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The Effects of Cross Training on Ballet Dance

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Thesis Summary

Peter Martins, the Ballet Master in Chief of the New York City Ballet once said, “Ballet is pure and demands that you serve something larger than yourself, whether it be beauty or art, or a combination of both. It requires discipline, taking care of yourself, taking care of your own body first. Then it allows you to give of that beauty, the beauty that you acquire by sculpting your own body all your life” (Balletquotes). Martins describes the true dichotomy of ballet. While ballet is an art form, dancers must treat themselves and their art form as a sport. Ballet dancers are dedicated and passionate individuals who strive for perfection daily. While ballet is aesthetically pleasing to the eye, the pain and work it requires of the body is grueling. A ballet dancer’s work is never done and this drive for excellence within the art is what pushes dancers and the art of ballet as a whole to the next level.

The primary purpose of this thesis is to discuss the way in which dancers should treat their bodies. This thesis looks into the hard and demanding life of a dancer through the lense of cross training. As a dancer and exercise enthusiast, the topic of cross training and ballet was very intriguing. Personally, I find learning about the body and how it works to be fascinating. Similarly, learning about ways in which I can improve my own personal dance technique is extremely rewarding. Throughout the course of this year long project, I have gained much more knowledge about cross-training and its effects on ballet dance. In addition to gaining this knowledge, I have also had the opportunity to put some of these cross training exercises into practice. This project has helped me personally better myself and my dance technique while also learning how I can help others improve their dance technique and overall fitness levels. In the future, I hope to use the knowledge I have gained from this project through teaching. I hope to incorporate some of these cross-training exercises into my lesson plans for future dance classes.

Incorporation of these exercises and ideas into a regular dance class will allow me to continue to share my knowledge regarding cross training with my fellow students and hopefully my students will also reap the benefits from additional cross-training.

The dictionary defines cross training as, “the action or practice of engaging in two or more sports or types of exercise in order to improve fitness or performance in one’s main sport” (“cross-train”). While ballet dancers may look physically fit and slim, ballet dancers do not always give their bodies proper care. This thesis will explain the elements of ballet training that are crucial for development as an artist and a dancer. It will also discuss the benefits of cross training for ballet dancers and how this should be incorporated into the ballet curriculum. Finally, this thesis will discuss the relevancy of the current research regarding the dance program here at the University of South Carolina. This thesis discusses various cross training exercises that can be incorporated into the three distinct levels of dancers: young dancers, pre-professional dancers, and professional dancers. While the entirety of the effects of cross training on ballet dancers are still being discussed within the field of dance medicine, it has been proven that cross training is indeed beneficial and necessary for dancers at all levels of training.

Introduction

As a dance major here at the University of South Carolina and an avid runner the question regarding the effects of running on dance has always been a common question. Throughout my high school career, I ran on the varsity cross-country team for four years while also dancing over ten hours per week. After beginning my dance career at the University of South Carolina, I found that I still needed and wanted to run daily. This love for running and dance has shaped me into an individual who is passionate about exercising. Personally, exercising is more than just lifting weights or running miles, it is something that is extremely important to me. Therefore, through conducting this research I hope to inform my fellow peers about the importance of cross training and hopefully I can continue to research and teach on this subject in the years to come.

The topic of “The Effects of Cross Training on Ballet Dance” developed from my love of dance and running. Both of these passions have been an important component of my life and I wanted to learn more about the effects of running on overall dance technique. The information and research reported in this paper have helped me see cross-training and running as a holistic practice that is beneficial for dancers and all individuals alike. The information presented in this thesis has helped improve my personal dance training and hopefully as the information is shared with other fellow dancers, their training and technique will also improve.

The purpose of this research study was to explain the effects of cross training specifically on ballet training. This paper discusses the benefits, harms, precautions, and specific exercises that dancers can use to improve their technique and their strength. The various types of training discussed will look specifically at how they affect the primary, pre-professional, and professional dancers. The conclusion of this paper will discuss how the South Carolina Dance Program can

improve on providing cross training for their dancers and improve upon communicating the new research with all members of the dance community here at the University of South Carolina.

Research Question and Thesis Statement

The guiding research question for this thesis was, “Is cross training beneficial or harmful to ballet dancers?” While this answer seems simple, many dancers, teachers, and professionals disagree on whether cross training is beneficial. Many dance teachers discourage their dancers from partaking in other forms of exercise. They believe that cross training and strength training ruins the long, lean aesthetic of the dancer’s body. The information in this thesis provides evidence that cross training is beneficial for all dancers and dancers should attempt to use cross training exercises to improve their art on a regular basis.

Dancers as Athletes

The Technical Manual and Dictionary of Classical Ballet written by Gail Grant defines ballet as, “a theatrical work or entertainment in which a choreographer has expressed his ideas in group or solo dancing to a musical accompaniment with appropriate costumes, scenery and lighting” (Grant 12). Based on this sole definition, it is evident that ballet is first and foremost an art form. The definition describes ballet as an expressive art form used for entertainment and pure enjoyment. While this definition of ballet is still relevant, the world of ballet is now much more demanding. The art of ballet has become a much more athletic and physical art form which has resulted in a shift in ideology for both dancers and audience members.

