

Research Advisor: Dr. Sandra Minton, University of Northern Colorado, sandra.minton@unco.edu

Purpose and Description: You are being asked to take part in a research study to investigate the physical benefits that Pilates Exercises might have on a dancer's alignment. I am asking for your permission to take part because you are a dancer and I highly respect your training and dedication to dance. If you volunteer to participate in the study, you will receive 50 minutes of Pilates lessons once a week for ten weeks. I am asking for you to fill out an introductory and post-questionnaire to help me understand your progress in terms of your alignment and other changes you notice during the classes which might be related to the Pilates exercises. I will also ask you to allow me to take your profile measurements of your head, shoulder, hip and ankle to note alignment in terms of any changes during weeks one, five, and ten of the classes. These measurements will be made by placing a plumb bob or plumb line which is a string suspended from the ceiling with a weight on the end noting ideal spinal alignment. I will ask you to stand behind the string which is positioned at a point slightly behind your ear. I will then document measurements between the string and your ear, shoulder, pelvis, and ankle. These measurements will be made in millimeters between the anatomical points or indicators noted above and the string. I will also take photos from a profile view in weeks one, five and ten. These photos will be used to document any changes in your frontal and profile alignment. Any changes will be measured in millimeters. Following the last class, I will make comparisons to ideal alignment for any noticeable changes in your in your profile alignment. I will keep track of whether the specific points on your body move closer to proper alignment. If these points on your body move closer to the ideal alignment indicators it will mean your alignment has improved.

(Subjects initials here)_____

Risks: The risks and discomforts inherit in the research study are no greater than those normally encountered in a normal dance training class.

Confidentiality: At the end of the research study, I would be happy to share your data with you at your request. I will take every precaution to protect your confidentiality. I will assign a subject number to you that only I will know. Your name will not be used in any report and document I create based on the data from the research. Data collected and analyzed for this study will be stored on a password protected computer and in a locked cabinet at the researcher's house. The completed consent forms from this research study will be taken personally by the researcher to the University of Northern Colorado where they will be stored in a locked file cabinet in the office of Dance Educator, Christy O'Connell-Black whose office is in Crabbe Hall Room 308. All data and consent forms will be destroyed after three years.

Upon Completion of this study: You will be permitted to keep your personal data if you request it. You will also have been introduced to a new body technique to add to your dance training.

Participation is voluntary. You may decide not to participate in this study and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, Office of Research, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

Thank you for assisting me in my research,

Researcher's Signature: _____ Date: _____

Subject's Signature: _____ Date: _____

APPENDIX B

RESEARCH INSTRUMENTATION

INTRODUCTORY QUESTIONS FOR DANCE AND PILATES STUDENTS

Student code: _____

Date: _____

1.) Have you taken a Pilates class before? If yes, was it on reformer or mat?

2.) What do you consider to be proper alignment?

3.) Do you notice yourself holding your breath when dancing or balancing? Do you have any other specific breathing patterns? Please explain:

4.) Do you feel you are flexible? Please explain:

5.) Do you feel you are strong? Please explain:

6.) Do you experience tightness or any pain in your body? If so, where?

7.) Do you notice if your body is sore after dancing or participating in other activities? If so, where and after doing what activities?

8.) Do you have any past or prior injuries or recent surgeries? If so, please describe:

9.) Have you worked with imagery before? When and where?

Please address any questions, concerns, or requests you would like for me to answer or elaborate on?

Thank you for your responses,

Darla Jentzsch

POST QUESTIONS FOR DANCE AND PILATES STUDENTS

Student code: _____

Date: _____

1.) Do you believe Pilates has changed your dancing in the last ten weeks? If you noticed any changes in your dancing, please describe them.

2.) What changes have you noticed in your body when you are at rest or while dancing in terms of:

   a. Flexibility-

   b. Strength-

   c. Breathing-

   d. Balance-

   e. Alignment-

3.) For each of these Pilates exercises below, please tell me which ones I used in the classes helped you to find proper alignment in your body. In addition, describe whether some of the exercises noted below helped alleviate problems or issues you described in the first questionnaire.

   a.) Hundreds-

   b.) Roll-up-

   c.) Single leg circles-

   d.) Rolling like a Ball-

   e.) Spine-stretch-

f.) Sidekicks-

g.) Standing roll down-

4.) Please describe how or why the exercises you noted above were especially useful to help you improve your alignment:

5.) Do you have any questions, concerns, or anything you experienced or discovered during the Pilates dance classes you would like to share?

6.) Did you gain a new appreciation for your anatomy and find new ways to move efficiently? If so, what did you discover about your body?

7.) Are you going to continue to add Pilates to your dance training? Why or why not?