Until recently, dancers have strictly been considered artists. When asking professional dancers about their occupation, typically one would respond with the fact that his or her body is an instrument which is used to express emotions, feelings, thoughts and ideas. Although this is still true, today ballet is much more than just an expressive art. The intricate and physical choreography combined with the extensive rehearsals equate ballet to a professional sport. In the journal of *Sports Medicine*, researchers Koutedakis and Jamurtas state, “the physical demands placed on dancers from current choreography and performance schedules make their physiology and fitness just as important as skill development” (Koutedakis and Jamurtas 651). Regarding ballet as a sport has resulted in the art form being taken more seriously by both dancers and teachers. Similarly, this renowned definition of ballet has allowed for audience members and the general public to see ballet in a completely different light. *Dance Consortium* says it best when it states, “The physical ability and disciplines expected of a dancer can be easily related to those of an athlete and increasingly, dance critics are describing dancers as athletic” (“Dancers as Athletes”).

Even though dancers are considered athletes, they are unique athletes. Dancers are different from athletes because of their high range of motion, their excessive flexibility and their ability to perform a technique that defies human nature (Ambegaonkar and Aalten). These unique features of the dancing athlete require dancers to take special care of their bodies. The extreme flexibility and high range of motion also result in dancers having a high risk of injury if they are not careful. The differentiation between dancers and most other athletes is what has driven dancers away from additional cross training when they should be partaking in it regularly. Many dancers have come to believe that cross training is harmful to their physique and their flexibility and thus have steered away from exercising outside the dance studio (Koutedakis and Jamurtas). As choreography continues to become more athletic, dancers need cross training to reduce their risk of injury and improve cardiovascular strength (Koutedakis and Jamurtas). Dancers must understand that cross-training helps them take their dancing to the next level. Similar to professional athletes, dancers need to keep in shape during their off season or outside studio time, to improve. Fortunately as dancers have learned more about the benefits of cross training, the number of dancers partaking in these activities has increased. This shift in thinking about cross training has helped many dancers become more educated about their bodies and their sport. Additional cross training has helped dancers view their art in a much more athletic light and overall dance has become a much more educational and holistic art form.

The Aesthetic of Ballet

When describing a ballet dancer, typically adjectives such as beautiful, skilled, capable, and light come to mind (Patrick, Turner, and Wainwright). This ideal of a featherlike, angelic dancer was established at the beginning of ballet when the high noble men and women of the courts used to dance. The prestige and high social class ideology is one that is still present within ballet. However, it has taken a different form. Today, rather than being noble of high status, ballet dancers desire to be thin and ethereal. The slender ideology of ballet has shaped ballet into a form of art that is both demanding and authoritarian.

The thin ideology of ballet has become one of the key components of the aesthetic. Even though dancers sometimes consider themselves as athletes, the ways in which they take care of their body are not optimal. The ideal of slenderness and long-limbed dancer has become so prevalent within the field of ballet it has caused dancers more harm than good. The aesthetic of thinness within the field of dance has caused eating disorders and disordered eating to become a normality. According to *The International Journal of Eating Disorders*, anorexia has a prevalence rate of 0.28 among all women in general (Thomas et al., 263). In the field of ballet, the prevalence rate for anorexia nervosa ranges from 1.6 to 7.0% (Thomas et al., 263). Research has shown that ballet dancers have lower body weights than most of the general public and this is a result of both the abundance of training and the aesthetic of thinness (Thomas et al., 263). Eating disorders can be detrimental to dancer's health and a dancer's career. Eating disorders can cause a reduction in physical fitness, an altering of body weight or body fat percentage, and a reduction in bone density (Scoffier-Mériaux et al. 627). Disordered eating has become so common in ballet that several ballet companies now have health and disordered eating policies in their company and school contracts. For example, The Royal Ballet in London, England has a

four-page nutrition policy that explains the severity of disordered eating and the ways in which the school will help dancers recover from an eating disorder (McConville). The company provides health education classes for lower level and upper level dancers which will hopefully help promote good health habits. Although these documents address the severity of the issue, they are not going to stop the problem. To reduce the number of cases of eating disorders in dancers, more health education and nutrition classes should be included in ballet schools. Similarly, dance teachers should try to promote positive body image and positive eating habits for all dancers both inside and outside the classroom. The aesthetic of thinness is an aspect of ballet that has been present for many years. Even though it has become a normality within the field, it does not necessarily mean it should remain. While ballet dancers may be thin and slender, they are not always physically fit. According to the *Sports Medicine Journal*, most ballet dancers are not as physically fit as professional athletes (Koutedakis and Jamurtas 651). Studies have shown that due to the slow nature of the sport, some professional dancers have the same fitness levels as a sedentary adult (Koutedakis and Jamurtas 651). Statistics like these demonstrate the negative effects of the aesthetic of ballet. This desire to be thin and slender has caused many dancers to fall succumb to disordered eating (McConville). Dancers must understand that being slender can be achieved without reducing one's body mass index or reducing one's food consumption.

While society as a whole has become very focused on body image and the thin ideal, the aesthetic of being a thin ballet dancer has become a normality (Turner and Wainwright, Bowling). Many dancers are more focused on their outward appearance and their body size, than their overall fitness levels. This focus on appearance has resulted in dancers having extremely low body masses and higher risks for injury (Turner, Wainwright, Bowling). This high risk for

injury and low body mass is directly associated with dancer's low fitness levels. Dancers need to understand that being slender does not equate to being physically fit and as a result, most dancers are not dancing to their fullest potential. Dancers must be knowledgeable about nutrition and proper food consumption to endure long days at the studio. Similarly, supplemental exercises will allow dancers to fulfill all of their daily requirements. The lack of education in supplemental exercise and nutrition is a driving force behind the slender ideology of ballet. This lack of education must be changed in order to prolong dancer's careers and lives. Increasing staffing to include nutritionists, physical therapists, and athletic trainers has helped dancers push past the mindset of thin as best. Certain dance companies like the New York City Ballet, American Ballet Theater, and Central Pennsylvania Youth Ballet have all added nutritionists and physical therapists into their company's staff. This increase of staffing has helped dancers become educated on these requirements and it has helped dancers become healthier (Wyon). The shift in thinking, education, and staffing has helped dancers understand the importance of overall fitness and ultimately this has debunked many of the myths and stereotypes regarding the thin ideals of ballet.

Ballet Technique and Daily Life

Ballet dancers are special individuals (Aalten 111). Ballet is a demanding and unique sport. The unnatural arch of dancer's feet, the extensive hours spent on one's toes, and the unnatural 180-degree turnout of the legs and feet put physical demands on the dancer's body and minds daily (Aalten 109). When dancers do not take proper care of their bodies, they are putting themselves at a high risk for injuries (Aalten 111). Injuries do not only cause dancers physical harm, but they can also cause serious mental harm. Injuries can cause dancers problems within their profession, their livelihoods, and their overall attitude on life (Aalten 110). Most dancers start their careers at a very young age. Typically dancers are so invested in their art, they continue to pursue, develop, and improve their technique and their artistry until they are no longer capable or willing to do so. While injuries are accepted as part of the process, they are not ideal. The long tenure of a dancer's career requires supplemental exercise on a regular basis. Dancers understand that cross training will not only help improve their technique and their strength but overall it will make them a more well-rounded dancer.

The long days of practice and rehearsal are not kind to dancer's body. A typical day for a dancer begins with an hour and half warm up class (Cooper). This class begins with barre exercises at the beginning. Barre work is the equivalent to low-moderate anaerobic activity (Koutedakis and Jamurtas 651). This type of activity is reliant mostly on stored energy sources and it requires very little oxygen (Koutedakis and Jamurtas 652). As dancers continue to grow in their careers, barre work can become more aerobic. The purpose of morning class is to wake up the dancer's body and get it aligned, centered, and warm for the remainder for the day. Barre work is crucial to the continual development of ballet technique and for professional dancers it is a time to continue to build strength and flexibility.

Following barre, dancers spend the rest of the class dancing in the center of the room. These exercises are typically called center exercises and they are comprised of both anaerobic and aerobic movements. Warming up the body and finding one's center of gravity is conducted through a sequence of anaerobic exercises (Koutedakis and Jamurtas 653). Following these exercises, turning, moving across the floor, small and large jumps make up the aerobic portion of class (Koutedakis and Jamurtas 653). Center work is the equivalent to cardiovascular exercise, however, most exercises only last approximately three minutes (Koutedakis and Jamurtas 652). While many dancers consider themselves to be physically fit, healthy, and strong, these types of exercise do not promote an overall fit athlete. Supplemental training in addition to ballet class would be the most ideal way to keep a dancer safe and healthy. Through additional exercise and additional cross training, dancers will improve their physical and cardiovascular strength (Koutedakis and Jamurtas 652). These two types of strength are crucial to perfecting and performing the athletic choreography that is presented on stage by many professional ballet companies (Koutedakis and Jamurtas 652). Although a dancer may not have an extraordinary amount of time to partake in these types of supplemental exercises, adding small bits of supplemental exercise to his or her daily schedule will be most beneficial for the tenure of his or her career. For example, Sara Mearns, a principle dancer with the New York City Ballet, describes how important cross training is in her daily schedule. After enduring two muscular back injuries, many sprained ankles and calves, and several other minimal injuries, Mearns believes cross training is the most important part of her day. Mearns stretches and rolls out her muscles with a foam roller for 45 minutes before morning class (Baggs). Prior to performances, Mearns partakes in 1 hour of physical therapy exercises. During rehearsals Mearns continues to roll, stretch, and keep her muscles warm. Finally, after a long day's work at the studio, Mearns

does one more additional hour of physical therapy exercises during dinner time (Baggs).

Although Mearns has had several setbacks with injuries during her career, she believes “injuries are a gift”. She states in an interview, “They make you reset and take a breath. You don’t see that in all the emotions that come with the pain and suffering, but in the aftermath, it’s all a gift. You become a stronger, healthier, more well-rounded dancer. It brings you back to reality and what’s really true which can be eye opening at first. But it’s all good” (Baggs).