Thank you for your responses,

Darla Jentzsch

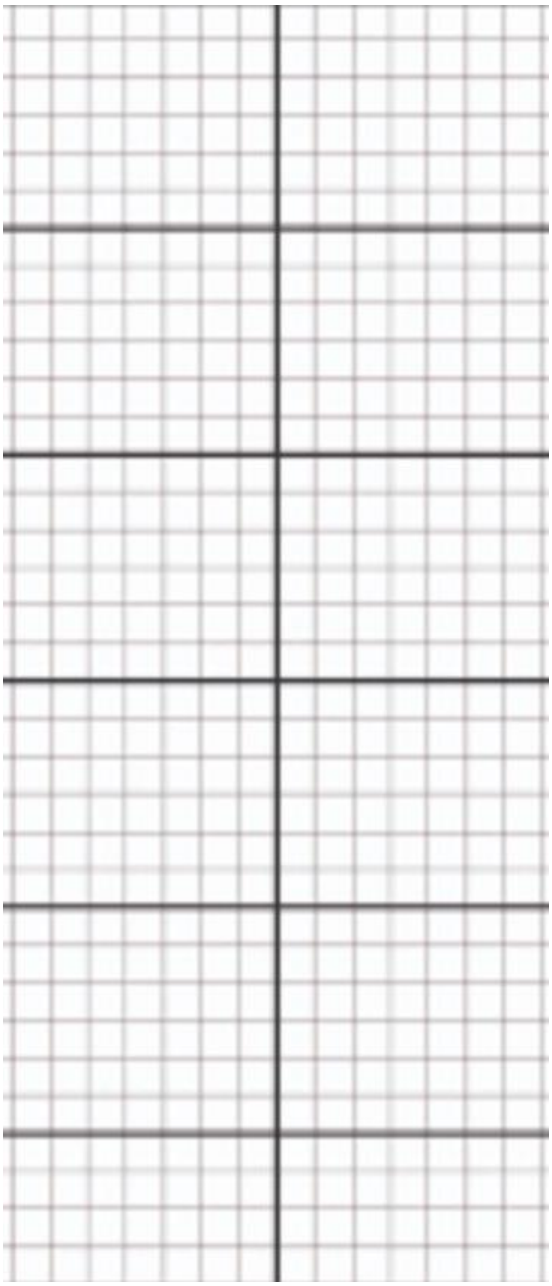

Figure 11: Postural Analysis Grid Chart designed by researcher.

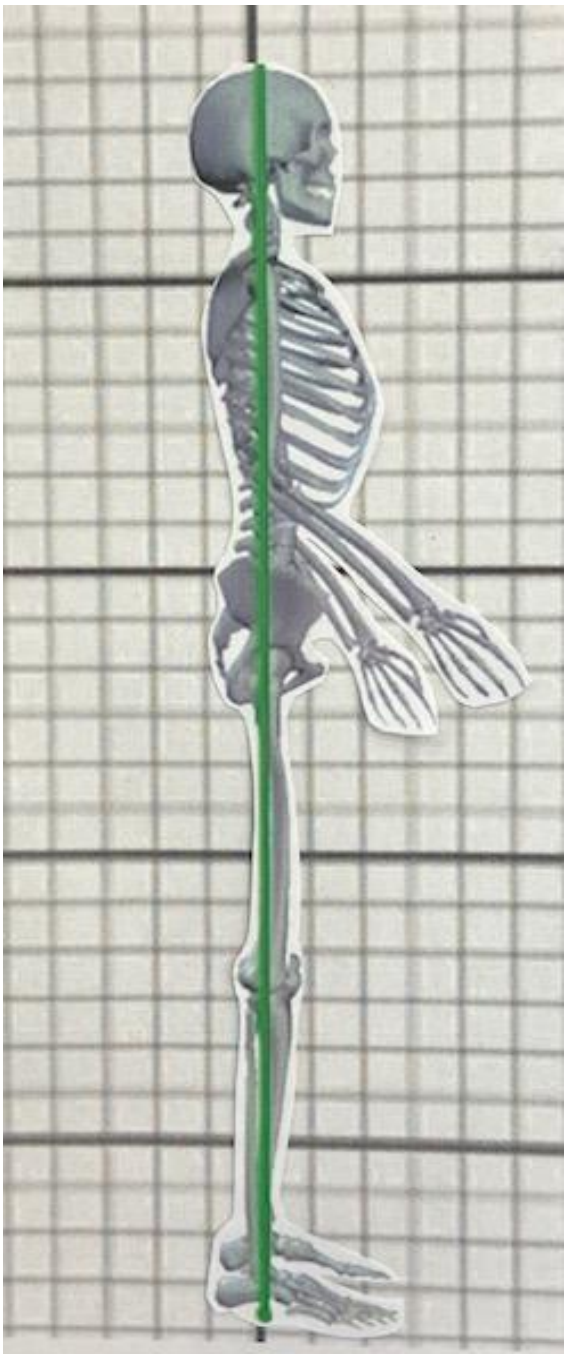

Figure 12: Proper profile alignment demonstrated on Postural Analysis Grid Chart

IN-PERSON MEASUREMENTS OF DANCE AND PILATES STUDENTS' PROFILE ALIGNMENT

Student code: _____

Date: _____

In ideal profile alignment, a straight vertical line which is perpendicular to the floor should pass slightly behind the ear, through the center of the shoulder and hip joints and slightly in front of the ankle. Thus, if these points fall closer to or on the vertical line which is perpendicular to the floor in weeks five and ten, improved profile alignment is indicated.

The straight line used in these measurements is a plumb bob or plumb line which is a string suspended from the ceiling with a weight on the end. The dance student will stand behind the string which is positioned at a point slightly behind the dancer's ear. The measurements are made in millimeters between the anatomical points or indicators noted in the above paragraph and the string. If these points move closer to the alignment indicators noted above, the dancer's alignment has improved.

Profile Alignment:

Week One

Ear _____

Shoulder _____

Hip _____

Ankle _____

Week Five

Ear _____

Shoulder _____

Hip _____

Ankle _____

Week Ten

Ear _____

Shoulder _____

Hip _____

Ankle _____

ASSESSMENT OF CHANGES IN PROFILE ALIGNMENT FROM PHOTOGRAPHS OR SCREENSHOTS OF DANCE AND PILATES STUDENTS

Student code: _____

Date: _____

In ideal profile alignment, a straight vertical line which is perpendicular to the floor should pass slightly behind the ear, through the center of the shoulder and hip joints and slightly in front of the ankle. Thus, if these points fall closer to or on the vertical line which is perpendicular to the floor in weeks five and ten, improved profile alignment is indicated.

Profile Alignment:

Week One

Ear _____

Shoulder _____

Hip _____

Ankle _____

Week Five

Ear _____

Shoulder _____

Hip _____

Ankle _____

Week Ten

Ear _____

Shoulder _____

Hip _____

Ankle _____

APPENDIX C

SUBJECTS' RESPONSES

Table 7

Individual Responses to Question 1: Changes Noticed in Dancing

Student	Response
1	Increased body awareness
2	Less soreness
3	Increased concentration
4	Increased balance
5	Efficient stretching
6	Know alignment
7	Weight evenly distributed
8	Increased internal focus
9	Mind-body-spirit connected
10	Know where center is

Table 8

Individual Responses to Question 4: Exercises Useful in Improving Alignment

Student	Response
1	Created focus of anatomical positions
2	Slow movements helped feel alignment
3	Able to feel each vertebrae articulate
4	Initiation coming from core
5	Zipper image aligned pelvis
6	Side kicks helped to focus on parallel
7	Rolling helped to find scoop
8	All exercises opened chest and lengthened spine
9	Exhaling through a straw activated transverses
10	Anatomically aware and feel control of body

Table 9

Individual Responses to Question 6: Anatomical Discoveries

Student	Response
1	Which muscles to use to find neutral
2	What 4 muscles needed to breathe
3	Where and what a plumb line is
4	That smaller movements are more efficient
5	Mental awareness creates safety in my body
6	When unbalanced and how to fix
7	Have freedom in joints
8	How to move from center
9	Know difference in strength and flexibility
10	Have control over own body

Table 10

Individual Responses to Question 5: Response to Research

Student	Response
1	Enjoyed imagery the most
2	Wants to continue Pilates as a career
3	Wish was taught Pilates earlier in dance
4	Stands up so much taller know
5	Found Pilates to be relaxing
6	Body feels awake after Pilates
7	Know when holding breath
8	Spine feels longer
9	Core is my new powerhouse
10	Imaginary helped to relax

APPENDIX D

SUBJECTS' ANATOMICAL MEASUREMENTS

Individual Anatomical Measurements in Profile View for Weeks One, Five, and Ten

Student ID	Week One Measurement, mm				Week Five Measurement, mm				Week Ten Measurement, mm			
	Ear	Shoulder	Hip	Knee	Ear	Shoulder	Hip	Knee	Ear	Shoulder	Hip	Knee
1A	70	0	5	30	65	0	8	30	50	10	10	30
2A	75	50	0	45	40	39	0	36	35	27	0	27
3A	30	60	30	50	30	35	15	40	20	10	0	30
4A	70	30	40	20	55	25	30	15	30	20	20	10
5A	30	50	40	35	20	45	20	18	20	40	0	0
6A	70	110	40	30	65	95	40	30	60	80	40	30
7A	95	80	40	20	80	65	30	15	65	50	20	10
8A	25	5	30	35	30	3	20	28	25	0	10	20
9A	50	50	20	30	35	30	13	20	15	10	5	10
10A	30	40	20	40	20	25	20	40	10	10	20	40
Avg	55	48	27	35	40	35	20	30	33	26	13	21

Percentage Change in Individual Anatomical Measurements Between Weeks One and Ten

Front-Back (Profile View)				
	% Change			
Student ID	Ear	Shoulder	Hip	Knee
1A	29	-100	-50	0
2A	53	46	0	40
3A	33	83	100	40
4A	57	33	50	50
5A	60	0	50	14
6A	14	27	0	0
7A	31	38	50	50
8A	0	100	66	43
9A	70	80	75	66
10A	66	75	0	0
Avg	41	38	34	30