After the conclusion of morning class, ballet dancers spend the next portion of their day in rehearsals. These rehearsals can range from 2-6 hours and most of them are filled with learning, practicing, and re-rehearsing certain sections of one piece or multiple pieces (Cooper). Most dancers spend the entire afternoon in rehearsals. During performance weeks, dancers will be on their feet from 10:00 am to 10:00pm (Cooper). While these days can be rewarding and full of action, it is important for dancers to continually take care of their bodies. During rehearsals, especially is when the majority of injuries occur. Common injuries for most ballet dancers include tendonitis, muscle strains, and stress fractures (Kinetz). While dance rehearsals can be extremely long and tiring, they are where dancers develop their cardiovascular strength. Through the repetition of rehearsing certain works, dancers develop the physical and cardiovascular strength necessary to complete the choreography. During these extensive hours dancers develop the physical and mental strength to perform the choreography to the best of their ability. Rehearsals can be viewed as another component of cross training for dancers simply because of the cardiovascular and physical strength necessary for completion. It is necessary that during these long hours dancers take extremely good care of their bodies in between rehearsals and post rehearsal to ensure that injuries do not occur.

The Basics of Cross-Training

Cross training is defined as “training in two or more sports to improve performance, especially on one’s main sport” (“cross train”). The research supports the idea that cross training is beneficial for ballet dancers. Cross training helps dancers reduce their risk of dance injuries, improve overall fitness, and helps improve the dancers aesthetic appeal (Koutedakis and Jamurtas 651). Seeing as to which ballet dancers understand these benefits, the next question that must be answered is; what types of cross training are most beneficial?

According to a study conducted in the *Sports Medicine Journal*, aerobic power, muscular strength, muscular imbalances, and bone and joint integrity are problematic areas for dancers (Koutedakis and Jamurtas 651). Another author for the *New York Times* notes, “typically ballet dancers have low cardiovascular stamina, chronically under stretched quadriceps, and weak upper bodies (Kinetz). Findings like these have resulted in ballet dancers partaking in various forms of cross training including strength training, cardiovascular training, Pilates, and yoga. These forms of cross-training are becoming widely popular within the field of ballet because of the tremendous benefits. As research continues to be published on this topic, dancers and teachers are becoming more informed and more educated about this area. New research findings help dancers continue to improve and as a result the field of ballet has become a more holistic and inviting.

There are various forms of strength training that are beneficial to dancers. Traditional strength training can be extremely beneficial for ballet dancers because it specifically targets muscular imbalances (Orio). In the past, many dancers have steered clear of strength training because they believed dancers would build up too much bulky muscle (Aalten). Researchers and personal trainers have found that if executed properly, strength training will help dancers

tremendously without generating bulky muscles (Orio). A study conducted in the *Journal for Strength and Conditioning Research* found that strength training allows for better performance quality because their muscles could generate and withstand more force and torque (Koutedakis 717). Similarly, personal trainer Joaquin De Luz believes that strength training is not only important, but it is imperative for all dancers (Orio). De Luz argues that strength training helps improve muscular imbalances, muscular endurance, and lifting strength for all dancers and therefore it should be incorporated into all professional dancer's schedules (Orio). De Luz suggests dancers should be performing these types of exercises two to three times per week and most professional ballet companies should be offering these types of activities and services to the entire ballet company (Orio).

The second type of cross training that is beneficial for dancers is cardiovascular training. Due to the slow and anaerobic nature of a ballet class, many dancers are lacking in aerobic power (Koutedakis and Jamurtas 651). Throughout the years dancers have steered clear of certain types of cardiovascular training because it was believed it would reduce flexibility (Yin et al., 354). The research demonstrates that cardiovascular strength does not inhibit a dancer (Yin et al., 354). Instead, cardiovascular strength helps dancers' bodies prepare lactic acid properly and it helps dancers' improve both their aerobic and anaerobic respiratory systems (Wyon). Specific types of cardiovascular training that are good for dancers include: running, swimming, elliptical, and cycling (Kinetz). Adding cardiovascular training to a dancer's schedule one to four times per week can help dancers be physically prepared for different choreography during rehearsals. Overall, this type of training helps dancers recover from long days in the studio much more efficiently and thus dancers should continue to endure these beneficial activities on a regular basis (Kinetz).

The most popular form of cross training for ballet dancers is Pilates. Pilates was created by movement specialist Joseph H. Pilates in the early 20th century. During this time, Pilates was frustrated with the existing forms of cross training and strengthening (Ahearn 92). Because of his frustration, Pilates took aspects of both Eastern and Western strength training techniques and created his new form of training for himself (Ahearn 92). Since the initial introduction of Pilates, dancers have continuously found the exercises to be useful and powerful. Various dancers and choreographers including: Jerome Robbins, Hanya Holm, Ted Shawn, George Balanchine, and Martha Graham were big advocates for the newly codified exercise and today it is just a popular worldwide (Ahearn 92).

While Pilates has been proven to be helpful for various types of people, it is especially beneficial for ballet dancers. Many dancers rely on Pilates training to balance out their bodies. Pilates balances the skeletal muscles of the body that have been overused or misused in ballet on a regular basis (Ahearn 97). Pilates also helps dancers learn and re-learn proper alignment (Ahearn 98). The low-impact exercises in Pilates are especially helpful for dancers who are rehabilitating an injury (Ahearn 98). Overall Pilates allows dancers to learn important information about their individual bodies while also improving their strength, muscularity, and overall ballet technique (Ahearn 98).

Cross Training and Young Dancers

Incorporating cross training into primary levels of ballet is crucial to the development of the dancer. While it is unnecessary to require cross training in the extremely young levels, it is important for dancers to begin cross training during their developing years. According to Dr. Amy Yin in the department of orthopedic surgery at Stanford Health Care, young dancers are more prone to injuries because of their physiological growth (Yin et al, 348). Implementing cross training into young dancer's daily class regimens will help them build a solid muscular foundation upon which they can dance while also reducing this risk for injury (Yin et al., 348).

According to Dr. Ann Bowling, a professor of Health Sciences in the United Kingdom, the most common type of injury for dancers is a soft tissue injury (Bowling). Professional dancers typically injure their lower extremities such as their knee, ankles, and lower back (Bowling). Similarly, most dance injuries for young athletes include tendonitis, patellofemoral pain syndrome, ankle impingement syndrome, and hip labral tears (Yin et al., pg. 348). Yin also notes that the majority of injuries for young dancers are located in the lower extremities, however some upper body injuries do also occur (Yin et al, pg. 348). Yin and Bowling argue that in order to preserve a dancer's career, dance health maintenance needs to become a fundamental part of young dancer's education (Yin 354). Physical therapy, strength and conditioning, and basic health education should to be included in a dancer's basic schooling in order to keep them safe.

There are various types of cross-training for developing dancers. Not all of these types of exercises have to be conducted outside the dance studio. Yin argues that incorporating cross-training exercises into the ballet class not only saves a dancer time, but more importantly it promotes power and strength within the entire classroom (Yin et al, 354). Some examples of

simple cross training for young dancers can include incorporating abdominal exercises, group stretching, or push-ups into the class warmup (“Cross Training, where were you”). Physical therapist for the Central Pennsylvania Youth Ballet, Chris Fisher agrees with Yin in the fact these types of exercises help dancers develop stability within their core and spine. Additionally, these types of exercises allow for students to become more educated on the anatomy of dance. (“Cross Training, where were you”). These types of exercises are not only easy to include in the ballet syllabus, but more importantly it adds an educational component to a ballet class that is extremely helpful.

Pilates is another form of cross-training that can be incorporated directly into a traditional ballet class. The incorporation of Pilates into ballet class helps young dancers improve more quickly and it helps them develop a deeper understanding for how the body moves (Ahearn 93). The Carver Center for Arts and Technology in Baltimore, Maryland is a public school for grades 9-12. This magnet school that has incorporated Pilates into their traditional ballet classes and it is helping students improve rapidly. During the semester, students complete four different units of Pilates education and training (Ahearn 94). This course includes a basic Anatomy and Physiology course and an introduction and history of Pilates course (Ahearn 94). After the completion of these two elementary courses, dancers and teachers are able to incorporate basic movement exercises into the beginning of a ballet class, prior to barre. Elizabeth Ahearn is dancer, choreographer, Pilates instructor, and former chair of the dance department at Goucher College (“Elizabeth Ahearn”). Ahearn argues that incorporating Pilates into a traditional ballet class is helpful for students. The additional exercises prior to beginning ballet barre help the students warm up their bodies and center their minds on the class ahead (Ahearn 94). The specific exercises also help students anatomically improve muscle efficiency, muscle capacity

and body awareness(Ahearn 94). Studies have shown that Pilates helps prevent injuries and it is especially helpful during the injury rehabilitation process(Ahearn 97). This type of Pilates training allows for teachers to see the weaknesses and muscular imbalances in their students. Seeing these imbalances at an early age allows for teachers to help the students individually improve upon these imbalances which will help prolong the student's dance careers (Ahearn 97).

Studies have also shown that a more rigorous and personable forms of cross training for young dancers helps reduce the risk of injuries (Yin et al., pg. 354). Prescribing individualized conditioning programs for young dancers can help them improve their ballet technique, their personal biological imbalances, and their understanding of how the body works within the realm of ballet (Yin et al., pg. 354). Incorporating a team of physical therapists, exercise specialists, and dance instructors into a ballet school's curriculum would be a tremendous help for young dancers (Yin et al 354). Fortunately, as studies continue to provide support for these types of exercises, more companies are adding dance medicine professionals to their staff (Orio). Providing on site physical therapy and cross-training has reduced the number of injuries in ballet companies tremendously (Kinetz). Starting to provide dancers with these types of services at a young age will help them become more responsible for taking care of their bodies and more importantly, it will help the dancer develop strength and technique at a much faster rate.

Cross Training and Pre-Professional Dancers

Cross-training at the pre-professional level of dance training is imperative. While many dancers become very focused on their artistry and craft during this stage of their career, continual development of the muscles and muscle fibers in the dancer's body will help the dancer's artistry develop even faster (Koutedakis and Jamurtas).

At the pre-professional level within a collegiate setting, cross training can be forgotten or ignored. According to medical professional, J.P. Ambegaonkar collegiate dancers need to respect their body and treat it as more than just an instrument (Ambegaonkar 114). While dancers are both athletes and artists, many times dancers do not take the time to take care of their bodies. Running from one class to the next or spending too much time on other activities causes the dancer to lose sight of the importance of cross training. Ambegaonkar argues that collegiate dancers need to understand the importance of keeping the body fit and active outside the dance studio (Ambegaonkar 114). Adding physical therapists and medical professionals to university staffing can help collegiate dancers reduce the number of injuries they may encounter over their collegiate career. As a result dancers will be more equipped and understanding of the physical demands of a professional dance career.

Many collegiate dancers argue there is not enough time in the day for supplemental cross-training activities, classes, rehearsal, and homework. While there may be times in which pre-professional dance students are extremely busy, Matthew Wyon believes that cross-training can be implemented into ballet class curriculum (Wyon 7). Wyon is a professor of dance science in the United Kingdom. Wyon believes incorporating cross training into a ballet class, will allow dancers to work on their strength and their technique simultaneously. Similarly, incorporating these exercises will also help save dancers time outside the studio (Wyon 7). Wyon argues that

while dancers may seem as though they are physically fit, their energy systems are not as equipped as professional athletes (Wyon 7). The incorporation of certain cardiovascular exercises into a ballet class will help pre-professional dancers achieve the level of fitness equivalent to a professional athlete while also improving their technique and artistry. (Wyon).

According to Wyon, aerobic foundation is an essential component of all dance forms (Wyon 9). Aerobic exercise and an aerobic foundation can help the body become accustomed to continual exercise. Aerobic exercise also increases a dancer's lung capacity and reduces lactic acid buildup in their muscles (Wyon 9). In order to improve one's cardiovascular strength, dancers need to perform cardio exercise at 65-80% of their VO₂ levels for 15-20 minutes (Wyon 9). These high levels of cardiovascular exercise will help dancers improve their ability to keep up with athletic choreography and improve their ability to maintain high energy levels during a performance (Wyon 9). Wyon recommends incorporating intense cardiovascular exercises into a typical ballet class 2-3 times per week (Wyon 10). Examples of strength building exercises would include lengthening the duration of a slow center exercise and reducing the rest time between repeats of the exercise (Wyon 10). During these activities, dancers should focus more on their cardiovascular strength and less on their technique. The incorporation of fast, long, and difficult combinations will help dancers build stronger muscle fibers throughout their body while dancing (Wyon 10). Wyon believes exercises like these will help dancers understand the importance of cardiovascular training within the realm of ballet choreography. These exercises will allow pre-professional dancers to improve on their ability to perform difficult and athletic choreography to their highest potential.

Due to the lack of cross-training that occurs within the pre-professional levels of training, injuries become much more common at this level. According to research conducted by J.P.

Ambegaonkar at the University of North Carolina at Greensboro, almost 2/3 of the dance students had at least one injury within the year of 2004 (Ambegaonkar, 116). With only 20% of the injuries being acute, the rest of the injuries resulted from chronic or overuse injuries (Ambegaonkar, 116). This study concluded that most the injuries for these collegiate dancers were back or lower extremity injuries (Ambegaonkar, 117). This study provides evidence that in order to continue with a dancing career, collegiate dancers especially need to focus on improving the overall physical fitness of their bodies. Whether it is through the incorporation of more fast-paced exercises into class or by participating in yoga and strengthening exercises outside the dance studio, collegiate dancers especially need to understand the importance and necessity of cross-training to prolong one's pre-professional and professional career.

Additional Pilates class offerings within school curriculums is another way students can gain strength and knowledge about cross-training. There are many colleges and universities that offer Pilates classes and even Pilates certifications for dance majors. For example, at Goucher College in Baltimore, Maryland, students are provided the opportunity to take Pilates mat classes weekly or sign up for the semester course called "Pilates Method of Body Conditioning" ("Pilates for the Goucher"). These types of extra curricular classes allow for students to continue to cross train even during their busy school days. One alumni of the college stated, "They have helped me to counter asymmetries caused by scoliosis and for the first time, my scoliotic curve stopped progressing"("Testimonials"). Providing Pilates classes within the department of dance allows for students to continue to build strength while also providing students with the opportunity to deepen their education about the body and the body's capabilities.

Cross Training at the Professional Level

While cross-training is a secondary activity at the primary and pre-professional levels, it is a necessity and a way of life at the professional level. Cross training is still fairly new within the field of professional ballet dancers, however it has become an activity of utmost importance for both dancers and dance companies. At the professional level, dancers are not only encouraged to train outside of the dance studio, but some are required. Professional dancers accept cross training as part of their occupational responsibilities and thus partake in them on a regular basis. Many large ballet companies such as New York City Ballet, Alvin Ailey American Dance Theater, and American Ballet Theater, have put in workout facilities and hired both medical professional and athletic trainers to assist the dancers in ensuring they will put their best foot forward on the stage.

The New York City Ballet dancer, Joaquin De Luz, is also one of the company's personal trainers (Orio). De Luz was a dancer with the company prior to becoming the company's personal trainer. After having back injuries himself, De Luz worked hard to get himself back on the stage. After many hours spent working in the gym, De Luz realized he wanted to help his fellow dancers and co-workers prolong their careers. Therefore, De Luz became a certified personal trainer through the National Academy of Sports Medicine and became the co-founder and designer of the NYCB Strength and Conditioning Program (Orio). De Luz stated on his website ““It's not only important, I believe it's imperative! I wish I had started earlier” (Orio). This program used by the company addresses areas including muscle imbalances, cardiovascular improvement, muscle endurance, stamina, and overall strength (Orio).

If dancers do not have the option of performing cross-training activities at the company's studio, they can partake in activities outside the studio on a daily basis. According to an

interview with Alvin Ailey dancer, Fana Tesfagiorgis, Gyrotonics and swimming are two of her daily cross-training activities (Murphy). Gyrotonics is similar to Pilates in that the aim of the exercise is to elongate and build strong muscles (Murphy). This type of exercise uses both a chair or other types of supportive equipment to help support, stretch and strengthen the dancer (Murphy). Tesfagiorgis usually partakes in these types of exercises twice per week. Additionally, Tesfagiorgis swims in her local community pool five times per week to massage and work out some of the lactic acid from daily rehearsal (Murphy). Tesfagiorgis argues that these types of exercises help her to be a well rounded dancer and it gives her a piece of mind to know her body can do more than plies and typical dance movements (Murphy).

These two examples demonstrate the importance of cross-training at the professional level. As research is published about the benefits of cross training, ballet companies are starting to hire more physical therapists and athletic trainers (Orio). These new additions to the dance companies' staff not only help the dancers perform better but they also help dancers understand the athleticism behind their artistry. Physical therapists and athletic trainers help dancers learn the best ways to take care of their bodies and their instrument. These new additions are allowing for dancers to finally equate themselves to professional athletes and take responsibility for their sport and their art. Kinetz said it best when she stated, "dancers are unique individuals" (Kinetz). The art of professional dancing is unlike most sports, and fortunately as research has continued, the profession of a ballet dancer has grown and developed into the physically demanding and extremely athletic sport it is today.

One drawback of cross-training is the extremely high costs of gym memberships and Pilates classes. For example, the average cost of a Pilates mat class can range from \$20-30 dollars per class ("Health &"). Similarly, the average cost for one personal training session is

\$90-\$150 (“Health &”). In addition to these high costs, most workout gyms require a membership fee for all users. Even though cross training is beneficial, sometimes financial obligations get in the way. Dancers are known for making very little income for their art. Therefore, when times are tight, dancers will have to prioritize in order to make ends meet. Although spending time cross training outside the dance studio is important, sometimes it is financially not feasible. Unfortunately many smaller dance companies cannot provide support for their dancers, but larger companies do give the company benefits in terms of cross training. For example, Joffrey Ballet offers their dancers free gym memberships and Bikram yoga classes (“Anatomy of a Paycheck”). Similarly, the Cincinnati Ballet dancers get free access to a gym and Pilates equipment for their individual use (“Anatomy of a Paycheck”). It is through benefit programs like these, professional dance companies are providing their dancers with benefits that allow them to continue cross training outside the dance studio. Through benefit programs like these, dancers are able to get the additional training in throughout the day without having to spend an excessive amount of money.

Overtraining and Precautions

Dancers are accustomed to feeling pain. Ballet dancing is a physical profession and as their careers develop, dancers understand the pain and exhaustion that is associated with the career. While dancers would like to avoid injury at all cost, injury is inevitable at some point throughout a dancer's career (Aalten 110). The dominant attitudes towards pain and injuries can be hazardous to dancers. These feelings of satisfaction with pain can cause dancers to ignore signs and symptoms of injury or overuse. Studies have shown that most dance injuries are associated with overuse and exhaustion (Aalten 110).

Cross-training and additional strength training is another way in which dancers can cause themselves more harm than good. While cross-training and additional strengthening exercises are important, rest and recovery is just as important for dancers. Many dancers do not take time off to recover or rest because they want to continually better themselves (Krasnow et al.). If dancers do not take adequate time to rest throughout their busy weeks or between performance seasons, they could run the risk for burnout (Koutedakis 122). Overtraining and overstimulation can lead dancers down a path of illness and injury (Koutedakis 122). Excessive exercise can lower a dancer's immune system (Koutedakis 124). Similarly, if dancers continue to excessively exercise, they could risk the loss of muscle strength due to the inability to respond to external electrical stimulation (Koutedakis 125). Excessive exercise can cause a dancer to lower their body mass index to unsafe levels and as a result their physical ability to perform the ballet technique will suffer (Koutedakis 125). Even though dancers are incredibly strong athletes, all athletes need rest and recovery in order to perform at their greatest potential.

While the term burnout is relatively new within the field of dance medicine, it is an aspect of ballet that must be addressed. According to Dr. Yiannis Koutedakis, burnout is the

disproportional frequencies in intensity or frequency with insufficient recovery (Koutedakis 123). While burnout happens more often within the younger age levels of ballet training, it is an aspect of ballet that is important to recognize at all levels. Promotion of excessive exercise to children during developmental years is detrimental to one's love and passion for the art (Koutedakis 125). The emphasis on slenderness in ballet can push young dancers to exercise too often (Koutedakis 125). During developing years, dance teachers should be careful as to how they promote cross-training and supplemental exercise. Continuously yelling at students to push themselves, fight through fatigue and illness is not ideal for the developing dancer's body and mindset (Koutedakis 125). While cross-training is a necessity at the developmental level, it should be presented to the students in a positive light. Promoting holistic health and strength will help young dancers understand the difference between excessive exercise and pushing themselves just enough to get to the next level. Similarly, after performance seasons, dancers should be allotted 3 to 5 weeks of rest. Studies have shown that this amount of time allows the dancer's bodies to fully recover. Breaks of this length will help dancers rebuild their muscles and immunity. Contrary to belief, long breaks have proven to be extremely beneficial to dancers in restoring their muscles to a point of even greater strength when they return. Rest periods do not have to exclude dance training altogether. Instead, during these breaks dancers should have reduced dance activity to ensure their muscles are recovering and rebuilding. Holistic thinking regarding cross training and recovery will allow dancers to put their best foot forward in the studio without the worries of burnout or injury.

Conclusion and Additional Research

The purpose of this thesis was to understand the effects of cross training on ballet dance. The guiding question for the research, “Is cross-training beneficial for ballet dancers” was supported. The research supports the fact that there are many types of cross training in which dancers can partake. Various forms of cross training that are beneficial for dancers include: strength training, cardio intervals, Pilates, and yoga. These forms of exercise will promote strength and muscularity within the dancers. The wide variety of cross-training exercises gives dancers the option to choose what would be best for them. There are many benefits that are associated with cross training. While strength and muscular development is important, cross training can also help dancers improve upon their artistry and overall technique. While the research in cross training and dance medicine is still new to most dancers and teachers, the research in dance medicine is helping prolong the career of a dancer as a whole.

The field of dance medicine and dance health is a relatively new field (Wyon). The research presented in this document, while relevant, is still considered new research. Information regarding the effects of cross training and other aspects of dance medicine are still being discovered. Fortunately, as the field continues to grow and evolve, so has the mentality of the dancer. In today’s dance world, most dancers partake in some form of cross-training on a regular basis. Especially at the elite level, dancers spend a minimum of 30 minutes doing physical therapy or stretching exercises prior to the beginning of class. Therefore, when new information regarding the effects of cross training is published, dancers and dance health professionals take the information and use it in congruence with the activities and exercises they already do. This newly discovered field of medicine is one that will continue to help dancers shape and evolve into world class athletes. Whereas ballet dance may be viewed as an ancient,

noble, art form it is one that has continued to evolve throughout the years. The research regarding the world of dance holds promises that the health of dancers in the future will look even better than it does today.

There were two key components to this research project. First, delve deeper into the research regarding cross-training and ballet dance. Second, share these findings with the University of South Carolina's dance program to help the current dance majors understand the importance of cross training on a regular basis. While studies have shown these types of exercises are extremely beneficial for dancers, dancers here at USC sometimes succumb to other classes and activities prior to cross training. While research demonstrates that this is common in most university settings, collegiate dancers must change their attitudes regarding cross-training to prolong their careers. Whether it is through the incorporation of Pilates exercises into daily class or getting a group of dancers together to participate in group training sessions, the attitude regarding cross training needs to change. Implementing cross training into the dance curriculum here at USC could help dancers understand the various ways in which they can cross train. There are various ways in which this information can be presented to the students. Whether the information is presented via the athletic trainer or via the class called "Dancer's Body", dancers need to know and understand the information.

The South Carolina Dance Conservatory offers young dancers within the Columbia community the opportunity to learn ballet at the university's studios. While the age of these dancers ranges from 3-18 years old, cross training can still be implemented into the conservatory curriculum. This information can be implemented via short abdominal and stretching exercises like Chris Fisher uses with the Central Pennsylvania Youth Ballet Students. Other ideas for incorporating cross-training into the conservatory would include providing an educational Pilates

class for the older students one day per week. This class could be structured similarly to the program implemented at The Carver Center for Arts and Technology in Baltimore, Maryland. This course could provide young dancers with the basic history of Pilates, basic anatomy and physiology, and basic Pilates exercises which they could do both at the studio and at home. Improving the strength of the young dancers at the SC Dance Conservatory could only better the students. Through taking the initiative and making small changes within the conservatory program, the dancers would be well ahead of many other young dancers.

The information and research discussed in this paper provides the basic foundation for improvements within the university's dance department and the SC dance conservatory. The research clearly supports and identifies ways in which dancers can improve their technique, artistry, and overall fitness levels. While teachers can inform and teach dancers about cross training and the various forms in which dancers can partake, it is ultimately up to the dancer to push himself or herself to the next level. Dancers need to understand that their instruments need to be tuned and retuned from time to time. In order to keep up with their peers and prolong their careers, dancers should participate in various forms of cross training on a regular basis. These additional exercises will allow dancers to not only improve themselves personally, but together the field of ballet dance will continue to become even more athletic and powerful.

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